CLIMATE ADAPTATION AND SAFETY ELEMENT

PUBLIC REVIEW DRAFT

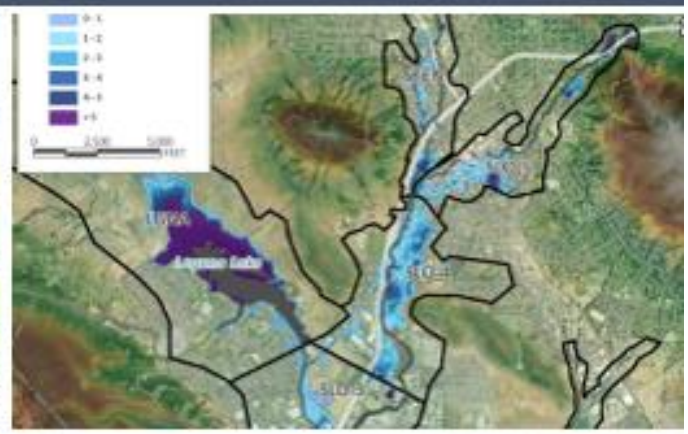
October 2022

City of San Luis Obispo
990 Palm Street
San Luis Obispo, CA 93401

City of San Luis Obispo

Climate Adaptation and Safety Element

2022



City of San Luis Obispo

Climate Adaptation and Safety Element

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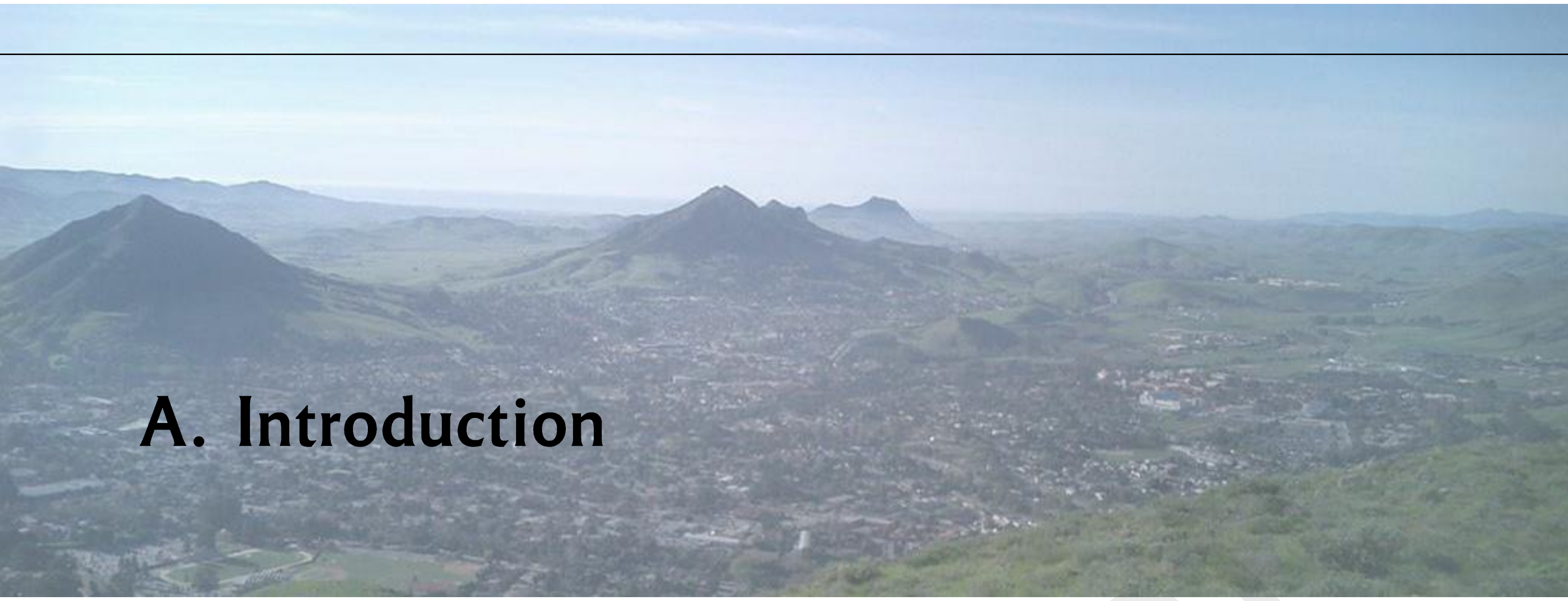


A. Introduction

The City of San Luis Obispo (City) is committed to protecting the community from natural and human-made hazards and building resilience to existing and projected climate change risks. The Climate Adaptation and Safety Element assesses the city's vulnerability to these hazards and establishes goals, policies, and implementation measures to protect people, property, and the natural environment. It is designed to realize an equitable, resilient community that thrives despite the changing climate and other known hazards, as articulated below in the Climate Adaptation and Safety Element's Vision.

CLIMATE ADAPTATION AND SAFETY ELEMENT VISION

The City of San Luis Obispo works diligently to protect all forms of life and property. While the changing climate has impacted us in expected and unexpected ways, the priorities identified by the community and our regional partners have shaped a San Luis Obispo that is thriving, equitable, and resilient. Community members, businesses, and neighborhoods support each other through climate disruptions, and civic life is stronger than ever. Critical facilities are resilient, incorporate innovative sustainability practices, and continue to provide core community functions in a cost-effective manner. San Luis Obispo's efforts also support environmental justice, and all community members have access to services and opportunities to influence the way we adapt to climate change. The world around us is impacted, but our natural resources and our built environments are designed to provide places of refuge and buffer against these disruptive forces. Climate change is one of the biggest challenges we have ever faced, but we have risen together to be safe, healthy, and prosperous.

PURPOSE

The Climate Adaptation and Safety Element serves as the City's Safety and Environmental Justice elements, which are required elements of general plans subject to the requirements of Government Code 65302(g)(h). Under state law, a safety element promotes protection for the community from unreasonable risks related to slope instability, seismic activity, subsidence, liquefaction, known geologic hazards, flooding, wildland and urban fires, tsunami, seiche, dam failure, and climate change. An environmental justice element addresses unique or compounded health risks in vulnerable and disadvantaged communities by decreasing pollution exposure, increasing community assets, and improving overall health.

The City is focusing on climate change adaptation in this Safety Element update because state law requires that safety elements include a vulnerability assessment that identifies the risks posed by climate change and a series of adaptation goals, policies, and implementation measures designed to protect the community (Senate Bill [SB] 379, 2015). The City's Hazard and Vulnerability Assessment is included in Appendix A. The City is also including climate adaptation due to the unprecedented disruptions that climate change will cause through and beyond General Plan buildout. Due to decades of rapidly increasing global greenhouse gas (GHG) emissions and insufficient climate action at all levels of government and industry, atmospheric GHG concentrations have reached a level that guarantees substantial and unavoidable impacts for the foreseeable future. California's recent historic heat, wildfires, droughts, floods, mudslides, and public safety power shutoffs represent the types of climate change impacts that will be experienced with increasing frequency and severity. These impacts threaten to make all the significant issues currently faced by the City (e.g., economic recovery, the housing crisis, homelessness, equity, sustainable water supply, etc.) more critical, challenging, and expensive. By centering climate change consideration in General Plan goals, policies, and programs now, the community can have sufficient capacity to thrive in the face of a rapidly changing future.

The City is focusing on the integration of environmental justice in this Safety Element update because as the state requires analysis of existing hazards and climate change impacts on the community related to existing and future hazards, climate change can further impact vulnerable and disadvantaged communities that already suffer from disproportionate environmental burdens and health risks. These communities would experience heightened risk and increased sensitivity to climate change due to having less capacity and fewer resources to cope with, adapt to, or recover from climate impacts (Office of Planning and Research, July 2020). Consideration of environmental justice in climate adaptation and safety planning provides an opportunity to improve resilience of the entire community over time, especially vulnerable and disadvantaged populations.

REGULATORY AND PLAN CONSISTENCY

The Climate Adaptation and Safety Element has been developed in compliance with State laws and regulations, consistent with other plans prepared or adopted by the City, including the San Luis Obispo County Multi-Jurisdiction Hazard Mitigation Plan (Hazard Mitigation Plan), Climate Action Plan for Community Recovery, and other elements of the City's adopted General Plan. A brief description of laws, regulations, and plans reviewed for consistency is provided below, with additional information provided in Appendix B (Compliance with Laws and Regulations).

Consistency with state laws and regulations

Key State laws informing preparation of the Climate Adaptation and Safety Element, including recent legislation related to planning for climate change adaptation and environmental justice, Include Senate Bill (SB) 379 (Climate Change and Resilience), SB 99 (Emergency Evacuation Routes), SB 1000 (Environmental Justice), Assembly Bill 747 (Emergency Evacuation Routes), the Alquist-Priolo Earthquake Faulting Zone Act, and the National Flood Insurance Program.

Consistency with City General Plan

To ensure that the goals, policies, and programs included in the Climate Adaptation and Safety Element are internally consistent with other elements of the City's General Plan a policy audit was conducted to identify any similar or overlapping goals, policies, and programs from other elements of the City's adopted General Plan, and other plans the City has adopted that support implementation of the General Plan. Based on this assessment, the City finds that the Climate Adaptation and Safety Element is consistent with the other elements of the General Plan.

Consistency with multi-jurisdictional Hazard Mitigation Plan

In June 2020, the City adopted the San Luis Obispo County Multi-Jurisdictional Hazard Mitigation Plan (Hazard Mitigation Plan) and accompanying city-specific Annex G: City of San Luis Obispo (Appendix C). The city-specific annex includes an assessment of natural and manmade hazards affecting the city and a comprehensive set of goals, objectives, strategies, and actions to mitigate potential impacts to life and property. It addresses the following medium and high significance hazards based on the potential impact which takes into account the geographic area, probability of future occurrences and magnitude/severity:

- Adverse Weather: Thunderstorm/Heavy Rain/Hail/Lighting/Dense Fog/Freeze
- Adverse Weather: High Wind/Tornado
- Agricultural Pest Infestation and Disease
- Biological Agents
- Drought and Water Storage
- Earthquake
- Flood
- Human Caused: Hazardous Materials
- Wildfire

The San Luis County Multi-jurisdiction Hazard Mitigation Plan is incorporated by reference into the Climate Adaptation and Safety Element

The Hazard Mitigation Plan was submitted to the Governor's Office of Emergency Services and Federal Emergency Management Agency (FEMA) for approval. By reviewing and updating the Hazard Mitigation Plan every 5 years, the City maintains eligibility for certain hazard mitigation funding from FEMA. The Hazard Mitigation Plan is incorporated by reference into the Climate Adaptation and Safety Element. The goals and policies of the Climate Adaptation and Safety Element are complementary to and consistent with the recommended mitigation strategy of the Hazard Mitigation Plan, which the City also will consult when addressing known hazards.

Consistency with the Climate Action Plan for Community Recovery

In August 2020, the City adopted the Climate Action Plan for Community Recovery. It establishes a community-wide goal of carbon neutrality by 2035 and a municipal operations goal of carbon neutrality by 2030, adopts sector specific emissions goals, and provides foundational actions to establish a trajectory towards achieving those goals. The plan recognizes the importance of reducing greenhouse gas (GHG) emissions to limit the amount of global warming that will occur and lessen the severity of future climate impacts, while also acknowledging that climatic changes have already been set into motion as a result of past, present, and future GHG emissions generated throughout the world. The Climate Adaptation and Safety Element illustrates the City's commitment to simultaneously addressing the causes and impacts of climate change.

B. Climate Adaptation and Safety Element Goals

ELEMENT STRUCTURE

The Climate Adaptation and Safety Element includes a set of broad goals for various aspects of the city derived from broad public outreach summarized in Appendix D. To provide a holistic approach, the goals focus on desired future conditions for key physical, natural, and social systems needed to achieve community safety and resilience. To facilitate ease of reference, this Element is organized into sections based on major hazards present in the city. These sections include a discussion of the hazard, how climate change is projected to influence the hazard (where relevant), and a comprehensive set of policies and programs to help achieve the goals. A brief definition of goal, policy, and program is provided below.

Goal - A statement that describes in general terms a desired future condition or “end” state. A goal serves to set a general direction.

Policy – A statement that guides a specific course of action for decision-makers to use to achieve a desired goal.

Program – An action, procedure, program, or technique that carries out a policy.

The Climate Adaptation and Safety Element is also supplemented by a series of appendices which provide additional information that was used to develop this Element.

CLIMATE ADAPTATION AND SAFETY ELEMENT GOALS

The Climate Adaptation and Safety Element has six goals, each of which contributes to achieving the vision presented in Chapter One. The six goals are as follows:

Goal 1: PUBLIC SAFETY

Minimize injury and loss of life, damage to public and private property, and social and economic disruptions resulting from injury, death, and property damage.

GOAL 2: COMMUNITY RESILIENCE

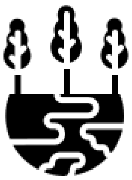
All community members are enabled and empowered to prepare for, respond to and recover from disruptions while seizing opportunities to thrive in changing conditions.

GOAL 3: CITY GOVERNMENT RESILIENCE

The City's facilities, infrastructure, and operations are resilient, innovative, and continue to cost-effectively provide core functions and services for all community members in times of acute disaster and ongoing disruptions.

GOAL 4: ENVIRONMENTAL JUSTICE

A diverse, equitable, and healthy community where those who are disproportionately affected by natural hazards and climate change have the resources and capacity to participate in public processes and have an active role in preparing and responding to future impacts.



GOAL 5: NATURAL SYSTEMS

The natural environment sustains and supports ecological and community health, safety, and natural beauty, provides equitable access to nature, and can adapt and keep pace with a dynamic, changing climate.

GOAL 6: BUILT ENVIRONMENT

Community buildings, public spaces and transportation systems withstand the natural hazards and escalating impacts of climate change, provide places of refuge, foster social cohesiveness, minimize injury and loss of life, and equitably protect personal and community assets.

C. Policies and Programs

1. High Impact Multi-Hazard Resilience

OVERVIEW

In the coming decades San Luis Obispo will experience more fires, floods, droughts, and extreme heat than ever before. Throughout the development of this plan, the community has called for bold, just, and proactive measures that build resilience amid increasing climate hazards (Baseline Conditions Report, Appendix E). While some of the resilience solutions presented in the Climate Adaptation and Safety Element will help our community adapt to a specific hazard, this chapter identifies strategic actions wherein a singular change in City policy or practice can co-solve for multiple climate hazards simultaneously. This chapter's cross-cutting policies and programs represent the highest leverage actions available to the City, which can broadly improve the community's ability to endure and recover from a range of disturbances.

Public infrastructure, private development, and natural resources are all subject to a confluence of natural and manmade hazards that can threaten human life and safety. The high-impact multi-hazard resilience solutions presented in this chapter offer clear points of intervention that boost community resilience amidst the unpredictable and compounding threat of fires, floods, earthquakes, and droughts facing San Luis Obispo.

This chapter also includes actions that boost social cohesion, connectedness, and community solidarity – as social cohesion is one of the strongest indicators of resilience during disaster events and post-disaster recovery efforts (Townshend et al. 2015). Alongside the steps the City and partner agencies are taking, it is important to recognize the role community organizations and informal social networks can play in building adaptive capacity to the impacts of climate change, especially for vulnerable populations.

MULTI-HAZARD RESILIENCE POLICIES

Policy MH-1.1: CLIMATE ADAPTATION AND SAFETY ELEMENT POLICIES

The policies and programs included in the Climate Adaptation and Safety Element are critical to maintaining community safety and to supporting disaster preparedness.

Policy MH-1.2: CLIMATE-INFORMED CAPITAL IMPROVEMENT PROGRAM, ENGINEERING STANDARDS AND NATURAL RESOURCES MANAGEMENT

The City shall incorporate climate projection data, risk modeling, and adaptive management, as appropriate, to account for future changes in key climate variables (e.g., changes in precipitation and flooding behavior, fire and smoke risk, maximum daily temperatures) in the City's Capital Improvement Program, Engineering Specifications and Standards, and natural resource projects and planning documents.

Policy MH-1.3: POST-DISASTER RECOVERY RESOURCES

The City shall expand equitable access to post-disaster recovery resources for residents and businesses (e.g., recovery funding, recovery services) including debris management.

Policy MH-1.4: REGIONAL COLLABORATION FOR CLIMATE ADAPTATION

The City shall integrate regional collaboration as a key component of the City's climate adaptation planning strategy, recognizing the regional nature of climate impacts and climate adaptation strategies.

MULTI-HAZARD RESILIENCE PROGRAMS

Program MH-1.5: UPDATE THE CITY'S CAPITAL IMPROVEMENT PROGRAM TO INCORPORATE CLIMATE PROJECTIONS

Assess existing infrastructure systems vulnerable to changes in key climate variables (e.g., flooding, extreme heat) and incorporate upgrades to critical infrastructure in the City's Capital Improvement Projects (CIP) planning process. Identify key pieces of existing infrastructure that are likely to be compromised by climate impacts and prioritize these upgrades as part of the City CIP process. Use data from the Climate Change Hazards and Vulnerabilities Report, the Cal-Adapt tool, and supplemental climate projection data and research to inform an appropriate list of infrastructure upgrades.

Program MH-1.6: UPDATE CITY'S ENGINEERING STANDARDS AND SPECIFICATIONS TO INCORPORATE CLIMATE PROJECTIONS

The City shall evaluate and update the City's building and engineering standards and specification to account for future changes in key climate variables (e.g., changes in the size of large storm events, maximum daily temperatures) that are likely to affect critical infrastructure. Use data from the Climate Change Hazards and Vulnerabilities Report, the Cal-Adapt tool, and supplemental climate projection data and research to inform the updates to the City's standards update process. Use a climate-informed adaptive management approach to continually monitor the performance of the updated building and engineering standards against the observed changes in climate variables, adjusting standards as need to match future changes in these variables caused by climate change.

Program MH-1.7: CLIMATE SMART NATURAL RESOURCE MANAGEMENT

The City shall integrate climate projections and adaptation projects (e.g., clearing or removal of dead material and replanting with more resilient shrubs and trees) regarding changes in average temperatures, extreme heat, flooding, fire, drought, etc. into updates of the City's natural resource planning documents as they occur, including, but not limited to:

- Open Space Conservation Plans
- Conservation Guidelines for Open Space Lands of the City of San Luis Obispo
- Waterway Management Plan.

Program MH-1.8: CLIMATE RESILIENCE HUBS

Work with community organizations, faith-based organizations, and other institutions to develop a network of conveniently located Climate Resilience Hubs including a mix of public facilities, community centers, businesses, and community-oriented facilities (e.g., churches, synagogues, mosques). Ensure the chosen facilities are equipped to provide aid to vulnerable populations during other emergency events such as periods of poor air quality from wildfire smoke, utility disruptions, flooding events, or other climate-related hazards (CDC n.d.). Ensure the Climate Resilience Center is centrally located and accessible.

Program MH-1.9: POST-DISASTER RECOVERY DEBRIS MANAGEMENT

Prepare and update solid waste agreement(s) addressing post disaster debris management activities including clearing, collection, removal, and disposal.

Program MH-1.10: POST-DISASTER RECOVERY RESOURCES AND EDUCATION

Work with community organizations, the San Luis Obispo County Office of Emergency Services, and other key stakeholders to: 1)assess effectiveness in post-disaster recovery efforts including establishing metrics to ensure that post-disaster recovery resources are allocated equitably; 2) Assess potential barriers for rehabilitation and rebuilding in post-disaster situations and develop protocols to remove barriers; and 3) educate individuals and households about strategies to increase preparedness for emergency events and climate-related impacts. Use information from the City's Hazards and Vulnerabilities Report (Appendix A) to identify areas in the City with vulnerable populations (e.g., linguistically isolated households, elderly, youth, homeless, individuals with chronic health conditions) to conduct targeted outreach to these neighborhoods and areas in the City. Strategies could include:

- Creating emergency kits emergency supply kits for homes, cars, and at work locations
- Creating personal emergency funds for short- and long-term emergency events
- Implementing household hazard mitigation projects such as defensible space, home hardening, earthquake retrofitting, and home insulating to improve ability to inhabit home during and post emergency event or climate-related impact.
- Information on mental health and support services for post-disaster recovery

Program MH-1.11: REGIONAL COLLABORATION AND COMMUNITY RESILIENCE AMBASSADORS

Develop consistent communications and participate with key community partners including: 1) communicate and provide updates on adaptation strategy implementation to the general public and key partners including San Luis Obispo County, other incorporated cities in the County, and community organizations; 2) continue the City's active participation in the Central Coast Climate Collaborative (4C) by sharing lessons learned, strategy collaboration opportunities, and regionally relevant data included in the Climate Change Hazards and Vulnerabilities Report (Appendix A); 3) identify members of the City's Green Team to serve as city liaisons for regional adaptation-focused organizations and key regional climate adaptation planning efforts; 4) work with community organizations and other institutions to establish a network of Community Resilience Ambassadors who can support outreach efforts, educate residents on climate preparedness, and connect residents to existing resources and organizations.

2. Equity and Environmental Justice

OVERVIEW

The City is committed to integrating diversity, equity, and inclusion in its operations and delivery of community services. The intersection of equity, environmental justice, and public safety is particularly important as the impacts of climate change will inequitably affect vulnerable and disadvantaged communities.

The policies and programs in the Climate Adaptation and Safety Element integrate equity considerations listed in Table 1, which derive from the State's Adaptation Planning Guide (Cal OES 2020) and align with the equity commitments made in the Climate Action Plan for Community Recovery (City of San Luis Obispo 2021). In addition to having equity as a lens through the entire Element, this Chapter provides policies and programs focused specifically on equity and environmental justice.

Table 1 Types of Equity in Climate Adaptation and Public Safety Planning

Type Of Equity	Equity Metrics
Procedural Equity	Create processes that are transparent, fair, and inclusive in developing and implementing any program, plan, or policy. Ensure that all people are treated openly and fairly. Increase the civic engagement opportunities of communities that are disproportionately impacted by climate change.
Distributional Equity	Fairly distribute resources, benefits, and burdens. Prioritize resources for communities that experience the greatest inequities and most disproportionate impacts and have the greatest unmet needs.
Structural Equity	Make a commitment to correct past harms and prevent future unintended consequences. Address the underlying structural and institutional systems that are the root causes of social and racial inequities. Include adaptation strategies to eliminate poverty, create workforce development, address racism, increase civic participation, protect housing availability, increase education, and provide healthcare.

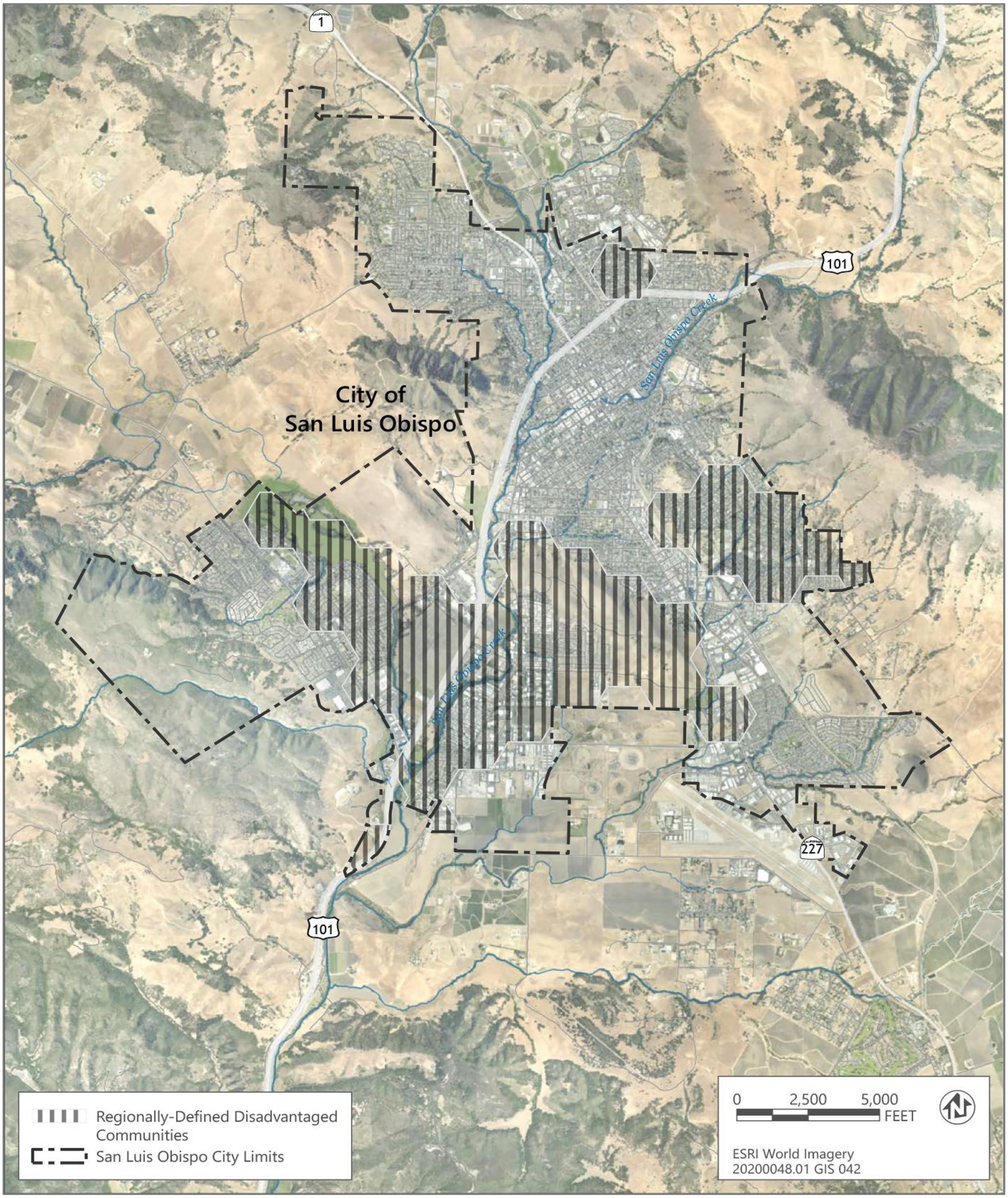
Source: Cal OES 2019.

DISADVANTAGED COMMUNITIES IN SAN LUIS OBISPO

The San Luis Obispo Council of Governments (SLOCOG) has defined disadvantaged communities as disproportionately burdened areas in the region that are economically distressed and/or historically underrepresented as a part of the local government process. The Disadvantaged Communities Assessment identifies 13 variables that address a wide range of socioeconomic and population-based factors to geographically define these disproportionately burdened areas. Figure 1 below includes the locations of the Regionally Defined Disadvantaged Communities identified in the city. For a more detailed discussion of environmental justice including survey summary and disadvantaged communities in the city, see Appendix F-1 and F-2 and the Hazards and Vulnerabilities Report (Appendix A).

Example: Utility Relief program increases household resiliency

The City offers water and sewer bill relieve programs for qualifying customers, which are required by California Proposition 218 to be funded outside of revenues generated by rate payers (i.e., water and sewer customers). The City's Customer Assistance Program provides a 15 percent discount on monthly water and sewer bills for qualifying customers. The City also shares information with the community regarding other local, state, and federal programs that may not be affiliated with the City, but that can offer financial assistance with utility bills.



Source 1: Data received from SLOCOG in 2021 and from CBEC Engineering in 2020 and downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020.

Draft Figure 1: Regionally Defined Disadvantaged Communities in the City of San Luis Obispo.

EQUITY AND ENVIRONMENTAL JUSTICE POLICIES

Beyond the items listed below, environmental justice related policies and programs are integrated throughout the safety element.

Policy EJ-2.1: EQUITY AND JUSTICE IN ALL POLICIES AND PROGRAMS

The City shall ensure that the implementation of the Climate Adaptation and Safety Element prioritizes equity and justice and addresses the community's greatest needs, including the needs of persons living in poverty, older adults, children, persons with disabilities, people of color, and immigrants.

Policy EJ-2.2: EQUITABLE CIVIC ENGAGEMENT

The City shall support an equitable and comprehensive approach to civic engagement and public outreach on all aspects of City governance and delivery of services.

EQUITY AND ENVIRONMENTAL JUSTICE PROGRAMS

Program EJ-2.3: EMPOWER COMMUNITY ORGANIZATIONS

Identify key community organizations working with underserved and historically disadvantaged communities and ensure these organizations and representatives from historically disadvantaged communities play a substantive role in implementing the Climate Adaptation and Safety Element.

Program EJ-2.4: ENSURE PUBLIC ENGAGEMENT NOTICING MANUAL ADVANCES PROCEDURAL EQUITY

Maintain the Public Engagement Noticing Manual (PEN Manual) as the guiding framework for all departments to participate in meaningful two-way communication with the public on all aspects of County governance and delivery of services. Community outreach and education opportunities should include multi-lingual options for both written materials and in-person engagement. The events should also include demographic surveys as part of community outreach events to ensure that participants are representative of the demographic makeup (e.g., race, age, ethnicity) of the city's population as a whole. The City shall provide opportunities for community organizations and other stakeholders to review strategy details before implementation.

Program EJ-2.5: DEVELOP EQUITY CHECKLIST FOR CITY PROGRAMS AND CAPITAL IMPROVEMENT PROJECTS

Use equity metrics included in the State's Adaptation Planning Guide, or similar metrics, to develop an Equity and Environmental Justice Project Checklist to be used during the design and development of City-led programs and capital improvement projects to ensure they are implemented equitably and, where appropriate, historically disadvantaged communities are prioritized in receiving the benefits of the project.

Program EJ-2.6: ESTABLISH COMMUNITY RESILIENCE FUND

Develop funding mechanisms through the State's Integrated Climate and Resiliency Program and develop criteria to administer a Community Resilience Fund that provides grants to individuals or community organizations to implement projects that support social cohesion as it relates to public safety, climate change impacts, and disaster recovery. Criteria would be developed to evaluate applications and prioritize the allocation of funding to projects that focus on protecting the most vulnerable populations (i.e., low-income, minority, or elderly populations).

PROGRAM EJ-2.7: REPORT ON EQUITY AND ENVIRONMENTAL JUSTICE PROGRESS

Include "Equity and Environmental Justice" as a category for reporting in the General Plan Annual Report.

3. Flooding

OVERVIEW

This chapter provides an overview of flood risk in the city and includes a comprehensive set of policies and programs to mitigate flooding impacts and recover from flooding events when they occur.

The City has adopted floodplain management regulations in Chapter 17.78 in the San Luis Obispo Municipal Code that are approved by FEMA that are included by reference into the Climate Adaptation and Safety Element (Appendix H).

FLOODING CHARACTERISTICS

Floods occur when the amount of water within a creek or river channel exceeds the channel capacity, causing water to spill over the banks and into the surrounding land. In these flat, flood-prone areas beyond the channel, called floodplains, slow moving or stagnant water that escapes the channel may remain until water levels within the channels recede or the areas are drained by infrastructure, percolation, or evapotranspiration.

Naturally, these floodplain areas would have been flooded every few years, but as the city developed onto portions of the floodplains of the creeks within the San Luis Obispo Creek watershed, channel incision and flood protection measures constrained flows to the creeks. During periods of intense rainfall, however, the watershed outflow, including urban runoff, can exceed the capacity of the channels. Under existing conditions, different creeks within the watershed may experience flooding every 10–25 years (Questa Engineering Corporation 2003).

There are several overall mechanisms by which flooding can occur:

- dam inundation flooding, in which impounded water is released because of dam breaching;
- localized flooding, which occurs when intense rainfall overwhelms the capacity of local drainage infrastructure; causing the ponding of water; and
- riverine flooding, which occurs when channels (i.e., the relatively deep, narrow sections of creeks and rivers) cannot contain the flow volume moving through them, causing water to spill out into the overbank areas (i.e., the relatively wide, flat regions on one or both sides of the channel, also called “floodplains”).

According to the Annex G of the County’s HMP, the city is not at risk of dam inundation flooding, as there are no major reservoirs within the watershed, and localized flooding is considered a minimal risk. The highest flooding concern for the city is riverine flooding, which may include “flash” flood risks (San Luis Obispo County 2019b).

SAN LUIS OBISPO CREEK WATERSHED

As shown in Figure 3, San Luis Obispo Creek flows through the city in a northeast to southwest direction, passing through the downtown area and generally following U.S. Highway 101 (U.S. 101) on its way to the Pacific Ocean at Avila Beach.

The watershed for San Luis Obispo Creek, the land area that captures rainfall and contributes water directly to the creek system, covers an area of approximately 84 square miles, ranging in elevation from approximately 2,460 feet in the upper watershed near the Cuesta Grade to its outlet into the Pacific Ocean. Along its main flow path, it transitions from steep canyons to the gently sloping alluvial plain underlying the city, descending more than 2,230 feet to downtown.

In the city’s downtown, San Luis Obispo Creek flows through the “under-city culvert,” consisting of a system of covered, constructed channels between Osos Street and Chorro Street before emerging into Mission Plaza.

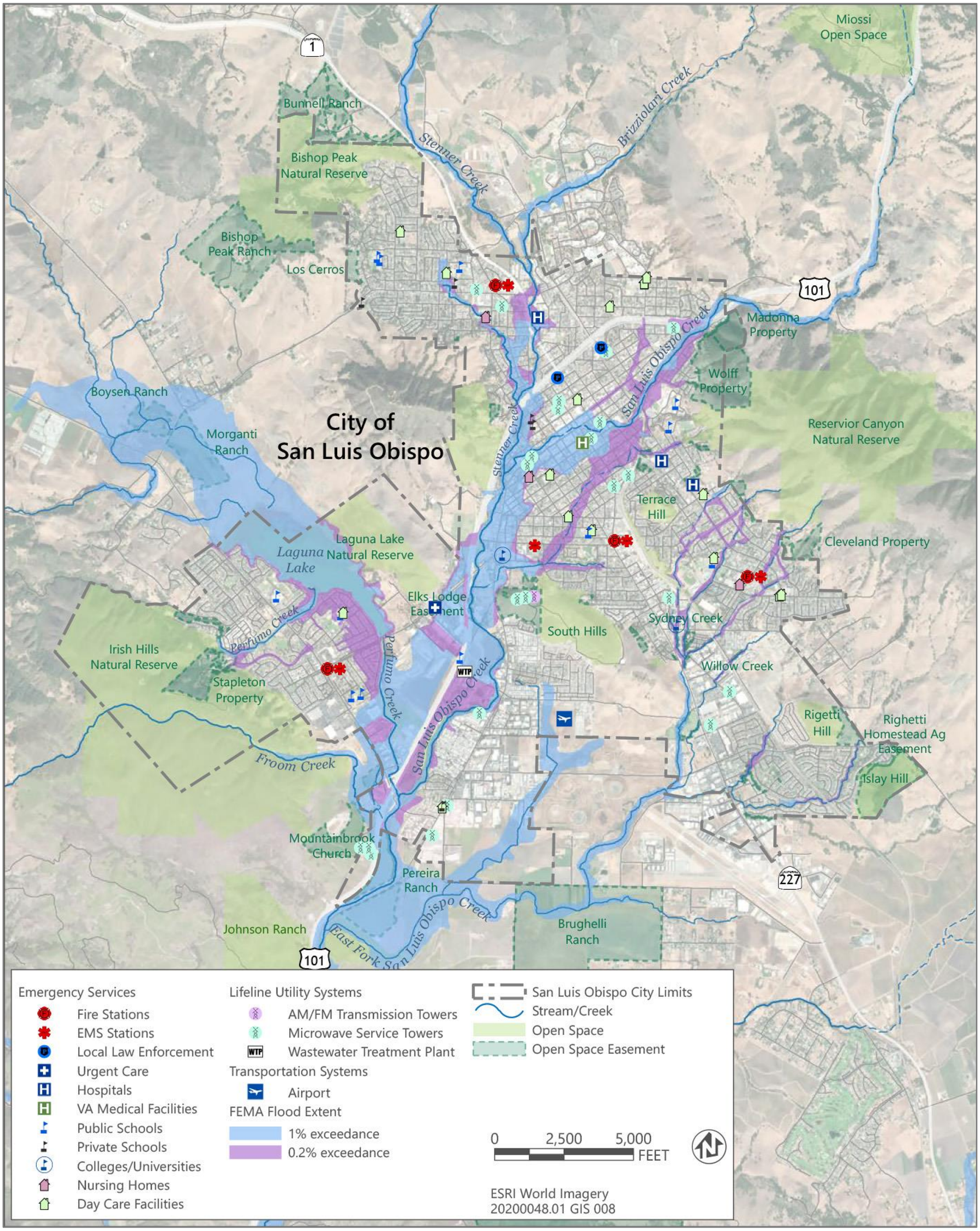
Flooding Definitions

Two interchangeable, technical terms that characterize flood frequency are used throughout the section and are defined as follows:

Recurrence Intervals: Refers to how often, on average, a given flood may occur. A 100-year event, for example, is described as an event that may occur about once in every 100 years, on average. However, this terminology can be misleading because flood events are statistical occurrences, and events may occur more frequently than their recurrence interval suggests.

Exceedance Probability: The exceedance probability of a given flood event is the percent chance that a larger flood will occur in any given year, and it is calculated by dividing the number 1 by the recurrence interval. Thus, the “100-year event” becomes the “1-percent exceedance event,” or a flow rate that has a 1-percent chance in any given year of being equaled or surpassed by a larger flow rate. This representation, although interchangeable with the recurrence interval, provides a more helpful way to think about flood risk.

Further downstream, near the intersection of Marsh Street and Higuera Street, San Luis Obispo Creek is joined by a major tributary, Stenner Creek, which in turn receives flow from Brizzolara and Old Garden Creeks. San Luis Obispo Creek then continues south along the alluvial plain, intercepting Prefumo Creek as it exits Laguna Lake and joining East Fork San Luis Obispo Creek near the Higuera Street/U.S. 101 interchange by the Johnson Ranch Open Space. Near the confluence of San Luis Obispo Creek with Davenport Creek, the channel enters “the Narrows” (Questa Engineering Corporation 2003), passing through a steep, confined canyon before being joined by San Miguelito Creek coming out of See Canyon and discharging to the Pacific Ocean. Flows in the watershed are “flashy,” meaning that water moves quickly through the system and that stream levels rise and recede rapidly in response to rainfall events. This is a result of the steep topography of the upper watershed and the relatively shallow soils, land cover, and rainfall characteristics for the region (Questa Engineering Corporation 2003).



Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020 and processed by cbec eco engineering in 2020.

Draft Figure 2 Waterways and Floodplain Areas in the City of San Luis Obispo with Critical Facilities

HISTORICAL FLOODING

The San Luis Obispo Creek watershed has a long history of flooding, with a series of storms over the last 50 years that have caused millions of dollars' worth of damage.[1] Damaging flood events have occurred in 1868–1872, 1884, 1897, 1911, 1948, 1952, 1962, 1969, 1973, 1995, 1998, and 2001 (Questa Engineering Corporation 2003; City of San Luis Obispo 2014).

Higuera Street, San Luis Obispo, January 1969 flood event.

The flooding events in January and March 1995 occurred during one of the wettest periods on record, causing the watershed to be relatively saturated for long periods, which prevented soils from absorbing incoming precipitation. The 1995 flooding events followed the 1994 Highway 41 fire, which burned major areas of the Stenner Creek and upper San Luis Obispo Creek watersheds and caused increased runoff and sediment delivery to channels. Flow spilled out of the San Luis Obispo Creek channel in the region around Marsh and Higuera Streets, causing extensive damage, and remained out of the creek banks for nearly 3 miles downstream. The events, for which the peak flow was estimated to be the 17-year flood event[2] (6-percent exceedance probability), caused $2.3 million in damage (Questa Engineering Corporation 2003).

Prior events were even more damaging: The 1969 flood caused $6.92 million in damage, and the 1973 flood caused $13.6 million in damage. During the 1973 flood, depths of inundation over U.S. 101 exceeded 4 feet near the Madonna Inn and were up to 3 feet near the Prefumo Creek confluence (Questa Engineering Corporation 2003).

FLOOD RISK

Following the 1973 flood, watershed studies and plans were developed and updated, including the 1974 U.S. Army Corps of Engineers floodplain study of San Luis Obispo Creek (USACE 1974), 1977 Nolte & Associates study (George S. Nolte & Associates 1977), and 1978 FEMA flood insurance study. The extent of 100-yr and 500-yr flood zones, based on these studies, is shown in Figure 3.

In 2003, the City's Waterway Management Plan (WMP) was completed, which relied on updated analyses for flow frequency. In general, the flow estimates provided by the WMP for a given recurrence interval are higher than those reported in the prior studies, leading to the

[1] Storm damages were normalized to reflect costs in the year 2000.

[2] According to the flood frequency analysis conducted for the 2003 Waterway Management Plan (Questa Engineering Corporation 2003), which represent updated flood frequency information compared to the Federal Emergency Management Agency study (1978).

recommendation that the WMP be used for design considerations for projects in the city, as a conservative assumption, as well as the adoption of the updated flow frequency estimates by the City. According to the WMP, nearly all streams in the San Luis Obispo Creek watershed have less than a 25-year (4-percent exceedance probability) flood capacity, with some experiencing flooding in the 10- to 15-year range (Questa Engineering Corporation 2003).

FLOOD RISK FACTORS

For the San Luis Obispo Creek watershed, factors that may directly contribute to flooding are infrastructure-induced flow constrictions, wildfire, and degraded riparian corridors (Questa Engineering Corporation 2003). In terms of flooding from infrastructure, bridges often serve as flow constrictions because the abutments, or structures connecting the bridge deck to the ground, may occupy part of the floodplain for a channel in order to reduce the span width of the deck. In addition, bridge piers can intercept transported debris, particularly woody vegetation, and reduce conveyance through the structure.

Undercity Culvert

One of the greatest flow constrictions in the watershed is the undercity culvert. This flow rate is below the 25-year flood event (4-percent exceedance probability) according to FEMA flood insurance studies (FEMA 1978), indicating that the culvert is unable to manage water flow during the 25-year flood event. Flows exceeding the undercity culvert capacity may exit the channel at Osos Street or further upstream at the Santa Rosa or Marsh Street bridges and cause overland flooding within downtown, particularly along the Marsh Street corridor and areas surrounding the creek channel.

Post-Wildfire Runoff

Post-wildfire runoff represents another risk for flooding because burned areas in the watershed will contribute more runoff and higher sediment loads than vegetated areas. As previously mentioned, the 1995 floods, which caused approximately $2.3 million in damages, followed the 1994 Highway 41 fire and the loss of vegetation on hillslopes contributed to high runoff volumes. Overall, about one third of the San Luis Obispo Creek watershed is considered by the California Department of Forestry and Fire Protection (CAL FIRE) to be in Very High Fire Hazard Severity Zones, based on an analysis of publicly available GIS data (CAL FIRE 2020).

Degradation of the City's Riparian Corridors

The degradation of riparian corridors, the thin strips of trees and other vegetation lining the creeks, may contribute to flooding within the San Luis Obispo Creek watershed. Historically, riparian zones would have been composed of tall, single-trunk sycamores, cottonwoods, and willows, but these areas are now characterized by shrubby willow growth (Questa Engineering Corporation 2003). This results in more low-hanging branches coming into contact with flowing water, which increases the roughness of the creek channels and consequently reduces flow velocities. When the water is slowed, water levels in the channel are increased and overflow into surrounding lands becomes more likely.

The conversion of land to impervious surfaces as a result of urban development, known generally as "urbanization" has indirectly affected flood risk by altering the shape and function of the creek channels within the watershed. Overall, the San Luis Obispo Creek watershed is about 10 percent urbanized, meaning that 10 percent of the land area within the basin[3] that drains to the outlet of

[3] Basin, or drainage basin, is another term for watershed.

San Luis Obispo Creek at Avila Beach is covered by urban development. However, when considering only the portion of the watershed upstream of Los Osos Valley Road, the drainage basin is 15 percent urbanized (Questa Engineering Corporation 2003). Conversion to impervious surfaces accompanying urban development results in higher runoff rates because rainfall cannot be absorbed by the underlying soil from these surfaces. This causes water to enter the creek channels more quickly and leads to higher flow volumes and faster channel velocities on a more frequent basis. The City has adopted post construction stormwater regulations that include provisions for the upgrade of existing developed sites upon redevelopment to improve historic watershed processes through retention.

For periods of sustained, heavy rainfall, the watershed soils may be highly saturated at the time of peak rainfall and the watershed may therefore, have a limited ability to absorb the incoming precipitation, even if the impervious surfaces had not been in place. Impacts from additional urbanization of the San Luis Obispo Creek watershed will need to be determined, as a result of build-out according to the general plans for the City, County, and the California Polytechnic State University at San Luis Obispo (Cal Poly).

In addition to urbanization, there are other causes of riparian corridor degradation. The historic presence of small dams in the upper watershed (near Stagecoach Road, which has been removed, and the larger Reservoir Canyon facility) prevented large sediments (cobble and large gravels) from being transported downstream. Naturally, these eroded sediments would have continuously filled in the channels, but instead they became trapped behind the dams and filled in the small reservoirs. The creek channels continued to erode the underlying material, and with reduced incoming sediment to offset this erosion, the channels cut deeper into the landscape.

FLOOD MANAGEMENT CHALLENGES

Flood management continues to be a high priority for the City, but there are several important barriers that can make management more difficult. Much of the creek corridor that runs through the city along San Luis Obispo Creek and its tributaries is not owned by the City. Although the City has some authority under the City's Municipal Code for emergency removal of vegetation and other debris, general maintenance of the creeks falls upon the owners of property adjacent to the creek.

Additionally, the creek corridor is highly confined in areas, particularly through downtown, making projects such as channel widening infeasible. Following the 1973 flood, the George S. Nolte & Associates study, completed in 1977, identified proposed flood control projects, but few were adopted because of the environmental effects associated with channel widening and other alternatives (Questa Engineering Corporation 2003). Several areas of the city, including downtown areas along San Luis Obispo Creek, the intersection of U.S. 101 and Los Osos Valley Road, the Johnson Avenue railroad underpass, and areas surrounding Laguna Lake have been at a high risk for frequent flooding (City of San Luis Obispo 2011).

To address these issues, large projects have been proposed to manage flood risk in the increasingly urbanized city. One such proposed project is the Mid-Higuera Bypass Project, which would increase conveyance capacity of San Luis Obispo Creek between Marsh Street and Madonna Road. This area, downstream of the confluence of Stenner and San Luis Obispo Creeks, has flooded and received extensive damage in some of the historical floods previously mentioned. The planned removal of sediment and Arundo stands from San Luis Obispo Creek south of Los Osos Valley Road will also serve to reduce local flood risk.

CLIMATE-INFORMED FLOOD RISK MODELING

As part of the development of the Climate Adaptation and Safety Element, a climate-informed flood risk modeling exercise was conducted to understand how changes in precipitation caused by climate change are likely to affect the frequency and severity of large storm events (e.g., 100-year storm event) and how these changes would affect the city's existing flood plains. To read details on the full Flood Risk Modeling Methodology, see Section 2.6 in Appendix A (Hazards and Vulnerability Report).

Table 2 includes the modeling results for various size storm events in the San Luis Obispo Creek watershed for the long-term period (2070-2099) under a high emissions scenario.

Table 2 Climate-induced Changes in Peak Stream Flow for the San Luis Obispo Creek Watershed

Flood Event (Return Interval)	Percent chance of flood occurring in any given year	Percent increase in peak stream flow		
		90th Percentile	50th Percentile (median)	10th Percentile
500-Year	0.2%	122%	38%	4%
200-Year	0.5%	116%	38%	4%
100-Year	1%	110%	38%	4%
50-Year	2%	103%	37%	4%
20-Year	5%	93%	35%	3%
10-Year	10%	84%	33%	3%
5-Year	20%	73%	29%	3%
2-Year	50%	51%	28%	8%
1-Year	99%	64%	17%	-31%

Source: cbec eco engineering 2021. The late century (2070-2099), RCP 8.5 scenario was used to determine flood impacts.

As shown in Table 2, the 10th percentile results indicate an extremely dry scenario, which experiences decreases in flow for events with less than a 2-year recurrence interval, while the 90th percentile results represent an extremely wet future scenario and results in peak flows more than doubling for events that occur every 50 or more years. For flood events occurring more rarely than every 2 years, flows are expected to increase across all scenarios including the 10th percentile projection. Overall, the median projection represents the best available estimate at this time for the San Luis Obispo Creek watershed for how peak flows are likely to change if global GHG emissions maintain the high emissions scenario trajectory for the long-term period.

The climate-induced increases in flood magnitude are due to increases in precipitation intensity. As the atmosphere warms, its ability to hold water vapor increases. While total annual precipitation in different parts of the state is projected to increase, decrease, or stay the same depending on the location, the trend of increasing rainfall within shorter periods of time (increasing intensity) is projected to occur broadly (OPR et al. 2018a). In this way, even areas that may become drier and experience water scarcity as a result of climate change may also experience increased flood risk.

Based on California's location next to the Pacific Ocean, the state is exposed to the atmospheric river (AR) phenomenon, a narrow corridor of concentrated moisture in the atmosphere.

California is subject to precipitation from an AR that transports water vapor from as far south as Hawaii to the state. The presence of the AR contributes to the frequency of "wet years" in the state, when there is an above-average number of AR storms and above-average annual precipitation. Projected peak stream flow increases are also greater for larger (less frequent) flood events than for smaller ones, as a result of the watershed's diminishing ability to absorb increasingly high levels of rainfall. For example, following a long, dry summer, the land surface, soils, and vegetation will have a relatively high capacity to hold incoming rain and very little stream flow may be generated from a notable amount of rainfall. In the mid-winter months, after a series of precipitation events has passed through, the soils are relatively saturated and generate runoff more quickly. For very large precipitation events, the capacity of the watershed to absorb incoming rainfall can be quickly exceeded, causing large increases in stream flow within the system. For the median scenario, peak flow rates are projected to increase from 17 percent to 38 percent for events that occur every year to every 500 years, on average, as show in Table 2.

While research indicates that the frequency of large storm events do increase in these wet years, the most severe flooding from ARs may not be in wet years (Swain et al. 2018). The largest flooding impacts are caused by persistent storm sequences on sub-seasonal timescales (i.e., short time periods, typically 2 weeks to 3 months), which bring a significant fraction of annual average precipitation over a brief period. These storm events are similar to the Great Flood events of 1861–1862, which caused widespread damage throughout northern California (Swain et al. 2016). Based on current climate modeling, the frequency of these large storm sequences over short timeframes is projected to increase noticeably under the high emissions scenario. It is estimated that a storm similar in magnitude to the Great Flood events is more likely than not to occur at least once between 2018 and 2060 (Swain et al. 2018).

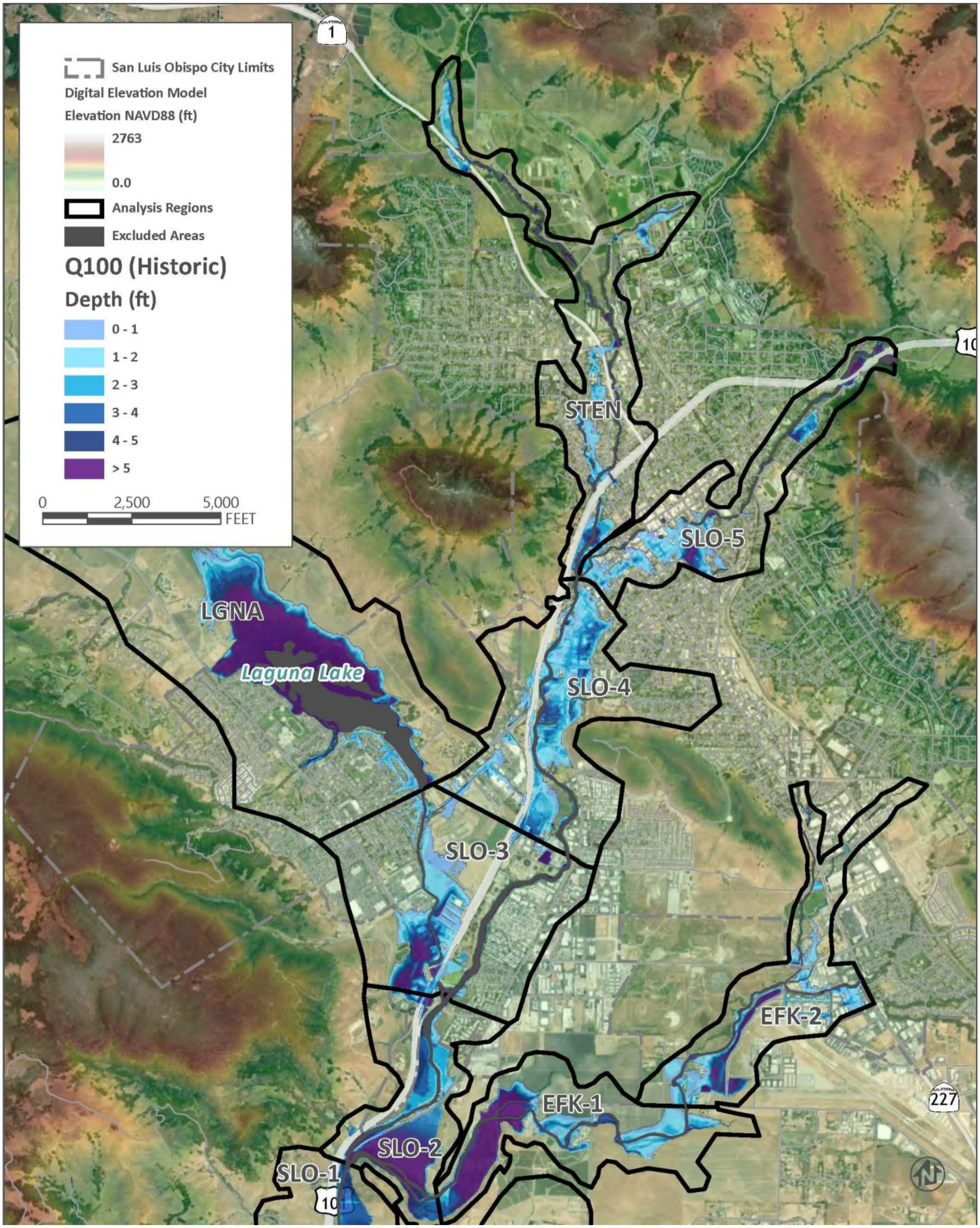
Although annual precipitation is anticipated to increase in the city and the larger central coast region, California's climate oscillates between extremely dry and extremely wet periods with annual precipitation varying widely from year to year. Climate change is anticipated to exacerbate these seasonal extremes with dry periods becoming dryer and wet periods becoming wetter (OPR et al. 2018b:19). As a result, the frequency and severity of large storm events are anticipated to increase as well. These oscillations between extremely dry and extremely wet periods, which have occurred historically in the state, are anticipated to become more severe with rapid shifts from dry to wet periods known as "whiplash events" (Swain et al. 2016). As Swain et al. note in their research, the recent 2012–2016 drought followed by the 2016–2017 flood events throughout the state serve as a good example of the type of whiplash events that will occur more frequently over the next century. These types of events are estimated to increase by approximately 100 percent in southern California, with increases in frequency occurring largely after 2050 (Swain et al. 2016).

FUTURE FLOOD MAPPING RESULTS

Based on hydraulic modeling discussed above, future floodplain maps were generated to understand how changes in precipitation for the 10-year, 50-year, and 100-year storm events would impact the city as shown in Figures 3 through 11. Additional modeling for the 10-year, 50-year, 100-year, and 500-year storm events are included in the appendix (Detailed Flood Mapping Results) of the Hazards and Vulnerabilities Report (Appendix A). Figures 4 through 12 show the generated depth maps for historic and future (long-term high emissions [RCP 8.5] scenario) conditions for the 10-year (Q10) and 100-year (Q100) events within the San Luis Obispo Creek – Stenner Creek and San Luis Obispo Creek – Prefumo Creek confluence areas. These figures provide an illustration of the future extent of flood plains in the San Luis Obispo Creek watershed.

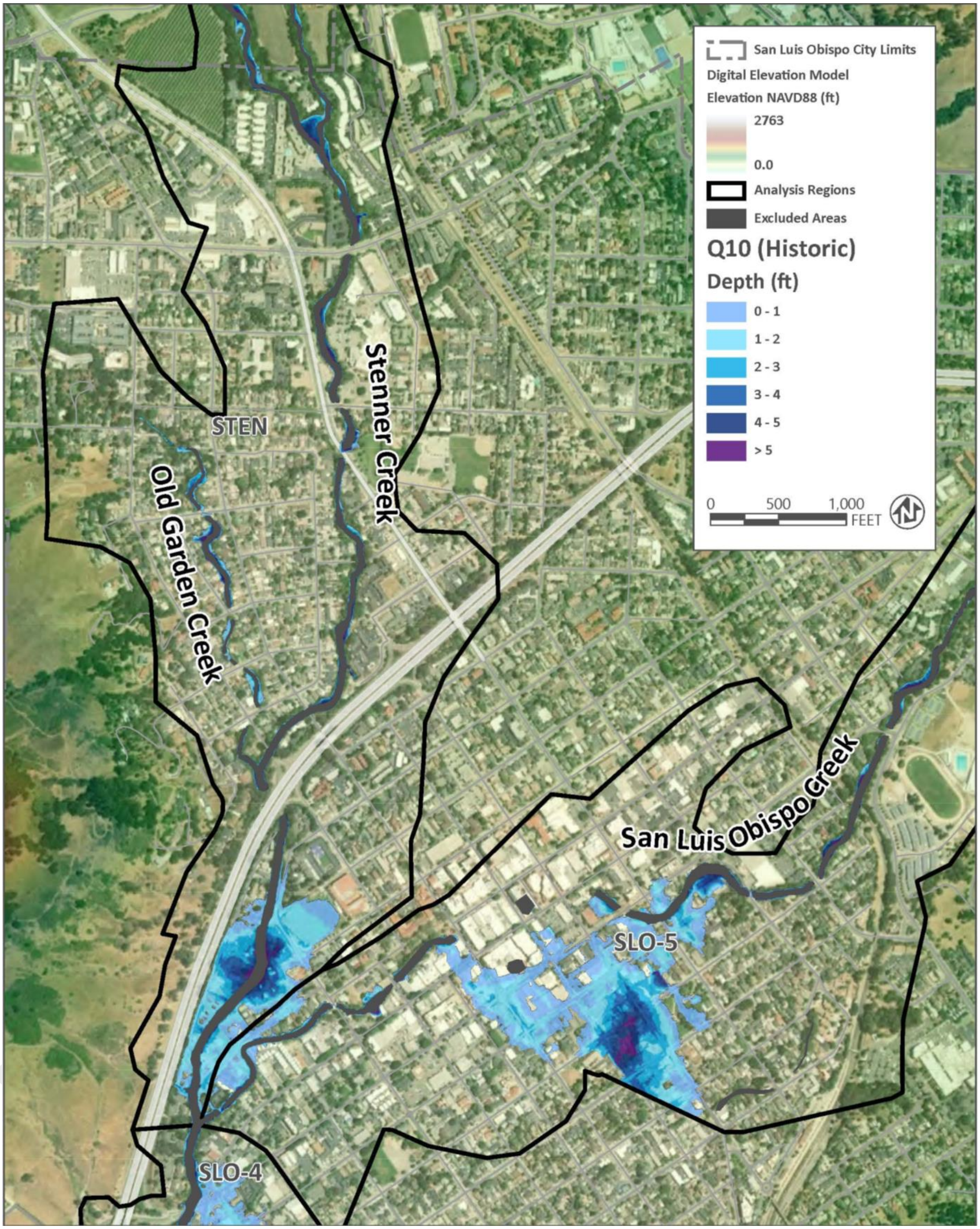
However, there are limitations preventing these maps from being used for more detailed or more absolute flood extent delineations for historic and future conditions. One main limitation is the reliance upon hydraulic models that are almost two decades old and do not cover all areas of the city as well as an uncertain range of possibilities for future precipitation and future global emissions trends during the late-century period. However, the mapping exercise is useful for indicating the locations and extents of relative flood impacts that may reasonably be expected to occur due to climate change under the late-century high emissions scenario.

To further understand relative flood impacts, the hydraulic model domain was divided into nine analysis regions where changes in inundated area in acres and average depth on the floodplain (ft) were compared between historic and future conditions for each flood event. To determine these statistics for floodplain areas, the regions within the creek channels and Laguna Lake were removed from the analysis.



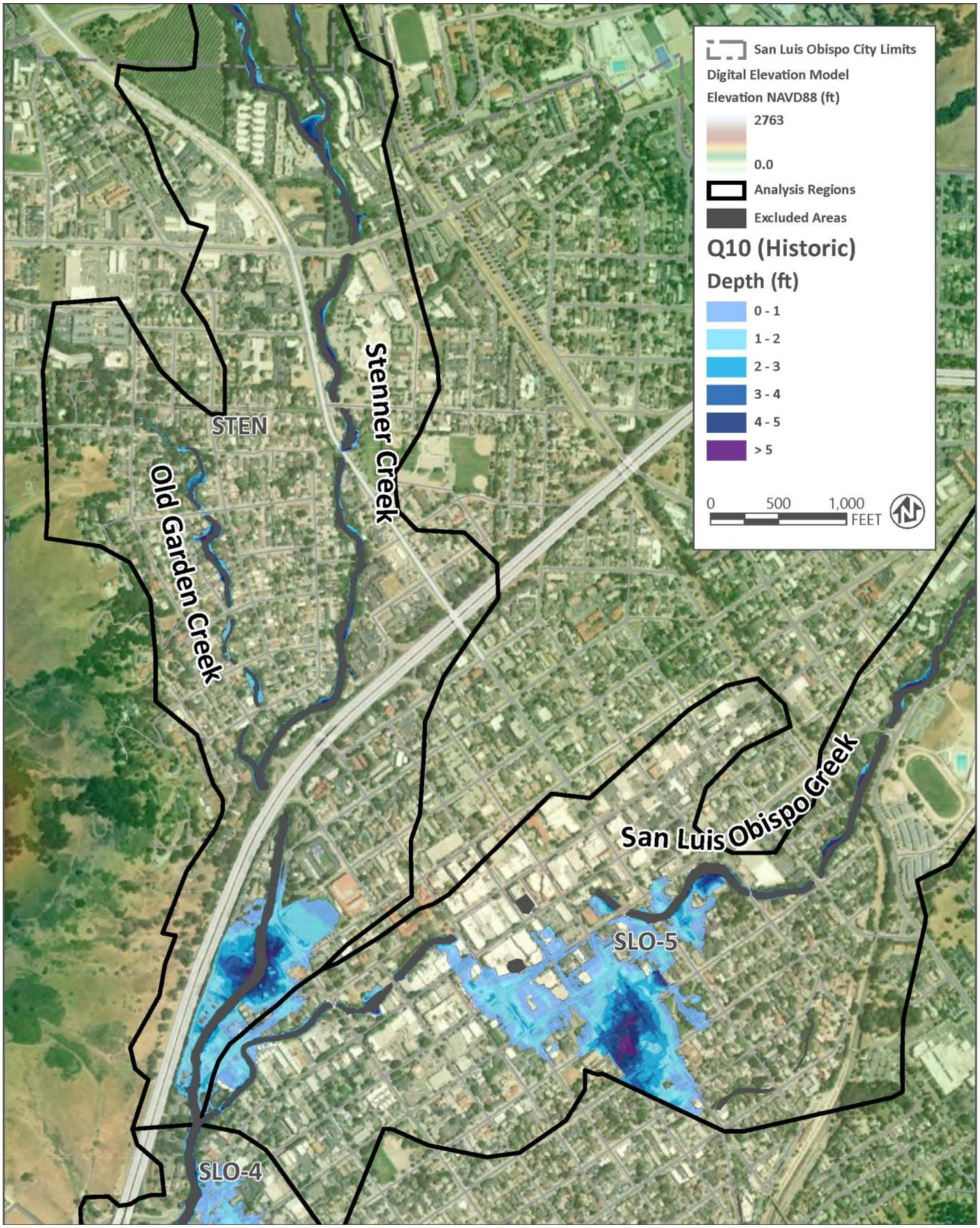
Source: cbec eco engineering 2021.

Draft Figure 3 Flood Depth: Full Extent - Q100 (Historic)



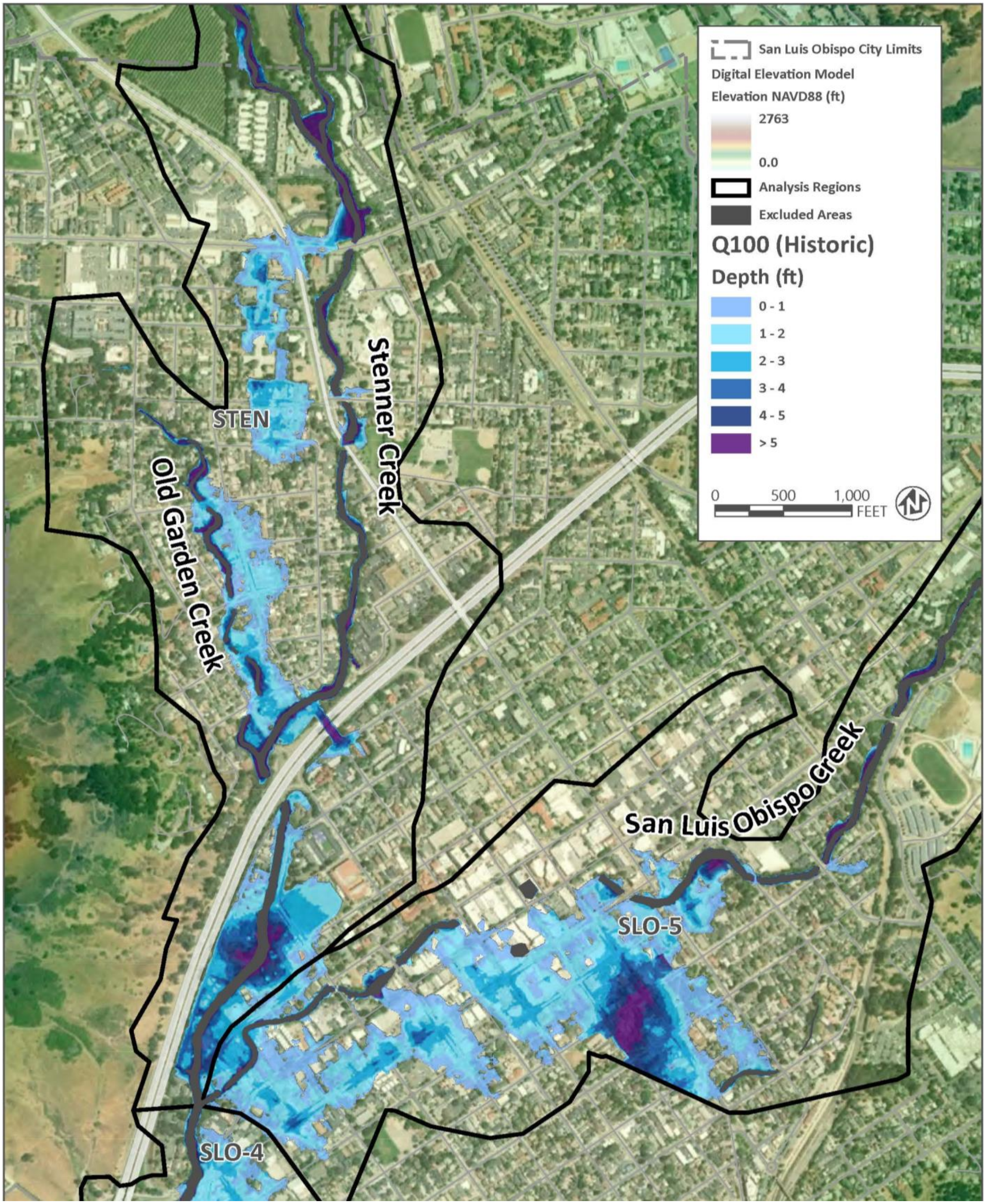
Source: cbec eco engineering 2021

Draft Figure 4 Flood Depth: SLO-Stenner - Q10 (Historic)



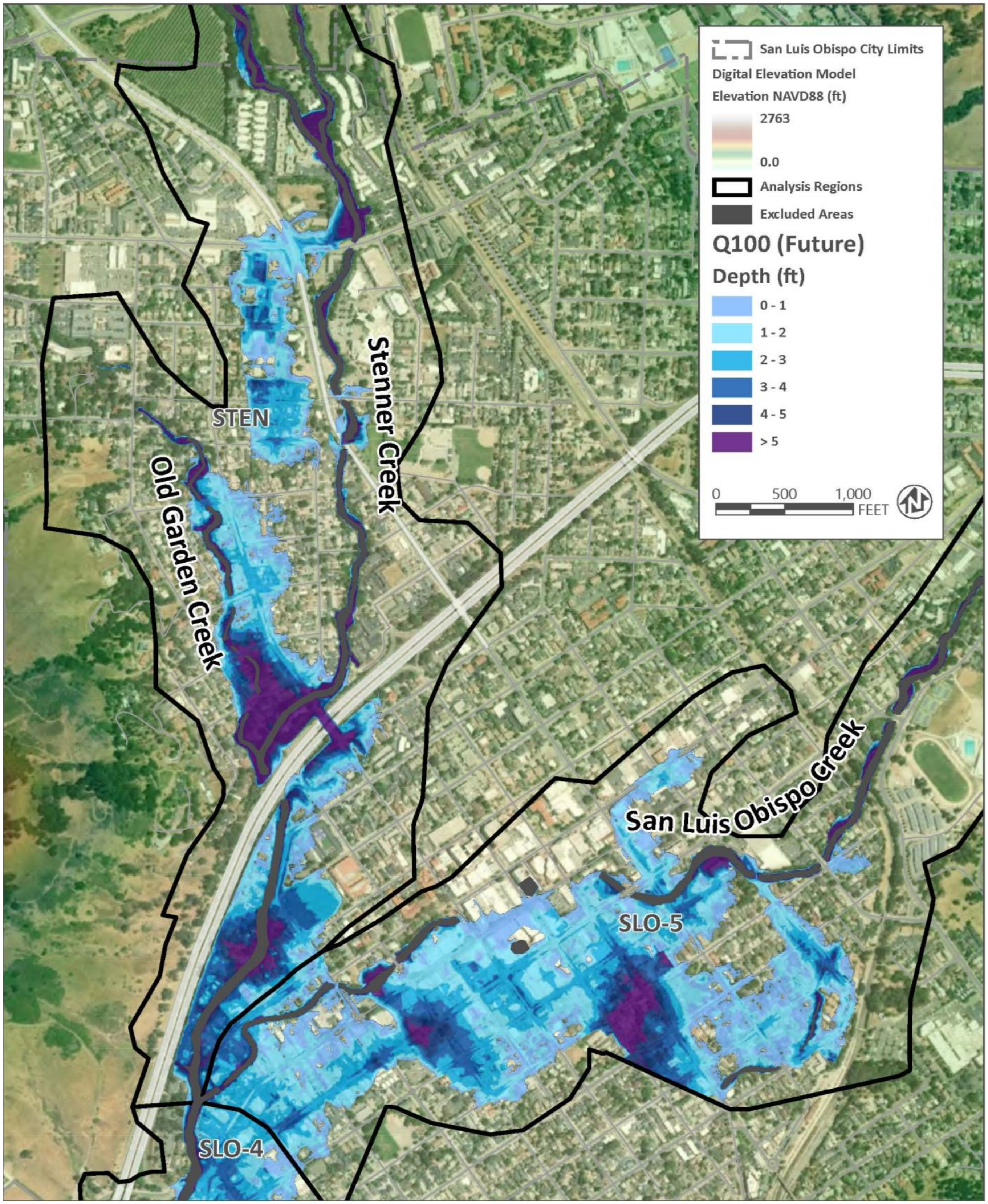
Source: cbec eco engineering 2021

Draft Figure 5 Flood Depth: SLO-Stenner - Q10 (Future 2070-2099 – RCP 8.5)



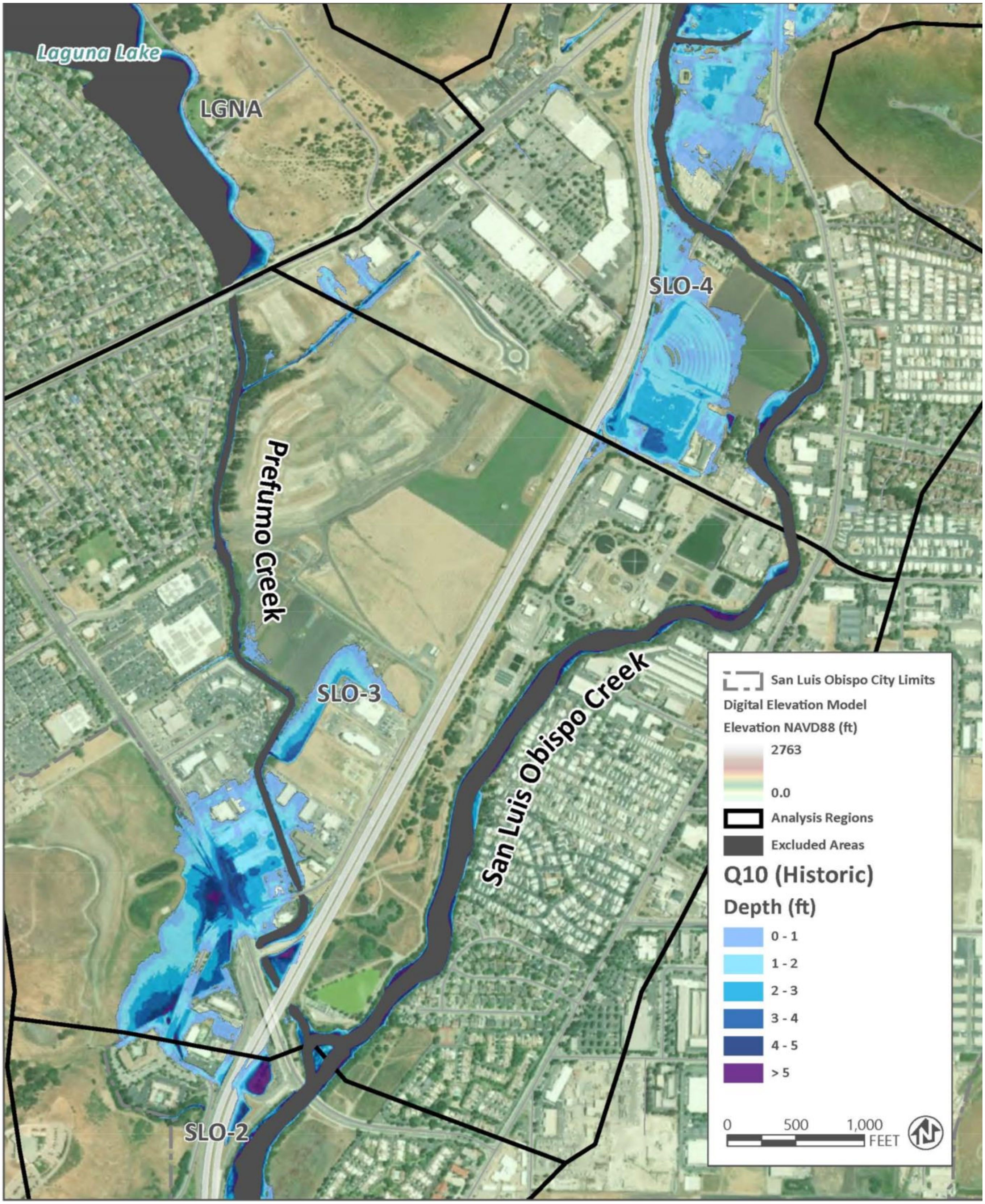
Source: cbec eco-engineering 2021.

Draft Figure 6 Flood Depth: SLO-Stenner - Q100 (Historic)



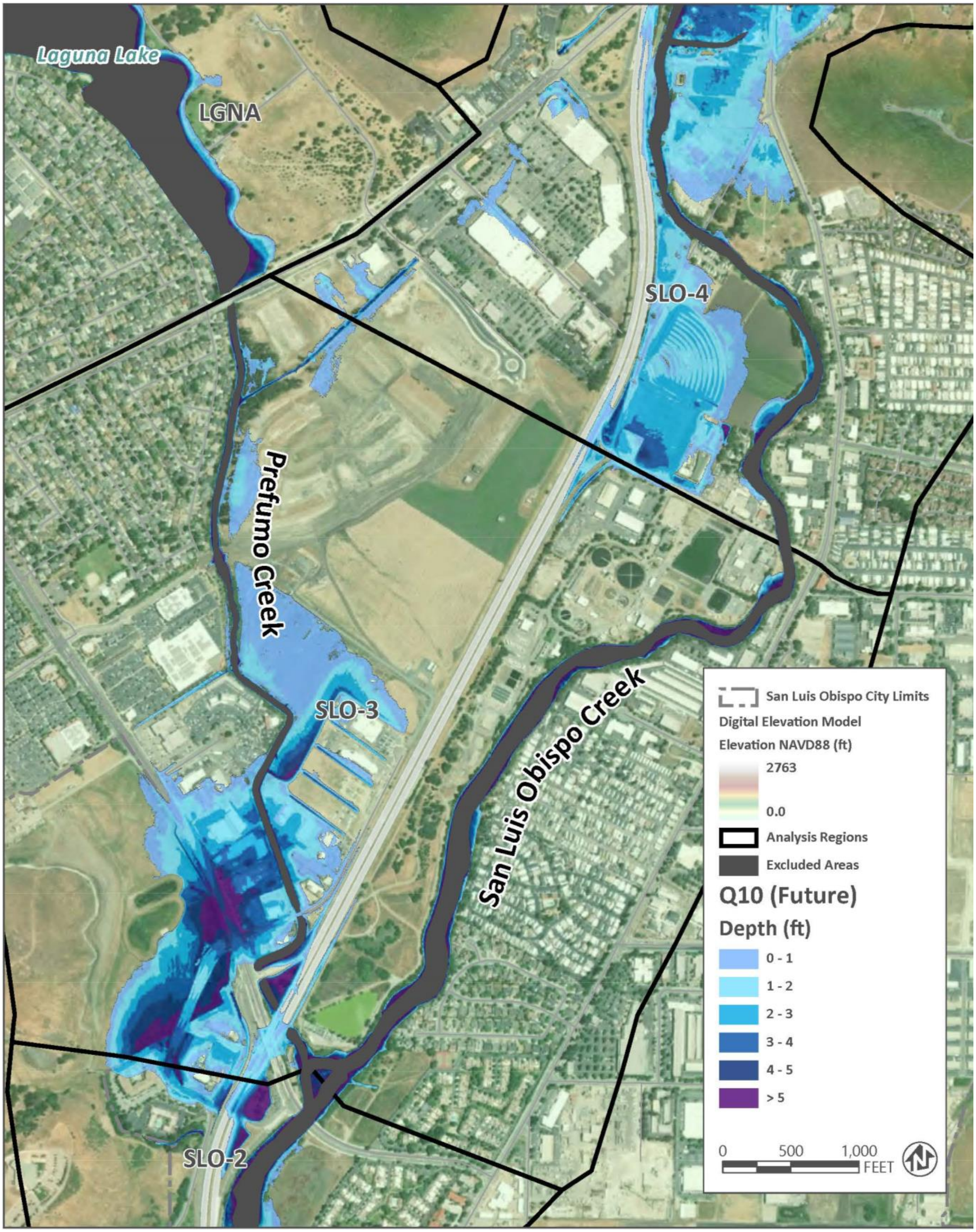
Source: cbec eco-engineering 2021.

Draft Figure 7 Flood Depth: SLO-Stenner - Q100 (Future 2070-2099 – RCP 8.5)



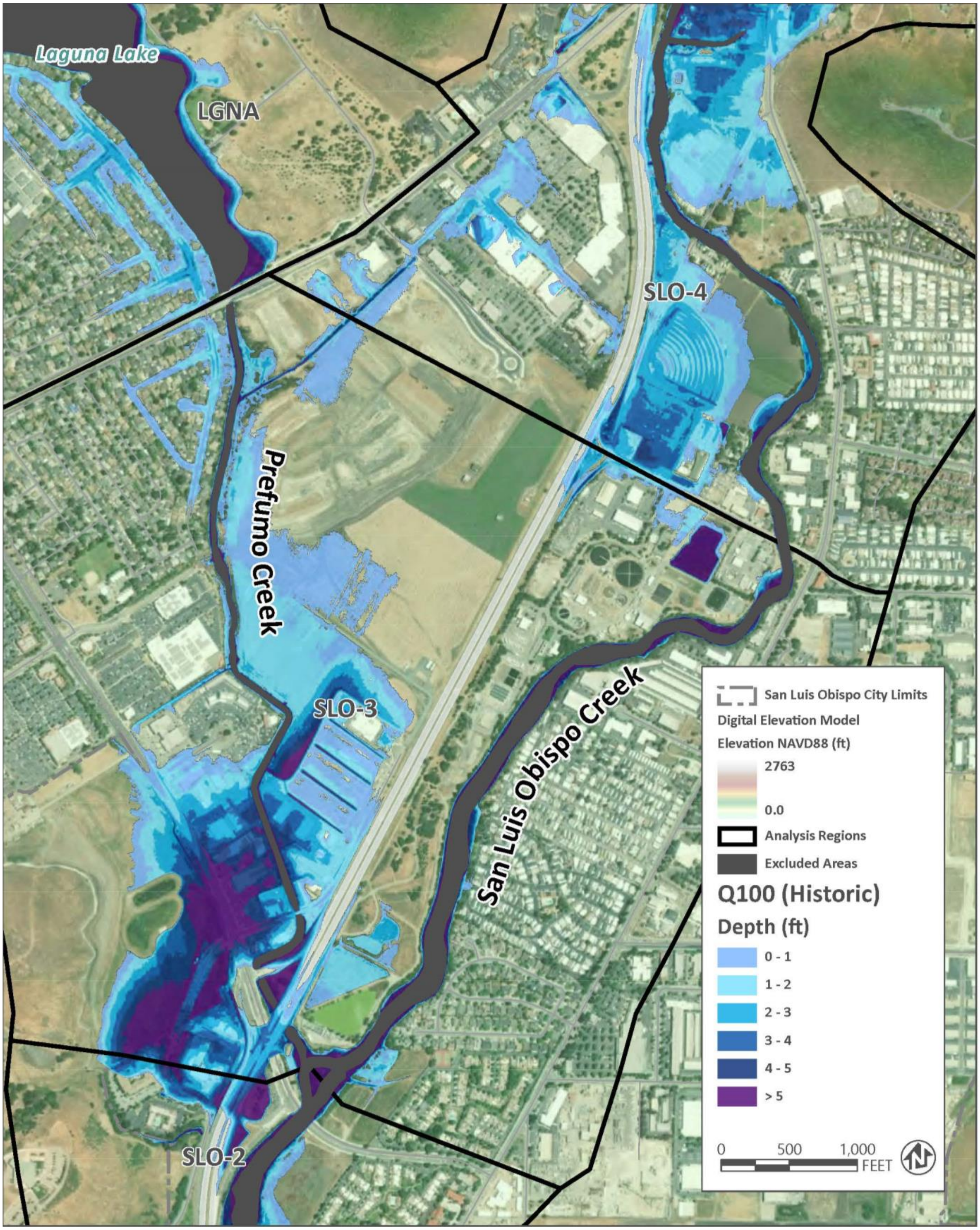
Source: cbec eco-engineering 2021.

Draft Figure 8 Flood Depth: SLO-Prefumo - Q10 (Historic)



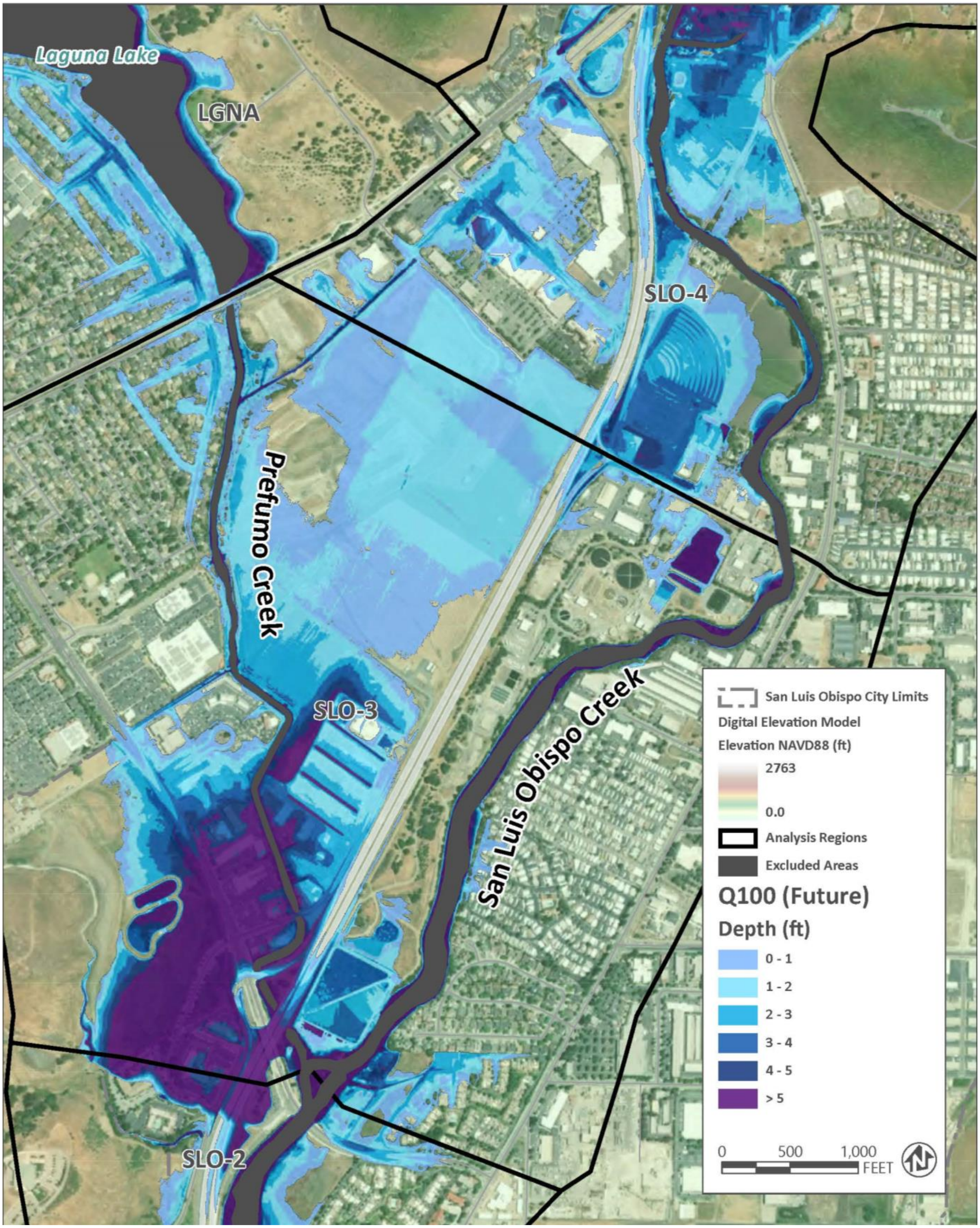
Source: cbec eco-engineering 2021.

Draft Figure 9 Flood Depth: SLO-Prefumo - Q10 (Future 2070-2099 – RCP 8.5)



Source: cbec eco-engineering 2021.

Draft Figure 10 Flood Depth: SLO-Prefumo - Q100 (Historic)



Source: cbec eco-engineering 2021.

Draft Figure 11 Flood Depth: SLO-Prefumo - Q100 (Future 2070–2099 – RCP 8.5)

FLOODING POLICIES

Policy FL-3.1: CLIMATE-INFORMED FLOOD MANAGEMENT

The City shall incorporate the climate-informed flood risk modelling in flood management plans, programs, and procedures.

POLICY FL-3.2: FLOOD PROTECTION FOR NEW DEVELOPMENT

The City shall ensure that all new development adheres to all provisions in Chapter 17.78 “Flood Damage Prevention” in the City’s Municipal Code and update the provisions accordingly to remain consistent with any future federal, state, and local regulatory requirements.

POLICY FL-3.3: FLOOD PROTECTION FOR EXISTING DEVELOPMENT

The City shall continue identification and mapping of areas that are at increased flood risk form large storm events using the climate-informed flood risk modeling that was developed as part of the City’s climate change vulnerability assessment. The City should research and develop flood damage prevention measures that can be applied to existing properties that will be at increased flood risk due to climate change.

Green Infrastructure: Bioswale

Policy FL-3.4: FLOODING AND POST-WILDFIRE DEBRIS FLOW

The City shall conduct a detailed assessment to identify key impact areas in the city from a post-wildfire debris flow scenario and the implications this scenario would have on stormwater runoff during larger storm events. Develop a set of pre-disaster mitigation measures to be implemented to help mitigate impacts from post-wildfire debris flow events. Mitigation measures could include:

- rapid reforestation and stabilization of wildfire-affected areas susceptible to debris flow runoff to stabilize soils;
- communication and coordination with residents and businesses located within potential impact areas from post-wildfire debris flow events; and
- development of analysis techniques to predict debris flow events based on rainfall and moisture conditions.

POLICY FL-3.5: A RESILIENT FLOOD MANAGEMENT SYSTEM

The City shall explore opportunities to add redundancy to the city’s existing stormwater and flood management systems to mitigate impacts from increased storm intensities, as needed. To provide co-benefits to the SLO community, design flood management system redundancies to serve multiple purposes that add value to the community (e.g., detention basins that serve as parks or recreation areas). Resilient flood management projects should be prioritized in locations of the city that are the most vulnerable.

Policy FL-3.6: REGIONAL COORDINATION FOR FLOOD CONTROL

The City shall continue to coordinate with regional partners (e.g., San Luis Obispo County, Cal Poly San Luis Obispo, Caltrans) on flood preparedness and flood management initiatives.

FLOODING PROGRAMS

Program FL-3.7: WATERWAY MANAGEMENT PLAN

The City shall work with County to update the Waterway Management Plan to incorporate the climate-informed flood risk modeling that was developed as part of the City's Hazard and Vulnerability Assessment. The City will encourage the County to include the following components in the updated Waterway Management Plan:

- Incorporate future changes in precipitation patterns into the City's Drainage Design Manual to ensure that future development in the city can properly accommodate changes in runoff from small and large storm events caused by climate change.
- Incorporate climate-informed flood risk modeling in all flood management-related capital improvement projects in the Waterway Management Plan.
- Develop strategy to offset the increase in stormwater runoff from existing residential and nonresidential land uses from small storm events through green infrastructure to help offset climate impacts on the City's stormwater management system from climate change. Prioritize green infrastructure design improvements, including rain gardens, rainwater catchment barrels, green stormwater infrastructure, bio-swales, detentions basins, permeable parking lots, and permeable pavement.
- Identify critical bridges and roadways (e.g., high-volume roadways, key evacuation routes) and prioritize upgrades to flood managent and drainange infrastructure associated with these roadways to account for future increases in large storm events. Identify anthropogenic bank protection features that could lead to flooding through channel constriction and mitigate those structures (e.g., rock gabion baskets, stacked concrete sack walls).
- Identify riparian corridors and floodplains particularly suited for water retention (e.g. is suitable to receive flood waters, can slow down in-channel water through) and prioritize conservation and restoration projects on these areas to restore and retain natural floodplain function and slow in-channel velocity with vegetation.

<u>Green Infrastructure Definition</u>
"Green infrastructure" encompasses natural features, such as forests and wetlands, that provide similar or complementary flood-management benefits as engineered infrastructure. While engineered infrastructure can degrade rivers and the values they provide, green infrastructure tends to support a diverse array of other benefits. A sustainable and resilient approach to flood-risk management will deploy a mix of green and engineered infrastructure solutions, tailored to specific challenges and objectives (The Nature Conservancy 2014).

Program FL-3.8 FLOOD DAMAGE PREVENTION

Update the provisions in Chapter 17.78 “Flood Damage Prevention” to incorporate climate risk and information from the updated Waterway Management Plan.

Program FL-3.9: SUSTAINABLE FLOOD MANAGEMENT AND OPEN SPACE

Develop a program to work with public and private landowners upstream of waterways passing through the city (e.g., Stenner Creek, San Luis Obispo Creek) to manage stormwater runoff through sustainable land conservation practices (e.g., conservation easements) that achieve multiple objectives including habitat restoration, land conservation, carbon farming, reconnection/enhancement of floodplain areas and vegetation management, with a focus on strategies that will reduce current and future flood risk.

Program FL-3.10: URBAN CREEKS VEGETATION MANAGEMENT PLAN

Develop Urban Creeks Vegetation Management Plan to address excessive and noxious vegetation growth and remove dead material to prevent debris jams and reduce likelihood of flooding in and around the City and integrate as an additional section in the updated Waterway Management Plan.

PROGRAM FL-3.11: FLOOD-PREPARED NEIGHBORHOODS PROGRAM

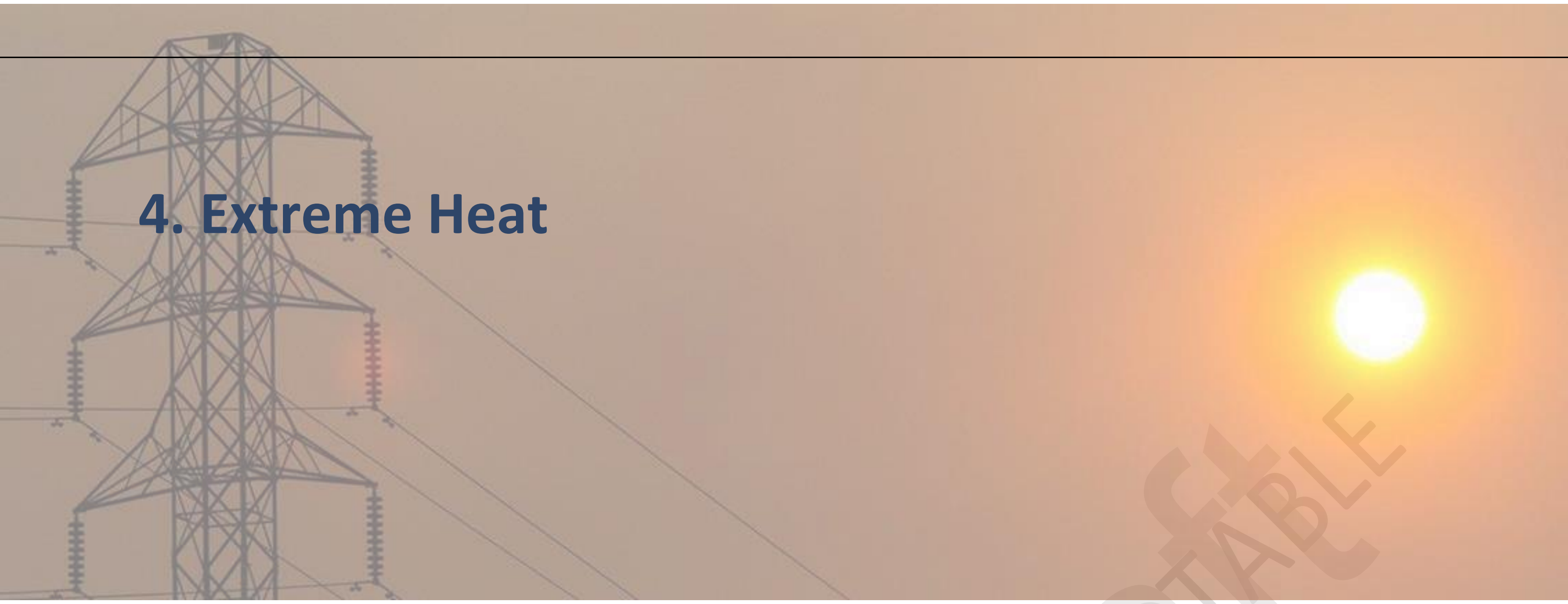
Work with the San Luis Obispo County Office of Emergency Services, community organizations, and regional partners to develop neighborhood readiness plans for areas of the city that are at current and future risk from flooding events. The City should prioritize planning efforts in neighborhoods that are the most vulnerable, and ensure additional supports are available for community members to participate in the planning process and invest in flood resilience.

Program FL-3.12: COMMUNITY-DRIVEN FLOOD EDUCATION

Continue to work with the San Luis Obispo County Office of Emergency Services to provide accurate and readily available flood risk information through the County Ready SLO and City Prepare SLO websites and resources and integrate future flood risk and climate-related flood impacts into County Ready SLO and City Prepare SLO materials. Creative community-driven flood risk and resilience workshops should be developed to build awareness with hard-to-reach populations and high-risk neighborhoods. These workshops could occur through collaboration with the County of San Luis Obispo Zone 9 Flood Control and Watershed Protection District.

Program FL-3.13 FLOOD WARNING MONITORING SYSTEM

Explore the feasibility, costs, and benefits of developing a dedicated early warning flood monitoring system, or incorporating early flood warning into existing alert and notification systems, in coordination with regional partners to provide alerts to residents and visitors in the city during large storm events. Ensure that such a program provides benefits to the most vulnerable members of the region, including persons experiencing homelessness and mobile home communities.

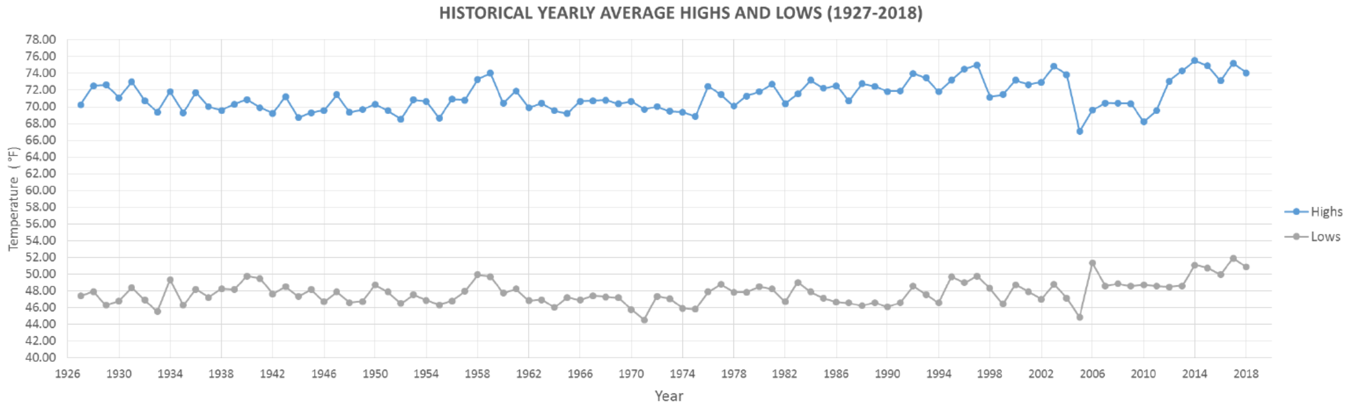


4. Extreme Heat

OVERVIEW

Heat is emerging as a critical hazard in San Luis Obispo. While the city generally has a mild, Mediterranean climate, recent observed extreme heat events and a projected increase of extreme heat events mean that heat is increasingly a public safety issue.

Although the city has not historically experienced many extreme heat conditions, the city is likely to experience increased sensitivity to extreme temperatures because residents are not acclimatized to or prepared for extreme heat conditions, even if increases are relatively mild compared to other parts of the state. Extreme heat events are described in this section in terms of their intensity (i.e., average maximum temperature), frequency (i.e., how often they occur), time of year in which they occur, and duration (total number of consecutive extreme heat days). Figure 12 includes the average annual maximum and minimum temperatures for the city from 1926 through 2018.



Sources: Cal Poly 2020.

Draft Figure 12 Average Annual Maximum and Minimum Temperatures in the City (1926-2018)

CLIMATE CHANGE AND EXTREME HEAT

As shown in Table 3, both annual maximum and minimum are projected to increase throughout the 21st century. The average annual maximum temperature in the city is projected to increase to 71.6°F in the near-term and 73.1°F in the midterm under the high emissions scenario. The average annual maximum temperature is projected to increase to 73.1°F and 75.6°F in the late-century period under the medium and high emissions scenarios, respectively. The average annual minimum temperature in the city is projected to increase to 48.7°F in the near-term and 49.7°F in the midterm under the high emissions scenario, and the late-century average annual minimum temperature is projected to increase to 50.1°F and 52.7°F under the medium and high emissions scenarios, respectively (CEC 2019a). Increased temperatures in the city will influence secondary climate effects, including extreme heat events, wildfire, and drought.

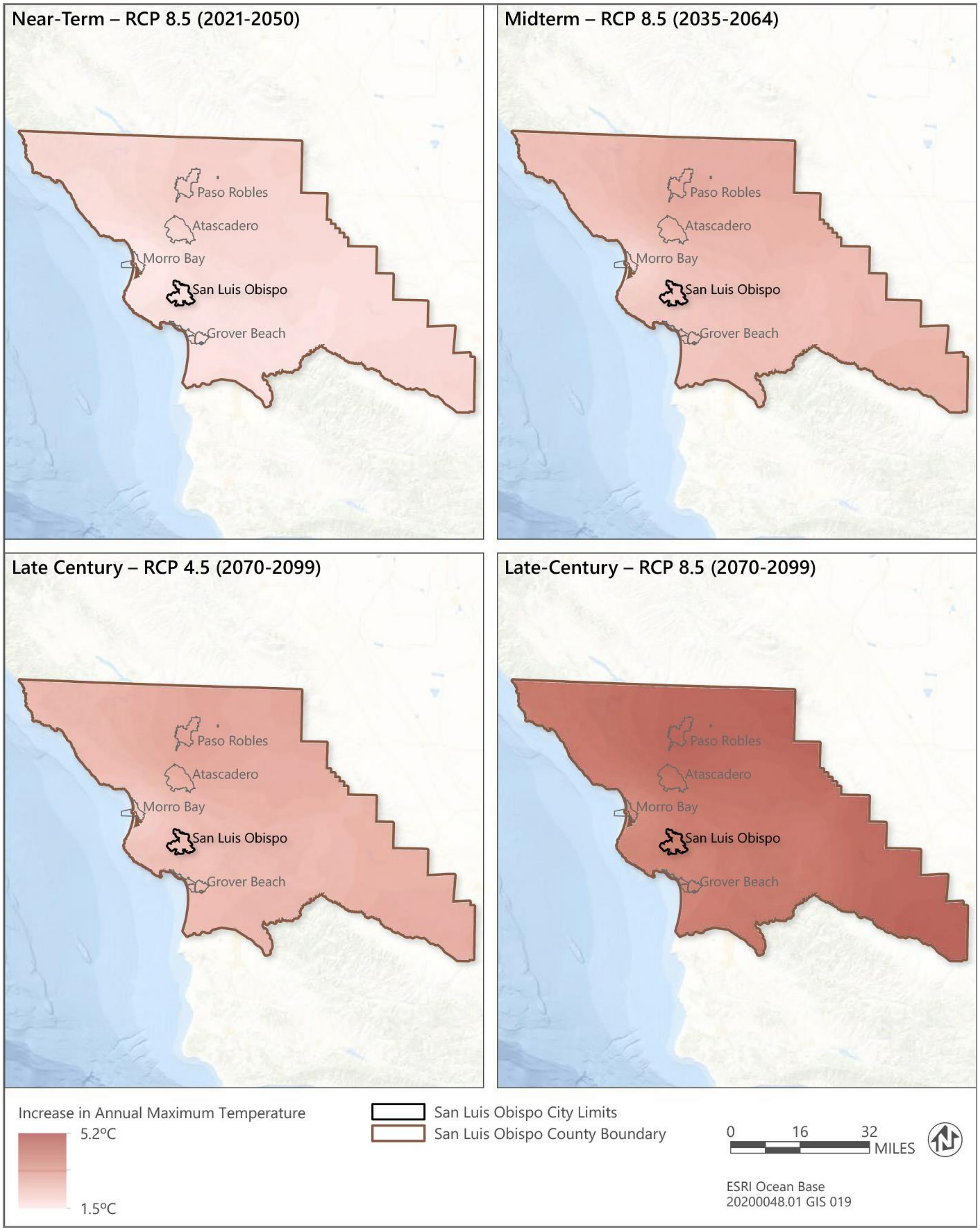
Table 3 Changes in Average Annual Temperature in City of San Luis Obispo

Geography	Average Annual Temperature	Historic Average Annual Temperature (1961-1990)	Near-Term (2021-2050)	Midterm (2035-2064)	Late-Century (2070-2099)	
					Medium Emissions	High Emissions
City of San Luis Obispo	Maximum Temperature (°F)	68.4	71.6	73.1	73.1	75.6
	Minimum Temperature (°F)	45.7	48.7	49.7	50.1	52.7
San Luis Obispo County	Maximum Temperature (°F)	69.8	72.9	74.3	74.7	77.3
	Minimum Temperature (°F)	42.2	45.4	46.6	46.9	49.8

Notes: °F = degrees Fahrenheit; RCP = Representative Concentration Pathway.

Source: CEC 2019a.

Figure 13 illustrates the projected change in average annual maximum temperature in the city and in San Luis Obispo County (County) in the near-term and midterm periods under the high emissions scenario and average annual maximum temperature in the late-century period under both emissions scenarios. As shown in the Figure 13, the average annual maximum temperature is expected to rise through the late-century period under both emissions scenarios. As shown in Table 3, the County compared to the City, has had slightly higher maximum and minimum temperatures historically with this trend continuing under both emissions scenarios as temperatures continue to rise in both the City and the County. This difference is also reflected in Figure 13, which shows the city experiencing smaller increases in annual average maximum temperatures compared to northern and eastern portions of the County.



Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020 and downloaded from Cal-Adapt in 2021.

Draft Figure 13 Changes in Annual Average Temperature in San Luis Obispo County through 2099

Extreme Heat Events

The Cal-Adapt tool provides estimates of future instances of extreme heat events. Extreme heat events include extreme heat days and heat waves. Cal-Adapt defines an extreme heat day as a day when the daily maximum temperature exceeds the 98th historical percentile of daily maximum temperatures based on observed data from 1961–1990 between April and October. Heat wave events are characterized as periods of sustained extreme heat and are defined by Cal-Adapt as four or more consecutive extreme heat days.

Extreme Heat Definitions for City of San Luis Obispo

Extreme Heat Day = Day with maximum temperature above 89.6°F

Heat Wave = Four or more consecutive Extreme Heat Days

The extreme heat threshold for the city is 89.6°F, meaning 98 percent of all recorded temperatures in this period were below 89.6°F. Historically (1961-1990), the city experienced an average of four extreme heat days per year. As a result of rising temperatures from climate change, the city is projected to experience up to 7 extreme heats days annually in the near-term and 10 extreme heat days annually in the midterm under the high emissions scenario. In the late-century period, the city is projected to experience up to 10 extreme heat days annually under the medium emissions scenario and 18 extreme heat days annually under the high emissions scenario (CEC 2019b). As shown in Table 4, the number of extreme heat days is already increasing from historic averages and will continue to increase under both emissions scenarios. The city is beginning to experience increases in extreme heat with a record high temperature of 117°F being set on September 6, 2020 (NOAA 2021).

Table 4 Changes in Extreme Heat Events in City of San Luis Obispo

Annual Averages	Historic Annual Averages (1961-1990)	Near-Term (2021-2050)	Midterm (2035-2064)	Late-Century (2070-2099)	
				Medium Emissions	High Emissions
Number of Extreme Heat Days	4	7	10	10	18
Number of Heat Waves	0.2	0.3	0.4	0.4	1.3
Number of Days in Longest Stretch of Consecutive Extreme Heat Days	2.6	2.8	3	3.4	4.6

Notes: RCP = Representative Concentration Pathway; Extreme Heat Day = day with maximum temperature above 89.6°F; Heat Wave = four or more consecutive extreme heat days

Source: CEC 2019b.

While heat waves have historically been infrequent in the city, with a historical average of less than one heat wave annually, climate change is expected to increase the frequency of heat waves. Under the high emissions scenario, the city is projected to still experience less than one heat wave per year in the near-term and in the midterm. In the long term, the city is projected to experience less than one heat wave per year under the medium emissions scenario and 1.3 heat waves per year under the high emissions scenarios.

The average number of days in the longest stretch of consecutive extreme heat days per year is also projected to increase. Historically, the longest stretch of consecutive extreme heat days lasted for an average duration of approximately two-and-a-half days. The longest stretch of consecutive extreme heat days is projected to increase only slightly in the near-term and 3 days in the midterm under the high emissions scenario. In the late century, the duration is projected to increase to an average of 3.4 days under the medium emissions scenario and 4.6 days under the high emissions scenario (CEC 2019b). The timing of extreme heat days is also projected to change over the 21st century with more extreme heat days and heat wave events occurring earlier in the year (April through May) and more severe events occurring in the historically hot months of September and October (CEC 2019b). The projected number of heat waves and number of days in the longest stretch of consecutive extreme heat days is shown in Table 4.

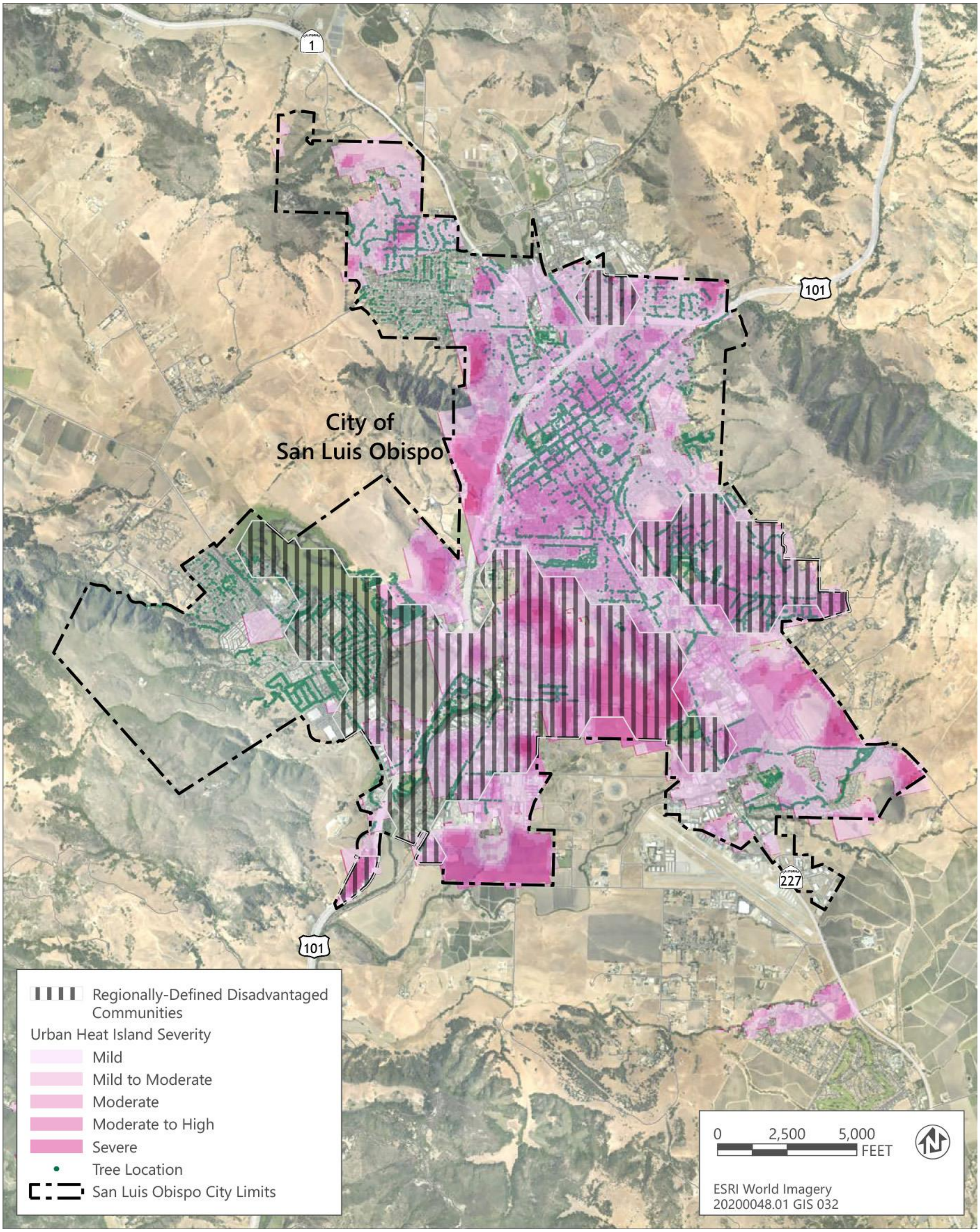
URBAN HEAT ISLAND

The city's urban land use patterns can intensify periods of extreme heat through the "urban heat island" (UHI) effect. The UHI effect is the phenomenon of urban areas being significantly warmer than surrounding rural areas because of human activity and land use patterns in the built environment. Several factors contribute to the effect, with the primary cause being changes in land surfaces (EPA 2008). The albedo of a surface is the measure of the ability to reflect or absorb solar radiation, with darker surfaces having a lower albedo and absorbing more solar radiation. As urban areas develop over time, resulting in the development of more land surfaces with low albedos (e.g., asphalt pavement, dark building surfaces), more solar radiation is absorbed in these materials causing increased ambient temperatures and warmer nighttime temperatures. Another factor contributing to the UHI effect is the loss of evapotranspiration in urban areas. Evapotranspiration, the movement of water to the air from sources such as the soil, plants, and bodies of water, reduces ambient air temperatures (EPA 2008). As cities grow and often reduce the extent of available vegetation that contributes to evapotranspiration, UHI effects increase. Additionally, waste heat from human activities involving machinery (e.g., vehicle traffic, using air conditioning, industrial activity) can also contribute to the UHI effect, with excess heat absorbed by surrounding surfaces (Sailor 2011; Zhu et al. 2017).

ENVIRONMENTAL JUSTICE AND EXTREME HEAT

Alongside populations with health sensitivities, residents with specific sociodemographic characteristics are at increased sensitivity to extreme heat events (CDC 2019). Research has found that low-income residents spend a larger proportion of their income on utilities, including electricity use for cooling, with these residents being disproportionately affected during extreme heat events (Voelkel et al. 2018). Additionally, research has found that low-income neighborhoods can often have less tree coverage and park space, further contributing to the disproportionate impact on low-income residents (Zhu and Zhang 2008). Decreased access to transportation services can further increase exposure and health risks from extreme heat events for the unhoused community (Ramin and Svoboda 2009). Unhoused individuals are also at increased risk from extreme heat events with, generally, less access to places to cool off and healthcare resources during these events. Figure 16 shows the location of low-income areas in the city, based on SLOCOG regional definition of low-income. The map shows urban heat island hotspots and areas where average income level is less than 80 percent of the region's average median income.

The Margarita Avenue Neighborhood (Census Tract 111.03) is an area of the city with a particularly vulnerable population in regard to extreme heat, Figure 14. This area includes a high percentage of elderly and disabled residents, a high percentage of residents experiencing linguistic isolation, and 50 percent of residents earning less than 200 percent of the federal poverty level. This census tract also is located in a portion of the city that experiences a more intense severity of the urban heat island effect, resulting in potentially disproportionate impacts on this population during extreme heat events. The West of South Higuera neighborhood (Census Tract 115.01) also stands out as a particularly vulnerable to extreme heat, with the area also near urban heat island hotspots and includes a high percentage of elderly and disabled residents.



Source: Data received and downloaded from City of San Luis Obispo and the Trust for Public Land.

Draft Figure 14 Urban Heat Island Effect and Tree Cover in the City

EXTREME HEAT POLICIES

Policy HE-4.1: CLIMATE-SMART URBAN HEAT MITIGATION

The City shall equitably mitigate the effects of extreme heat in outdoor environments.

Policy HE-4.2: EQUITABLE ACCESS TO SAFE INDOOR SPACES

The City shall support equitable access to climate controlled indoor spaces.

Policy HE-4.3: GREEN AND HEALTHY BUILDINGS

The City shall support fuel switching retrofits (from fossil fuel to high-efficiency electric appliances), energy efficiency retrofits, and distributed energy resources as low carbon solutions to create safe, cool, and healthy buildings and consider programs and projects that support these retrofits as critical to maintaining community safety and to supporting disaster preparedness.

EXTREME HEAT PROGRAMS

PROGRAM HE-4.4: URBAN HEAT ISLAND MITIGATION PROGRAM

Develop and implement a program to mitigate the projected increasing impacts from the urban heat island effect. This program should include:

- A strategy to maintain and enhance the city’s urban tree canopy and other vegetative features to help reduce the urban heat island effect while accounting for the effect of shifting average minimum and maximum temperatures on sensitive tree species and vegetation.
- A “cool pavement” pilot to reduce the urban heat island effect being generated from the city’s pavement surfaces, focusing on large surface parking lots and urban heat island hotspots. Should the pilot prove effective, consider scaling the program, including through the adoption of new standards for new development projects, as appropriate, to use high-albedo or cool pavements for surface parking lots.
- A Climate-Smart Green Infrastructure Strategy with regular updates to the City’s Capital Improvement Program and Foundational Action Natural Solutions 2.1 in the City’s Climate Action Plan which focuses on preparing the City’s first Community Forest Plan by 2022 and planting and maintaining 10,000 new trees by 2035.
- A review of and update to Section 12.38.090 “Landscaping Standards” in the City’s Municipal Code and other design guidelines to incorporate strategies to increase shading of buildings and parking lots to mitigate the urban heat island effect while also ensuring that the updated landscaping standards are aligned with recommended fire wise plant species.
- A review of and update to City development standards, where appropriate, to include building and site design features that mitigate the urban heat island effect including reflective roofing, solar carports.

PROGRAM HE-4.5: CLIMATE-SMART URBAN TREE CANOPY

Conduct analysis and incorporate climate change considerations into the City's Community Forest Plan and update the City's Street Trees Master List to prepare for increases in minimum and maximum temperatures and extreme heat events and corresponding drought and fire risk, identifying which trees will be most vulnerable to climate impacts and which species will thrive during future increases in temperature. Ensure that the updated Street Trees Master List does not include high water use trees or highly combustible trees. Emphasize the planting and care of appropriate climate-ready trees in locations where they will have the greatest chances of success in environmental conditions that are predicted to become more challenging (i.e., "right tree, right place"). Communicate the results of the analysis to help community members prepare for impacts on trees on private property.

Give high priority to water conservation in all urban forest-related actions. This could include species selection, irrigation method and time-of-day recommendations, mulching, co-location with natural drainages and stormwater runoff, etc.

Lumber from removed trees should be used in ways that store carbon indefinitely instead of releasing it back into the atmosphere, and these uses should be publicized to build awareness and support for climate action.

Program HE-4.6: COMMUNITY COOL ZONES NETWORK

Work with community organizations, faith-based organizations, businesses, local government entities in SLO County, and other institutions to develop a Community Cool Zone Network comprised of air-conditioned spaces conveniently located throughout the city that can be opened during heat wave events to help prevent heat-related illness for vulnerable populations (e.g., elderly, youth, homeless, residents without air conditioning). Support network participants to conduct energy efficiency and building decarbonization improvements consistent with the City's Climate Action Plan. Prioritize opening cool zone locations in areas with identified heat-vulnerable populations and disadvantaged communities and consider co-locating with Resilience Hubs. Assess feasibility and efficacy of providing transportation options to the cooling network location to elderly residents and transit-dependent populations.

PROGRAM HE-4.7: GREEN AND HEALTHY BUILDINGS PROGRAM

Expand the City's Green and Healthy Buildings Program (the existing building retrofit program focused on electrification per the 2020 Climate Action Plan) to include climate resilience retrofit features to help residents prepare for the impacts of climate change (e.g., extreme heat, wildfires, and wildfire smoke). This work should include conducting a gap analysis to identify portions of the city's housing stock that are not equipped with air-conditioning or other cooling systems to address the projected increases in temperature and extreme heat events. As part of the building retrofit program, include proactive efforts (i.e., incentives, matching funds) to retrofit or assist with retrofitting the identified housing stock with climate resiliency features including:

- Adequate climate control equipment (e.g., heat pump HVAC-systems) with air filtration systems.
- Weatherization and energy efficiency improvements.
- Distributed energy resources (e.g., rooftop solar, battery storage, electric vehicle battery to building equipment, etc.) to support grid-independent operation and to offset utility energy costs.

- Home hardening improvements to protect against wildfire.

PROGRAM HE-4.8: EXTREME HEAT AND EMERGENCY PREPAREDNESS

As part of the next update of the City's Emergency Operations Plan, incorporate a protocol for emergency operations during extreme heat events in the city. Identify extreme heat thresholds which, if exceeded, would trigger the opening of cooling centers in the city as well as emergency response efforts from appropriate City departments (e.g., Police Department, Fire Department, Parks & Recreation). Coordinate emergency response efforts in Program HE-4.9 regarding heat-related community outreach with this strategy.

PROGRAM HE-4.9: EQUITABLE COMMUNITY OUTREACH FOR EXTREME HEAT

Use information from the Hazards and Vulnerabilities Report that identifies areas in the City with vulnerable populations (e.g., linguistically isolated households, elderly, youth, homeless, individuals with chronic health conditions) to conduct targeted outreach to these neighborhoods and areas in the City. Increase education and training opportunities for residents to prepare for extreme heat events, with a prioritization on participation from vulnerable populations and businesses and institutions that house and/or support vulnerable populations. Work with community organizations and the San Luis Obispo County Health Department to provide additional resources and training to staff working with elderly populations on how to prevent health-related heat impacts (Paterson et al. 2014). Work with community organizations and schools to help mitigate the impacts of extreme heat and heat wave events on youth. Educate and train staff working with youth populations on how to prevent health-related impacts from extreme heat. Continually assess the effectiveness of the City's public information and education efforts during heat wave events.

5. Fire

OVERVIEW

A wildfire is defined as an uncontrolled fire spreading through vegetative fuels that poses a threat to life and/or property (San Luis Obispo County 2019). Wildfires can be ignited by natural events, such as lightning strikes, or can be caused by damaged infrastructure (e.g., downed power lines) or human activities (e.g., campfires, arson). Wildfires can move quickly, casting embers into downwind areas and spreading to developed areas, putting human lives and properties at risk.

Three factors that contribute significantly to wildfire behavior are topography, fuel, and weather:

Topography—An area's terrain and slope affect its susceptibility to wildfire spread. Both fire intensity and the rate of spread increase as slope increases because heat from a fire tends to rise through convection. For this reason, wildfires tend to spread more slowly downhill. The arrangement of vegetation on a hillside can also contribute to increased or decreased fire activity on slopes.

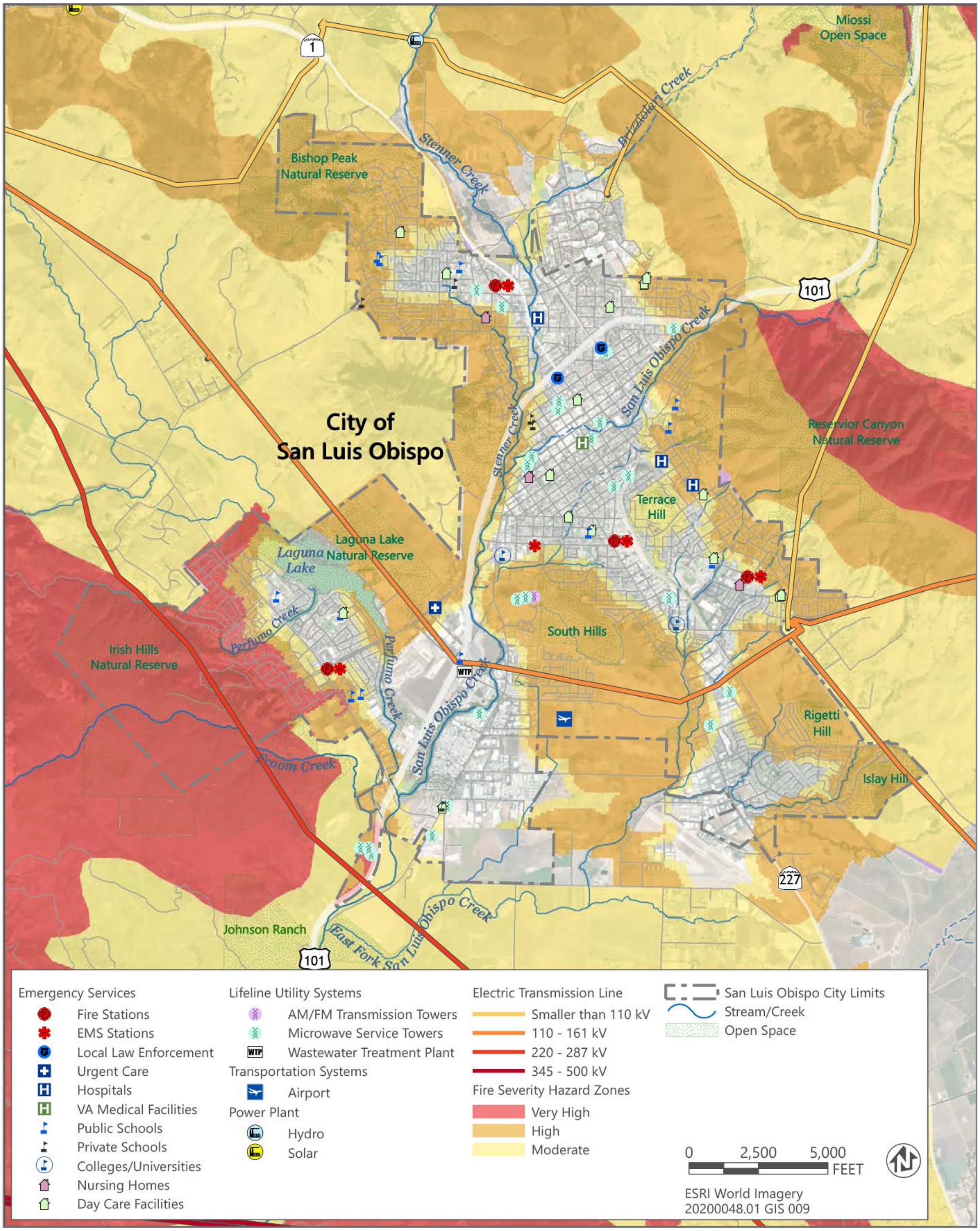
Fuel—The type, condition, and volume of fuel material are key factors that influence wildfire behavior. Fuel sources are diverse and can include dead vegetative matter, live trees, brush, and cured grasses. Buildings and other structures, such as homes, can also be sources of fuel. Certain types of plants are more susceptible to burning or will burn with greater intensity, and dead, dry plant matter tends to burn more easily than living plant matter. Thus, fire risk is increased significantly during periods of prolonged drought. The density of vegetation increases the amount of combustible material available, also called the fuel load.

Weather—Factors such as temperature, humidity, wind, and the occurrence of lightning affect the potential for wildfire and its spread. High temperatures and low humidity can dry out wildfire fuels, creating a situation in which fuel will ignite more readily and burn more intensely. Thus, wildfire risk increases during periods of drought. Wind is one of the most significant weather factors in the spread of wildfires. Higher wind speeds lead to faster wildfire spread and, oftentimes, greater fire intensity.

Environmental and climatic conditions in and around the city influence the frequency and magnitude of wildfires. The city often experiences high-wind events, such as the Santa Lucia winds, which originate inland and flow westward during the late summer and early fall, counter to the prevailing westerly winds that occur throughout much of the year. Santa Lucia winds contain little humidity, and summers in the city are hot and dry, with precipitation primarily occurring in the winter months. Thus, the combination of the relatively hot, dry Santa Lucia winds occurring at a time when vegetation in the County and the city is particularly dry following the summer months can contribute to the ignition and spread of large wildfires. Periods of low relative humidity, when dead trees and vegetation cannot absorb moisture from the air, can also increase the risk of wildfires (City of San Luis Obispo 2011).

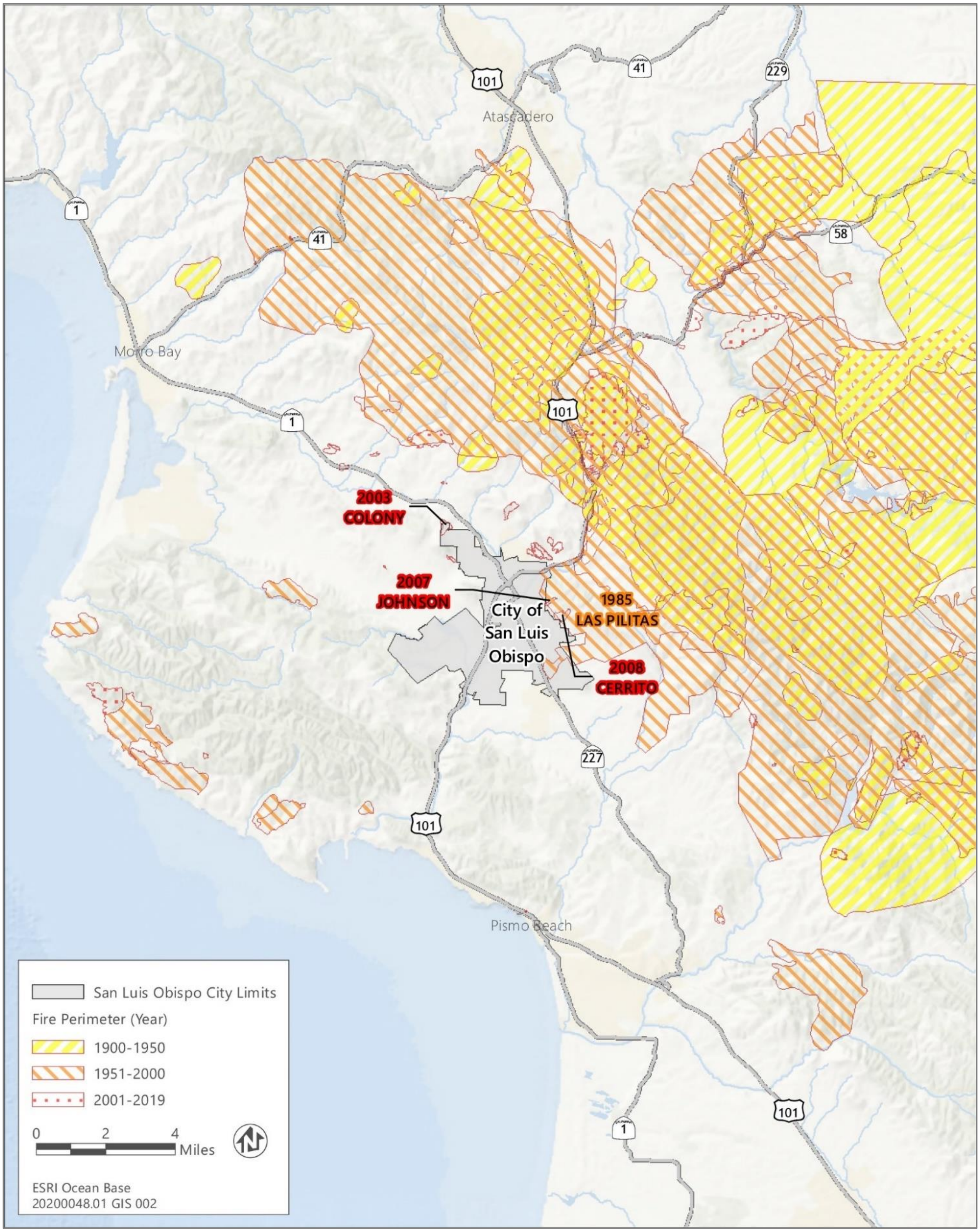
The risk of wildfires and subsequent impacts to property and life is greatest at the wildland-urban interface (WUI), which is where urban development borders wildland fuels. Wildfire risk is compounded in areas of the WUI that are also located in or near High or Very High Fire Hazard Severity Zones. Figure 18 includes CAL FIRE designated Fire Hazard Severity Zones in and surrounding the city. Portions of southwestern and northeastern parts of the city are located in or near a Very High Fire Hazard Severity Zones, and many of these portions of the city overlap with the WUI. Locations identified by CAL FIRE as Hazard Severity Zones for the City and County are identified in Appendix G (Cal Fire San Luis Obispo County Fire Hazard Severity Zone Map). Beyond these areas of the city, the risk of urban fires decreases, with most of the areas surrounding the city located in a Moderate Fire Hazard Severity Zone.

Figure 19 shows the locations of fires that have occurred within 10 miles of the city between 1900 and 2020; four fires have occurred within city boundaries. Between 1900 and 2018, 490 wildfires have been recorded in the County (San Luis Obispo County 2019a). Notable fires that have occurred in the County include the Weferling fire (1960), the Las Pilitas fire (1985), the Chispa fire (1989), the Highway 41 fire (1994), the Highway 58 fire (1996), the Logan fire (1997), and the Chimney fire (2016). In total, these fires burned approximately 400,000 acres, destroyed numerous structures, and cost millions of dollars to suppress (City of San Luis Obispo 2019). The Las Pilitas fire burned 75,000 acres and burned within city limits, damaging a number of structures (City of San Luis Obispo 2011). The 1994 Highway 41 fire burned more than 50,000 acres close to the city’s northern boundary and destroyed 42 homes, 61 other structures, and 91 vehicles (San Luis Obispo County 2019).



Source: San Luis Obispo County 2019a.

Draft Figure 15 Wildfire Hazard Severity Zones in and Surrounding the City of San Luis Obispo with Critical Facilities



Sources: Data downloaded from CAL FIRE in 2020.

Draft Figure 16 Wildfire Perimeters for Wildfires within 10 Miles of the City of San Luis Obispo (1900–2020)

Wildfire Management

The City's Fire Department is the main agency responsible for wildfire response, management, and mitigation in the city, with many fires being addressed through mutual aid by both the City's Fire Department and CAL FIRE. Several agencies, including the County, provide support to incorporated areas, including the City, during wildfire events. Supporting agencies, such as CAL FIRE, are also available to mobilize during fire response if needed. In addition to having the authority to declare local emergencies, the County can provide support for evacuations, shelter, and other forms of assistance for municipalities, including the City (San Luis Obispo County 2016). The City can also declare a disaster declaration through the City's Disaster Council, absent the County. Because fire risk is highest for regions of the city within the WUI, the City has produced detailed maps of these regions, indicating evacuation routes and other critical information for responders. Locations identified by CAL FIRE as Hazard Severity Zones for the City and County are identified in Appendix G (Cal Fire San Luis Obispo County Fire Hazard Severity Zone Map). The City's Community Wildfire Protection Plan serves as the primary document for assessing wildfire risk in different areas in the city and helping to implement a series of policies and strategies to reduce this risk, including:

Education – The goal of the education policies and strategies are to prepare response organizations, communities, the public, and policy makers regarding appropriate community actions and interactions to reduce the unwanted impacts of fires in the WUI.

Fuel – The goal of the fuel policies and strategies are to mitigate the unwanted impacts of wildfires on communities through proper vegetation management techniques that reduce hazardous fuels and the resulting wildfire intensity.

Planning – The goal of the planning policies and strategies are to mitigate the unwanted impacts of wildfires on communities through community planning (including new resilient community design, retrofitting existing communities, and efforts that support community recovery from the impact of fire), response planning, evacuation planning, and preparedness planning for responders, communities, individuals, animals, and livestock.

Response – The goal of the response policies and strategies are to mitigate the unwanted impacts of wildfires on life, property, and resources by having an efficient and effective response that includes properly trained personnel, appropriate equipment, and a community prepared to take appropriate action or evacuation.

Ignition Resistance - The goal of the ignition resistance policies and strategies are to eliminate or mitigate structural ignitions from radiant heat, flame contact, or embers from WUI fires.

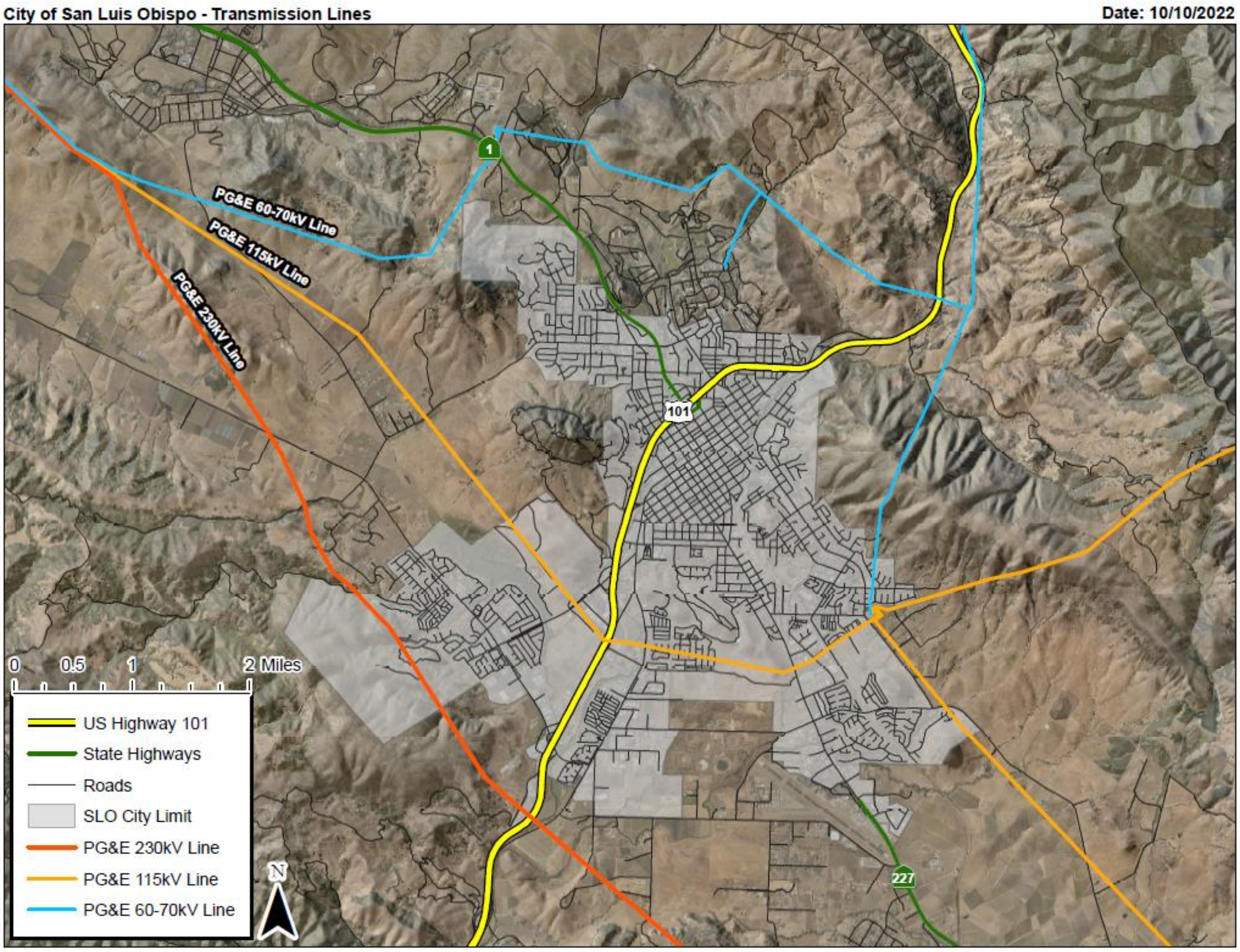
Wildfire Smoke

While the city is at risk from the impacts of wildfires, the city and its residents are also susceptible to impacts of smoke from wildfires in the coastal mountain ranges of central California and the Los Padres National Forest to the east of the city. Wildfire smoke in the surrounding region and, due to wind patterns, wildfires along the central coast in general, can greatly reduce air quality in the city and cause public health impacts as well as impacts to tourism and normal community functions. Community public health factors that can increase the impacts of wildfire smoke include the prevalence of asthma in children and adults; chronic obstructive pulmonary disease; hypertension; diabetes; obesity; percent of population 65 years of age and older; and indicators of socioeconomic status, including poverty, income, and unemployment. Exposure to wildfire smoke, particularly exposure to vulnerable populations, can result in worsening of respiratory symptoms, increased rates of cardiorespiratory emergency visits, hospitalizations, and even death (Rappold et al. 2017). In the summer of 2020, wildfire smoke alerts were issued for San Luis Obispo County due to poor air quality caused by the Dolan Fire near Big Sur. Wildfire smoke can also have impacts on the labor market and the economy in general, with air quality affecting the ability of outdoor workers to perform their work and impact industries that operate in the open air (e.g., wineries, recreation activities, sporting events) (Borgschulte et al. 2019).

Climate Change and Wildfires

The effects of climate change, including increased temperatures, and changes to precipitation patterns, will exacerbate many of the factors that contribute to wildfire risk. Recent research has found that increases in global temperatures may be affecting wind patterns and increasing global wind speeds, however these changes would not be experienced uniformly across geographies in the future (Chen 2020). While the impact of climate change on wind speeds is still uncertain, it is important to recognize this potential effect and how it may also contribute to wildfire risk in the future.

Increased variability in precipitation may lead to wetter winters and increased vegetative growth in the spring, and longer and hotter summer periods will lead to the drying of vegetative growth and ultimately result in a greater amount of readily burned fuel for fires. This has already been seen across the state in recent years, with the area burned by wildfires increasing in parallel with rising air temperatures (OEHHA 2018). These factors, combined with the increasing frequency and severity of intense wind conditions, will cause fires to spread rapidly and irregularly, making it difficult to predict fires' paths and effectively deploy fire suppression forces. Pacific Gas and Electric (PG&E) also has several electrical transmission lines running through the city, which carry significant potential fire risk (Figure 17).

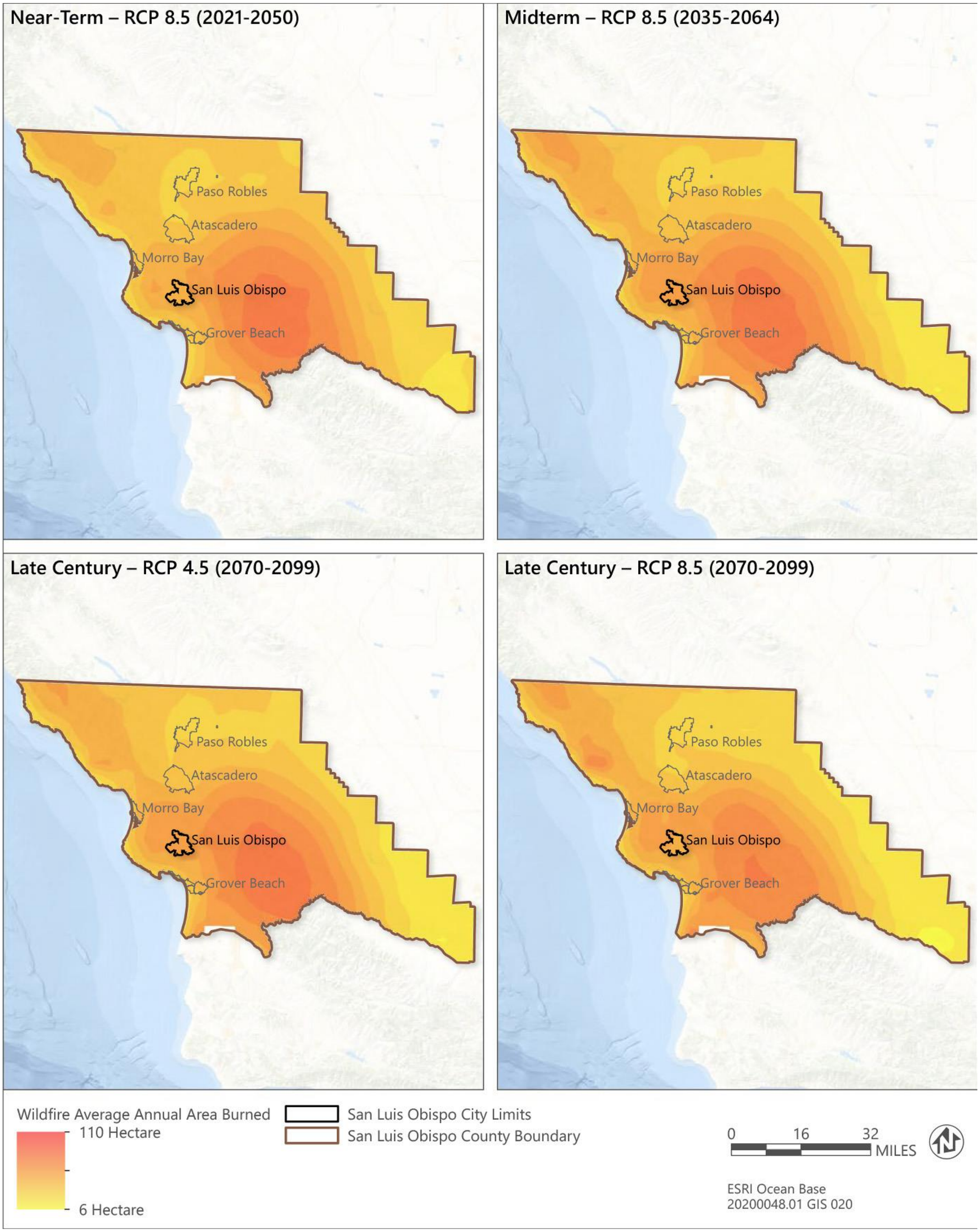


Draft Figure 17 PG&E Transmission Lines in the City of San Luis Obispo

Relative humidity is also an important fire-related weather factor; as humidity levels drop, the dry air causes vegetation moisture levels to decrease, which consequently increases the likelihood that plant material will ignite and burn. With an increase in hotter and drier landscapes, humidity levels may continue to drop and result in higher fuel loads, increasing the risk of wildfire (Schwartz et al. 2015).

Given the city's urban setting, with minor portions of the city in the VHFHSZ, the analysis for future wildfire risk analyzes changes in wildfire risk at the County level to assess how larger regional risks and potential impacts may affect the city. Using a statistical model based on historical climate vegetation, population density, and large fire history, Cal-Adapt provides projections for future annual mean acres burned within the County when wildfires do occur. Cal-Adapt does not account for current or planned wildfire management projects. Table 5 and Figure 18 shows the projected change in average annual area burned within the County under low and high emissions scenarios for the central population growth scenario at midterm and late-century timescales. The total area burned annually by wildfire within the County is expected to rise 15 percent from the historic (1961–1990) annual average of 22,852 acres to 26,497 acres in the near-term and increase in the midterm to 26,509 acres burned annually. In the late-century, average annual area burned in the County is projected to increase to 26,509 acres and decrease slightly to 24,382 acres under the low and high emissions scenarios, respectively (CEC 2019b).

This reduction in annual average acres burned in the late-century period is noted in the research conducted to develop the Cal-Adapt wildfire tool. As vegetation type and fuel amount, structure, and continuity change in the future due to altered disturbance regimes (e.g., changes in the frequency, seasonality, duration, extent and severity of wildfire and infestations by beetles and other pathogens) and climate, future wildfire activity and its response to climatic variability may reduce wildfire activity in some ecosystems (Westerling 2018).



Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020 and downloaded from Cal-Adapt in 2021.

Draft Figure 18 Projected change in average annual area burned within San Luis Obispo County through 2099

Importantly, Figure 18 illustrates that anticipated changes in wildfire impacts are not homogenous across the County; for instance, the Santa Lucia Wilderness and the La Panza Mountain range located in the southern central portions of the County will experience the larger increases in average area burned over the 21st century under both emissions scenarios. While these areas are outside of the city boundaries and jurisdiction, due to the regional characteristics of wildfire impacts, wildfire events in these areas could affect the city through secondary impacts such as short-term and long-term wildfire evacuees, wildfire smoke, and impacts on the County's regional transportation network.

Table 5 Changes in Annual Average Area Burned in San Luis Obispo County

Average Annual Area Burned	Historic Modeled[1] Average Annual Area Burned (1961-1990)	Near-Term (2021-2050)	Midterm (2035-2064)	Late-Century (2070-2099)	
				Medium Emissions	High Emissions
Average Annual Area Burned (acres)	22,852	26,497	26,509	26,509	24,382

Notes: RCP = Representative Concentration Pathway.

[1] Observed historical average annual area burned data were not available from Cal-Adapt; the modeled historical average annual area burned data under the medium emissions scenario was available and used as proxy data.

Source: CEC 2019d, hectares converted to acres

FIRE POLICIES

POLICY FI-5.1: REDUCE WILDFIRE RISK

The City shall reduce the risk of wildfires in city open spaces and in the wildland urban interface through timely implementation of the City's Community Wildfire Protection Plan and the Vegetation Management Plan.

POLICY FI-5.2: FIRE-SMART LAND-USE PLANNING

The City shall minimize fire risk in land-use planning decisions. The City shall update local zoning and subdivision codes to designate wildfire hazard overlay zones and associated conditional use, site development standards, and design criteria to mitigate wildfire hazards and reduce risks to new development within the overlay zones.

Promote the following risk reduction measures in future land use planning efforts in the city:

- Use wildfire risk analysis resources such as the CAL FIRE's Fire and Resource Assessment Program data in future housing site constraints analyses to ensure future land use planning avoids locating new housing in high wildfire risk areas.
- Promote the use of clustered development patterns for subdivisions that require less fire suppression resources and are easier to defend during wildfire events compared to large-lot single family homes.

POLICY FI-5.3: FIRE-SMART NEW DEVELOPMENT

The City shall avoid locating future development projects in the wildland-urban interface or in areas of the city located within a CAL FIRE designated High or Very High Severity Zones.

The City shall only approve development when adequate fire suppression services and facilities are available or will be made available concurrent with development, considering the setting, type, intensity, and form of the proposed development. Ensure that new development projects include adequate measures to minimize fire hazards while remaining in compliance with housing laws regarding objective design standards and discretionary review.

Fire protection plans should address wildland fuel transition zones surrounding the development and include the following components:

- Provisions for the maintenance of vegetation within the subdivision to reduce wildfire risk
- Requirements for hardening of structures to mitigate fire risk that meets or exceed the California Building Code
- Landscaping and defensible space design around a proposed structure that reduces wildfire risk.

POLICY FI-5.4: FIRE-SMART BUILDINGS AND HIGH OR VERY HIGH FIRE HAZARD SEVERITY ZONES

The City shall reduce wildfire risk associated with new development by requiring all new development located within any CAL FIRE designated High or Very High Fire Hazard Severity Zone to:

Meet or exceed the State's Fire Safe Regulations (title 14, CCR, division 1.5, chapter 7, subchapter 2, articles 1-5 commencing with section 1270) and Fire Hazard Reduction Around Buildings and Structures Regulations (title 14, CCR, division 1.5, chapter 7, subchapter 3, article 3 commencing with section 1299.01).

Include designs to minimize pockets or peninsulas or islands of flammable vegetation within a development.

Include additional access roads, where feasible, to ensure adequate access for emergency equipment and civilian evacuation concurrently. All requirements and any deviations will be at the discretion of the Fire Code Official.

Meet or exceed the California Building Code for Materials and Construction Methods for Exterior Wildfire Exposure (Title 24, part 2, Chapter 7A).

For all remodeled or rebuilt structures, require projects to meet current ignition resistance construction codes included in the State's Fire Safe Regulations.

POLICY FI-5.5: WILDFIRES AND CRITICAL FACILITIES

The City shall locate, when feasible, new essential public facilities outside of high fire risk areas, including, but not limited to, hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities, or identifying construction methods or other methods to minimize damage if these facilities are located in a State Responsibility Area or Very High Fire Hazard Severity Zone.

POLICY FI-5.6 MAINTAIN FIRE FLOW

The City shall ensure adequate fire flow is maintained within the City limits through ongoing maintenance, capital improvement infrastructure upgrades, and improvements required in association with development projects.

POLICY FI-5.7 FIRE SUPPRESSION INFRASTRUCURE RESILIENCY

The City shall maintain fire flow during scheduled and unscheduled power outages and interruptions through incorporation of power source resiliency and redundancy within City water supply, treatment, and distribution infrastructure.

POLICY FI-5.8: WILDFIRE AND PARKING MANAGEMENT

The City shall adopt an ordinance to restrict on-street parking in high wildfire risk areas in San Luis Obispo during increased fire risk days to ensure full access for fire trucks and emergency vehicles and to increase roadway accessibility during evacuation events. The City Fire Department and other departments shall identify streets and neighborhoods that are at increased wildfire risk using the CAL FIRE Fire Hazard Severity Zones, Wildland Urban Interface Areas identified by the City, or another internal process. Conduct community outreach to neighborhoods affected by the policy and provide detailed information on how and when the parking restrictions will be implemented.

POLICY FI-5.9: CONCURRENCY OF FIRE PROTECTION SERVICES

The City shall ensure that adequate fire protection staffing, facilities, and equipment required, to serve developments operating before, or in conjunction with development.

POLICY FI-5.10: CLIMATE-SMART FIRE PROTECTION

The City shall incorporate the most current climate science regarding wildfires into all future reviews and updates to the City's fire and wildfire related documents (e.g., community wildfire protection plan).

POLICY FI-5.11: PROACTIVE COMMUNICATIONS ON FIRE RISKS AND PREVENTION

The City shall proactively communicate with the public about fire risks and prevention, including information about:

- wildfire smoke health impacts and available mitigation strategies
- The "Ready, Set, Go!" wildfire preparedness program including defensible space, home hardening, personal wildfire action planning, and evacuation actions.
- Public safety power shutoffs associated with high fire danger.

FIRE PROGRAMS

PROGRAM FI-5.12: IMPLEMENT THE COMMUNITY WILDFIRE PROTECTION PLAN

Continue to implement the City's Community Wildfire Protection Plan (CWPP) to reduce wildfire risk in the City's wildland-urban interface including implementation of the CWPP Tactical Policy Measures which focus on the four key policy areas of community education, fuels management, planning, and emergency response preparedness on an ongoing basis. Update the CWPP, every 5 years or sooner, to incorporate new best practices, funding opportunities, new legislation regarding wildfire protection, and other wildfire protection planning resources.

PROGRAM FI-5.13: IMPLEMENT THE VEGETATION MANAGEMENT PLAN

Continue to implement the City's Vegetation Management Plan, conducting fuel reduction projects at the 12 large open space lands included in the plan, using vegetation management techniques appropriate for each open space including manual vegetation removal; tree removal; mechanical treatment, prescribed burning, livestock grazing, and chemical treatment. Update the Vegetation Management Plan, as needed, to incorporate regulations regarding new best practices, and new funding opportunities for vegetation management projects.

Meet with the yak tityu tityu yak tiłhini (Northern Chumash Tribe San Luis Obispo County and Region (ytt Tribe)), Northern Chumash Tribal Council, and other tribal bodies on an annual basis, or as needed to incorporate Traditional Ecological Knowledge approaches to vegetation management in the City where appropriate.

Work with private property owners, San Luis Obispo County, and Caltrans to conduct roadside vegetation clearance along public and private roadways in Very High Fire Hazard Severity Zones in the city. Ensure that fuel reductions provide an appropriate fuel buffer for evacuees should these roadways become congested during an emergency incident.

Develop an Urban Creek Vegetation Management Plan as part of the Waterway Management Plan update. The plan shall set forth a holistic vision to address excessive and noxious vegetation and dead material in the creeks and waterways in San Luis Obispo and surrounding areas. Work with private property owners and San Luis Obispo County to review and conduct vegetation management to ensure dead trees and vegetation are reduced to prevent fire from spreading to adjacent lands.

PROGRAM FI-5.14: WILDFIRE IGNITION SOURCE REDUCTION PROGRAM

The City will work to reduce wildfire ignition sources within the City's open space and creek systems by supporting policy and exploring fire code amendments that restricts public access to hazardous fire areas during critical weather events.

PROGRAM FI-5.15: WILDLAND-URBAN-INTERFACE DEFENSIBLE SPACE AND HOME HARDENING PROGRAM

Implement a program to assist homeowners, landlords, and business owners in improving the defensible space for structures in or near the very high fire hazard severity zones. The program will serve to connect participants to contractors with experience in developing or improving home hardening improvements (e.g., fire-safe building materials, fire resistant home vent upgrades). The program will seek funding to supplement the costs associated with defensible space improvements, prioritizing low-income participants and elderly or disabled residents who would not be able to implement defensible space improvements on their own. The program would be developed and administered in close collaboration with the City's Fire Department and CAL FIRE to ensure appropriate standards for defensible space are implemented as part of the program consistent with AB 3074 ("Fire Prevention: wildfire risk : defensible space: ember-resistant zones").

PROGRAM FI-5.16: RESIDENT INFORMATION AND TRAINING ON FIRE HAZARDS

The City will inform homeowners and tenants about local fire hazards, appropriate responses to fire, and ways to prevent loss, including home improvements that can reduce the impact of fire.

The City will promote the efforts of the Fire Safe Council.

The City will continue hosting community preparedness sessions and workshops as effective preparation resources for residents to aid themselves when needs exceed the availability of professional emergency response workers.

The City will support education programs in the lower grades, using displays and demonstrations to inform young children about fire safety, and in secondary schools, demonstrating the dynamic aspects of fire, including major factors contributing to fire hazard and the relationship of fire to the natural ecology. Fire prevention and evacuation lessons will be included in each program.

PROGRAM FI-5.17: WILDFIRE SMOKE PROTECTION OUTREACH STRATEGY

Work with the San Luis Obispo Air Pollution Control District to ensure residents are educated on how to protect themselves and their homes from wildfire smoke impacts. Prioritize outreach campaigns to populations who are vulnerable to poor air quality and those who work with the population (e.g., elderly care nurses and assistances, teachers), conducting educational events at convenient locations for these residents.

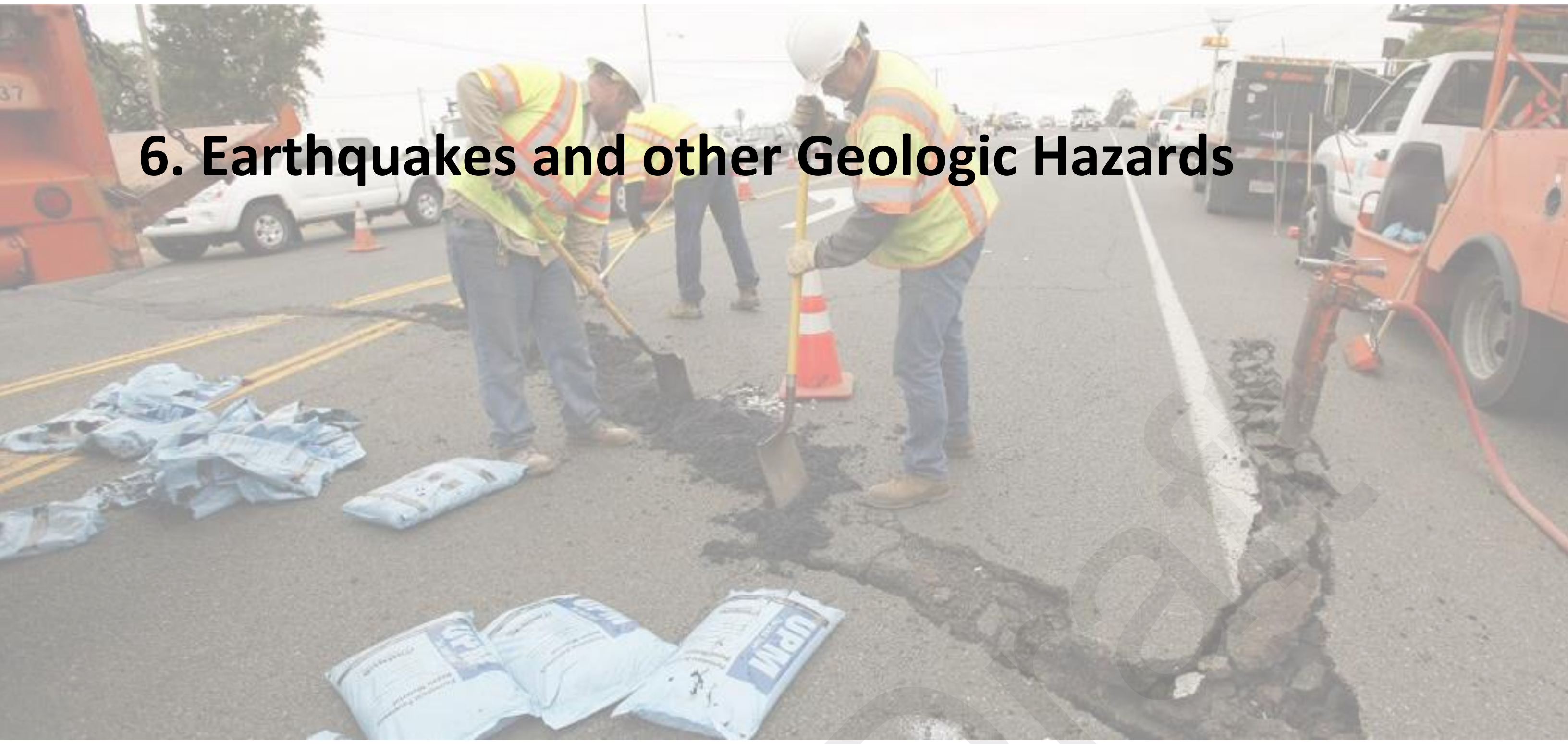
The outreach strategy should also focus on supporting employers to maintain compliance with California Code of Regulations, Title 8, Section 5141.1, which applies to most outdoor workplaces where the current Air Quality Index (current AQI) for airborne particulate matter is 2.5 micrometers or smaller is 151 or greater, and where employers should reasonably anticipate that employees could be exposed to wildfire smoke. Compliance requirements and training instructions are included in California Code of Regulations, Title 8, Section 5141.1.

PROGRAM FI-5.18: SUPPORT COMMUNITY RESILIENCE DURING PUBLIC SAFETY POWER SHUTOFFS

Through the City's Community Development Department, proactively provide information for the installation of battery storage systems for existing residential and non-residential developments, prioritizing opportunities for essential services such as hospitals, grocery stores, pharmacies, and other essential businesses.

Develop a streamlined permitting process, including appropriate CEQA exemptions, for the installation of small- and large-scale battery storage systems in existing residential and nonresidential development as well as providing applicants information on available financing options. Prioritize resource allocation to residents facing additional risks from Public Safety Power Shutoffs (PSPSs) including the elderly and disabled. Explore the viability of vehicle-to-building (V2B) technologies that can provide resilience by using the energy stored in PEV batters to power loads inside residential, commercial, or public buildings.

6. Earthquakes and other Geologic Hazards



OVERVIEW

Geologic conditions encompass the form of the ground surface, the composition and character of soils, rocks, and water at the ground surface and below, and the long-term movement of the Earth’s crust and mantle. These conditions determine the stability of the ground at a site, and how that site will respond to changes caused by people and by the natural forces of earthquakes and weather.

Numerous faults transect valleys and hillside areas in San Luis Obispo.

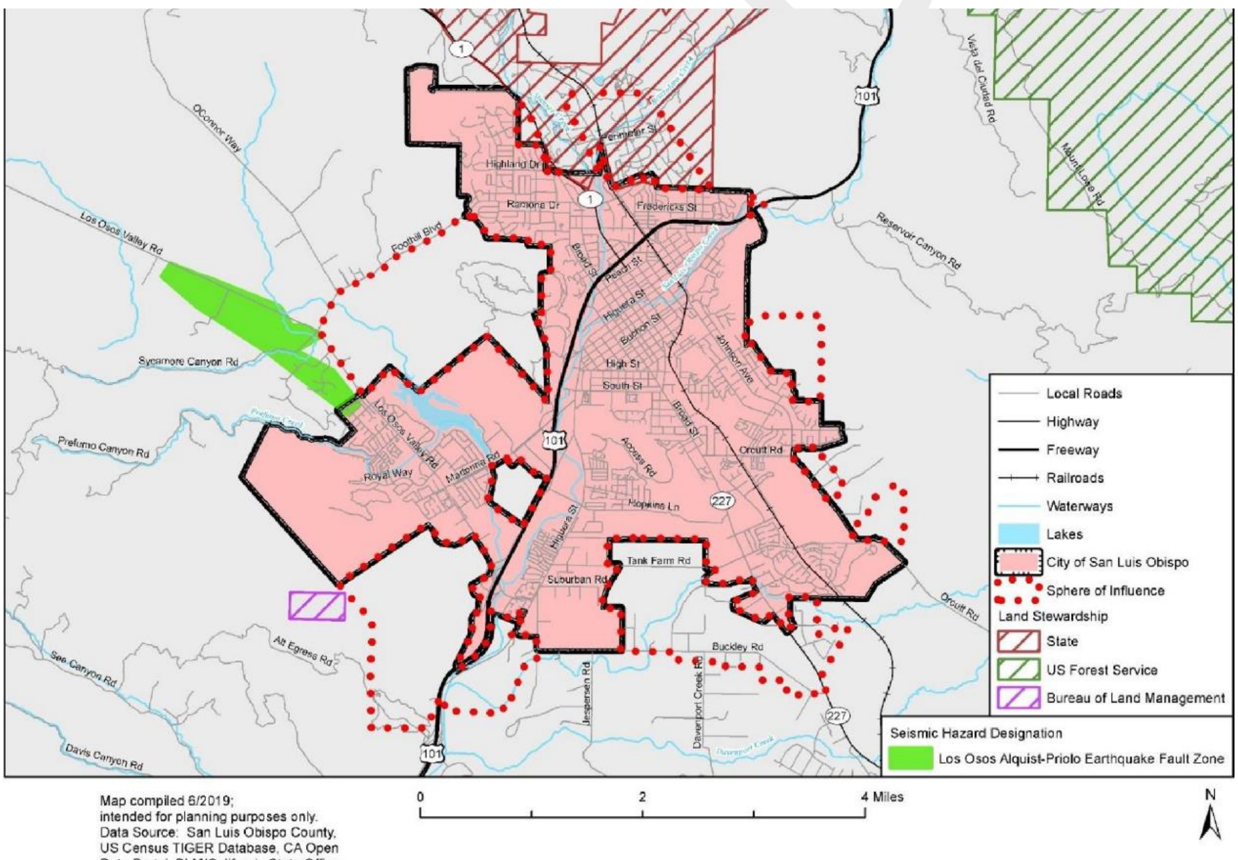
The frequency and strength of earthquakes depend on the number and type of faults that pass through an area. The city is in a geologically complex and seismically active region. Seismic conditions here have the potential to result in significant harm to people and property. Some fault locations and characteristics have been identified, however, recent earthquakes in California have shown that not all active faults are revealed by surface features. Safety precautions should be based on known factors, as well as an awareness of the limitations to current knowledge. This Element must consider two of the direct effects of an earthquake: rupture of the ground surface along a fault, and ground shaking that results from fault movement. Other hazards associated with earthquakes are settlement, liquefaction, landslide, collapse of pipes and structures, fires, and flooding from dam failure.

Surface Rupture

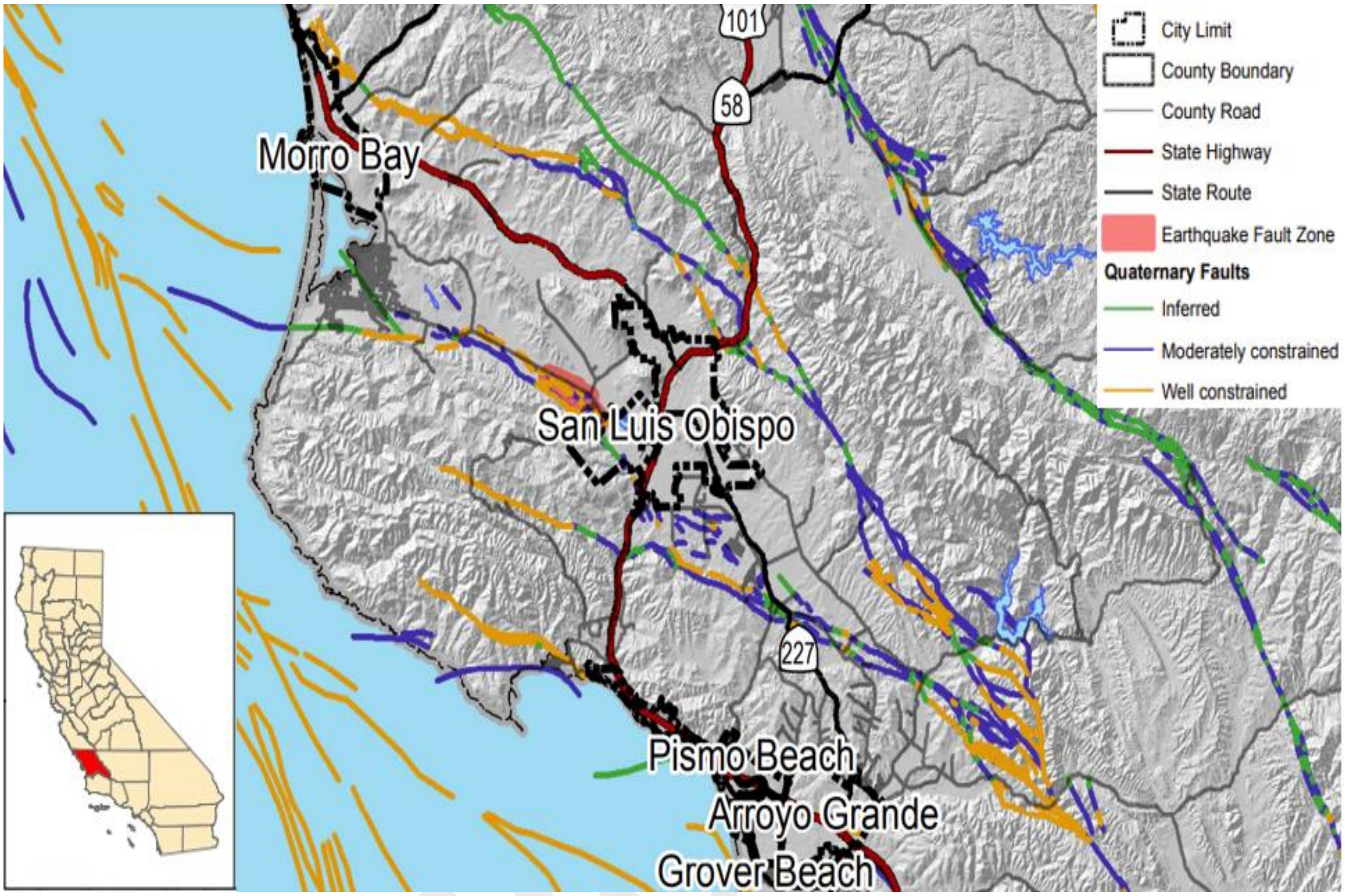
Surface rupture refers to the top of the ground moving unevenly along a fault: one side moves horizontally, vertically, or both, with respect to the other side. It typically occurs within an area of linear traces along previous ruptures, which mark a fault zone, and often in concert with movement on adjacent or intersecting faults. Rupture of the ground surface along a fault trace typically occurs during earthquakes of about magnitude 5 or greater. Surface rupture endangers life and property when structures or lifeline facilities are located on, or cross over, a fault.

The Los Osos Fault, adjacent to the City of San Luis Obispo, is identified under the State of California Alquist-Priolo Fault Hazards Act (Figure18). This fault's main strand lies near the intersection of Los Osos Valley Road and Foothill Boulevard. It has been classified as active within the last 11,000 years. Additional site-specific studies may find other segments of the fault, in which case it would be appropriate for the California Department of Mines and Geology to expand the zone. The Los Osos Fault presents a high to very high fault rupture hazard to development and facilities in the Los Osos Valley.

Other faults in the vicinity of San Luis Obispo are the West Huasna, Oceanic, and Edna faults. These faults are considered potentially active and present a moderate fault rupture hazard to developments near them. Figure 19 shows the locations of faults in the immediate San Luis Obispo area.



Draft Figure 19 Seismic Hazard Designation Area



Draft Figure 20. Regional Faults

Ground Shaking

Ground shaking refers to the vibration that occurs in response to displacement along a fault. Typically, ground shaking has a side-to-side component as well as a vertical component, with the actual movement depending on the type of fault, a site's distance from the fault, and the rock and soil conditions at the site. Shaking endangers life and property by damaging or destroying structures and lifeline facilities, including water distribution systems that carry water to the city from Whale Rock, Nacimiento and Salinas reservoirs. City reservoirs are not located near one another which reduces the likelihood of damage and loss of all water supplies. Several faults can produce strong ground motion in San Luis Obispo. These are the Los Osos, Point San Luis, Black Mountain, Rinconada, Wilmar, Pecho, Hosgri, La Panza, and San Andreas faults (Figure 20). The San Andreas Fault and the offshore Hosgri Fault, which present the most likely source of ground shaking for San Luis Obispo, have a high probability of producing a major earthquake within an average lifespan. The highest risk from ground shaking is found on deep soils that were deposited by water, are geologically recent, and have many pore spaces among the soil grains. These are typically in valleys.

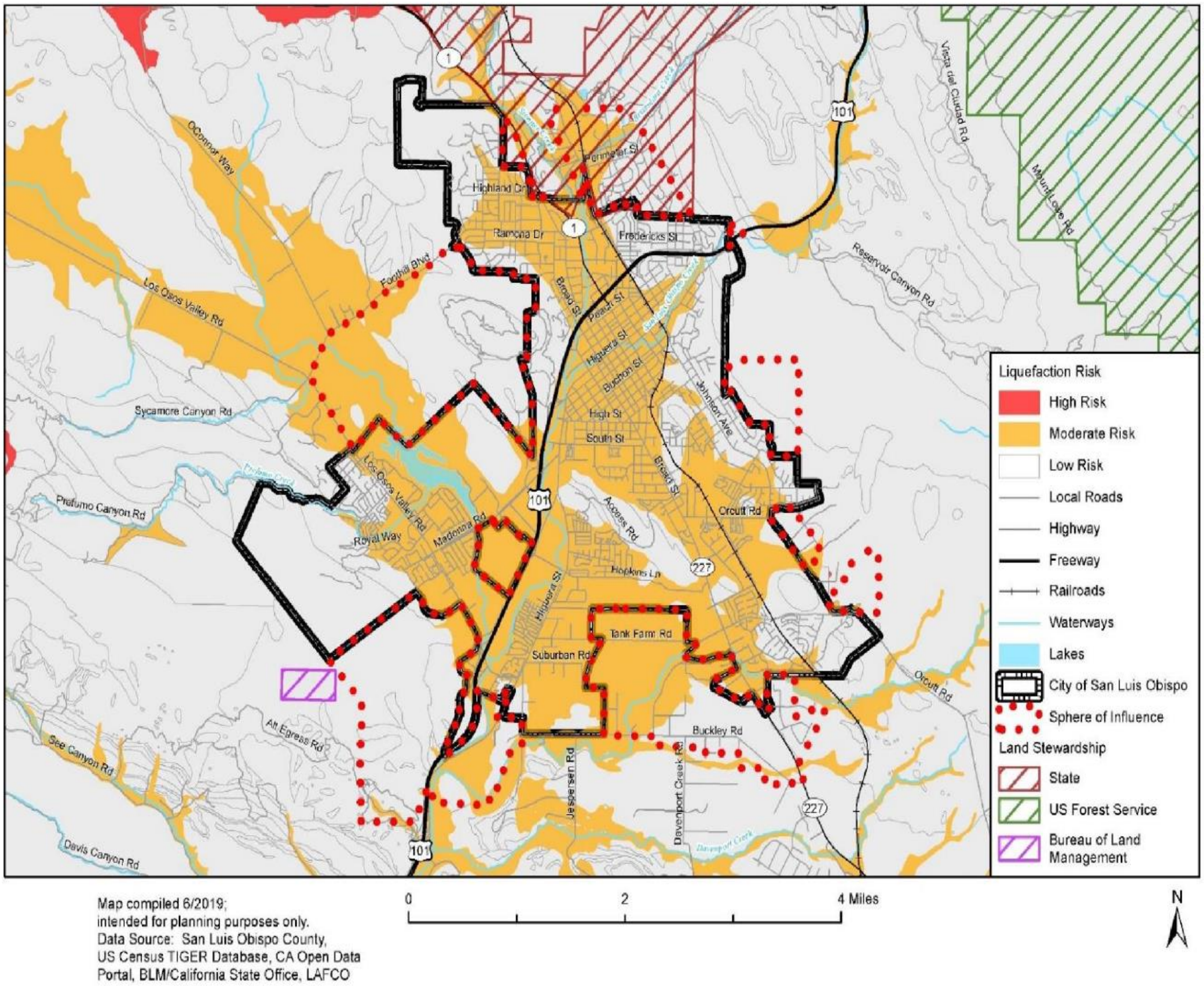
Engineering standards and building codes set minimum design and construction methods for structures to resist seismic shaking. Model standards and codes are typically updated every few years at the recommendation of professional advisors, in response to review of the performance of structures and lifelines that have been subject to recent earthquakes. Local governments then amend or replace their codes to reflect those required by State law or recommended.

Settlement and Liquefaction

In this context, settlement means the ground supporting part of a structure or facility lowers more than the rest or becomes softer, usually because ground shaking reduces the voids between soil particles (and often with groundwater rising in the process). The result can be more strain on the supporting features than they were built to withstand, leading to cracked walls or floors and broken water and sewer lines. Liquefaction is the sudden loss of the soil's supporting strength due to groundwater filling and lubricating the spaces between soil particles as a result of ground shaking. Soils with high risk for liquefaction are typically sandy and in creek floodplains or close to lakes. In extreme cases of liquefaction, structures can tilt, break apart, or sink into the ground. The likelihood of liquefaction increases with the strength and duration of an earthquake.

The soils in the San Luis Obispo area that are most susceptible to ground shaking, and which contain shallow ground water, are the ones most likely to have a potential for settlement and for liquefaction (Figure 21). The actual risk of settlement or liquefaction needs to be identified by investigation of specific sites, including subsurface sampling, by qualified professionals. Previous investigations have found that the risk of settlement for new construction can be reduced to an acceptable level through careful site preparation and proper foundation design, and that the actual risk of liquefaction is low. (An example is the City's fire station at Madonna Road and Los Osos Valley Road.)

The building code requires site-specific investigations and design proposals by qualified professionals in areas that are susceptible to settlement and liquefaction.



Draft Figure 21 Liquefaction Risk Areas

Slope Instability and Landslides

Slope instability can occur as a gradual spreading of soil, a relatively sudden slippage, a rockfall, or in other forms. Causes include steep slopes, inherently weak soils, saturated soils, and earthquakes. Improper grading and manmade drainage can be contributing factors. Slope instability may result in gradual or sudden damage to buildings, roads, and utility lines. Sudden movement can be a threat to lives through immediate injury or suffocation, or loss of access.

In the late 1990s, rain-saturated soil moved above houses on the Santa Lucia foothills.

Much of the development in San Luis Obispo is in valleys, where there is low potential for slope instability. However, the city contains extensive hillsides. Several are underlain by the rocks of the Franciscan group, which is a source of significant slope instability. The actual risk of slope instability needs to be identified by investigation of specific sites, including subsurface sampling, by qualified professionals.

The building code requires site-specific investigations and design proposals by qualified professionals in areas that are susceptible to slope instability and landslides.

Damage-Prone Buildings

Any type of building can be damaged in an earthquake, but some types are much more able to withstand quakes. In the past, many buildings were constructed of clay blocks, bricks, stone, or concrete blocks, with few or no steel members to resist separation of the masonry units. The weight and lack of connectivity within these unreinforced masonry buildings make them a particular threat to safety in an earthquake. Because many unreinforced masonry buildings have historic and architectural value, and contain viable businesses, there is reluctance to remove or replace them quickly. State law has required the City to identify unreinforced masonry buildings and implement a locally devised program to reduce risks. The City has surveyed them and required owners to evaluate their deficiencies and reinforcing needs. The City requires upgrades as buildings are remodeled or uses change, and provides fee credits to help offset some of the cost. A City law required the owners to complete seismic upgrades or demolish the buildings by 2017.

Some non-masonry buildings are especially prone to earthquake damage because they lack connections to their foundations or resistance to side-to-side motion. Examples include wood-frame buildings with apartments over garages that have one side occupied by a door opening, and hillside houses with little or no bracing for tall supports on the downhill side. The City participates in a rehabilitation loan program and a Voluntary Seismic Retrofit Program that includes standard retrofit plans for free that helps correct such problems, along with other measures such as bracing masonry chimneys and anchoring water heaters, mainly for older homes.

Expansive Soils

Expansive soils can change dramatically in volume depending on moisture content. When wet, these soils can expand; conversely, when dry, they can contract or shrink. Sources of moistures that can trigger this shrink-swell phenomenon include seasonal rainfall, landscape irrigation, utility leakage, and/or perched groundwater. Expansive soil can develop wide cracks in the dry season, and changes in soil volume have the potential to damage concrete slabs, foundations, and pavement. Special building/structure design or soil treatment are often needed in areas with expansive soils

POLICIES

POLICY GE-6.1: AVOIDING FAULTS

The City shall prohibit development atop known faults. Applications for the following types of discretionary approvals within 100 meters (330 feet) of any fault that is previously known or discovered during site evaluation shall be subject to review and recommendation by a State-registered engineering geologist:

- rezoning to a more intensive land-use designation;
- Tentative Tract Maps;
- Minor, Moderate, and Major Development Review Applications.

POLICY GE-6.2: AVOIDING SLOPE INSTABILITY

Development shall not be located on or immediately below unstable slopes, or contribute to slope instability. Any development proposed in an area of moderate or high landslide potential shall be subject to review and recommendation by a State-registered engineering geologist.

POLICY GE-6.3: AVOIDING LIQUEFACTION HAZARDS

Development shall not be located in areas of high liquefaction potential unless a site-specific investigation by a qualified professional determines that the proposed development will not be at risk of damage from liquefaction. The Chief Building Official may waive this requirement upon determining that previous studies in the immediate area provide sufficient information.

POLICY GE-6.4 STRUCTURAL STABILITY

Require new development to ensure structural stability while not creating or contributing to erosion, subsidence, or geologic instability or destruction of the site or surrounding area. Ensure that soils reports are prepared by a licensed civil engineer with expertise in soils and geology. Prior to acceptance, require soils reports by a certified engineering geologist when developing in the following areas:

a. Expansive soils and potential for subsidence
b. All areas having cut or fill material on property
c. Where there are known or suspected geologic, soils or hydrologic problems in the immediate vicinity.

PROGRAMS

PROGRAM GE-6.5: UPDATE THE HILLSIDE PLANNING PROGRAM

Update the City's Hillside Planning Program to ensure orderly development along the City's hillside areas prioritizing slope stability, safe access, circulation, and evacuation routes.

PROGRAM GE-6.6 SAFEGUARD THE INTEGRITY OF UTILITY CONVEYANCE SYSTEMS INCLUDING WATER PIPELINES FROM CITY RESERVOIRS.

Incorporate climate models and hazard impact assessment in the design and planning of maintenance and upgrades of water distribution systems from city reservoirs.

7. City Operations and Emergency Services

OVERVIEW

The City has a comprehensive set plans, policies, and procedures in place to prepare for and respond to a variety of emergency events. In coordination with San Luis Obispo County, the City provides emergency services to the community.

EMERGENCY OPERATIONS

City government consists of approximately 457 regular full-time employees and 8 regular part-time employees and 11 departments at the time of the Climate Adaptation and Safety Element update. Key departments involved in emergency operations activities include:

- The City of San Luis Obispo Police Department;
- The City of San Luis Obispo Fire Department;
- The City of San Luis Obispo Utilities Department;
- The City of San Luis Obispo Public Works Department;
- The City of San Luis Obispo Parks & Recreation Department; and
- The City Manager’s Office.

The City has many staff with specific training on the use of specialized equipment or areas of expertise that are essential in implementing mitigation actions. Additionally, the City has several key planning documents related to emergency operations that help support emergency operations. These plans and a brief description of their content and purpose are included below.

Emergency Operations Plan– This Plan provides policy and guidance for the coordination of planning efforts involving the City and related organizations. The San Luis Obispo Fire Department is responsible for Disaster Leadership and Preparedness coordination and will regularly revise and exercise Hazard Specific Annexes and related support materials, as appropriate. The 2022 Emergency Operations Plan covers the following types of major events:

- Earthquake
- Hazardous Materials Release
- Multiple Casualty Event
- Transportation
- Fire
- Civil Disturbance-Terrorism-Active Shooter
- Diablo Canyon Nuclear Power Plant
- Adverse Weather
- Utility Disruption

- Pandemic

The Emergency Operations Plan also provides resource materials for staff in the event of an Emergency Operations Center activation, such as position specific checklists, resource directory, and specific plans related to debris management, disaster recovery, and Continuation of Operations and Reconstitution of Government.

City of San Luis Obispo Hazard Mitigation Plan (Annex G in the San Luis Obispo County Multi-Jurisdictional Plan) – The 2020 San Luis Obispo County Multi-Jurisdictional Hazard Mitigation Plan was adopted by the City in June 2020. It includes a profile of existing hazards in the city, assess the probability and severity of each hazard event, and includes a comprehensive set of mitigation actions and implementation strategies while taking into account agency capabilities to help the City reduce risk from the identified hazards. To remain eligible for many state and federal funding, grants and assistance programs, the City must update the Hazard Mitigation Plan, at a minimum, every 5 years, which is based on the date of FEMA plan approval.

The City also coordinates with many external agencies (e.g., local, state, federal, private sector, and non-profits) which have capabilities to support hazard mitigation activities. Many of these agencies participated in the hazard mitigation planning process, including the following:

- County of San Luis Obispo – Airports
- County of San Luis Obispo – Office of Emergency Services
- County of San Luis Obispo – Public Health Department
- Cal Poly – City & Regional Planning Department
- Cal Poly – Administration and Finance
- French Hospital Medical Center
- American Red Cross
- Sierra Vista Regional Medical Center
- San Luis Coastal Unified School District
- California Highway Patrol
- PG&E
- San Luis Obispo County Fire Safe Council

In addition to the plan and policy resources available to the City to mitigate hazards, the City has developed or participated in several hazard mitigation programs including:

- Unreinforced Masonry Hazard Mitigation Program
- Disaster Preparedness Program
- Floodplain Management Educational Program
- San Luis Obispo Chamber of Commerce Business Continuity Planning
- County Public Health Emergency Preparedness Advisory Committee
- National Flood Insurance Program and FEMA Repetitive Loss Properties
- Community Wildfire Protection Program
- Greenbelt Protection Program

CRITICAL FACILITIES

Critical facilities and infrastructure provide essential services to the public, such as preserving the quality of life and providing essential public safety, emergency response, and disaster recovery functions. Different types of critical facilities include medical facilities, evacuation and community centers, potable water and wastewater facilities, fire stations, and local law enforcement stations. The County's HMP organizes critical facilities the following four categories:

Emergency Services – Facilities or centers aimed at providing for the health and welfare of the whole population (e.g., hospitals, police, fire stations, emergency operations centers, evacuation shelters, schools).

Lifeline Utility Systems – Facilities and structures such as potable water treatment plants, wastewater, oil, natural gas, electric power and communications systems.

Transportation Systems – These include railways, highways, waterways, airways, and city streets to enable effective movement of services, goods and people.

High Potential Loss Facilities – These include nuclear power plants, dams, and levees.

Transportation infrastructure is discussed in greater detail in Section 3.1, "Assets at Risk" of the Hazard Mitigation Plan. Table 6 includes the City's critical facilities and infrastructure are that have been evaluated for their replacement value and are included in Appendix G of the Hazard Mitigation Plan.

Table 6 Critical Facilities and Infrastructure in the City of San Luis Obispo

Category	Facility/Infrastructure Asset
Community and Recreational Facilities	City Hall
	Library
	Ludwick Community Center
	Meadow Park Recreational Center
	Mitchell Park Senior Center
	Sinsheimer Pool and Park
Medical Facilities	Sierra Vista Regional Medical Center
	French Hospital Medical Center
Schools	California Polytechnic State University
	Cuesta College
	Laguna Middle School
	San Luis Obispo High School
Infrastructure	Critical Bridges
	Essential Bridges
	Higuera Box Culvert
	Evacuation Route Roads
	Other Essential City-Owned Roads
	Communication Towers
Other City-Owned Facilities	City Corporation Yard
	Community Development and Public Works Administration
	Parking Garages
	Parks and Recreation Building
	Prado Day Center
	Utilities Administration
Police and Fire Stations	Dispatch Center

Category	Facility/Infrastructure Asset
	Fire Station #1
	Fire Station #2
	Fire Station #3
	Fire Station #4
	Police Main Building, Garage, Annex
Potable Water and Wastewater Facilities	Fire Station #4 Well
	Pacific Beach Well
	Reservoirs
	Eight Sewer Lift Stations
	Sewer System Infrastructure (pipes) – Approx. 140 miles
	Water Resource Recovery Facility
	Seven Water Pump Stations
	Water System Infrastructure (pipes) – Approx. 180 miles
	Eleven Treated Water Storage Tanks
	Water Treatment Plant

Note: N/A = not available.

Source: Modified from Table G.9 in San Luis Obispo County 2019b.

RADIATION HAZARDS

The Diablo Canyon Power Plant is the primary hazard for ionizing radiation in the San Luis Obispo area. Risks result from the potential for mistakes during day-to-day operations, accidents associated with refueling, and damage from earthquakes or other causes. There is added risk from on-site storage of spent fuel that remains radioactive for several generations. Long-term, off-site storage facilities for spent fuel are not available. Protective systems are installed, and emergency plans are in place in the event that any part of the reactor system fails. Diablo Canyon is scheduled to be decommissioned in 2025 with potential extended operations through 2030 per Senate Bill 846 (SB 846, Dodd). Decommissioning will take approximately ten years after units are shutdown. The plant operator and local agencies have jointly prepared plans for warning, sheltering, evacuation, and other responses to radiation emergencies. Updated information regarding the Emergency Response Plan is distributed to the public each year.

Relatively low-level radioactive materials and waste result from some medical facilities and other sources. The use, transportation, and disposal of these materials are governed by State and Federal regulations.

Radon is a naturally occurring gas produced by the breakdown of traces of uranium in certain soils and rocks. This gas can accumulate inside structures where building materials emit or trap radon, posing a significant health hazard. Soils and rocks in the San Luis Obispo area are not known to be sources of radon, so it is not considered a substantial local hazard.

HAZARDOUS MATERIALS

Hazardous materials include a wide range of solids, liquids, and gases that are flammable, explosive, corrosive, or toxic. Because large amounts of hazardous materials are shipped through the San Luis Obispo area daily, transportation accidents pose the most significant hazardous material risk to residents and the environment. Hazardous materials are transported along highways, the railroad, and pipelines, which pass through the city.

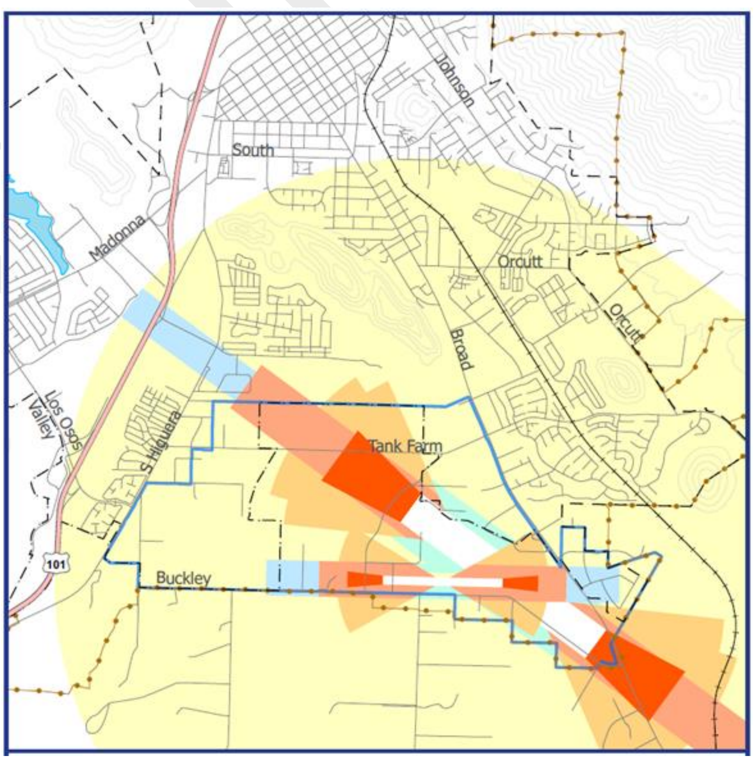
Public exposure to hazardous materials also can result from their use by industry, agriculture, and services. In 2022, there were about 195 businesses in the city using hazardous materials in sufficient quantities to require filing a report with the Fire Department, as required by the California Health and Safety Code. Household use of hazardous materials is also a threat to health and the environment if used or disposed of improperly.

AIRPORT HAZARDS

The San Luis Obispo County Airport provides commuter, charter, and private service to the area. The primary hazard associated with the airport is the risk of aircraft crashing on approach and take-off. Aircraft flight operations are determined largely by the physical layout of the airport and rules of the Federal Aviation Administration. Activities on the airport property are managed by the County.

Existing land uses under the approach and take-off paths include agriculture and businesses close to the airport, and shopping centers, dwellings, and schools at greater distances. State law requires the independent, countywide Airport Land Use Commission to adopt an Airport Land Use Plan for each airport. This plan establishes zones based on flight patterns, with the aim of having future development be compatible with airport operations, considering safety and noise exposure. State and County policies encourage future development to be consistent with the Airport Land Use Plan.

On May 26, 2021, The County of San Luis Obispo Airport Land Use Commission (ALUC) adopted the Amended and Restated San Luis Obispo County Regional Airport (SBP) Land Use Plan (ALUP). In accordance with state law, unless an overrule action is taken, the City's General Plan is required to be consistent with the ALUP.



Draft Figure 22 ALUP Safety Zones

CITY OPERATIONS AND EMERGENCY SERVICES POLICIES

Policy OP-7.1: EMERGENCY PREPAREDNESS AND RESPONSE

Ensure the City and all relevant City departments have adequate planning, organization, and resources for emergency preparedness and emergency response.

The following response-time programs are intended to apply to recurrent types of emergencies, not rare, area wide disasters:

A. The Fire Department has set a response-time objective of four minutes. (The Fire Department's Master Plan recommends that a three-person engine company, with paramedic, meet this standard 90 percent of the time).

B. The Police Department has set a one-third (33%) available-time objective for patrol response. ("Available time" is the fraction of total time that a patrol unit is not previously assigned or otherwise unavailable for response to a new emergency call for service.) The presence of available time during a shift allows Officers to perform proactive policing methods to deter and prevent crime, rather than responding to crime once reported.

Policy OP-7.2: CLIMATE-INFORMED EMERGENCY OPERATIONS PLANNING

The City shall incorporate climate projections and climate impact data into the Emergency Operation Plan updates.

Policy OP-7.3: EMERGENCY ACCESS AND EVACUATION

Substantial development will be allowed only where multiple routes of road access can be provided, consistent with other General Plan policies on development location and open space protection and community risk reduction. "Substantial development" means industrial, commercial, and institutional uses, multifamily housing, and single-family dwellings in accordance with adopted fire code. "Multiple routes" include vehicle connections that provide emergency access only, as well as public and private streets.

Policy OP-7.4: MINIMIZING HAZARDOUS MATERIALS EXPOSURE

The City shall minimize people's exposure to hazardous substances through ensuring businesses that use, store, or transport hazardous materials to take adequate measures to protect public health and safety.

Policy OP-7.5: MITIGATING HAZARDS FROM NEW DEVELOPMENT

New development with sensitive land uses shall be buffered from stationary sources and mitigated from non-stationary sources of pollution. Development, including access and utility systems, shall be directed away from hazardous areas as described in the Hazard Mitigation Plan. Where development, including access and utility systems, cannot avoid hazardous areas, the development shall adequately mitigate the hazards and provide that the City and all relevant City departments have adequate planning, organization, and resources for emergency preparedness and emergency response. Hazard mitigation measures shall not significantly impact the environment, including wildlife habitats. Development shall pay an equitable share of the costs to mitigate area wide hazards. Hazard mitigation measures shall not burden taxpayers with high maintenance costs. Development shall not increase hazards for other properties in the area.

Policy OP-7.6: HAZARDOUS MATERIALS IN CITY OPERATIONS

The City shall avoid using hazardous materials in its own operations to the greatest extent practical, and will follow all established health and safety practices when they are used. When managing pests and invasive plants, the City should use Integrated Pest Management practices and avoid the use of chemical insecticides and herbicides to the greatest extent practical.

Policy OP-7.7: BUSINESS AND ECONOMIC RESILIENCE

The City shall incorporate climate projections and climate impact data to develop business and economic resiliency.

Policy OP-7.8: CLIMATE CHANGE AND FOOD SECURITY

The City shall minimize potential impacts of climate hazards on food security.

CITY OPERATIONS AND EMERGENCY SERVICES PROGRAMS

Program OP-7.9: CLIMATE RESILIENCE FUND

Establish a Climate Resilience Fund to support the implementation of climate adaptation strategies identified in the Community Safety and Resilience Element. Supplement the Climate Resilience Fund by identifying and pursuing funding and financing opportunities for specific climate adaptation and climate-related hazard mitigation strategies. Identify high-priced climate adaptation strategies or capital improvement projects and research the feasibility of financing these efforts through green bonds or similar financing mechanisms.

Program OP-7.10: EMERGENCY OPERATIONS CENTER

The City will maintain an Emergency Operations Center Plan, to prescribe the intended activation and operation of a single facility from which disaster response and essential city services will be supported. Fire Station 1 will serve as the Emergency Operations Center, with the Ludwick Center serving as the back-up emergency operations center. The Corporation Yard and the Police Station serving as department operating centers or tertiary back-up emergency operation centers if the primary and back-up locations are not viable. The primary Emergency Operations Center will transfer to the new Public Safety Center located at the existing Police Headquarters when construction is complete, and occupancy is permitted, at which time, the Fire Department will become the back-up EOC. The City will maintain back-up power sources for the primary and secondary EOC. If a permanent back-up power source is not feasible, the City will maintain portable back-up power sources.

Program OP-7.11: CLEAN-ENERGY MICROGRID FOR CITY FACILITIES

Continue supporting the City's current Carbon Neutral City Facilities plan. As part of this plan, if appropriate, conduct a feasibility study for developing a clean energy microgrid for key City facilities to provide clean, and reliant back-up power during utility disruptions (e.g., Public Safety Power Shutoffs or other disruptions) as well as providing local solar power to City facilities for non-emergency use during the day. Ensure that the feasibility study includes the following details to allow for the development of a City microgrid, if deemed feasible:

- A review of regulatory and operational considerations
- A conceptual shovel-ready design of the technical components for a fully connected microgrid and an "islandable" solar + storage system
- A phasing strategy and procurement plan for implementation
- An operational strategy that includes governance and cybersecurity
- Key considerations for operation of the microgrid during short-term and long-utility disruptions

Seek funding sources including the California Energy Commissions Electric Program Investment Charge (EPIC) Program and the Pacific Gas and Electric Community Microgrid Enablement Program (CMEP) to conduct a feasibility study.

Program OP-7.12: CRITICAL FACILITIES LOCATIONS

The following City facilities are necessary for community function and emergency response:

- fire stations
- police main station
- water treatment plant
- raw water storage reservoirs/lakes
- wastewater treatment plant
- public works and utilities corporation yards
- principal telecommunications facilities

New City's Critical facilities will not be located in 100-year floodplains, in areas of high or extreme wildland fire hazard, on sites subject to liquefaction or landslide (as distinguished from areas with potential for these hazards), atop earthquake faults or withing State-designated special studies zones, or where prohibited by the Amended and Restated San Luis Obispo County Regional Airport (SBP) Land Use Plan (ALUP). Where the existing city operated critical facilities are located in these high hazard areas, they shall be flood protected and the city will identify, and when feasible, implement, mitigation strategies to limit the impacts of associated hazards.

The following facilities operated by entities other than the City, which are necessary for community function and emergency response, should not be located in 100-year floodplains, in areas of high or extreme wildland fire hazard, on sites subject to liquefaction or landslide [as distinguished from areas with potential for these hazards], atop earthquake faults or within State-designated special studies zones, or where prohibited by the Amended and Restated SBP ALUP:

- hospitals
- Caltrans and utilities corporation yards

- principal electrical substations
- principal natural gas transmission mains and pumping stations
- principal public-utility telecommunications and emergency broadcast facilities
- resilience hubs and community centers

Program OP-7.13: WATER SYSTEM RESPONSE PERFORMANCE STANDARDS

The City will evaluate fire-flow capacities and identify deficiencies through testing and modeling of the water system. For identified deficiencies, the Utilities and Fire Departments will propose remedies to meet recommended service levels based American Water Works Association (AWWA) standards and Fire Code regulations.

Program OP-7.14: REDUCING STRUCTURAL HAZARDS

The City will identify and evaluate hazards in existing structures and work toward reducing those hazards to acceptable levels of risk. The City will advocate that other organizations and agencies do the same. Highest priority will be given to critical facilities (listed in Program OP-7.12) and transportation facilities. This overall effort has five basic components:

A. The City's continuing steps to evaluate, maintain, and replace its own facilities, in particular bridges, public assembly rooms, fire stations, water tanks, and water and wastewater treatment plants.

B. Routine inspections for code compliance in commercial, industrial, public-assembly, group-housing, and multifamily residential buildings.

C. Complaint-based inspections for code compliance in all buildings.

D. Implementation of the City-adopted program to identify and mitigate hazards of unreinforced masonry buildings.

E. Subject to adequate resources being provided through the budget process, outreach for private, woodframe buildings involving attachments to adequate foundations, cripple-wall bracing, water-heater attachment, and bracing or attachment of masonry chimneys.

Program OP-7.15: COORDINATED EMERGENCY PLANNING

The City will work within the Standardized Emergency Management System, an emergency response and coordination system used throughout California, the National Incident Management System, and the National Response Framework. The City will participate in periodic disaster-response drills, on a regional basis with all involved jurisdictions and involving the news media.

The City will review the hazard assessment studies and emergency response plans of utilities and of transportation agencies and companies operating in the San Luis Obispo area, and update the City's Emergency Plan, including evacuation routes, as necessary.

The City will work with Caltrans to assure transport of hazardous materials follows Caltrans-approved routes, with all necessary safety precautions taken to prevent hazardous materials spills. The City will train fire fighters, police officers, building inspectors, and public works.

Program OP-7.16: CLIMATE RESILIENCY CHECKLIST FOR NEW DEVELOPMENT

Similar to the City's GHG Emissions Analysis Compliance Checklist, develop and adopt a Climate Resiliency Checklist to ensure that new residential and nonresidential development in the city is designed and built to withstand the forecasted impacts of climate change. Incorporate all appropriate policies related to new development that are included in the Community Safety and Resilience Element into the checklist. Items in the Climate Resiliency Checklist should be objective and comply with all relevant housing laws to eliminate discretionary review. Checklist items could include:

A. Energy design standards that incorporate future changes in annual average minimum and maximum temperatures

B. Additional battery storage requirements for certain types of development to mitigate impacts from future utility disruptions

C. Defensible space and home hardening requirements for development located in high wildfire risk areas designated by the City

D. Additional building design or site plan requirements to mitigate flood-related impacts in areas with current or future flood risk

E. Additional building design or landscaping requirement to reduce water consumption in new development

Program OP-7.17: DEVELOPMENT REVIEW AND INSPECTIONS

The City will maintain and administer its Zoning and Subdivision Regulations and Community Design Guidelines in conformance with the General Plan. The standards and guidelines will be consistent with the requirements and recommendations of City police and fire departments.

A. City fire, police, public works, and utilities personnel will review applications for subdivisions and development projects, for consistency with safety objectives.
B. The City will maintain and administer its building and fire regulations in conformance with State requirements, including adoption of updated editions of uniform codes.
C. The City will conduct safety inspections for fire and hazardous materials in commercial, industrial, and multifamily residential buildings.

Program OP-7.18: STAFF TRAINING

The City will train fire fighters, police officers, building inspectors, and public works and utilities staff to levels appropriate for their tasks and responsibilities. The City will provide training for those of its staff who apply its building regulations and planning standards, emphasizing the lessons learned in locations that have experienced disasters. The City will conduct disaster-response exercises for the types of non-nuclear disasters discussed in this element, coordinated with participation in required, periodic nuclear-disaster response training exercises. All public employees in the State of California are considered Disaster Service Workers (DSW) and as such the City will train all employees to ensure basic understanding of DSW responsibilities, the State Emergency Management System, National Incident Management System and the Incident Command System.

PROGRAM OP-7.19: BUILDING CITY CAPACITY FOR CLIMATE RESILIENCE

Identify key gaps in the City's knowledge of climate adaptation planning and how to integrate the topic into work efforts. Establish a 1–3 year strategy and workplan to increase City staff capacity to fully integrate climate change adaptation as a key component of their work for appropriate departments and staff. Assess progress towards increasing staff capacity to address climate change on an annual basis and adjust strategy accordingly based on results and new information and guidance regarding climate adaptation planning. Establish the City's Green Team as the official working group to help implement the suite of climate adaptation strategies included in the Climate Adaptation and Safety Element, identifying representatives from key City departments to lead climate adaptation efforts in those departments.

PROGRAM OP-7.20: TRADITIONAL ECOLOGICAL KNOWLEDGE

Work with the yak tityu tityu yak tiłhini (Northern Chumash Tribe San Luis Obispo County and Region (ytt Tribe)), Northern Chumash Tribal Council, and other tribal bodies to incorporate Traditional Ecological Knowledge approaches into the City's Open Space Conservation Guidelines.

PROGRAM OP-7.21: CLIMATE-SMART PEST MANAGEMENT

Integrate Climate-Smart Pest Management Practices into the City's Open Space Conservation Guidelines with consideration of how climate change is going to affect pest control and invasive species.

PROGRAM OP-7.22: CLIMATE INFORMED EMERGENCY OPERATION PLAN

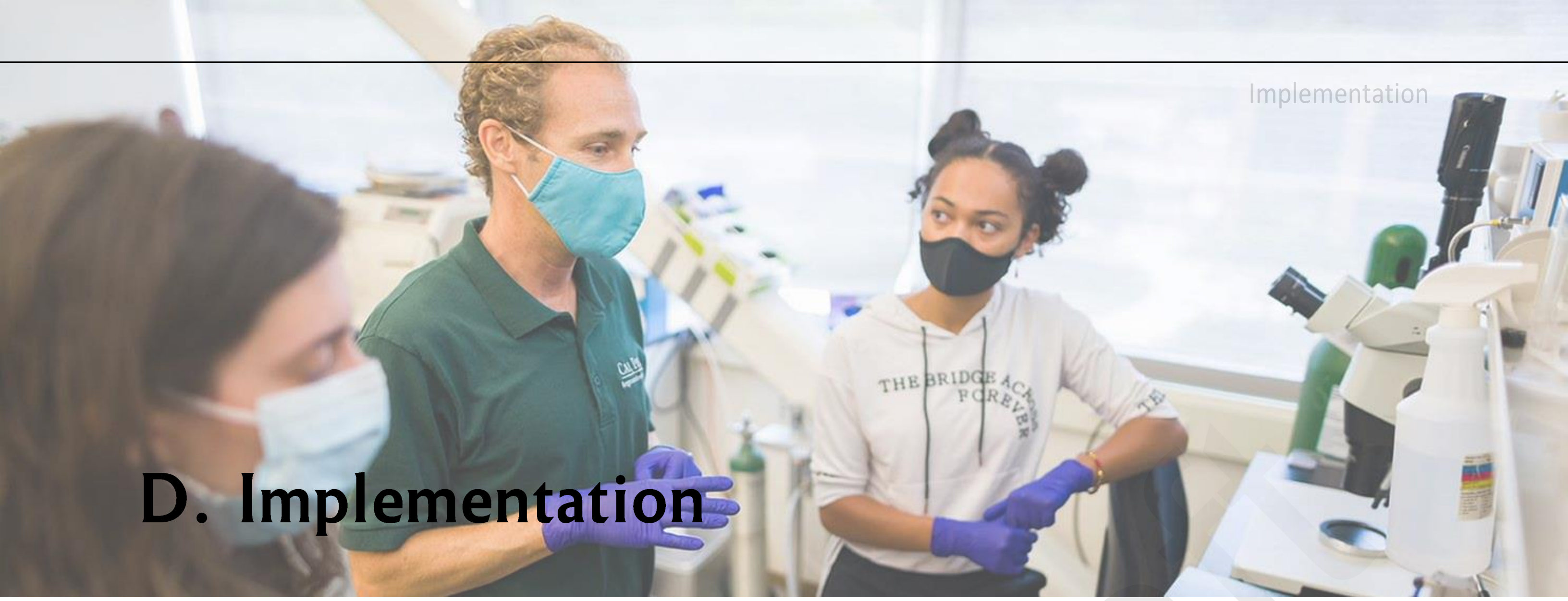
During the City's next comprehensive update of the Emergency Operations Plan (EOP), incorporate climate projections and climate impact data from the Climate Change Hazards and Vulnerabilities Report into the plan's hazard identification and analysis to ensure hazard specific annexes address climate-related disasters. Analyze future staffing and resource requirements to adequately address the future frequency and intensity of climate-related hazards in the city. Develop protocols for novel climate-related hazards that the city has previously experienced which are not adequately addressed in existing EOP hazard-specific annexes.

PROGRAM OP-7.23: CLIMATE INFORMED ECONOMIC DEVELOPMENT STRATEGIC PLAN

Work with the local business community to identify key economic sectors that are vulnerable to impacts from climate-related hazards and other hazards identified in the Hazard Mitigation Plan (e.g., tourism) and develop a strategy to diversify the City's economy to avoid overreliance on economic sectors that are vulnerable to climate impacts and local hazards. Work with the San Luis Obispo Chamber of Commerce to identify businesses and local industries already being affected by climate-related impacts (e.g., drought, wildfire smoke, extreme heat, flood) and identify opportunities to help support affected industries. Where economic vulnerabilities pose a risk to ongoing City revenues, develop programs to bolster the City's financial resilience through a Resilience Fund or other measures.

PROGRAM OP-7.24: FOOD SECURITY

Work with community organizations (e.g., SLO Food Bank) and the SLO County Health Department to assess potential impacts of climate hazards on food availability, food prices and food insecurity in the city, particularly for disadvantaged communities. Partner with community organizations to address food insecurity including opportunities to support food recovery efforts as part of implementation of Senate Bill 1383 to reduce food waste and associated greenhouse gas emissions.



D. Implementation

OVERVIEW

This section provides information on how the City can successfully implement the set of policies and programs included in the Climate Adaptation and Safety Element. It describes how best to conduct ongoing community engagement during implementation as well as develop key regional and community partnerships to ensure successful implementation of the policies and programs. The section also identifies appropriate funding and financing sources to support implementation. Finally, the section provides a succinct timeline to help the City prioritize implementation of the policies and programs.

COMMUNITY ENGAGEMENT AND PARTNERSHIPS

Effective implementation of the policies and programs in the Climate Adaptation and Safety Element will require sustained collaboration with community partners and regional agencies, as well as collaboration among City departments. Collaboration with partners during the strategy implementation process ensures that knowledge and resources will be shared and allows the City to implement strategies effectively. Many of the strategies that focus on hazard preparedness involve helping residents prepare their household and neighborhoods for climate-related hazards (e.g., flooding, heat wave events). By conducting community outreach and involving residents in the implementation process, the City will ensure that the community overall will be better prepared to respond to and adapt to changing circumstances, whether they are chronic stresses, such as climate change, or acute shocks, such as an earthquake. Community engagement during implementation can also help create a committed group of community stakeholders who will help implement strategies and help create sustained commitment in the community for achieving successful implementation (Cal OES 2020). The City will utilize a whole Community approach which will attempt to engage the full capacity of the private and nonprofit sectors, including businesses, faith-based and disability organizations, and the general public, in conjunction with the participation of local, tribal, state, territorial, and Federal governmental partners. This Whole Community approach is a means by which residents, City officials, organizational and community leaders can collectively understand and assess the needs of their respective communities and determine the best ways to organize and strengthen their assets, capacities, and interests (FEMA 2011).

COMMUNITY RESILIENCE ROUNDTABLE

As part of implementation, the City will establish a Community Resilience Roundtable (Roundtable) to help increase the City's capacity and knowledge base for implementing the comprehensive policies and programs in this element. Successful implementation will require the expertise and experience of various parts of the community and the larger San Luis Obispo region (e.g., the transportation system, the flood management system, and community preparedness). The Roundtable will be comprised of technical experts, residents, representatives from community organizations, members of the business community, City staff, and other relevant partners. The primary responsibilities of the Roundtable will be to (1) meet regularly to guide the successful implementation of the Climate Adaptation and Safety Element, (2) assist the City by providing subject area expertise as various policies and program are implemented, (3) help increase the City's capacity to implement strategies by encouraging collaboration with regional and State agencies and community partners, and (4) review and support grant applications for identified actions as appropriate to leverage additional funds for implementation.

SUSTAINED COMMUNITY ENGAGEMENT

The City will need to host community outreach events to gather input on how best to implement the strategy and identify community priorities to help design strategy implementation. Many of the programs in the element will require sustained community participation or comprehensive infrastructure updates, requiring significant City staff time and resources. By conducting sustained community outreach during implementation, the City can gain support and buy-in from members of the community who will help advocate for and support implementation of these strategies.

The City is developing an interactive website that will provide a platform for easy access for residents and serve as a real-time tool to monitor and provide input on implementation of specific strategies. The website will also serve as a platform for community members to receive the most up-to-date information on ways to get involved in implementation of certain strategies, attend community events, and participate in other activities to support implementation. The website will be updated regularly to report progress on implementation of individual strategies.

IMPLEMENTATION WORKPLAN

The tables included in this section provides a ten-year timeline for when programs related to each hazard in the element should be implemented by the City. The implementation timelines have been designed to account for overlaps in similar programs to maximize the City's capacity and resources for implementation as well as for the time required for the strategy to be fully implemented and become effective in mitigating various hazard.

PROGRAM IMPLEMENTATION TIMELINE

Program	Program Name	Lead Department	Immediate	Near Term (2023-27)	Long term (by 2035)	Ongoing
High Impact Multi Hazard Resilience Solutions						
MH-1.5	Update the City's Capital Improvement Program to Incorporate Climate	Public Works		x		
MH-1.6	Update City's Engineering Standards and Specifications to Incorporate	CDD		x		
MH-1.7	Climate Smart Natural Resource Management	Office of Sustainability				x
MH-1.8	Climate Resilience Hubs	Office of Sustainability		x		
MH-1.9	Post-Disaster Recovery Debris Management	Utilities	x			
MH-1.10	Post-Disaster Recovery Resources and Education	CDD		x		
MH-1.11	Regional Collaboration and Community Resilience Ambassadors	Office of Sustainability				x
Environmental Justice						
EJ-2.3	Empower Community Organizations	Office of Sustainability	x			
EJ-2.4	Ensure Public Engagement Noticing Manual Advances Procedural Equity	Office of Diversity,	x			
EJ-2.5	Develop Equity Checklist for City Programs and Capital Improvement	Public Works	x			
EJ-2.6	Establish Community Resilience Fund	Administration				
EJ-2.7	Report on Equity and Environmental Justice Progress	Administration	x			
Flooding						
FL-3.7	Waterway Management Plan	Office of Sustainability		x		
FL-3.8	Flood Damage Prevention	Office of Sustainability		x		
FL-3.9	Sustainable Flood Management and Open Space	CDD				x
FL-3.10	Urban Creeks Vegetation Management Plan	Office of Sustainability		x		
FL-3.11	Flood-Prepared Neighborhoods Program	Fire Department				x
FL-3.12	Community-Driven Flood Education	Administration				x
FL-3.13	Flood Warning Monitoring System	CDD	x			
Extreme Heat						
HE-4.4	Urban Heat Island Mitigation Program	CDD			x	
HE-4.5	Climate-Smart Urban Tree Canopy	Public Works				x
HE-4.6	Community Cool Zones Network	CDD		x		
HE-4.7	Green and Healthy Buildings Program	Office of Sustainability				x
HE-4.8	Extreme Heat and Emergency Preparedness	Fire Department				x

Program	Program Name	Lead Department	Immediate	Near Term (2023-27)	Long term (by 2035)	Ongoing
High Impact Multi Hazard Resilience Solutions						
HE-4.9	Equitable Community Outreach for Extreme Heat	CDD	x			
Fire						
FI-5.12	Implement the Community Wildfire Protection Plan	Fire Department				x
FI-5.13	Implement the Vegetation Management Plan	Office of Sustainability				x
FI-5.14	Wildfire Ignition Source Reduction Program	Fire Department				x
FI-5.15	Wildland-Urban-Interface Defensible Space and Home Hardening Program	Fire Department		x		
FI-5.16	Resident Information and Training on Fire Hazards	Fire Department	x			
FI-5.17	Wildfire Smoke Protection Outreach Strategy	Fire Department				x
FI-5.18	Support Community Resilience During Public Safety Power Shutoffs	CDD				x
Earthquakes and other Geologic Hazards						
GE-6.5	Update the Hillside Planning Program	CDD			x	
GE-6.6	Inspect and Safeguard the Integrity of Utility Conveyance Systems	Utilities				x
City Operations and Emergency Services						
OP-7.9	Climate Resilience Fund	CDD	x			
OP-7.10	Emergency Operations Center	Fire & Police				x
OP-7.11	Clean-Energy Microgrid for City Facilities	Public Works				x
OP-7.12	Critical Facilities Locations	CDD				x
OP-7.13	Water System Response Performance Standards	Utilities & Fire	x			
OP-7.14	Reducing Structural Hazards	CDD	x			
OP-7.15	Coordinated Emergency Planning	Fire & Police				x
OP-7.16	Climate Resiliency Checklist for New Development	CDD	x			
OP-7.17	Development Review and Inspections	CDD				x
OP-7.18	Staff Training	Administration				x
OP-7.19	Building City Capacity for Climate Resilience	Administration		x		
OP-7.20	Traditional Ecological Knowledge	Office of Sustainability				x
OP-7.21	Climate-Smart Pest Management	Office of Sustainability	x			
OP-7.22	Climate-informed Emergency Operations Plan	Fire & Police		x		
OP-7.23	Climate-informed Economic Development Strategic Plan	Economic Dev.	x			
OP-7.24	Food Security	Administration & DEI		x		

FUNDING AND FINANCING

Successful implementation of the resilience strategies will require both City staff time and resources. In many cases, it also will require funding for consultants to assist with implementation, as well as material costs to complete physical upgrades to the city's infrastructure and the built environment. For other strategies, the City will be able to integrate strategies into existing operations and procedures, as well as into already planned projects. The funding required to implement the strategies will need to come from a variety of sources, including both external funding opportunities, such as grants, and the internal funding sources devoted to climate resilience, such as general fund revenue sources. The following discussion identifies available external funding opportunities and presents a summary of internal funding mechanisms that the City can use to implement the strategies.

EXTERNAL FUNDING OPPORTUNITIES

Federal, State, and local grants can help fill the gap for projects that cannot be funded from the City's general fund or local funding mechanisms.

Federal Emergency Management Agency: Hazard Mitigation Assistance Grants

FEMA's hazard mitigation assistance grants provide funding for eligible mitigation measures that reduce disaster losses. FEMA administers four hazard mitigation assistance grant programs relevant to the City:

Hazard Mitigation Grant Program—Assists in implementing long-term hazard mitigation planning and projects following a Presidential major disaster declaration

Flood Mitigation Assistance Program—Provides funds for planning and projects to reduce or eliminate the risk of flood damage to buildings that are insured annually under the National Flood Insurance Program

Building Resilient Infrastructure & Communities—Support for states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards

Pre-Disaster Mitigation Program—Provides funds annually for hazard mitigation planning and projects

National Oceanic and Atmospheric Administration: Environmental Literacy Grants

The goal of this funding opportunity is to improve the environmental literacy of K–12 students and the public so that they are knowledgeable of the ways in which their community can become more resilient to extreme weather and other environmental hazards and become involved in achieving that resilience. Projects are intended to build the collective environmental literacy necessary for communities to become more resilient to the extreme weather and other environmental hazards they face in the short and long term.

U.S. Department of Agriculture: Conservation Innovation Grants

The Conservation Innovation Grant program is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production. These projects may be watershed-based, regional, or statewide in scope.

CivicSpark Program

The CivicSpark Program supports sustainability-focused research, planning, and implementation projects throughout California by providing public agencies and other organizations with capacity-building support to implement sustainability projects or programs from CivicSpark Fellows. Fellows serve for 11 months and can work on variety of issues including social equity, climate resilience, water resource management, affordable housing, and mobility.

California Climate Investments

California Climate Investments is a statewide initiative that directs funds from the State's Cap-and-Trade Program to projects and programs that work to reduce greenhouse gas emissions in the state. These funds can support a variety of projects, including affordable housing, renewable energy, public transportation, environmental restoration, more sustainable agriculture, and recycling. Numerous State programs, including some discussed above, are funded through California Climate Investments; however, the State's Cap-and-Trade Program continues to evolve and is updated by the State periodically to include new or modified programs.

LOCAL FUNDING AND FINANCING MECHANISMS

Considering that major updates to the City's built environment (e.g., flood management system) may be needed to help prepare for current or future climate-relate hazards, financing mechanisms may need to be leveraged to pay for projects with large upfront costs. Financing requires a source of repayment, commonly referred to as funding, to secure a large upfront payment that is then paid back over time with interest.

In California, laws and regulations that govern how revenue can be raised from taxes, assessments, and fees, combined with the need for a variety of public investments competing for the same dollars, can make securing funding a larger challenge than securing financing. Making a compelling case that ensures broad-based public support by clearly articulating the cost of inaction (e.g., what will be lost without the investment in the context of progressive climate impacts) and the resulting co-benefits is an important component of securing funding for climate-related investments through mechanisms such as taxes, assessments, and fees, as well as successfully pursuing grants and other external funding opportunities.

After funding is secured, typical financing mechanisms used by local governments include municipal bonds and loans, although in recent years, additional types of bonds that include consideration of characteristics that may be relevant for climate-related investments, such as green bonds, are now offered. Selection of a financing mechanism should be based on the total cost of the financing and its suitability for funding the needed investment.

The mechanisms discussed below are a few of those commonly used to implement climate adaptation projects, which may have multiple sources of funding and/or financing. An assessment of which mechanisms would be used to pay for resilience strategies would be conducted as the City begins to implement the policies and programs.

Funding

Taxes: The cost of large infrastructure projects can be offset through various tax mechanisms. For adaptation and resilience projects, a tax is generally a special tax that is implemented to pay for a specific project or program. Because of voter approval requirements, special taxes can be more difficult to develop without a clear understanding by the public of their purpose and the specific benefits they provide. Under California law, if a jurisdiction would like to adopt, increase, or extend a special tax, a two-thirds-majority approval is required. General taxes can pass with a simple majority. The following common types of taxes could be used to fund appropriate resilience strategies:

- Ad valorem property tax—This is a tax levied on property owners based on a property's value. It can be used only to finance voter-approved debt or finance bonds for infrastructure projects. The requirements for voter approval to raise property taxes depend on the type of infrastructure project being funded. In general, property tax increases for infrastructure bonds need approval by two-thirds of local voters.
- Parcel taxes—This is a form of property tax assessed based on certain established characteristics of a parcel rather than a rate based on the assessed value of the property. A parcel tax is considered a special tax and requires approval from two-thirds of all local voters.
- Mello-Roos taxes—A Mello-Roos district is a special district established by a local government to obtain additional public funding for specific projects or services, such as emergency services (e.g., fire departments, police) or public work projects (e.g., infrastructure improvements).

Financing

Bonds: A bond is a financing tool whereby money borrowed from investors is paid back with interest. Bonds are bought and sold on the bond market. Local governments can finance specific resilience projects by issuing bonds.

Green Bonds: For adaptation and resilience projects, green bonds can expand the potential investor pool by characterizing aspects of the investment that interest investors focusing on projects with defined environmental performance characteristics, but this approach could have higher administrative costs. Several green and climate bond certifications, such as the Climate Bond Standard and the Green Bond Principles, have been created to standardize the definition of the environmental characteristics of green bond projects.

Loans

Loans are a financing tool whereby a party borrows money from a single source, such as a bank or the government, for a specific purpose. Loans can have fixed interest rates, as bonds do, but they often have variable interest rates, making them less attractive to cities that have budgets that fluctuate over time. Loan payback terms also tend to be shorter than bond payback terms. Commercial loans are available to local governments for resilience- and infrastructure-related projects in California from the Infrastructure State Revolving Fund, which provides financing to nonprofits and public agencies for infrastructure and economic development (excluding housing).

List of Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
AB	Assembly Bill
AR	atmospheric river
CAL FIRE	California Department of Forestry and Fire Protection
Cal Poly	California Polytechnic State University at San Luis Obispo
CIP	Capital Improvement Projects
City	City of San Luis Obispo
County	San Luis Obispo County
CWPP	Community Wildfire Protection Plan
EOP	Emergency Operations Plan
EMF	electromagnetic field
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
HMP	Hazard Mitigation Plan
LHMP	Local Hazard Mitigation Plan
PG&E	Pacific Gas and Electric
SB	Senate Bill
SLOCOG	San Luis Obispo Council of Governments
TAZ	traffic analysis zone
U.S. 101	U.S. Highway 101
UHI	urban heat island
VHFHSZ	Very High Fire Hazard Severity Zones
WMP	Waterway Management Plan

Definitions

100-Year Flood: A flood that has a 1 percent likelihood of occurring in any given year.

100-Year Floodplain: The areas that have a 1-in-100 chance of flooding in any given year using criteria consistent with, or development by, the Federal Emergency Management Agency.

200-Year Floodplain: The areas that have a 1-in-200 chance of flooding in any given year using criteria consistent with, or development by, the Department of Water Resources.

500-Year Floodplain: The areas that have a 1-in-100 chance of flooding in any given year using criteria consistent with, or development by, the Department of Water Resources.

Adaptive Capacity: The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences (IPCC 2014).

Alquist-Priolo Earthquake Fault Zone: A regulatory zone, delineated by the State Geologist, within which site-specific geologic studies are required to identify and avoid fault rupture hazards prior to subdivision of land and/or construction of most structures for human occupancy.

Climate Adaptation: Adjustment or preparation of natural or human systems to a new or changing environment that moderates harm or exploits beneficial opportunities.

Climate Mitigation (Greenhouse Gas Emissions Reductions): A human intervention to reduce the human impact on the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks. Refer to Chapter 7, Climate Change, for more information.

Critical Facility: Facilities that either (1) provide emergency services or (2) house or serve many people who would be injured or killed in case of disaster damage to the facility. Examples include hospitals, fire stations, police and emergency services facilities, utility facilities, and communications facilities.

Extreme Weather Event: In most cases, extreme weather events are defined as lying in the outermost (“most unusual”) ten percent of a place’s history. Analyses are available at the national and regional levels.

Fault: A fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side. A fault zone is a zone of related faults which commonly are braided, but which may be branching. A fault trace is the line formed by the intersection of a fault and the earth’s surface.

Active Fault: A fault that has exhibited surface displacement within Holocene time (approximately the past 11,000 years).

Potentially Active Fault: A fault that shows evidence of surface displacement during Quaternary time (the last 2 million years).

Flooding: A rise in the level of a water body or the rapid accumulation of runoff, including related mudslides and land subsidence, that results in the temporary inundation of land that is usually dry. Riverine flooding, coastal flooding, mud flows, lake flooding, alluvial fan flooding, flash flooding, levee failures, tsunamis, and fluvial stream flooding are among the many forms that flooding takes.

Hazardous Material: An injurious substance, including pesticides, herbicides, toxic metals and chemicals, liquefied natural gas, explosives, volatile chemicals, and nuclear fuels.

Hazard Mitigation: Sustained action taken to reduce or eliminate long-term risk to people and their property from hazards and their effects.

Landslide: A general term for a falling, sliding, or flowing mass of soil, rocks, water, and debris. Includes mudslides, debris flows, and debris torrents.

Liquefaction: A process by which water-saturated granular soils transform from a solid to a liquid state during strong ground shaking.

Resilience: The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change.

Seiche: An earthquake-induced wave in a lake, reservoir, or harbor.

Subsidence: The gradual, local settling or sinking of the earth's surface with little or no horizontal motion (subsidence is usually the result of gas, oil, or water extraction, hydrocompaction, or peat oxidation, and not the result of a landslide or slope failure).

Social cohesion: The extent of connectedness and solidarity among groups in society or community. Social cohesion is one of the strongest indicators of resilience during disaster events as well as in post-disaster recovery efforts (Townshend et al. 2015). Social cohesion can play an important role in helping protect residents, particularly vulnerable populations, during climate-related disasters. While measuring the degree of social cohesion present in the City is not possible at this point, this subject is discussed here to emphasize the importance of social cohesion in increasing community resilience to the impacts of the climate change.

Tsunami: A wave, commonly called a tidal wave, caused by an underwater seismic disturbance, such as sudden faulting, landslide, or volcanic activity. Wildland Fire: A fire occurring in a suburban or rural area that contains uncultivated lands, timber, range, watershed, brush, or grasslands. This includes areas where there is a mingling of developed and undeveloped lands.

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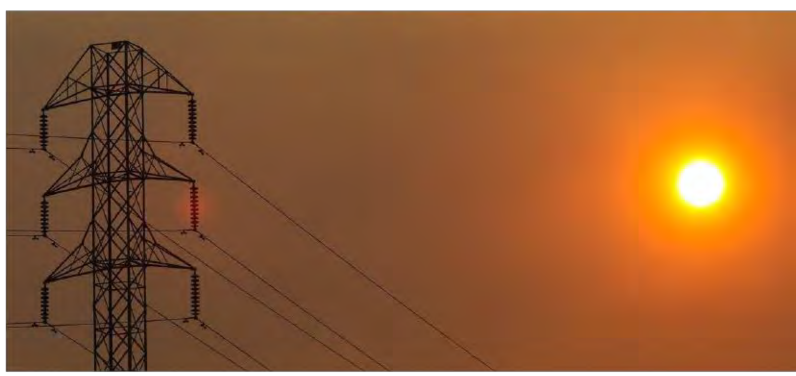
DECEMBER 2021

Climate Change Hazards and Vulnerabilities Report



City of San Luis Obispo
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Resilient SLO: Climate Change Hazards and Vulnerabilities Report

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December 2021

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LIST OF ABBREVIATIONS

°F	Fahrenheit
°C	Celsius
Q10	10-year storm event
Q100	100-year storm event
APG	Adaptation Planning Guide
AR	Atmospheric River
CALFIRE	Department of Forestry and Fire Protection
Cal Poly	California Polytechnic State University at San Luis Obispo
Caltrans	California Department of Transportation
CDC	Center for Disease Control and Prevention
CDD	Cooling Degree Day
CDHP	California Department of Public Health
CHAT	California Heat Assessment Tool
County	County of San Luis Obispo
City	City of San Luis Obispo
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
GIS	geographic information system
HDD	Heating Degree Day
HHE	Heat Health Events
HMP	San Luis Obispo County Multi-Jurisdictional Hazard Mitigation Plan
IDF	intensity, duration, frequency
IPCC	Intergovernmental Panel on Climate Change
OES	Office of Emergency Services
OPR	Governor's Office of Planning and Research
PG&E	Pacific Gas and Electric
PCTP	Pacific Coast tick fever
ppm	Parts Per Million
PSPS	Public Safety Power Shutoff
RCP	Representative Concentration Pathways
Report	Climate Change Hazards and Vulnerabilities Report
RTA	San Luis Obispo Regional Transit Authority

SB	Senate Bill
SLO	San Luis Obispo
SR	State Route
SWAT	Soil and Water Assessment Tool
UHI	Urban Heat Island
UWMP	Urban Water Management Plan
VHFHSZ	Very High Fire Hazard Severity Zones
WUI	wildland-urban interface

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1 INTRODUCTION

The climate is changing, with the pace of global warming being rapidly increased by human activities. Human-caused climate change is likely to increase the global average temperature 1.5 degrees Celsius (°C) (2.7° Fahrenheit [F]) between 2030 and 2052 (IPCC 2018). While the global community continues to reduce greenhouse gas (GHG) emissions moving forward, historic global GHG emissions have already solidified permanent changes to the environment, bringing with it substantial changes to the world, the state, the region, and the City of San Luis Obispo (City). Acknowledging the severity of these impacts and the importance of preparedness, the City of San Luis Obispo City Council has identified climate adaptation and resilience as a top priority.

The Climate Change Hazards and Vulnerabilities Report (Report) is the City's primary climate change vulnerability assessment summary document. The vulnerability assessment included in the Report identifies the City's exposure to the effects of climate change, identifies the sensitivity of population groups and community assets to specific climate-related hazards, analyzes potential climate change impacts, and assesses the City's existing capacity to address those impacts. The Report also serves to summarize and synthesize more detailed work being done that focuses on specific climate-hazards, City resources, or specific climate-related impacts. This Report is a component of the City's Resilient SLO project, a community-led initiative to improve community resilience to the worsening impacts of climate change. It is intended to help identify the specific climate vulnerabilities and impacts that are projected to occur in the City and assist in the development of a comprehensive set of climate adaptation strategies that will be incorporated into the General Plan Safety Element in compliance with Senate Bill (SB) 379, Government Code section 65302(g)(4).

SB 379, adopted in 2015, requires jurisdictions to integrate climate change adaptation into the general plan safety element development and update process. The law requires all cities and counties to update their safety elements to include the assessment of climate change vulnerabilities and adaptation strategies upon the jurisdiction's next safety element update. Under Government Code Section 65040.2, the Governor's Office of Planning and Research is charged with periodically updating and adopting the State General Plan Guidelines to guide the preparation of general plans for all cities and counties in California. The 2017 update to the General Plan Guidelines Safety Element chapter includes an additional focus on preparing communities for long-term climate change impacts (OPR 2017). The Resilient SLO project follows the four-phase adaptation planning process included in the California Adaptation Planning Guide, as shown in Figure 1. This Report serves as the culmination of Phase 2 of the project, assessing the unique vulnerabilities of the SLO community to the impacts of climate change. The findings of this Report will support development of a set of adaptation strategies (Phase 3) to be included in City's Safety Element Update.

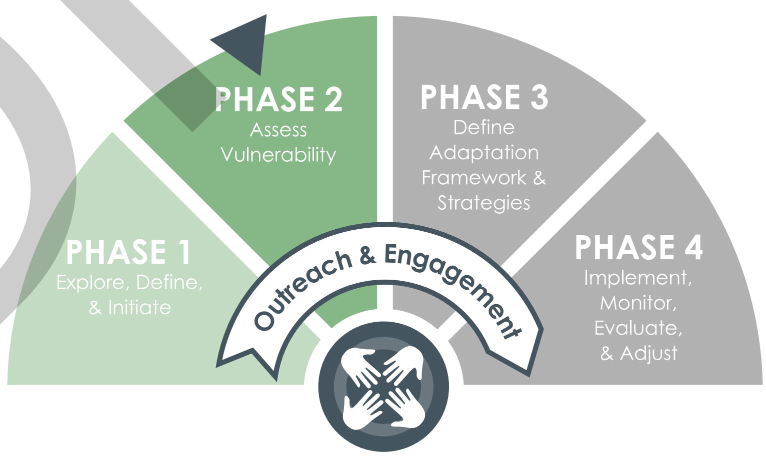

Figure 1 California Adaptation Planning Guide Adaptation Planning Phases

This Report was developed using the best available information regarding climate change projections for the City and the Central Coast region, relevant information on current efforts to adapt to climate change, and best practices and guidance provided by the State and other sources specific to climate adaptation planning. The primary resources used in developing this Report are:

- *California Adaptation Planning Guide* (Cal OES 2019);
- *Safeguarding California Plan: California's Climate Adaptation Strategy* (CNRA 2018);
- Cal-Adapt 2.0;
- *California's Fourth Climate Change Assessment* (statewide report) (OPR et al. 2018a, 2018b);
- *California's Fourth Climate Change Assessment: Central Coast Region Report* (2018b);
- *State of California General Plan Guidelines* (OPR 2017);
- State Adaptation Clearinghouse in the Integrated Climate Adaptation and Resiliency Program;
- *San Luis Obispo County Multi-Jurisdictional Hazard Mitigation Plan (San Luis Obispo County 2019a*; and
- California Department of Transportation (Caltrans) *District 5 Climate Change Vulnerability Assessment Summary Report* (Caltrans 2019a); and associated Technical Report (Caltrans 2019b).

1.1 CLIMATE CHANGE OVERVIEW

The combustion of fossil fuels, among other human activities since the Industrial Revolution in the 19th century, has introduced GHGs into the atmosphere at an increasingly accelerated rate. Significantly elevated levels of GHG emissions have intensified the greenhouse effect and led to a trend of unnatural warming of the Earth's climate, known as global climate change or global warming. The largest source of GHG emissions from human activities is the burning fossil fuels for electricity, heat, and transportation. Climate change, in recent decades, has become a priority issue on an international, national, and local scale as recent climate data reveal more extreme weather patterns, increased average global temperatures, and the rapid melting of the Earth's Artic and Antarctic poles and glaciers.

The global average temperature is expected to increase by 3.7 degrees Celsius (°C) (6.7 to 8.6 degrees °F) by the end of the century unless additional efforts to reduce GHG emissions are made (IPCC 2014). Human-caused climate change is currently increasing the global average temperature by approximately 0.2°C (0.36 °F) per decade due to past and ongoing emissions. While the global average temperature has already begun to increase, the Intergovernmental Panel on Climate Change (IPCC) has identified an increase of 1.5 degrees °C (2.7 F°) as a threshold that, if crossed, push many natural systems that sustain life past a dangerous turning point with a more limited ability to recover (IPCC 2018). Depending on future GHG emissions, average annual maximum daily temperatures in California are projected to increase between 4.4 and 5.8°F by 2050 and by 5.6 to 8.8°F by 2100 unless significant reductions in GHG emissions are made (OPR et al. 2018a). Temperature changes in the Central Coast region are expected to be even more significant, with projections of a 7 to 8°F increase by the end of the century (OPR et al 2018b) if global emissions continue on their current trend.

The state and the City have already begun to experience extreme weather effects, the frequency and intensity of which have been worsened by climate change (OPR et al. 2018a). Extreme weather effects such as volatility in precipitation, increased average temperatures, and increased frequency of extreme heat events have led to increases in the frequency and intensity of human health and natural hazard impacts such as wildfires, droughts, and changes to regional water supplies.

While the scope of the Resilient SLO project is intended to focus on local and regional climate impacts, it is important to recognize that larger scale climate impacts to natural and manmade systems may affect the SLO community and should be recognized.

In September 2021, the IPCC's Sixth Assessment Report was released. The findings highlight key new insights into the importance of global climate tipping points, a threshold that, when exceeded, can lead to large changes in the state of the climate system with one impact rapidly leading to a series of cascading events with vast repercussions. This new report is set to contain the body's strongest warnings yet on the subject.

Importantly, the draft report notes that, in terms of solutions, "We need transformational change operating on processes and behaviors at all levels: individual, communities, business, institutions and governments. We must redefine our way of life and consumption (Earth.org 2021)"

In 2020, the City adopted the Climate Action Plan for Community Recovery with the goal of achieving carbon neutrality by 2035 while focusing on using resources more effectively, improving community equity and well-being, and developing an economy that is set to recover from the impacts of COVID-19. The intent of the science-based goal is to play a proportional role in achieving global carbon neutrality and inspire similar action regionally, statewide, nationally and internationally so that global warming is kept between 1.5°C and 2°C. While it remains imperative that the City implement the Climate Action Plan and reduce GHG emissions to achieve carbon neutrality, it is equally important for communities to invest in climate change adaptation planning to improve resilience to extreme climate events that are projected over the 21st century.

1.2 WHAT IS RESILIENCE?

Resilience is the capacity of any entity—an individual, a community, an organization, or a natural system—to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience (Rodin 2014). As has been demonstrated by recent catastrophic wildfire seasons, the more frequent severe storms, the prolonged drought periods and the longer and hotter summer seasons, the effects of climate change are already occurring in California and in the Central Coast region. Planning for how to mitigate and adapt to these impacts is important to ensure the City is able to continue to prosper as a community.

Importantly, the concept of creating community resilience goes beyond preparing for the physical environment for future impacts from climate change and now considers and prioritizes the physical and psychological health of the population, social and economic equity, and well-being of the community. Developing a resilient community requires effective risk communication, integration of organizations (both governmental and community-based) in climate adaptation planning, response, and recovery, and supporting social connectedness for resource exchange, cohesion, response, and recovery efforts (CNRA 2018). In an effort to identify how the City can not only adapt to climate impacts but become more resilient and thrive in a more volatile and unpredictable climate, this Report identifies and discusses both the physical and social vulnerabilities the City has to the impacts of climate change in an effort to better support the adaptation strategy development process.

The following section (Climate Hazards Assessment) of the Report provides a detailed assessment of four key climate-related hazards (Temperature and Extreme Heat; Long-Term Drought; Wildfire; and Precipitation and Flooding) that are projected to affect the City. Section 3 (Vulnerability Scoring Summary) then provides a summary and ranking of the four climate-related hazards based on the findings of the assessment in Section 2.

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2 CLIMATE HAZARDS ASSESSMENT

This section provides a comprehensive assessment of the City's vulnerabilities to climate change. It identifies and characterizes climate-related hazards and other climate effects that are anticipated to affect the City, its residents, and visitors. The analysis in this section is organized into four distinct hazard categories. These categories are:

- Temperature and Extreme Heat
- Long-Term Drought
- Wildfire
- Precipitation and Flooding

It is important to recognize that the City is exposed to other natural and human-made hazards such as seismic events or hazardous waste. However, these hazards are addressed other planning documents in the City's Safety Element and the County Multi-Jurisdictional Hazard Mitigation Plan. This Report assesses hazards that are going be affected and exacerbated by climate change, focusing specifically on how these hazards are likely to increase in frequency and severity.

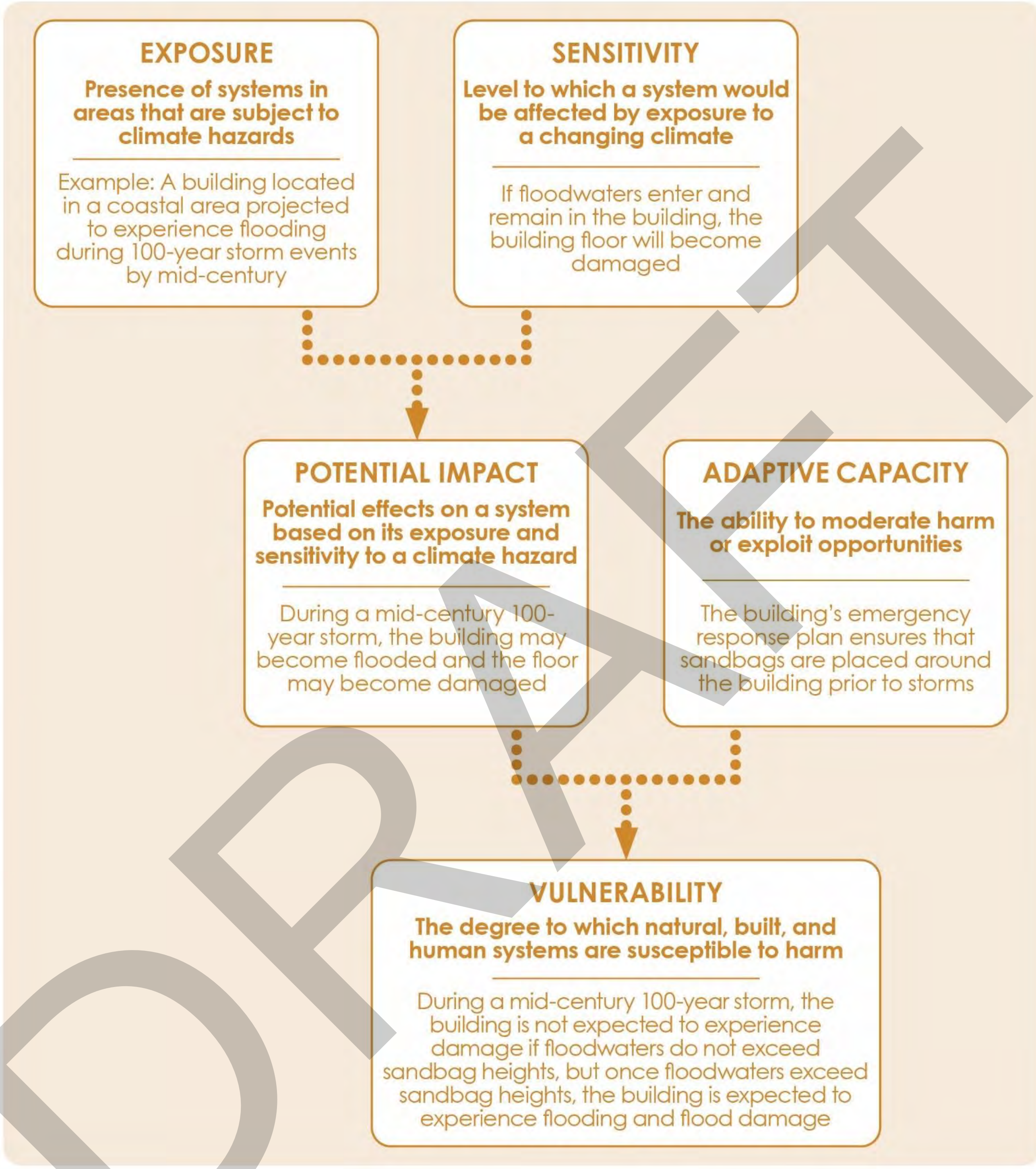
2.1 VULNERABILITY ASSESSMENT METHODOLOGY

For each of the four hazard areas listed above, the analysis follows the vulnerability assessment process outlined in the California Adaptation Planning Guide and is composed of the four steps outlined below in Figure 2. The following discussion provides an overview of the methodology used for each step of the vulnerability assessment process and provides context for the discussions of each climate-related hazard in Sections 2.2 through 2.5.

2.1.1 Exposure

The purpose of this step is to understand to what degree the City is vulnerable to impacts from each climate-related hazard under historic conditions and how changes in climate variables are projected to affect the hazard. A summary of the City's existing exposure to each hazard is provided using information from the Resilient SLO Baseline Conditions Report (City of San Luis Obispo 2021a).

According to the work of IPCC and research conducted by the State of California, partner agencies, and organizations, climate change is already affecting and will continue to affect the physical environment throughout California, including the City. To identify the local impacts of climate change in California, the California Energy Commission, and the University of California, Berkeley Geospatial Innovation Facility developed the scenario planning tool Cal-Adapt. The Cal-Adapt tool uses global climate simulation model data downscaled to a local and regional resolution to identify localized impacts from various climate metrics. Developers of the Cal-Adapt tool selected four priority global climate models to include in projections provided in the tool. This analysis uses the average of these four models to identify changes in temperature and extreme heat events.



Source: Cal OES 2019.

Figure 2 California Adaptation Planning Guide Vulnerability Assessment Process

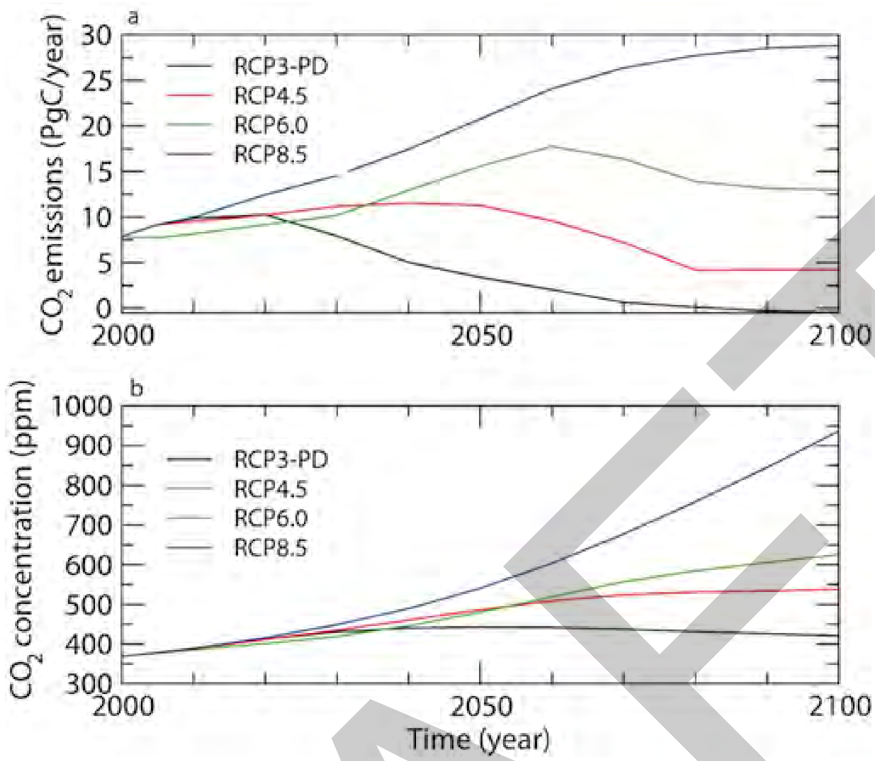
This analysis uses Cal-Adapt data to evaluate changes in several key climate variables projected to affect the City. The analysis also identifies at what point over the next approximately 80 years (2021–2099) changes in these variables will occur and at what magnitude. This exposure analysis uses three time periods to analyze changes in key climate variables. Due to annual fluctuations in climate variables, climate data is typically measured on a 30-year or longer timescale. Climate variables measured over a shorter time period is typically less accurate and not reflective of long-term averages (NOAA 2018). The time periods established for this analysis are 30-year time intervals to gather accurate data on average changes in the climate. This results in overlap among some time periods and a gap between 2064 and 2070. However, the three time periods used in this analysis have been chosen to align with time periods used in the Cal-Adapt tool and are intended to provide snapshots of how certain climate variables will change over the 21st century. The three time periods are:

- Near-term (2021–2050),
- midterm (2035–2064), and
- late-century (2070–2099).

The California Adaptation Planning Guide (APG), as well as the Governor's Office of Planning and Research's guidance for State agencies (OPR 2018), provide guidance on choosing appropriate Representative Concentration Pathways (RCP) scenarios to be included in vulnerability assessment analyses. For analysis of impacts through 2050, the APG suggests using a conservative approach and selecting the high emissions scenario, to assume a worst-case scenario but notes that impacts by 2050 under the medium and high scenarios will vary based on local context. As recommended by the APG, this analysis evaluates near-term and midterm climate change effects and their associated impacts under the high emissions scenario, as this takes a conservative approach and assumes a worst-case scenario. Additionally, as observed in the Cal-Adapt data, changes in climate variables during the near-term and midterm periods are similar under both the medium and high emissions scenarios. Because long-term global GHG emissions trends are less certain and climate impacts vary more considerably between scenarios during this period, a discussion of both the medium and high emissions scenarios is included for this timescale (OPR et al 2018a).

FORECASTING ASSUMPTIONS

The projected effects of climate change over the next century will vary depending on global GHG emissions trends. The Cal-Adapt tool includes global climate simulation model data from two emissions scenarios, known as RCPs, that were used in the IPCC's Fifth Assessment Report. The RCPs represent scenarios that estimate the level of global GHG emissions through 2099. The RCP scenarios used in the Cal-Adapt tool and discussed in the California Adaptation Planning Guide are the RCP 8.5 (high emissions) scenario, which represents a business-as-usual future emissions scenario in which global GHG emissions continue to rise through the rest of the century, peaking around 2099, and resulting in atmospheric CO_2 concentrations exceeding 900 parts per million (ppm) by 2100, and the RCP 4.5 (medium emissions) scenario, which represents a lower GHG emissions future and likely the best-case scenario for climate impacts, under which GHG emissions would peak in 2040 and then decline through the rest of the century, resulting in a CO_2 concentration of about 550 ppm by 2100. The RCP trends assumed in the analysis are illustrated in Figure 3. Figure 3 also includes other global emissions scenarios that have been analyzed by the IPCC but are not included in the Cal-Adapt tool. The RCP 4.5 and 8.5 scenarios have been included in the Cal-Adapt tool because they represent two important scenarios for future planning. The RCP 8.5 scenario is included to illustrate what climate impacts will look like if no future action is taken to reduce global emissions. The RCP 4.5 scenario is included as a potential best-case scenario for reducing global GHG emissions. The emissions scenarios depend on global GHG emissions trends in the future and the efficacy of global GHG reduction strategies proposed by the international community.



Notes: CO_2= carbon dioxide; ppm = parts per million; PgC = one billion metric tons of carbon; RCP = Representative Concentration Pathway.

Source: Goosse et al. 2010

Figure 3 Representative Concentration Pathway Used in Global Climate Modeling

Cal-Adapt also includes 10 global climate models, downscaled to local and regional resolution using the Localized Constructed Analogs statistical technique. Four of these models have been selected by California's Climate Action Team Research Working Group as priority models for research contributing to California's Fourth Climate Change Assessment. Projected future climate from these four models can be described as producing:

- A warm/dry simulation (HadGEM2-ES),
- A cooler/wetter simulation (CNRM-CM5),
- An average simulation (CanESM2), and
- The model simulation that is most unlike the first three for the best coverage of different possibilities (MIROC5).

2.1.2 Sensitivity and Potential Impacts

This step summarizes population groups and community assets that are sensitive to localized climate change effects. Changes in climate-related hazards are generally projected to increase in severity, with the potential for climate change to generate new impacts that communities have not experienced historically. Using historical data, research from regional and statewide reports on climate impacts, and input from stakeholders on which sensitive populations and assets should be prioritized for the analysis, this step identifies sensitive populations and assets and assesses how they are likely to be impacted by climate change.

As part of the community outreach process for the Resilient SLO project, a specific set of priority assets and functions were identified for each of the three categories described above. The priorities identified for these three categories were developed through a set of working group meetings based on the three categories and confirmed by the

Resilience Roundtable, a community-led advisory body that is helping the City guide the approach and focus of the Resilient SLO project and the City's Safety Element update. The priorities identified through the community outreach process were then supplemented using hazard mitigation and emergency operation planning resources developed previously the by City and the County. The priorities identified by the working groups and additionally identified priority sensitive populations and assets are list below under each category.

The set of sensitive populations, assets, and community functions analyzed in this step are organized into the following three general categories.

- Natural Systems – This category includes systems or system components of the natural environment (e.g., forests and grasslands, flora and fauna, stream health) in the City and the surrounding region that are critical to overall ecosystem health.
  - Passive Recreation and Trails (Working Group)
  - Open Space and Ecosystem Functions (Working Group)
  - Agricultural Production and Industry (Working Group)
  - Invasive species and secondary impacts (Working Group)
  - Water (water supply, stormwater) (Working Group)
  - Urban Tree Canopy (Additional Priority)

- Built Environment – This category includes the physical assets that comprise the City's built environment (e.g., roadway network, buildings, utility systems, stormwater management system) that are critical to supporting normal community functions in the City.
  - Evacuation Routes and Mobility (Working Group)
  - Telecommunication Systems (Working Group)
  - Building Stock and Energy Efficiency (Working Group)
  - Community Spaces for Gathering (Working Group)
  - Energy Infrastructure and Outages (Working Group)
  - Wildland Urban Interface (Additional Priority)
  - Water Supply Reservoirs (Additional Priority)
  - Stormwater Management System (Additional Priority)

- Community Resilience – This category includes human-focused systems that provide essential services to residents and visitors in the City and are critical to maintaining normal community functions (e.g., economic activity, healthcare system, schools).
  - Food Systems and Supply Chains (Working Group)
  - Emergency Communications/Misinformation (Working Group)
  - Personal Resilience (Health and Finances) (Working Group)
  - Governance/Trust (Working Group)
  - Community Organizations and Social Networks (Working Group)
  - Climate Vulnerable Populations (Additional Priority)

These three categories, marked by their signature color shown above, are discussed throughout this report in relation to each hazard.

While these three categories are intended to encompass important components of the City and its functions, impacts in these categories are likely to affect one another and result in secondary or compounding impacts. Alongside the discussion of potential impacts, the sections below that discuss each hazard also includes a discussion of how some of the various impacts in these categories may overlap or compound one another.

Based on guidance from the California Adaptation Planning Guide, potential impacts from each of the four climate-related hazards listed above are rated on a qualitative scale comprised of Low, Medium, and High ratings. A description of each qualitative rating for potential impacts is provided in Table 1.

Table 1 Potential Impact Scoring

Score	Potential Impact Scoring Description
Low (1)	Impact is unlikely based on projected exposure; would result in minor consequences to public health, safety, and/or other metrics of concern.
Medium (2)	Impact is somewhat likely based on projected exposure; would result in some consequences to public health, safety, and/or other metrics of concern.
High (3)	Impact is highly likely based on projected exposure; would result in substantial consequences to public health, safety, and/or other metrics of concern.

Source: CalOES 2020

2.1.3 Adaptive Capacity

Adaptive capacity is defined as the ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences (IPCC 2014). The City, partner agencies, and community organizations in the City have already taken substantial steps to build resilience and protect the City from existing climate-related hazards. The purpose of this step is to analyze and summarize the City's current adaptive capacity to address and reduce risk from future climate impacts. This step includes a review of the City's existing policies, plans, programs, and resources, as well as those from relevant regional and State agencies and organizations that provide an assessment of the City's current ability to reduce vulnerability to hazards and adapt to climate change over the 21st century. Although the City has already taken comprehensive steps to reduce risk from these hazards, climate change is projected to increase the frequency and severity of climate-related hazards in the future and may exceed the City's current capacity to address these hazards or may pose novel threats the City has not encountered historically.

Based on the analysis of current resources and efforts undertaken by the City or partner agencies, the City's adaptive capacity for each climate-related hazard is rated Low, Medium, or High. High adaptive capacity indicates that measures are already in place to address the points of sensitivity and impacts associated the specific climate-relate hazard, while a low rating indicates a community is unprepared and requires major changes to address specific sensitivities. Adaptive capacity ratings are described in Table 2.

Table 2 Adaptive Capacity Scoring

Score	Adaptive Capacity Scoring Description
Low (3)	The community lacks capability to manage climate impact; major changes would be required.
Medium (2)	The community has some capacity to manage climate impact; some changes would be required.
High (1)	The community has high capacity to manage climate impact; minimal to no changes are required.

Source: CalOES 2020

2.1.4 Vulnerability Scoring

This step determines the City's priority climate vulnerabilities through a vulnerability scoring process. The City's vulnerability to each identified impact is assessed based on the magnitude of risk to and potential impacts on City while considering the current adaptive capacity to mitigate for these impacts. Based on the ratings of potential impacts and adaptive capacity, an overall vulnerability score has been assigned to each climate-related hazard category. This scoring helps the City better understand which climate hazards pose the greatest threat and should be prioritized for future planning efforts. Table 3 presents the rubric used to determine overall vulnerability scores based on the ratings for potential impacts and adaptive capacity.

Table 3 Potential Impact Summary

Vulnerability Score				
Adaptive Capacity	Low	3	4	5
	Medium	2	3	4
	High	1	2	3
		Low	Medium	High
		Potential Impacts		

Source: CalOES 2020; adapted by Ascent Environmental in 2021

Vulnerability scoring for each climate change effect identified and evaluated in Sections 2.2 through 2.5 is included in Section 3 which also provides a summary of all climate-related hazards analyzed.

2.2 SOCIAL VULNERABILITY AND ENVIRONMENTAL JUSTICE

This section provides an overview of the sociodemographic characteristics of the City and highlights specific social vulnerabilities and environmental justice issues that may place certain populations or areas in the City at a disproportionately higher risk of climate change related impacts. The information in this section is then used, as appropriate, in each hazard discussion, highlighting where and how certain populations may be at increased risk from climate impacts.

Certain populations in urban areas are particularly vulnerable to a variety of hazards that are likely to be exacerbated by climate change. Vulnerabilities can include being disproportionately exposed to hazards and environmental pollution; being more sensitive to impacts because of preexisting health conditions; or having less resources or opportunities to prepare for and recover from hazard impacts. Vulnerable populations often include persons over the age of 65, infants and children, communities of color, individuals with chronic health conditions (e.g., cardiovascular disease, asthma), low-income populations, athletes, and outdoor workers (CDC 2019). More broadly, any trait that would limit or prevent people from avoiding a hazard, seeking medical attention, or obtaining essential food, supplies, and/or care in an emergency would make them vulnerable to hazards.

2.2.1 Population Overview

The U.S. Census bureau estimates the City's population to be 47,459 persons as of July 2019 (U.S. Census Bureau 2019). Table 4 illustrates the City's demographics by sex, race, and age according to the U.S. Census. As shown, the majority of residents identify as white with those identifying as Hispanic being the second largest demographic group. In terms of youth and elderly populations, 29 percent of City residents are either under 18 years or over 65 years old. The City is highly educated: 93 percent of the population over 25 years old has at least a high school degree, and 50 percent of the population over 25 years old has a bachelor's degree or higher (U.S. Census Bureau 2018).

Table 4 City Demographics by Sex, Race, and Age

Demographic Characteristics	City of San Luis Obispo	San Luis Obispo County	California
Population	47,459	283,111	39,512,223
Male	51%	51%	50%
Female	49%	49%	50%
White alone	84%	89%	72%
Hispanic or Latino	18%	23%	39%
Asian alone	6%	4%	16%
Two or more races	4%	4%	4%
Black or African American alone	2%	2%	7%
American Indian and Alaska Native alone	0.4%	1.4%	1.6%

Demographic Characteristics	City of San Luis Obispo	San Luis Obispo County	California
Persons under 5 years	3%	5%	6%
Persons under 18 years	13%	18%	23%
Persons 65 years and older	13%	21%	15%

Source: U.S. Census Bureau 2019

HOUSING COSTS

Overall, the cost of living in the City is high relative to household income. Table 5 provides key information about housing costs in the City. As shown in Table 6, around 57 percent of renters spend 35 percent or more of their income on rent (U.S. Census Bureau 2018). Around 6 percent of all families and 14 percent of families with a female single parent had an income that fell below the poverty level in the span of a year (U.S. Census Bureau 2018).

Table 5 Housing Cost Characteristics

Housing Characteristic	Housing Cost
Median monthly cost for owners with a mortgage	$2,340
Median monthly cost for renters	$1,461 per unit
Median household income	$52,740

Source: U.S. Census Bureau 2018

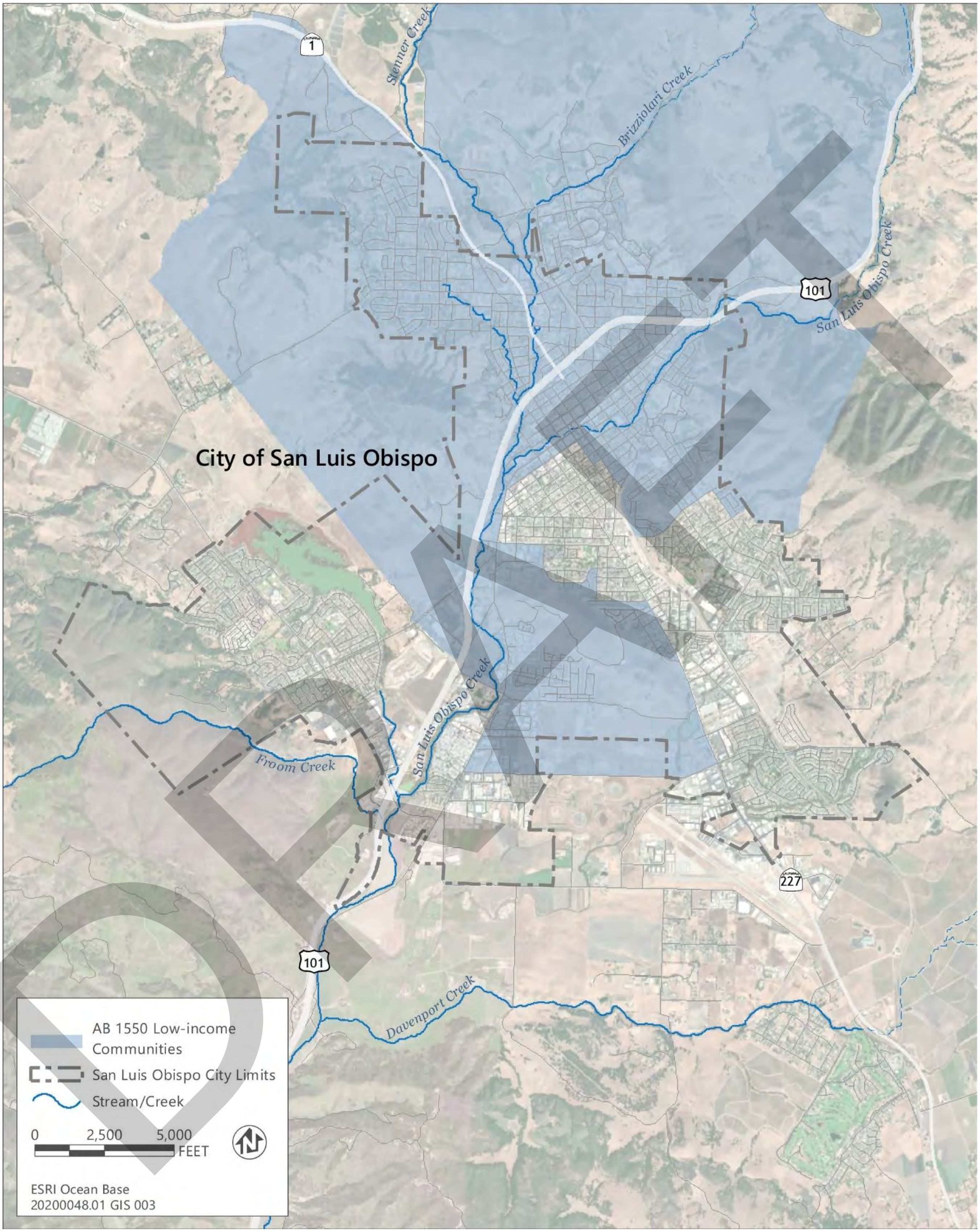
Table 6 Gross Rent as a Percentage of Monthly Household Income

Housing Characteristic	Percent of Occupied Units
Less than 15 percent	7%
15 to 20 percent	8%
20 to 25 percent	9%
25 to 30 percent	13%
30 to 35 percent	6%
35 percent or more	57%

Source: U.S. Census Bureau 2018

As illustrated in Figure 4, the City has a substantial low-income population, as mapped consistently with definitions provided in Assembly Bill 1550, which defines low-income communities as census tracts with median household incomes at or below 80 percent of the statewide median income or with median household incomes at or below the threshold designated as low income by the California Department of Housing and Community Development’s list of state income limits adopted pursuant to California Code Section 50093. As demonstrated in Figure 4, this population is located primarily in the northern and central parts of the City. It is estimated that Cal Poly State University and Cuesta College students comprise more than one third of the City's population. As a result, students strongly influence the City’s housing supply and demand. As noted in the City’s Housing Element, although often grouped into low-income categories statistically, many students can spend more on housing than income data suggests because of parental support or larger household sizes. By pooling their housing funds, groups of students can often afford more expensive housing. This contributes to higher rents in San Luis Obispo compared to other parts of the County (City of San Luis Obispo 2020a).

Research has found that housing affordability is one of the strongest predictors of rates of homelessness in a community, with higher median rents leading to higher rates of homelessness and higher rates of sheltered homeless populations. To better understand the issue of homelessness, the U.S. Interagency Council on Homelessness categorizes homeless individuals in three basic groups: chronically homeless (i.e., people who have experienced long-term homelessness), episodic homeless (i.e., people who alternate between permanent housing and supportive housing or shelters), and transitional homeless (i.e., people who become temporarily homeless because of an event, such as loss of employment) (U.S. Interagency Council on Homelessness 2009). There are approximately 482 homeless individuals in the City (City of San Luis Obispo 2020a).



Source: CalEPA 2020

Figure 4 Low-Income Communities as Defined under Assembly Bill 1550

DISABILITY STATUS

Individuals with disabilities, especially those who are also unemployed or underemployed, are especially vulnerable to climate hazards largely because they, along with youth and senior populations, often rely heavily on family or caretakers for transportation and other basic needs (e.g., taking medications, cooking food). Around 9 percent of the City's total civilian noninstitutionalized population has a disability, with the majority of these people 65 years and over. Around 35 percent of people 65 years and over in the city have reported having a disability (U.S. Census Bureau 2018).

LANGUAGE

Cultural and linguistic isolation can make it difficult for people to access or understand important information regarding preparing for and responding to emergency situations. Approximately 6 percent of the City's population primarily speaks a language other than English and reports that they can speak English less than "very well" (U.S. Census Bureau 2018). Table 7 includes information about languages spoken in the City as well as what percentage of residents that speak another language do not speak English "very well" and may experience linguistic isolation.

Table 7 Languages Spoken by City Residents

Language Spoken	Percentage of Population	Percentage of population that speak English less than "very well"
Speak only English	83%	n/a
Speak Spanish	11%	33%
Other Indo-European Language	2.5%	26%
Asian-Pacific Island Language	3%	45%
Other Languages	0.5%	21%

Notes: n/a = not applicable

Source: U.S. Census Bureau 2018

2.2.2 Social Vulnerability Mapping and Environmental Justice

While the City includes sociodemographic characteristics that may place residents at increased risk to climate impacts, it is important to recognize that these social vulnerabilities are not spread evenly across the City. Populations with specific vulnerabilities may be concentrated in key areas of the City and have the potential to overlap with key climate related hazards that place these populations at a disproportionate level of risk from climate impacts. In general, low-income residents, communities of color, tribal nations, and immigrant communities have disproportionately experienced some of the greatest environmental burdens and related health problems throughout the history of the U.S. and in California. These historic inequities are, in the majority of cases, not a coincidence but a result of inappropriate zoning and negligent land use planning, intersecting structural inequalities, failure to enforce proper zoning or conduct regular inspections, deed restrictions and other discriminatory housing and lending practices, limited political and economic power among certain demographics, the prioritization of business interests over public health, development patterns that tend to concentrate pollution and environmental hazards in certain communities, and the placement of economic and environmental benefits in areas outside of disadvantaged communities (California Environmental Justice Alliance 2017).

Based on the State's definition of disadvantaged communities, no census tracts within the San Luis Obispo region are designated as disadvantaged communities. However, the San Luis Obispo Council of Governments (SLOCOG) has created a regional definition of disadvantaged communities to better compete for grant funding, distribute funds more equitably, and meet the state and federal environmental justice requirements. The Disadvantaged Communities Assessment was approved by the SLOCOG Board for use in the 2023 RTP and the 2022 Programming Cycle on June 2nd, 2021.

In the San Luis Obispo Region, disadvantaged communities are defined as disproportionately burdened areas that are economically distressed and/or historically underrepresented as a part of the local government process. The Disadvantaged Communities Assessment identifies 13 variables that address a wide range of socioeconomic and population-based factors to geographically define these disproportionately-burdened areas. The 13 variables are:

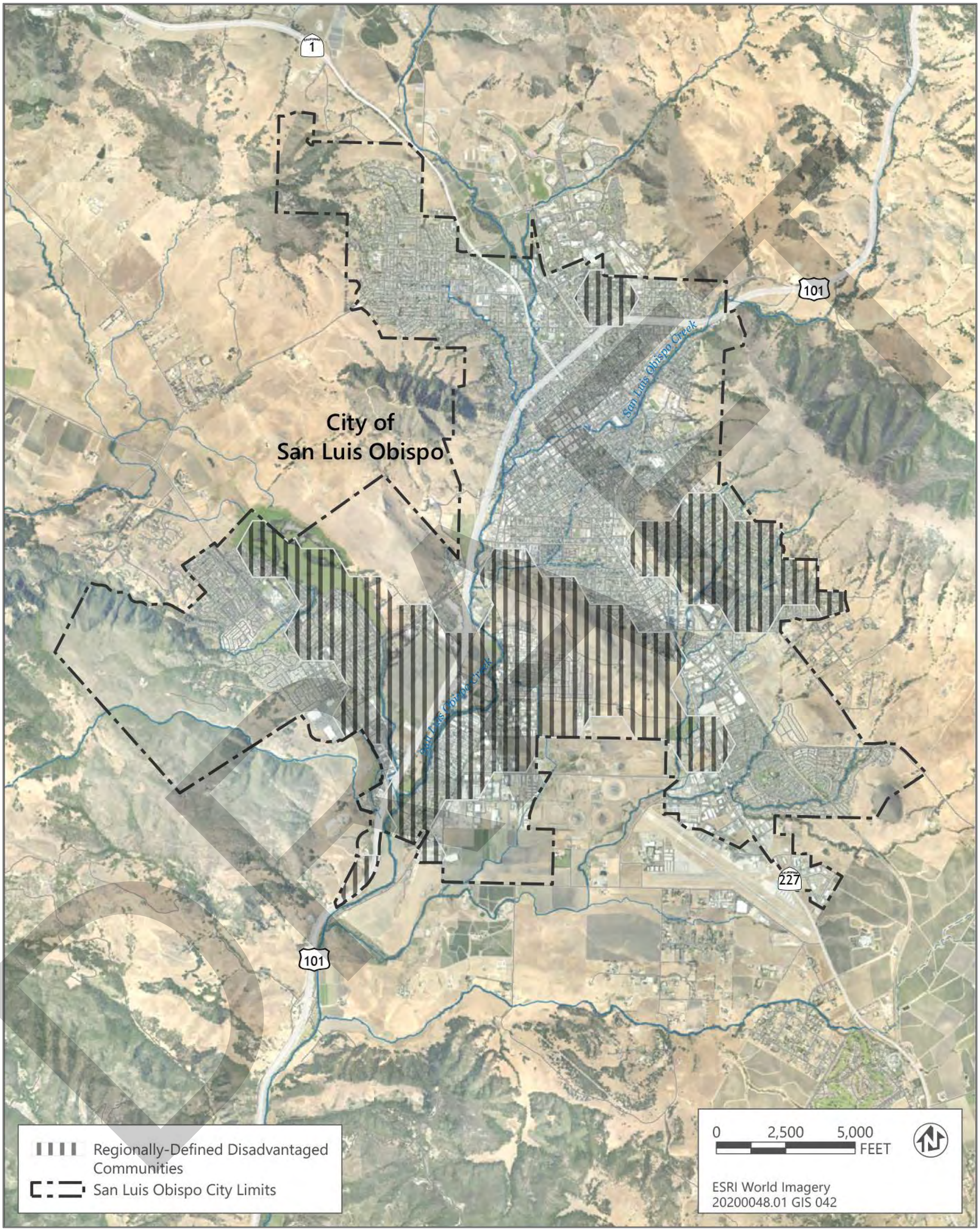
- Racial Minority
- Ethnic Minority
- Disability Status
- Household Income
- Free or Reduced-Price Meals
- Educational Attainment
- Language Proficiency
- Renter Affordability
- Housing Ownership Affordability
- Older Adults: Age 75 Years and Older
- Youth: Age 15 Years and Under
- Households with No Vehicle Available
- Households with No Computing Device Available

Similar to the SLOCOG assessment of disadvantaged communities, the Public Health Alliance of Southern California has developed the California Healthy Places Index (HPI). The California HPI provides an interactive map, graphs, data tables, and a policy guide to examine local health factors and compare local conditions to those across the state. Climate health vulnerability indicators are built into the HPI by incorporating climate-related hazards data layers into the mapping (e.g., air conditioning access, public transit access); incorporating select climate-resiliency metrics into the HPI score, which combines 25 community characteristics into a single indexed score to describe a community's overall health; and addressing climate challenges in the policy guide.

The HPI score for the City combines 25 community characteristics across eight areas (i.e., economic, social, education, transportation, neighborhood, housing, clean environment, and health care) into a single indexed score correlated to life expectancy at birth. The HPI score ranking for the combined census tracts in the City places it in the 61st percentile, meaning it has healthier community conditions than 61 percent of other California census tracts. Certain geographic areas and populations may be more vulnerable than others, by identifying these specific populations or geographic areas, the City can work to address these vulnerabilities and, in turn, make the whole community more resilient.

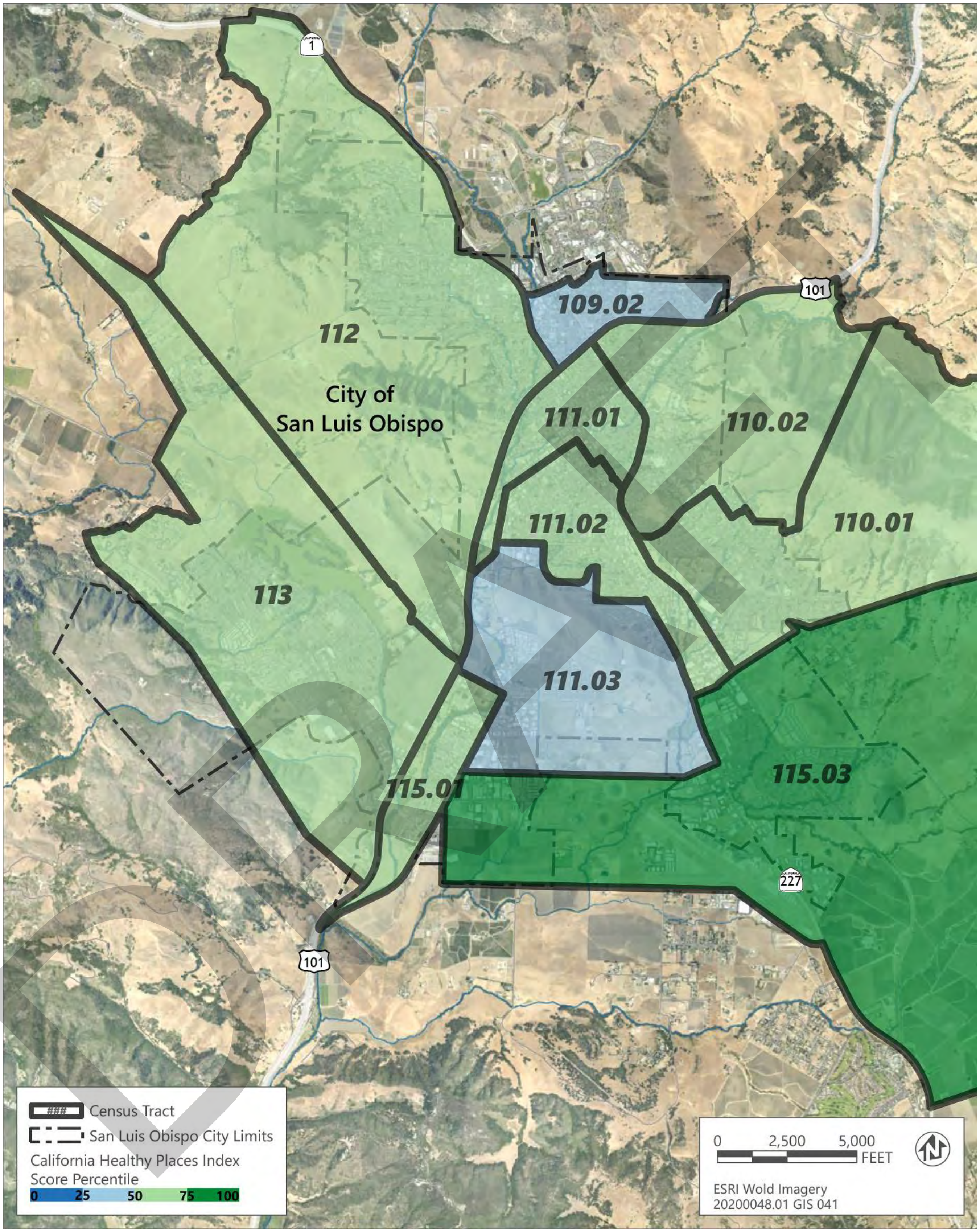
Compared to the City's overall HPI score, the City is doing particularly well in terms of education, performing better than 78 percent of other California census tracts in preschool enrollment and residents with a bachelor's degree or higher. However, the City ranks lower in terms of the economic factors score (39^{th} percentile overall), which includes factors such as median household income, unemployment rate, and population with an income exceeding 200 percent of federal poverty level. The City also ranks low in terms of the housing factors score (17^{th} percentile overall), which includes indicators such as low-income homeowners and renters with a severe housing burden (HPI 2020). This summary provides highlights of the City overall HPI score. To see all information on individual indicators, visit the California HPI website (https://map.healthyplacesindex.org/).

Figure 6 below includes the main census tracts that comprise the City. Table 8, which corresponds with Figure 6, includes a set of sociodemographic characteristics for each of the City's census tracts. Figure 5 also includes the HPI scoring scale for each census tract in the City, highlighting the portions of the City with lower scores that may be more vulnerable to climate impacts. The HPI scores for each census tract can be compared across the state to paint an overall picture of health and well-being in each census tract relative to the rest of California. For example, a census tract HPI score of 21 means that that tract has healthier community conditions than just 21.5 percent of other California census tracts. This means the lower the HPI score equates to, in general, less healthy living conditions and health outcomes for residents and potentially more climate vulnerability.



Sources: Data received from SLOCOG in 2021 and from CBEC Engineering in 2020, and downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 5 Regionally Defined Disadvantaged Communities in the City of San Luis Obispo



Sources: Data downloaded from US Census in 2019, City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 6 Census Tracts in the City of San Luis Obispo

Table 8 Social Vulnerability and Environmental Justice Indicators by Census Tract

Name	Cal Poly Neighborhood	North Monterey Street and Johnson Avenue	Sinsheimer Neighborhood	Downtown SLO and Mill Street Historic District	South Downtown SLO and Railroad District	Margarita Avenue Neighborhood	Foothill Boulevard Neighborhood	Laguna Lake and Los Osos Valley Road	West of South Higuera	South Broad Street Neighborhood
Census Tract	**109.02**	**110.02**	**110.01**	**111.01**	**111.02**	**111.03**	**112**	**113**	**115.01**	**115.03**
Healthy Places Index Score	**27.6**	**70.5**	**72.7**	**55.5**	**69.6**	**37.4**	**50.9**	**68.4**	**60.4**	**84.6**
Latino	12%	9%	16%	15%	16%	25%	10%	18%	17%	9%
Black	<1%	<1%	<1%	2%	<1%	2%	<1%	0.01	2%	<1%
Asian	6%	4%	5%	3%	3%	3%	5%	7%	4%	4%
Poverty Level	80%	51%	30%	49%	42%	50%	59%	38%	32%	22%
Linguistic Isolation	2%	2%	4%	1%	3%	8%	1%	8%	4%	0%
Outdoor Workers	<1	2%	2%	4%	4%	3%	2%	3%	5%	2%
Elderly Populations	3%	8%	20%	9%	10%	17%	13%	14%	17%	12%
Youth Populations	2%	2%	7%	2%	3%	5%	3%	3%	5%	6%
Disabled Population	3%	4%	12%	7%	11%	11%	8%	10%	15%	7%
Tree Canopy	5%	1%	7%	6%	3%	4%	9%	9%	5%	3%
Park Access	76%	78%	93%	100%	100%	94%	60%	99%	100%	93%
Supermarket Access	33%	67%	30%	83%	99%	40%	58%	53%	92%	32%
Renter Housing Cost Burden	70%	42%	22%	29%	25%	35%	70%	34%	11%	41%
Active Commuting	31%	20%	11%	35%	23%	21%	22%	13%	9%	6%
CalEnviroScreen Score	9.89	14.99	6.69	11.85	10.95	26.9	15.86	16.58	12.86	10.9

Notes: n/a = not applicable

Source: California Healthy Places Index 2021; U.S. Census Bureau 2017

<u>Sociodemographic Characteristic Definitions</u>

- Latino – Percent of population in the census tract that identify as Latino.
- Black – Percent of population in the census tract that identify as Black or African American.
- Asian – Percent of population in the census tract that identify as Asian.
- Poverty Level - Percent of people in the census tract earning less than 200% of the federal poverty level (Federal poverty level = $12,880 per individual in 2021). 200% is often used to measure poverty in California due to high costs of living.
- Linguistic Isolation – Percent of households in the census tract that do not have one or more persons 14 years or older who speaks English well.
- Outdoor Workers - Percent of adults (over 16) in the census tract who work outdoors.
- Elderly Populations - Percent of population in the census tract under 5 years old.
- Youth Populations - Percent of population in the census tract under 5 years old.
- Disabled Population - Percent of people in the census tract with access and functional needs (a physical or mental disability).
- Tree Canopy - Percent of land in the census tract has tree canopy (weighted by number of people per acre).
- Park Access - Percent of people in the census tract who live within walkable distance (half-mile) of a park or open space greater than 1 acre.
- Supermarket Access - Percent of land in the census tract that reside less than 1/2 mile from a supermarket/large grocery store.
- Renter Housing Cost Burden - Percent of low-income renters in the census tract who pay more than 50 percent of their income on housing costs.
- Active Commuting - Percent of workers (16 years old and older) in the census tract commute to work by transit, walking, or cycling.
- CalEnviroScreen Score – CalEnviroScreen score which identifies communities disproportionately burdened by multiple sources of pollution and with population characteristics that them more sensitive to pollution. An area with a high score is one that experiences a much higher pollution burden than areas with low scores, with scores (0 -100) being compared across all census tracts in the state.

As shown in Figure 6 and Table 8, the city includes several census tracts which include both sociodemographic characteristics and characteristics of the built environment that make the populations in these census tracts more vulnerable to climate-related hazards and may be at a larger disadvantage in their ability to become more resilient to the impacts of climate change. However, as shown in Table 8, other census tracts in the City display specific characteristics that may make those residents particularly vulnerable to certain climate related hazards and should not be overlooked.

Margarita Avenue Neighborhood (Census Tract 111.03) stands out as a particularly vulnerable area of the City and includes the second lowest HPI score and highest CalEnviroScreen score. Notable characteristics of this area that make it particularly vulnerable, compared to the rest of the city, include a high percentage of minority residents, a high percentage of elderly and disabled residents, a high percentage of residents experiencing linguistic isolation, low access to supermarkets and grocery stores, and 50 percent of residents earning less than 200 percent of the federal poverty level. The West of South Higuera neighborhood (Census Tract 115.01) also stands out as a particularly vulnerable area of the City to climate impacts. Notable characteristics of this area that make its residents particularly vulnerable, compared to the rest of the city, include a high percentage of elderly and disabled residents, the highest percentage of outdoor workers in the City, and a high percentage of Latino residents who are generally more vulnerable to climate impacts (Natural Resource Defense Fund 2016) and may not have the same level of access to emergency resources of information.

The analysis of each hazard also takes into account the information on social vulnerabilities presented above to assesses how populations in different areas of the City are vulnerable to specific hazards.

Figure 7 includes the location and relative density of homeless encampments in the city. The city's homeless population are particularly vulnerable to climate-related hazards with less access to shelter and resources to protect themselves during emergency events (e.g., flooding, heat waves). Similar to the sociodemographic trends prevalent in some areas of the City, which make them particularly vulnerable to climate-related hazards, the locations of the homeless encampments identified in Figure 7 are also identified as areas in the City with particularly vulnerable populations.

2.2.3 Community-Based Adaptative Capacity

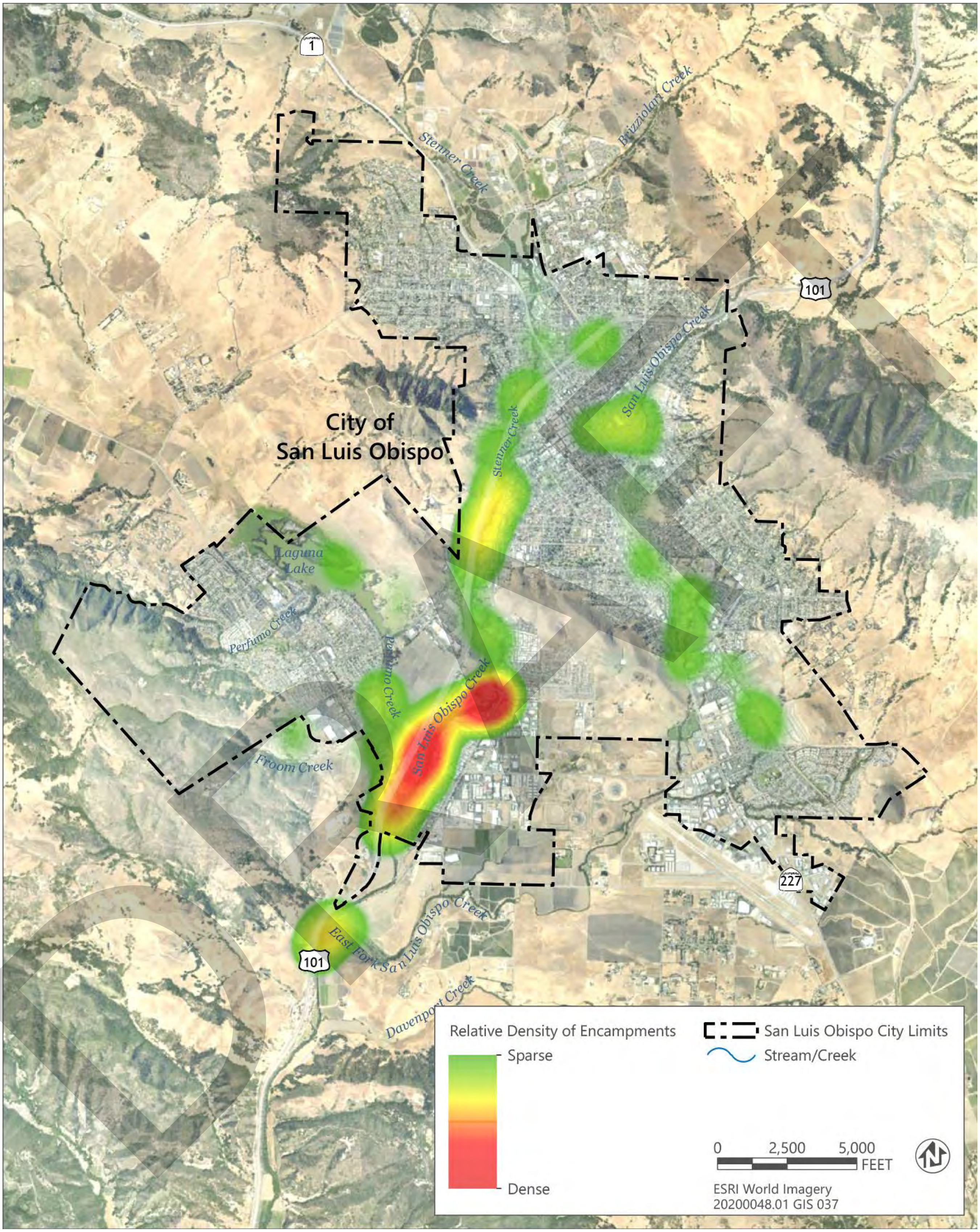
As discussed in 2.1.3, adaptive capacity is defined as the ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences (IPCC 2014). Alongside the steps the City and partner agencies have already taken protect the City from existing climate-related hazards, it is important to recognize the role community organizations and informal social networks can play in building adaptive capacity to the impacts of climate change.

SOCIAL NETWORKS AND SOCIAL COHESION

Aside from resources provided by the City or other agencies to help mitigate the impacts on residents and businesses during these events, social cohesion can play an important role in helping protect residents, particularly vulnerable populations, during climate-related disasters. Social cohesion, generally understood as the extent of connectedness and solidarity among groups in society or community, is one of the strongest indicators of resilience during disaster events as well as in post-disaster recovery efforts (Townshend et al. 2015). Important indicators of social cohesion, from the this research include:

- Belonging versus isolation, which means shared values, identity, feelings of commitment;
- Inclusion versus exclusion, which concerns equal opportunities of access;
- Participation versus non-involvement;
- Recognition versus rejection, which addresses the issue of respecting and tolerating differences in a pluralist society; and,
- Legitimacy versus illegitimacy (Jenson 1998).

An important component in remaining resilient to the impacts of climate change and climate-related disasters is the post-disaster recovery period. As noted in research on the topic, a focus not only of the physical rehabilitation of the built environment but on the addressing the emotional and mental health impacts of disasters is needed to ensure a successful community recovery during the post-disaster period. The emotional and mental health impacts of disasters can be addressed though various types of social cohesion including social and support networks (including access to social support in times of need), social participation (as the obverse of social isolation and being cut off from relationships providing friendship and company), and community engagement (including volunteering which draws people together to work for the benefit of others) (Townshend et al. 2015). While measuring the degree of social cohesion present in the City is not possible at this point, this subject is discussed here to emphasize the importance of social cohesion in increasing community resilience to the impacts of the climate change. Social cohesion here is highlighted as important component of community-based adaptative capacity and is discussed, as appropriate, in the discussions on specific climate-related hazards.



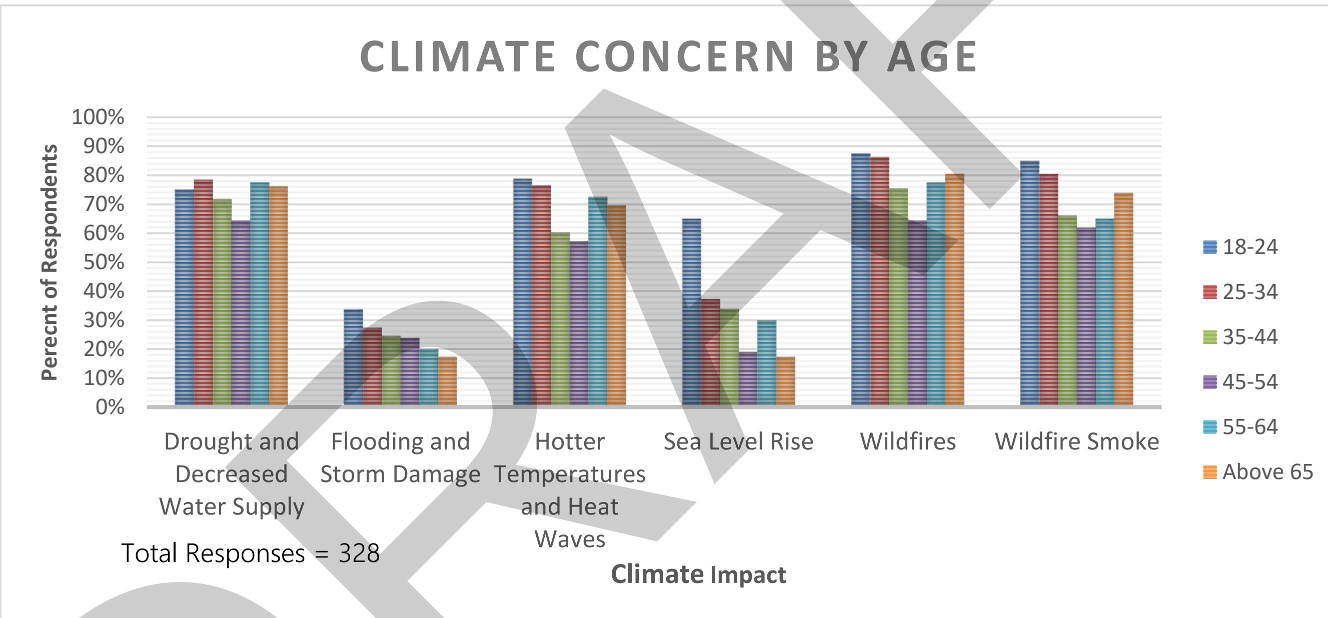
Sources: City of San Luis Obispo in 2021

Figure 7 Location and Relative Density of Homeless Encampments in the City of San Luis Obispo

RESILIENT SLO COMMUNITY PRIORITIES SURVEY

The effects of climate change are already being felt by community members. In an effort to gather input on overall community priorities regarding climate-related hazards, concerns related to climate change impacts, experience with past hazard events and response efforts, and priorities for local action, a community priorities survey was developed and provided to community residents. The survey, consisting of 19 questions, was open from August 31, 2020 – October 11, 2020 and had 328 responses. Highlights from the survey results have been included in this Report to help better understand the community's priorities regarding climate-related hazards and how the residents may already be affected climate-related hazards. The survey results are also included in the discussion on specific climate-related hazards.

As part of the survey, participants were asked what climate-related impact they were most concerned about. Figure 8 illustrates the responses to this question by age group. As shown in Figure 8, respondents were most concerned about wildfires and associated poor air quality events. Leading up to and during the survey response period, the City experienced poor air quality from several wildfires in the surrounding region, which may have influenced survey results. The large majority of respondents were also concerned about drought, increasing temperatures, and heat wave events and much less concerned about flooding and sea level rise. Survey results for this question also highlight that respondents in the 18-24 year old age cohort were the most concerned about almost all climate issues. To explore the full results of the community priorities survey, please refer to Baseline Conditions Report



Sources: Resilient SLO Community Priorities Survey

Figure 8 City Resident's Climate Concern by Age

COMMUNITY-BASED ORGANIZATIONS

Community-based organizations are generally understood as public or private nonprofit organizations that represent one or more segments of a community and/or provide educational or other community services to individuals or specific segments of the population. Climate-related hazards can also affect the ability of community-based organizations to operate and provide services to the communities they serve. Community-based organizations also play an important role in providing a wide variety of services to any community both during disaster and post-disaster recovery periods as well as during non-disaster periods (Tyler and Moench 2012). In many cases, community-based organizations provide services to a communities most vulnerable population and as a result are the institutions most in touch with the day-to-day needs and concerns of these populations during both disaster and non-disaster periods (Murray and Poland 2020). There is a comprehensive network of organizations in the city and the County that provide a wide variety of services to SLO community residents and visitors. In June 2020, a brief survey was sent out to community-based organizations in the City to better understand how these organization's operations were being affected by climate-related hazards and what responses were being taken to better prepare for the impacts of climate change. A total of eight community organizations responded to the survey. Figure 9 includes the results from two key questions in the survey, highlighting which climate-hazards community-based organizations have been affected by and which hazards they are concerned will affect their operations. The survey also asked what actions are being taken by the organizations to better prepare for climate changes. These results will be incorporated in the resilience strategy development process of the Resilient SLO project.

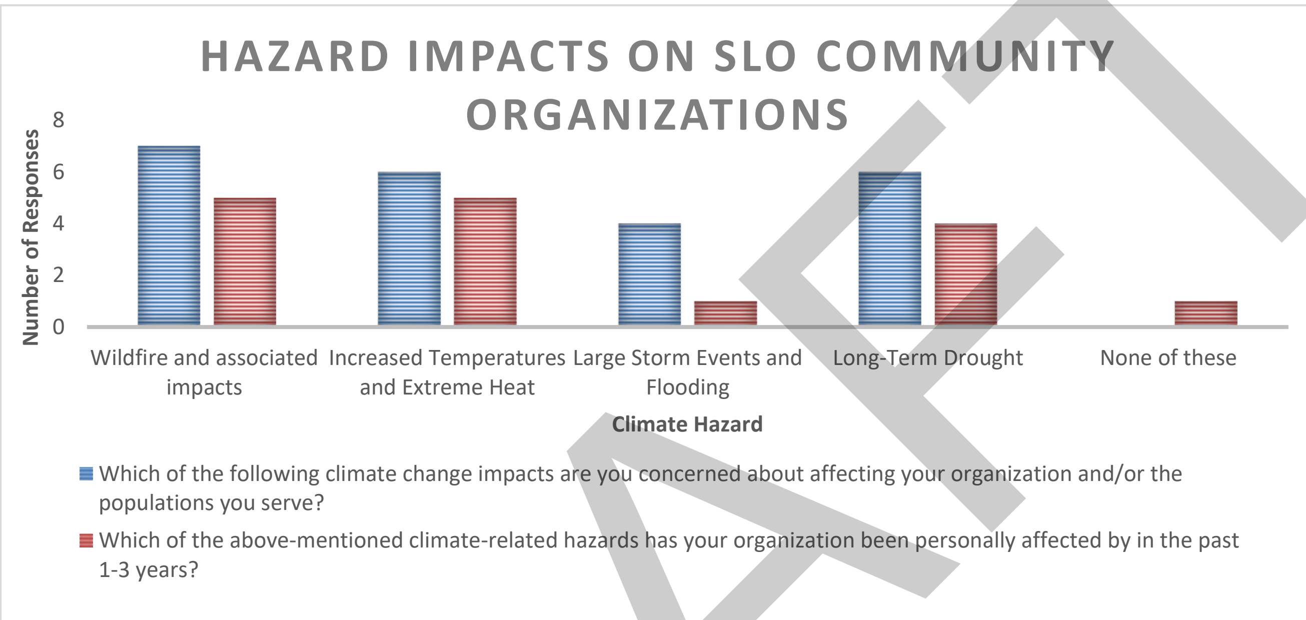


Figure 9 Climate -Related Hazard Impacts on Community Organizations in the City of San Luis Obispo

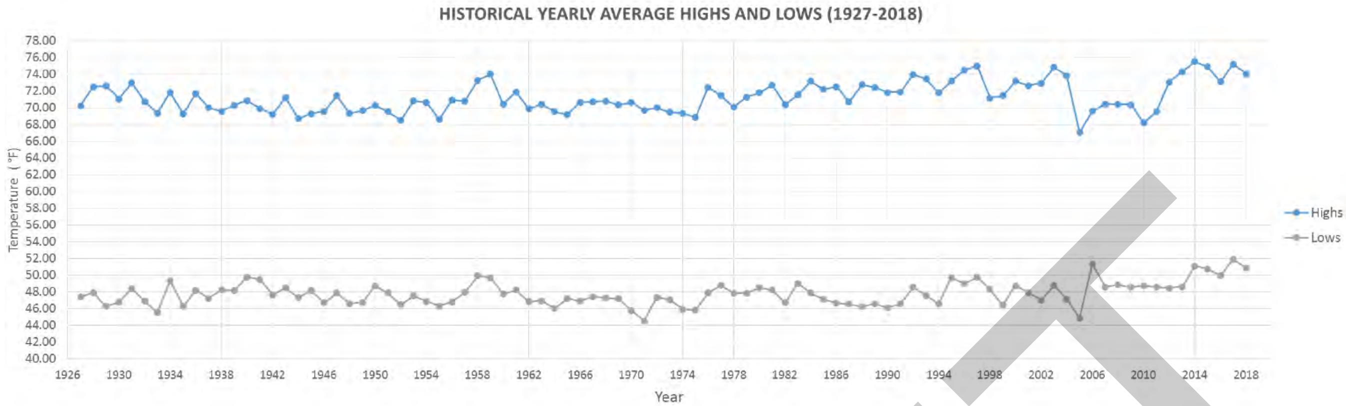
2.3 TEMPERATURE AND EXTREME HEAT ANALYSIS

This section discusses future increases in temperature and extreme heat in the City and analyzes how these changes are likely to impact the City and its population as well as highlighting what capacity the City and partner agencies already have in place to address future heat-related impacts.

2.3.1 Future Exposure to Temperature Increases and Extreme Heat

The City is characterized by a Mediterranean climate. While the City is generally considered to have a mild climate, historically unseasonably warm periods and cold spells have been observed. According to Cal-Adapt, during the historic period (1961–1990), the annual average maximum temperature in the City was 71.1°F and the annual average minimum temperature was 43.7°F (CEC 2019a). The annual maximum and minimum daily temperatures are calculated by averaging daily values of maximum and minimum temperatures for the full year, which is then averaged over a thirty-year time-period to account for year-to-year variability.

Although the City has not historically experienced many extreme heat conditions, the City is likely to experience increased sensitivity to extreme temperatures because residents are not acclimatized to or prepared for extreme heat conditions, even if increases are relatively mild compared to other parts of the state. Extreme heat events are described in this section in terms of their intensity (i.e., average maximum temperature), frequency (i.e., how often they occur), time of year in which they occur, and duration (total number of consecutive extreme heat days). Figure 10 includes the average annual maximum and minimum temperatures for the City from 1926 through 2018.



Sources: Cal Poly 2020

Figure 10 Average Annual Maximum and Minimum Temperatures in the City (1926-2018)

AVERAGE TEMPERATURE

As shown in Table 9, both annual maximum and minimum are projected to increase throughout the 21st century. The average annual maximum temperature in the City is projected to increase to 71.6°F in the near-term and 73.1°F in the midterm under the high emissions scenario. The average annual maximum temperature is projected to increase to 73.1°F and 75.6°F in the late-century period under the medium and high emissions scenarios, respectively. The average annual minimum temperature in the City is projected to increase to 48.7°F in the near-term and 49.7°F in the midterm under the high emissions scenario, and the late-century average annual minimum temperature is projected to increase to 50.1°F and 52.7°F under the medium and high emissions scenarios, respectively (CEC 2019a). Increased temperatures in the City will influence secondary climate effects, including extreme heat events, wildfire, and drought.

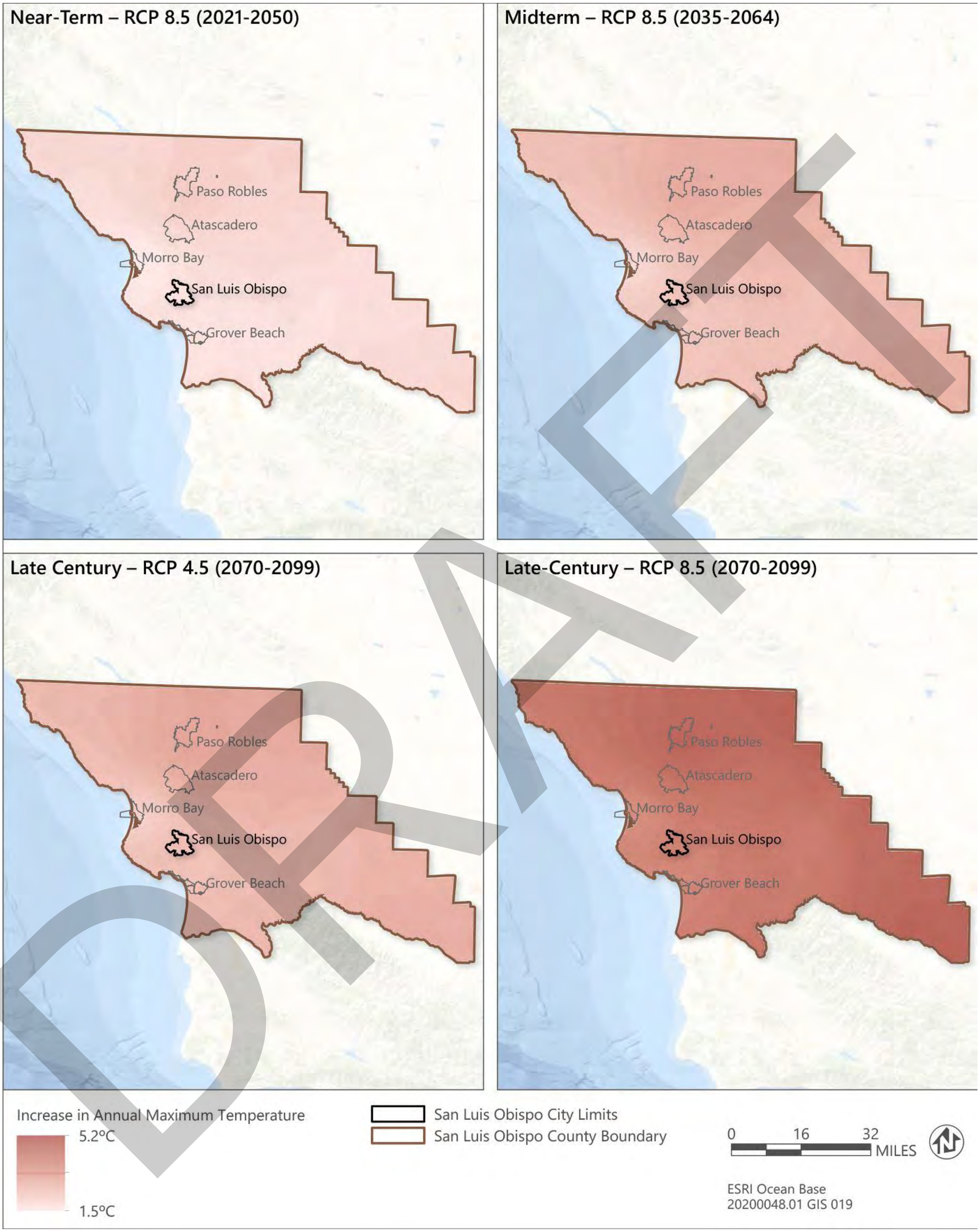
Table 9 Changes in Average Annual Temperature in City of San Luis Obispo

Geography	Average Annual Temperature	Historic Average Annual Temperature (1961-1990)	Near-Term (2021-2050)	Midterm (2035-2064)	Late-Century (2070-2099)	
					Medium Emissions	High Emissions
City of San Luis Obispo	Maximum Temperature (°F)	68.4	71.6	73.1	73.1	75.6
	Minimum Temperature (°F)	45.7	48.7	49.7	50.1	52.7
San Luis Obispo County	Maximum Temperature (°F)	69.8	72.9	74.3	74.7	77.3
	Minimum Temperature (°F)	42.2	45.4	46.6	46.9	49.8

Notes: °F = degrees Fahrenheit; RCP = Representative Concentration Pathway.

Source: CEC 2019a

Figure 11 illustrates the projected change in average annual maximum temperature in the city and in San Luis Obispo County (County) in the near-term and midterm periods under the high emissions scenario and average annual maximum temperature in the late-century period under both emissions scenarios. As shown in the Figure 11, the average annual maximum temperature is expected to rise through the late-century period under both emissions scenarios. As shown in Table 9, the County compared to the city, has had slightly higher maximum and minimum temperatures historically with this trend continuing under both emissions scenarios as temperatures continue to rise in both the city and the County. This difference is also reflected in Figure 11, which shows the City experiencing smaller increases in annual average maximum temperatures compared to northern and eastern portions of the County.



Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020 and downloaded from Cal-Adapt in 2021

Figure 11 Changes in Annual Average Temperature in San Luis Obispo County through 2099

EXTREME HEAT EVENTS

The Cal-Adapt tool provides estimates of future instances of extreme heat events. Extreme heat events include extreme heat days and heat waves. Cal-Adapt defines an extreme heat day as a day when the daily maximum temperature exceeds the 98th historical percentile of daily maximum temperatures based on observed data from 1961–1990 between April and October. Heat wave events are characterized as periods of sustained extreme heat and are defined by Cal-Adapt as four or more consecutive extreme heat days.

The extreme heat threshold for the city is 89.6°F, meaning 98 percent of all recorded temperatures in this period were below 88.6°F. Historically (1961-1990), the city experienced an average of four extreme heat days per year. As a result of rising temperatures from climate change, the city is projected to experience up to 7 extreme heats days annually in the near-term and 10 extreme heat days annually in the midterm under the high emissions scenario. In the late-century period, the city is projected to experience up to 10 extreme heat days annually under the medium emissions scenario and 18 extreme heat days annually under the high emissions scenario (CEC 2019b). As shown in Table 10, the number of extreme heat days is already increasing from historic averages and will continue to increase through the late-century under both emissions scenarios. The city is already beginning to experience increases in extreme heat with a new September record high temperature of 117°F being set on September 6th, 2020 (NOAA 2021).

Table 10 Changes in Extreme Heat Events in City of San Luis Obispo

Annual Averages	Historic Annual Averages (1961-1990)	Near-Term (2021-2050)	Midterm (2035-2064)	Late-Century (2070-2099)	
				Medium Emissions	High Emissions
Number of Extreme Heat Days	4	7	10	10	18
Number of Heat Waves	0.2	0.3	0.4	0.4	1.3
Number of Days in Longest Stretch of Consecutive Extreme Heat Days	2.6	2.8	3	3.4	4.6

Notes: RCP = Representative Concentration Pathway; Extreme Heat Day = day with maximum temperature above 89.6°F; Heat Wave = four or more consecutive extreme heat days

Source: CEC 2019b

While heat waves have historically been infrequent in the City, with a historical average of less than one heat wave annually, climate change is expected to increase the frequency of heat waves. Under the high emissions scenario, the City is projected to still experience less than one heat waves per year in the near-term and in the midterm. In the long term, the City is projected to experience less than one heatwave per year under the medium emissions scenario and 1.3 heat waves per year under the high emissions scenarios.

Extreme Heat Definitions

Extreme Heat Day = Day with maximum temperature above 89.6°F

Heat Wave = Four or more consecutive Extreme Heat Days

The average number of days in the longest stretch of consecutive extreme heat days per year is also projected to increase. Historically, the longest stretch of consecutive extreme heat days lasted for an average duration of approximately two-and-a-half days. The longest stretch of consecutive extreme heat days is projected to increase only slightly in the near-term and 3 days in the midterm under the high emissions scenario. In the late century, the duration is projected to increase to an average of 3.4 days under the medium emissions scenario and 4.6 days under the high emissions scenario (CEC 2019b). The timing of extreme heat days is also projected to change over the 21st century with more extreme heat days and heat wave events occurring earlier in the year (April through May) and more severe events occurring in the historically hot months of September and October (CEC 2019b). The projected number of heat waves and number of days in the longest stretch of consecutive extreme heat days is shown in Table 10.

2.3.2 Extreme Heat Sensitivities and Impact

This section discusses the City's existing sensitivities to extreme heat and analyzes potential impacts to City with impacts discussed in the three general impact categories (e.g., Natural Systems, Built Environment, Community Resilience).

EXTREME HEAT AND NATURAL SYSTEMS

Open Space and Ecosystem Functions

Increases in annual average maximum and minimum temperatures are likely to alter suitable habitat for specific flora and fauna in the City, particularly in the City's recreation and open space areas. In general, plant species in the Central Coast mountain ranges in or near the city will shift upslope to track warming temperatures while, in the lowlands, species will move northward over the 21st century. The City's designated open space areas are comprised of a of a mixture of vegetation types including oak woodland, grassland, coastal sage scrub, and chaparral. Changes in annual average temperatures as well as long-term drought periods are projected to place increased pressure on these vegetation types. Invasive species have become more common in coastal sage scrub communities and compete with native coastal sage scrub species including commercial cultivars of the Monterey Pine (Pinus radiata) from New Zealand. However, it is unclear what effect climate change will have on invasive species in these open space areas (OPR et al. 2018b).

Many of the open spaces in and around the city also include inland grasslands. Historically, the duration and intensity of annual droughts in California varies substantially with elevation, latitude, distance to coast, and local soil characteristics. However, it is projected that most grassland species should be adaptive to tolerate climate extremes and variability (OPR et al. 2018b). As noted in the Central Coast Region Report, future changes in precipitation and drought will impact grasslands and wildflowers on the Central Coast and will be dependent on 1) the proximity to coast, 2) the relative proportion of native to exotic, and perennial to annual species.

Currently, the city has an extensive urban tree canopy with approximately 20,000 public trees on designated public property within the city limits. The City's tree canopy provides key benefits to residents and business owners including shading, traffic calming, beautification, and carbon sequestration. However, due to shifts in annual average minimum and maximum temperatures in the future, the urban tree canopy may be threatened, with some tree species no longer suitable given future minimum and maximum temperature thresholds. Research indicates that increases in temperature result in decreased photosynthesis and tree growth, and subsequently less carbon sequestration potential, as well as elevated incidence of pests (Meineke et al. 2016). Research on the impact of climate change on street trees in 16 California cities indicates that certain tree species that may be less suitable under future climate conditions may be more resilient when they are part of urban tree network. This is because urban tree networks are managed by staff which typically includes irrigation and pest management (McBride and Laćan 2018), two important factors that affect the suitability of various tree species under future climate conditions. The combined urban heat island effect as well as increase in temperatures due to climate change will also place increased heat stress on the City's urban tree canopy (McBride and Laćan 2018).

Invasive Species

As temperatures have increased over the past decade or more, observations have shown that invasive species have become more common in coastal sage scrub communities and compete with native coastal sage scrub species with the potential for coastal sage scrub habitats to convert to grasslands after fires, grazing, or nitrogen deposition. However, as noted in a recent study, while climate change is projected to affect coastal sage scrub communities, anthropogenic land use changes are likely to be a stronger indicator of effects on this habitat (Riordan and Rundel 2014).

In terms of forests and tree species in and surrounding the City, climate change's impacts on physical conditions in Central Coast forests will interact with biotic factors such as insect and disease outbreaks alongside changes in temperature and precipitation. The increasing presence of non-native species in the City's riparian areas also creates competing demand for water resources alongside native populations of plant species. For the last several decades, Sudden Oak Death has affected coast live oak, canyon live oak, California black oak, Shreve oak, and the closely related tan oak. During wet weather, spores of the disease of (Phytophthora ramorum) are produced on infected leaves, which can be dispersed by wind or via transported soil transported by humans (e.g., hikers, bikes) to infect new hosts. Climate models suggest broad scale movement Sudden Oak Death into California's North Coast by 2030, but less toward the southern portions (e.g., San Barbara County and San Luis Obispo County) of the Central Coast because of drier conditions there (Meentenmeyer et al. 2011).

Agriculture

Agricultural production is a prominent industry in the County of San Luis Obispo, including a thriving wine industry. The City also includes some agricultural land uses most notably the San Luis Ranch and the City Farm, a community-based urban farm hub, both located in the southern portions of the city west of US 101. The agricultural industry is highly sensitive to climate impacts including specific climate variables such as amounts, forms, and distribution of precipitation and changes in temperatures. Decrease in water availability due to long-term drought can affect crop yields and areas suitable for growing (Tanaka et al. 2015).

Increases in temperature, along with the frequency of extreme heat events and heat waves, has the potential to affect livestock operations in the County. Higher temperatures will lead to increased rates of evaporation of surface waters and evapotranspiration in plants, resulting in decreased moisture content of soils. These effects will lead to increased demand for irrigation to water crops. Warmer nighttime temperatures will reduce or eliminate the required number of "chill hours" that certain crops (e.g., fruit trees) need to bud (Union of Concerned Scientists n.d.). Strawberry production accounts for approximately 26 percent of total crop value in the County (County of San Luis Obispo 2018). It is projected that increases in temperatures caused by climate change could decrease yields of California strawberries by about 10 percent by 2050 and up to 43 percent between 2070 and 2099 (USDA 2016). Crop loss of this magnitude would result in significant loss of tax revenue to the County and result in impacts to employment opportunities for agricultural workers. Additionally, changes in temperatures will alter the range of crop-damaging pests and microbial diseases, which could increase the susceptibility of certain crops to predation, increased spoilage, reduced nutritional content, and other damage. Livestock operations, which accounts for approximately 3 percent of total crop value in the County, could also be subject to heat stress, which can result in reduced livestock pregnancy rates, increased length of time needed to meet market weight, and reduced milk production (CNRA 2014:24).

Total yields for wine grapes may be reduced due to warmer winters in the future. Changes in temperature can also affect plant diseases, insects, and invasive weeds (Pathak et al. 2018). Because the City relies heavily on tourism including wine and vineyard-based tourism, impacts on agriculture and the wine industry due to climate change in the County could have negative economic impacts for the City and businesses. There are over 250 wineries throughout Paso Robles, Edna Valley, and other areas of the County that are national and international tourist destinations. The grape and wine industry has a large influence on agricultural production in the County. Grapes alone accounted for approximately 27 percent of all crop value in 2018, while the County produced one billion dollars in total crop value, demonstrating the significance of agriculture in supporting the County's economy (County of San Luis Obispo 2018).

Key Findings and Policy Considerations

- Changes in temperature and extreme heat are likely to have negative impacts on the City's tree canopy with some tree species no longer suitable for future minimum and maximum temperatures. Any future policies focused on improving the City's tree canopy or green spaces to mitigate the urban heat island effect should carefully consider what plant and tree species will be suitable for future climate conditions.
- Climate change is projected in invasive species in the City's open spaces, affecting coastal sage scrub habitats as well as the City's oak species from Sudden Oak Death.

- Regional impacts on the agriculture and viticulture industries from shifting temperatures have the potential impact the City via decreases in wine and vineyard-based tourism, with the City relying heavily on revenue and employment opportunities in these industries. Resilience strategies focused on economic impacts should consider potential impacts on viticulture vineyard-based tourism and potential diversification of the City's tax revenue sources and employment industries.

EXTREME HEAT AND THE BUILT ENVIRONMENT

Urban Heat Island

Although the city's Mediterranean climate includes high temperatures during summer and fall months, the city's urban land use patterns can intensify periods of extreme heat through the "urban heat island" effect. The urban heat island effect is generally understood as the phenomenon of urban areas being significantly warmer than surrounding rural areas because of human activity and land use patterns in the built environment. Several factors contribute to the urban heat island effect, including land use patterns; the presence of large-paved areas (e.g., roads and parking lots); traffic from high-volume roadways (Zhu et al. 2017), impervious surfaces (e.g., roofs). Conversely, the presence of vegetation and trees in urban environments increases evapotranspiration in which water is released form plants in its gas vapor form and has a cooling effect on the surrounding air.

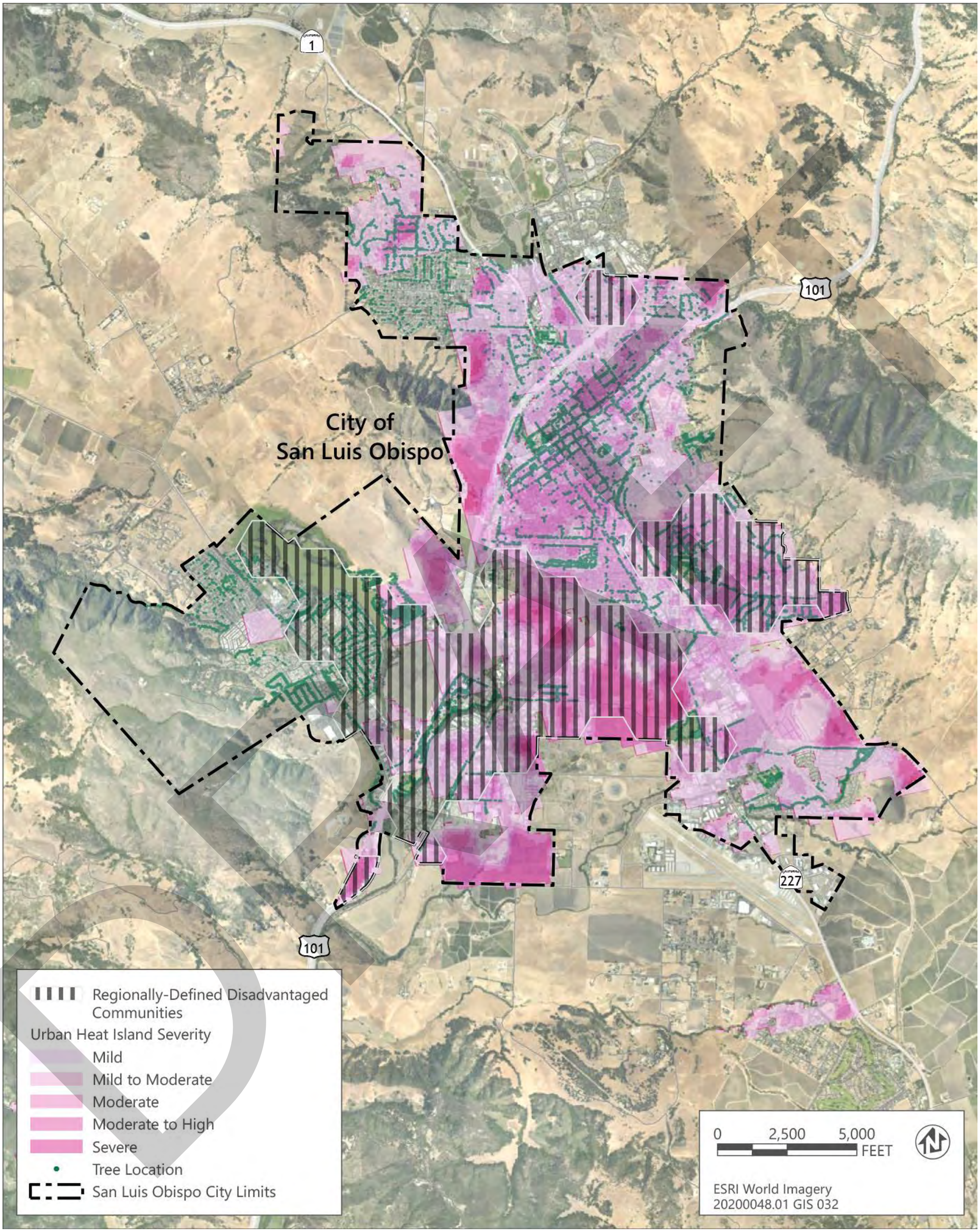
SLOCOG developed a regional definition for disadvantaged communities. Disadvantaged communities are disproportionately burdened areas that are economically distressed and/ or historically underrepresented as a part of the local government process. SLOCOG examined 13 variables, such as racial and ethnic minority, disability status, language proficiency, renter affordability, and household income. Many of these indicators also result in increased susceptibility to extreme heat impacts. To show how the urban heat island effect may further exacerbate projected heat impacts on the city, including vulnerable populations, Figure 12 identifies SLOCOG identified disadvantaged community areas, as well as the locations of critical facilities for vulnerable populations.

As shown in Figure 12, areas in the city with an increased concentration of commercial and industrial land uses have above-average surface temperatures. Notable urban heat island hotspots in the city include:

- the Service and Manufacturing, Office, and Business Park land uses near Tank Farm Road and South Higuera Street
- the Neighborhood Commercial land uses near Broad Street and Tank Farm Road
- some Commercial land uses along the northern portions of Monterey Street in downtown San Luis Obispo (SLO)

Notably, the urban heat island hotspot along South Higuera Street is directly adjacent to residential land use to the east of South Higuera Street and north of Prado Road likely resulting in disproportionate impacts on these residential areas including increased energy demand for cooling.

Additionally, as shown in Figure 12, southern portions of the city include far less tree cover than areas near the downtown and the Laguna Lake area to the west of US 101, which is likely contributing to urban heat island hotspots in these areas. This include the Margarita Avenue Neighborhood (Census Tract 111.03) and the West of South Higuera Neighborhood (Census Tract 115.01) which have four and five percent tree cover, respectively, which is lower than many other parts of the City. Southern portions of the city including areas adjacent to southern portions of Broad Street and Tank Farm Road include newer residential and commercial developments which include younger trees and vegetation. This may reduce potential urban heat island effects as vegetation and the tree canopy increase in these areas in the future.



Source: Data received and downloaded from City of San Luis Obispo and the Trust for Public Land.

Figure 12 Urban Heat Island Effect and Tree Cover in the City

Buildings and Energy Use

Changes in annual average temperature and extreme heat events are likely to effect buildings primarily through changes in energy use as well as disproportionate impacts on individuals residing in units that do not have air conditioning. Cal-Adapt provides data on the shifts in Cooling Degree Days and Heating Degree Days, which are measurements used to assess the energy demand needed for cooling and heating buildings in different climate zones throughout California. A degree day does not equate to a single day of the year but rather compares the mean (the average of the high and low) outdoor temperatures recorded for a location to a standard temperature (i.e., 65°F). For example, if the average temperature for a day is 80°F, the day has 15 Cooling Degree Days (80 – 65 = 15). Degree days are used in the State's Title 24 Building Energy Efficiency Standards to help design the energy demand needed for heating and cooling in the various climate zones throughout the state. To illustrate how climate change is likely to affect energy demand for heating and cooling in the future, Table 11 includes the relative shift in Cooling Degree Days and Heating Degree Days in the city through 2099.

Table 11 Changes in building energy use through 2099

Impact	Impact Type	Percent Change in Energy Demand for Heating and Cooling				Threshold Source
		Near-Term (2021-2050)	Midterm (2035-2064)	Late-Century (2070-2099)		
				Low Emissions	High Emissions	
Building Energy Use	Cooling Degree Days	66%	77%	80%	89%	CEC 2019c
	Heating Degree Days	-43%	-68%	-82%	-161%	CEC 2019c

Note: NA = not available.

Source: CEC 2019c

As shown in Table 11, in the near-term period, Cooling Degree Days in the City will increase by 66 percent while Heating Degree Days will decrease by 43 percent compared to historic averages. By the midterm period, Cooling Degree Days in the City will increase by 77 percent while Heating Degree Days will decrease by 68 percent compared to historic averages. In the late-century period under the medium emissions scenario, Cooling Degree Days will increase by 80 percent while Heating Degree Days will decrease by 82 percent. Under a high emissions scenario in the late-century period, Cooling Degree Days will increase by 89 percent while Heating Degree Days will decrease by 161 percent.

Changes in Cooling Degree Days will have implications for energy demand in residential and nonresidential buildings in the City with a higher energy demand for cooling and a decrease in energy demand for heating, in general. In general, for buildings in the City, increases in Cooling Degree Days will result in increased electricity demand for cooling and place increased demand on the electricity grid, particularly during extreme heat days and heat wave events which is projected to increase peak electricity demand for utilities. Currently, during extreme heat days and heat wave events, electricity utilities and the State's grid operator, California Independent System Operator, initiate "Flex Alerts", requesting customers to conserve energy during certain times of the day to reduce stress on the electricity grid (KSBY Santa Barbara-San Luis Obispo 2021). Some initial research that models future changes in peak load for utilities in California during extreme heat events has demonstrated that peak loads are substantially more sensitive to temperature anomalies, indicating warm-anomalous temperatures (e.g., extreme heat days and heat waves) will have a disproportionate impact on higher-intensity electricity consumption (Kumar et al. 2020). The research also indicates that disregarding the asymmetry in temperature response of electricity demand will lead to underestimating the climate-sensitive portion of the upper extremes of demand for electricity utilities in California, for short-term (2021-2040) and long-term (2081-2099) time periods included in the study.

As noted above, the urban heat island effect and hotspots in the City are likely to experience disproportionate increases in ambient air temperature during extreme heat days and heat wave events, further increasing electricity demand for cooling for homes with air conditioning while potentially resulting in heat-related public health impacts for homes without air conditioning. As noted in the City's recent Housing Element update, approximately 79 percent of the City's housing stock was built before 1989 (City of San Luis Obispo 2020a). These older and, in general, less energy efficient homes are more susceptible to increases in energy demand for heating and cooling.

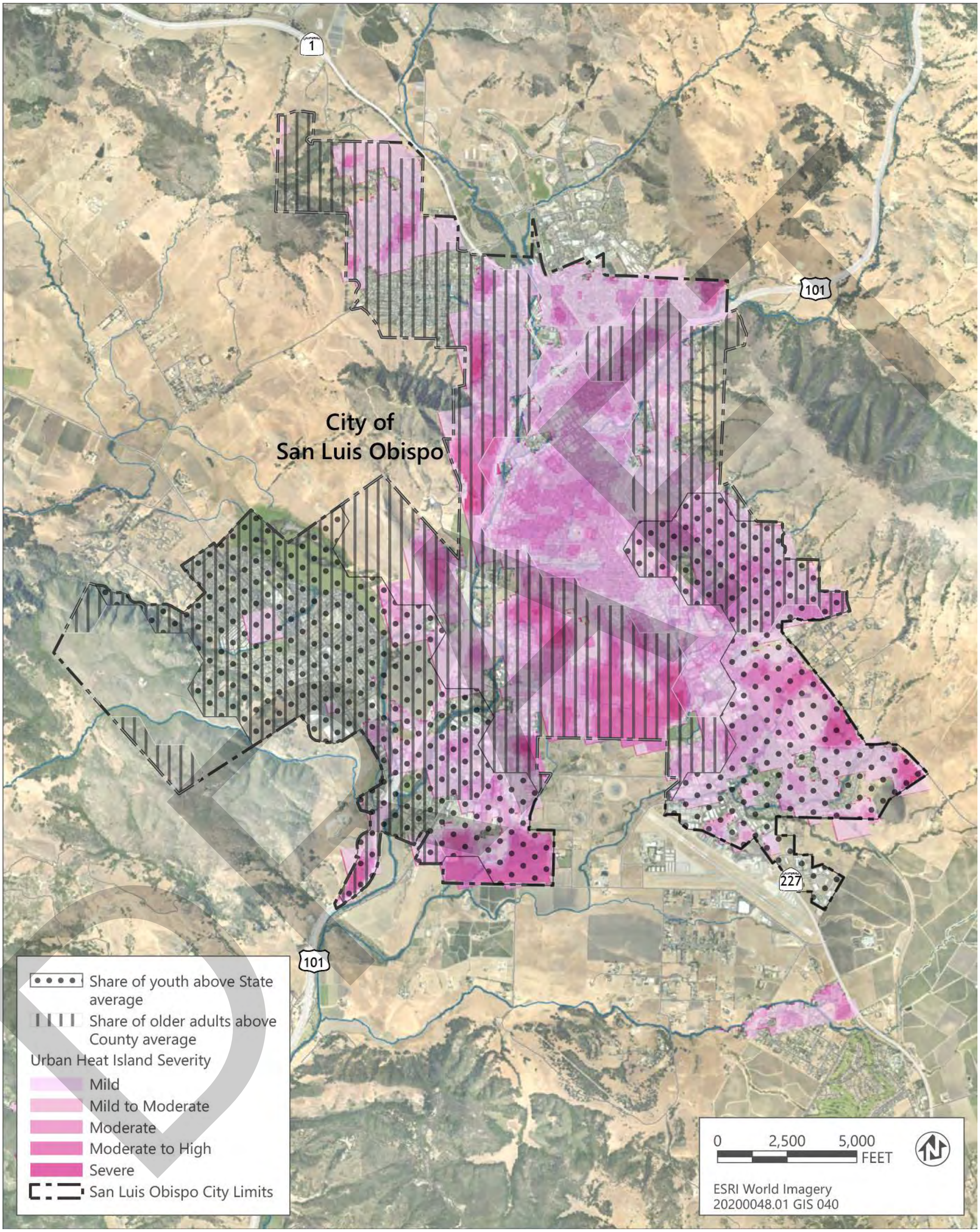
Key Findings and Policy Considerations

- The Margarita Avenue Neighborhood (Census Tract 111.03) includes population characteristics that make this area particularly vulnerable to extreme heat and is located in an area of the City with increased urban heat island severity. Resilience strategies that mitigate impacts of the urban heat island effect should focus on supporting this area of the City.
- Shifts in temperature and extreme heat will result in changes in energy demand for cooling in the City, with increased demand in areas experiencing more severe urban heat island hotspots. As the City implements it's recently adopted Climate Action Plan and as well as the Resilient SLO strategies, solutions that both reduce GHG emissions and help the City adapt to impacts of climate change should be prioritized.
- Older and, in general, less energy efficient homes are more susceptible to increases in energy demand for heating and cooling. Only 34 percent of homes in San Luis Obispo County have air conditioning with likely similar percentages in the City, making the City and it's building stock particularly ill-equipped to projected increases in heat wave events.
- Extreme heat days and heat waves will have a disproportionate impact on electricity demand, with higher electricity demand projected for these events in the future. These projections place an increased urgency on electricity utilities to plan for higher electricity demand during these events in future.

EXTREME HEAT AND COMMUNITY RESILIENCE

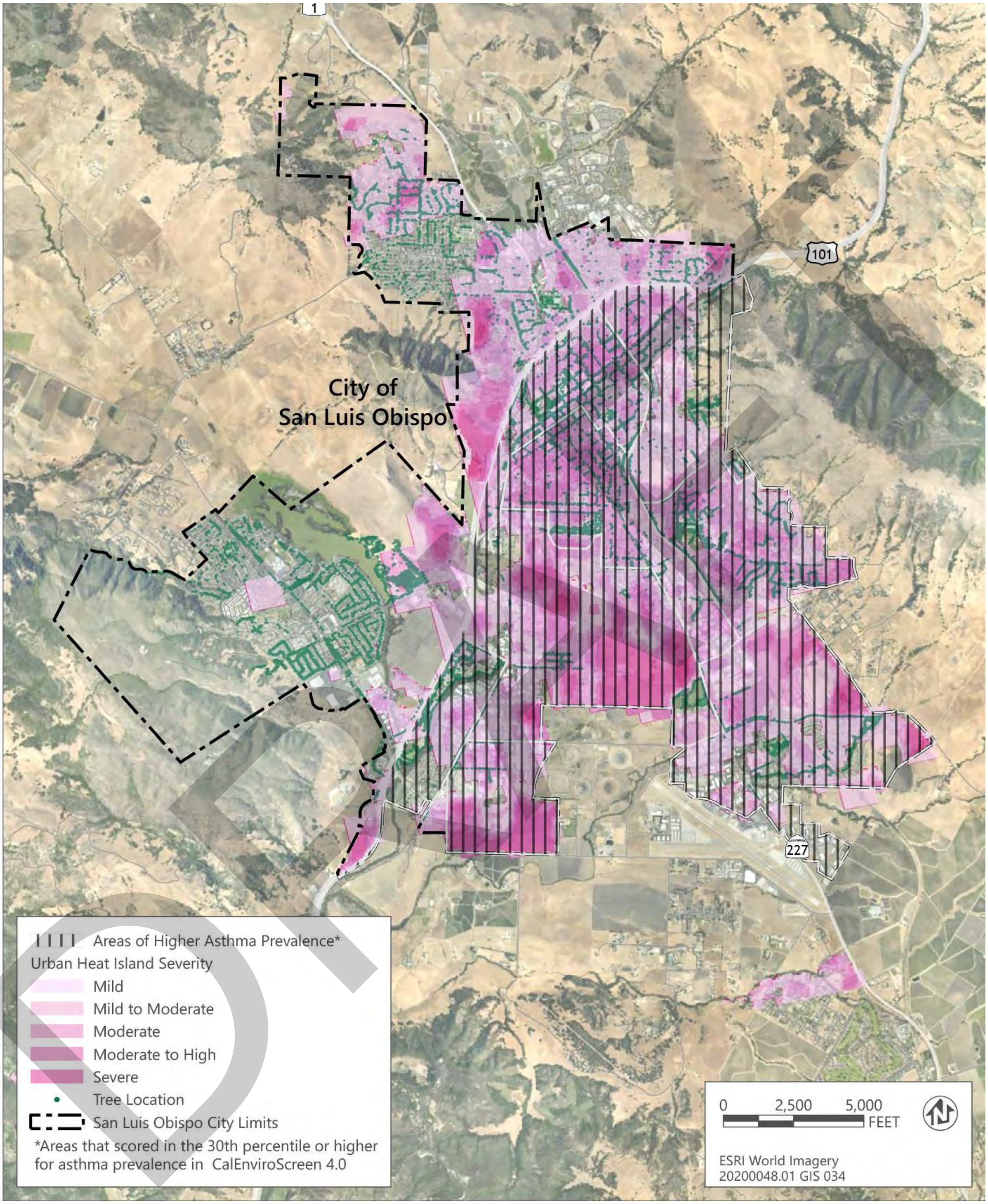
Heat-Sensitive Populations

As discussed in Section 2.2., over the age of 65, infants and children, individuals with chronic health conditions (e.g., cardiovascular disease, asthma), low-income populations, athletes training outdoors, and outdoor workers are particularly vulnerable to climate-related hazards including extreme heat (CDC 2019). Increased temperatures have been reported to cause heat stroke, heat exhaustion, heat syncope, and heat cramps, with certain vulnerable populations at increased probability of experiencing these effects (Kovats and Hajat 2008). Homeless populations often have higher rates of chronic disease because of extreme poverty, delays in seeking care, nonadherence to therapy, substance abuse, cognitive impairment, and other factors, placing them at increased risk during extreme heat events. Additionally, preexisting psychiatric illness can triple the risk of death for homeless populations during extreme heat events (Ramin and Svoboda 2009). Extreme heat can also worsen air quality, quickening the production of ozone in areas with increased concentrations of ozone precursors (i.e., oxides of nitrogen and reactive organic gases) (Knowlton et al. 2004). As shown in Figure 13 there is significant overlap between areas of moderate to severe urban heat island effect and areas with a higher share of older adults and youth under 5 years of age. The California Communities Environmental Health Screening Tool (CalEnviroScreen 4.0) includes an asthma prevalence indicator that measures the rate of emergency department visits for asthma. Although asthma rates in the City are low compared to statewide levels, there are areas of the City with relatively high asthma prevalence compared to local levels. Exposure to extreme heat has been shown to increase the risk of hospitalization for those with asthma (Dahl et al. 2019). As shown in Figure 14, the southern part of the City includes areas of more severe urban heat island effect and higher asthma prevalence. As noted in Section 2.2.2., the Margarita Avenue Neighborhood (Census Tract 111.03) and the West of South Higuera neighborhood (Census Tract 115.01) both include population characteristics that make these areas particularly vulnerable to extreme heat including higher percentages of elderly and disabled residents in these areas as well 50 percent of residents earning less than 200 percent of the federal poverty level in the Margarita Avenue Neighborhood.



Sources: Data received from SLOCOG in 2021, downloaded from The Trust for Public Lands in 2020, City of San Luis Obispo in 2020, County of San Luis Obispo in 2020

Figure 13 Youth and Elderly Populations and Urban Heat Island Severity in the City



Sources: Data downloaded from OEHHA in 2021, downloaded from The Trust for Public Lands in 2020, City of San Luis Obispo in 2020, County of San Luis Obispo in 2020 and received from CBEC Engineering in 2020

Figure 14 Asthma Rate Prevalence and Urban Heat Island Severity in the City

Public Health and Extreme Heat

For this analysis, the California Heat Assessment Tool (CHAT) was used to identify how Heat Health Events would increase in the future. A Heat Health Event, for the purposes of the tool, is defined as any event that results in negative public health impacts, regardless of the absolute temperature. The tool includes unique Heat Health Events threshold for locations throughout the state, specific to the climate and the historical sensitivity of people in that area to past extreme heat events. Heat Health Events are defined by a set of meteorological conditions over several days that have been associated with significant negative public health impacts (i.e., rate of visits to local emergency rooms) in a specific location. The defined temperature threshold for the City in the CHAT tool is days when maximum temperatures reach 92.6°F and maximum humidity reaches 50.5 percent. Specifically, the tool focuses on emergency room visits for individuals under four and above 65 as well as all non-white individuals, to define a vulnerable population cohort. For this analysis, the CHAT tool and the projected increase in Heat Health Events in the City for the general populations and vulnerable populations, as defined by the tool, are used. For more information on the tool and methodology used to identify Heat Health Events, please visit the CHAT Tool website (cal-heat.org). Table 12 includes increases in Heat Health Events for the general population and vulnerable populations in the City through 2099.

Table 12 Heat Health Events through 2099

Impact	Impact Type	Population	Historic (1961-1990)	Near-Term (2021-2050)	Midterm (2035-2064)	Late-Century (2070-2099)		Threshold Source
						Low Emissions	High Emissions	
Building Energy Use	Heat Health Events (HHE)	General Population	NA	1.3	1.4	1.75	5.4	CEC 2018
	Heat Health Events (HHE)	Vulnerable Populations	NA	8.23	10	11.2	12	CEC 2018

Note: NA = not available; CHAT = California Heat Assessment Tool.

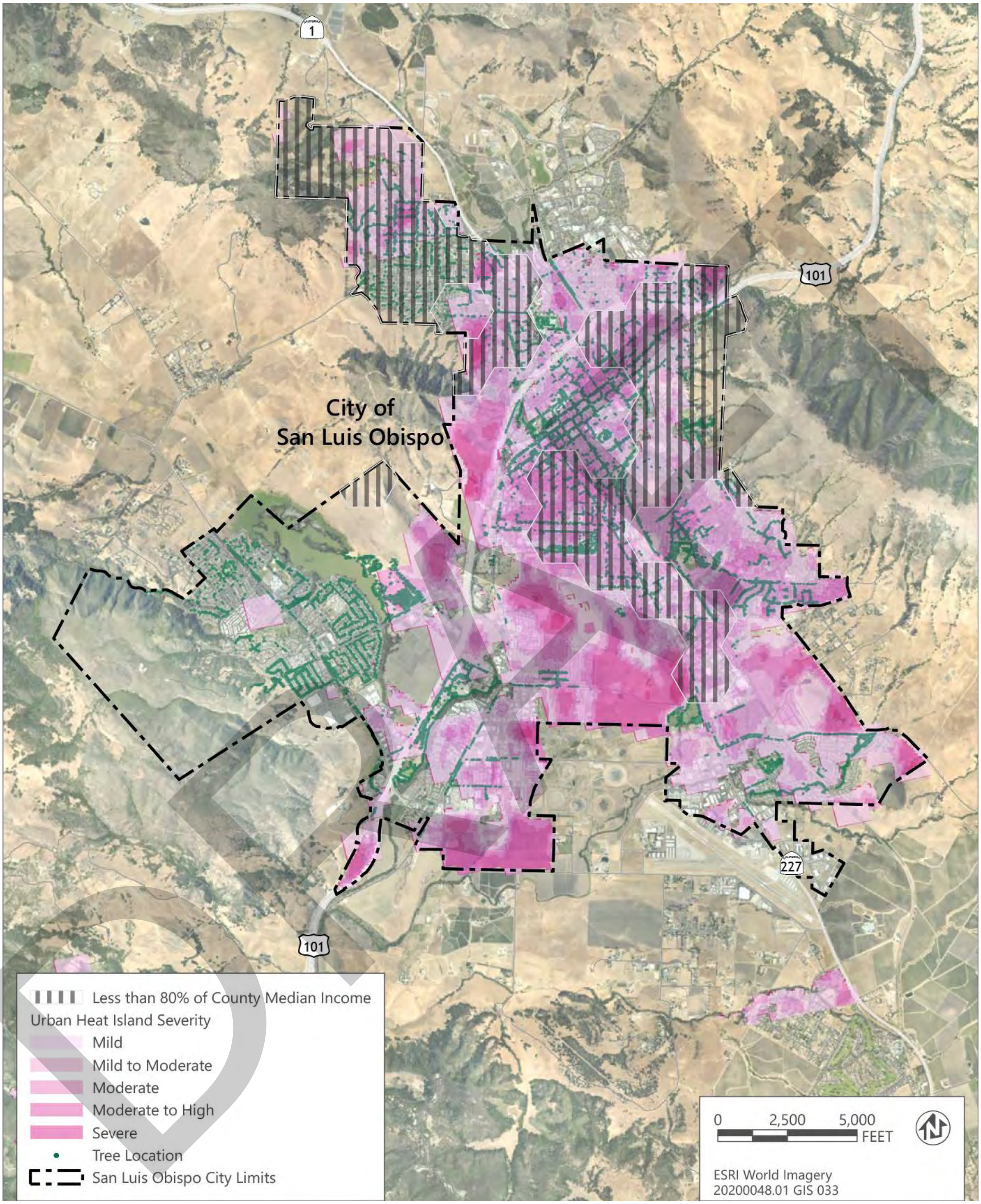
Source: CEC 2018

As shown in Table 12, during the near-term period, the City's general population will experience approximately 1.3 Heat Health Events while vulnerable populations to extreme heat will experience 8.23 Heat Health Events per year resulting in projected increases in demand for emergency services and hospital room visits. By the midterm period, the City's general population will experience approximately 1.4 Heat Health Events per year while vulnerable populations will experience 10 Heat Health Events per year. In the midterm period under the medium emissions scenario, the general population will experience approximately 1.75 Heat Health Events per year while vulnerable populations will experience 11.2 Heat Health Events per year. Under the high emissions scenario for the late-century period, the City's general population will experience a large increase to approximately 5.4 Heat Health Events per year while vulnerable populations to extreme heat will experience 12 Heat Health Events per year. As shown in Table 12, Heat Health Events for both the general population and vulnerable populations will continue to increase through the late-century period. For the general population, by the late-century period, Heat Health events will increase between 33 percent (low emissions scenario) and 315 percent (high emissions scenario). For vulnerable populations at increased risk from heat-related impacts, by the late-century period, Heat Health events will increase between 36 percent (low emissions scenario) and 46 percent (high emissions scenario). This analysis demonstrates a general increase in Heat Health Events throughout the century with a more pronounced impact on vulnerable populations who are at increased risk during Heat Health Events.

Environmental Justice and Extreme Heat

Alongside populations with health sensitivities, residents with specific sociodemographic characteristics are at increased sensitivity to extreme heat events (CDC 2019). Research has found that low-income residents spend a larger proportion of their income on utilities, including electricity use for cooling, with these residents being disproportionately affected during extreme heat events (Voelkel et al. 2018). Additionally, research has found that low-income neighborhoods can often have less tree coverage and park space, further contributing to the disproportionate impact on low-income residents (Zhu and Zhang 2008). Additionally, decreased access to transportation services can further increase exposure and health risks from extreme heat events for the unhoused community (Ramin and Svoboda 2009). Unhoused individuals are also at increased risk from extreme heat events with, generally, less access to places to cool off and healthcare resources during these events. Figure 15 shows the location of low-income areas in the City, based on the San Luis Obispo Council of Government's (SLOCOG) regional definition of low-income. The map shows urban heat island hotspots and areas where average income level is less than 80 percent of the region's average median income. Unhoused individuals are also at increased risk from extreme heat events with, generally, less access to places to cool off and healthcare resources during these events. Additionally, decreased access to transportation services can further increase exposure and health risks from extreme heat events for the unhoused community (Ramin and Svoboda 2009).

The Margarita Avenue Neighborhood (Census Tract 111.03) is an area of the city with a particularly vulnerable population in regard to extreme heat. This area includes a high percentage of elderly and disabled residents, a high percentage of residents experiencing linguistic isolation, and 50 percent of residents earning less than 200 percent of the federal poverty level. This census tract also is located in a portion of the City that experiences a more intense severity of the urban heat island effect, resulting in potentially disproportionate impacts on this population during extreme heat events. The West of South Higuera neighborhood (Census Tract 115.01) also stands out as a particularly vulnerable to extreme heat, with the area also near urban heat island hotspots and includes a high percentage of elderly and disabled residents.

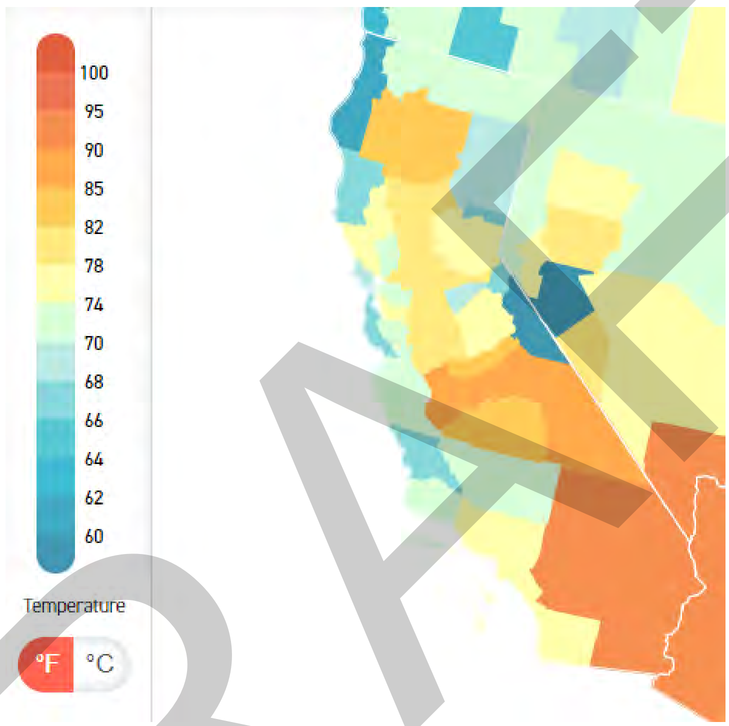


Sources: Data received from SLOCOG in 2021, The Trust for Public Lands in 2020, City of San Luis Obispo in 2020, County of San Luis Obispo in 2020 and received from CBEC Engineering in 2020

Figure 15 Low-Income Areas and Urban Heat Island Severity in the City

Economic Systems and Extreme Heat

As discussed previously and shown in Table 9 and 10, the City will experience increases in average annual temperature and extreme heat days throughout the 21st century. However, these increases are, in general, less intense than increases many other parts of California, particularly in southern California and the San Joaquin Valley. Coastal communities in the County as well as the City already experience an influx of visitors during the summer months, many of them escaping the more extreme summer heat in the San Joaquin Valley. This phenomenon was even more pronounced during the recent heat waves in the summer of 2020, with the County and the City experiencing record maximum temperatures coupled with an influx of visitors escaping heat in other parts of the state (San Luis Obispo Tribune 2020). As shown in Figure 16, by approximately 2050, increases in average temperatures will be less severe relative to other parts of the state.



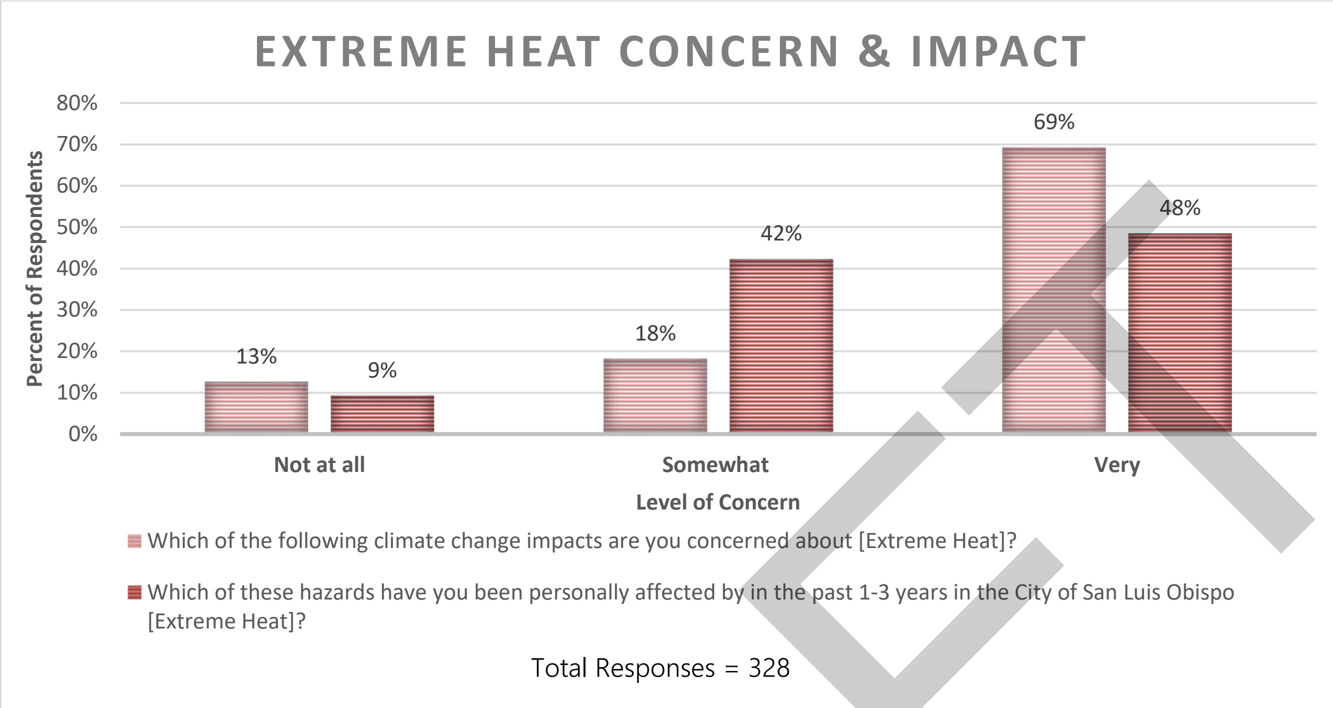
Increases in average temperature in June through July by 2050 under a high emissions scenario.
Source: Climate Impact Labs 2021

Figure 16 Relative Changes in Extreme Heat by 2050

Due to this milder change in temperature, the City and the County are likely to increasingly become a refuge for visitors and future permanent residents looking to escape more extreme climate impacts. This influx could have secondary impacts on the City including increase demand for services, increases in traffic congestion, and increases demand for housing, placing additional pressure on the City's housing market and affordability issues. Given that the City is an attractive destination for tourism, coupled with the characteristics that could serve as a refuge for the impacts from climate change, these factors pose a unique issues with potential benefits and drawbacks that should be considered carefully.

Community Extreme Heat Concerns

As part of the community priority survey, when participants were asked to report on their level of concern for extreme heat, as shown in Figure 17, 87 percent of respondents indicated that they were "Somewhat" or "Very" concerned about the issue. Ninety percent of individuals indicated they had been "Somewhat" or "Very" impacted by extreme heat in the past 1-3 years. Additionally, individuals with a household income of less than $50,000 and individuals between the ages of 18 and 24 had the highest level of concern for extreme heat. Individuals who note their housing situation as "Renter" or "Other" indicate the highest level of concern for extreme heat (i.e., 79 percent versus 58 percent for homeowners).



Sources: Resilient SLO Community Priorities Survey

Figure 17 City Resident's Extreme Heat Concern and Impact

Key Findings and Policy Considerations

- The Margarita Avenue Neighborhood (Census Tract 111.03) West of South Higuera neighborhood (Census Tract 115.01) is an area of the city with a particularly vulnerable population in regard to extreme heat, with a high percentage of elderly, disabled, or low-income residents. The West of South Higuera neighborhood (Census Tract 115.01) also includes a high percentage of elderly and disabled residents, making this area particularly vulnerable to extreme heat impact.
- Low-income residents are particularly vulnerable to extreme heat impacts due to a number of factors including a higher reliance on public transit (leaving these residents more exposed to extreme heat during transit use), a higher percentage of income being devoted toward utility bills, and a trend of lower income neighborhoods having less tree cover. Unhoused individuals are also at increased risk from extreme heat events with, generally, less access to places to cool off and healthcare resources during these events.
- The City and the County, in general, have historically served as a destination for summer tourists to escape more extreme summer heat in the San Joaquin Valley and southern California. As extreme heat events continue to increase disproportionately in those areas of the state compared to less severe increases locally, the City may experience increases in this phenomenon placing increased demand on services, impacts on City infrastructure and resources, as well increased pressure on the housing shortage issue in the City from new permanent residents.

2.3.3 Adaptive Capacity for Temperature and Extreme Heat Events

ADAPTIVE CAPACITY RATING: LOW

While the City has experienced periods of extreme heat historically, this climate-related hazard has not been a prominent issue for the City in the past. Because prolonged heat events have been rare in the City, both the City's 2006 Local Hazard Mitigation Plan and the more recent Annex G of the County's Multi-Jurisdictional Hazard Mitigation Plan do not discuss or evaluate extreme heat events in any detail. Specifically, the City's portion of Annex G of the County's Multi-Jurisdictional Hazard Mitigation Plan does not include any mitigation actions specific to extreme heat or protecting vulnerable populations from extreme heat. The City's Emergency Operation Plan also does not include a specific discussion or protocols for addressing extreme heat events when they occur. The exclusion of extreme heat from these documents is likely because these events have not been an issue historically.

The City is currently working to implement its recently adopted Climate Action Plan which includes strategies for the electrification of new and existing buildings (Green Buildings 1.1 and 1.2 in City's Climate Action Plan). As the City continues this work to electrify new and existing buildings, changes in electricity demand for cooling will remain an important consideration for the energy design of new buildings and existing building retrofits. Decreases in HDDs due increase in annual maximum and minimum temperatures as shown in Table 11, will result in decreased demand for heating fuels, which for buildings in the City is primarily natural gas. Decreases in energy demand for heating also has the potential to decrease the City's overall GHG emissions and help achieve the City's GHG emissions reduction targets.

As noted previously, 79 percent of the City's housing stock was built before 1989, reducing the ability of these older and less energy efficient homes to adapt to changes in extreme heat. In the County as a whole which can serve as proxy for the City, only 34 percent of households include air conditioning, placing these households at increased risk when extreme heat events do occur (CEC 2009). Retrofitting homes with central air conditioning or air conditioning units can be a major expense, especially for low-income households, and may not be possible for City residents who are renting. Overall, because the City has not historically experienced many extreme heat conditions,, residents are not acclimatized to or prepared for extreme heat conditions, which makes the City particularly sensitive to extreme temperatures.

Climate Action Plan and Resilient SLO

In 2020, the City adopt the Climate Action Plan for Community Recovery which establishes a community-wide goal of carbon neutrality by 2035, adopts sector specific goals, and provides foundational actions to establish a trajectory towards achieving those goals. The Resilient SLO project focuses on developing strategies to make the City more resilient to the impacts of climate change. However, as the City implements the Climate Action Plan and the Resilient SLO strategies, it will be important to prioritize solutions that both reduce GHG emissions and help the City adapt to impacts of climate change. Both reducing emissions and adapting to climate change serve to create a more resilient community.

For these reasons, the adaptive capacity ranking for increased temperatures and extreme heat is ranked as low.

2.3.4 Vulnerability Summary

Overall, the City is projected to experience noticeable increases in annual average temperatures and extreme heat events. These changes will result in varying impacts on the City and its residents as discussed above. Based on the analysis of various impacts discussed in Section 3.2.2, the City's potential impact scoring is Medium (2). Impacts that are unique to the City and should be given increased consideration during the adaptation strategy development process are discussed below.

Natural System Findings

- Changes in temperature and extreme heat are likely to have negative impacts on the City's tree canopy with some tree species no longer suitable for future minimum and maximum temperatures. Any future policies focused on improving the City's tree canopy or green spaces to mitigate the urban heat island effect should carefully consider what plant and tree species will be suitable for future climate conditions.
- Climate change is projected in invasive species in the City's open spaces, affecting coastal sage scrub habitats as well as the City's oak species from Sudden Oak Death.
- Regional impacts on the agriculture and viticulture industries from shifting temperatures have the potential to impact the City via decreases in wine and vineyard-based tourism, with the City relying heavily on revenue and employment opportunities in these industries. Resilience strategies focused on economic impacts should consider potential impacts on viticulture vineyard-based tourism and potential diversification of the City's tax revenue sources and employment industries.

Built Environment Findings

- The Margarita Avenue Neighborhood (Census Tract 111.03) includes population characteristics that make this area particularly vulnerable to extreme heat and is located in an area of the City with increased urban heat island severity. Resilience strategies that mitigate impacts of the urban heat island effect should focus on supporting this area of the City.
- Shifts in temperature and extreme heat will result in changes in energy demand for cooling in the City, with increased demand in areas experiencing more severe urban heat island hotspots. As the City implements it's recently adopted Climate Action Plan and as well as the Resilient SLO strategies, solutions that both reduce GHG emissions and help the City adapt to impacts of climate change should be prioritized.
- The City's historically moderate climate has, in general, not required the City's existing building stock to be designed or equipped with air conditioning. However, as average temperatures and extreme heat events increase in the future, residents are ill-equipped to prepare for these events. Additionally, increases in temperature and extreme heat will result in increased energy demand for cooling, which underscores the need to support distributed energy resources, customer sited energy storage, demand response, and grid/building connected appliances and vehicles.
- Extreme heat days and heat waves will have a disproportionate impact on electricity demand, with higher electricity demand projected for these events in the future. These projections place an increased urgency on electricity utilities to plan for higher electricity demand during these events in future.

Community Resilience Findings

- The Margarita Avenue Neighborhood (Census Tract 111.03) West of South Higuera neighborhood (Census Tract 115.01) is an area of the city with a particularly vulnerable population in regard to extreme heat, with a high percentage of elderly, disabled, or low-income residents. The West of South Higuera neighborhood (Census Tract 115.01) also includes a high percentage of elderly and disabled residents, making this area particularly vulnerable to extreme heat impact.
- Low-income residents are particularly vulnerable to extreme heat impacts due to a number of factors including a higher reliance on public transit (leaving these residents more exposed to extreme heat during transit use), a higher percentage of income being devoted toward utility bills, and a trend of lower income neighborhoods

having less tree cover. Unhoused individuals are also at increased risk from extreme heat events with, generally, less access to places to cool off and healthcare resources during these events.

- The City and the County, in general, have historically served as a destination for summer tourists to escape more extreme summer heat in the San Joaquin Valley and southern California. As extreme heat events continue to increase disproportionately in those areas of the state compared to less severe increases locally, the City may experience increases in this phenomenon placing increased demand on services, impacts on City infrastructure and resources, as well increased pressure on the housing shortage issue in the City from new permanent residents.

Temperatures and Extreme Heat Vulnerability Score

Adaptive Capacity: Low (3)

Potential Impact: Medium (2)

Vulnerability Score: 4

2.4 LONG-TERM DROUGHT ANALYSIS

This section discusses future long-term drought scenarios for the City and analyzes how long-term drought could impact City and its population as well as highlighting what capacity the City and partner agencies already have in place to address future drought impacts.

2.4.1 Future Exposure to Long-Term Drought Scenarios

Long-term drought can have environmental, agricultural, health, economic, and social consequences. The County, along with larger areas of California, experiences periods of long-term drought that stress ecosystems and water supplies; and subsequently, impact agriculture, public health, and the economy. The City relies on regional water supplies with the four primary sources being Whale Rock Reservoir, Salinas Reservoir, Nacimiento Reservoir, and recycled water (City of San Luis Obispo 2019). Because the City relies on reservoirs in the County, outside the City limits, this analysis focuses on long-term drought scenario projections for the County as a whole.

While average annual precipitation in the County is projected to trend upward in future years, the key finding for this climate effect is that precipitation patterns are expected to become more volatile, with potentially less frequent but intense storms that produce above average amounts of precipitation. As discussed in more detail in Section 2.5, precipitation patterns in California oscillate between extremely dry and wet periods. Climate change is anticipated to exacerbate these seasonal extremes with dry periods becoming dryer and wet periods becoming wetter (OPR et al. 2018b:19). As a result, the frequency and severity of large storm events are anticipated to increase as well. These oscillations between extremely dry and extremely wet periods, which have occurred historically in the state, are anticipated to become more severe with rapid shifts from dry to wet periods known as “whiplash events” (Swain et al. 2016). With the increased severity of oscillation between wet and dry periods and precipitation occurring over more intense but shorter periods in the year, this will reduce opportunities for groundwater recharge which ideally occurs during prolonged wet periods allowing for soil infiltration, deeper percolation, and the resulting groundwater recharge. As discussed further in Section 2.4.2, while a unique long-term drought scenario would likely affect the City’s overall water supply management practices, there is the potential for there still to be above average wet years within a long-term drought, as shown in Figure 18. These above average wet years have the potential to replenish water supplies in the City’s reservoirs and help mitigate the impacts of long-term drought. Table 13 includes projections for average annual precipitation in the County through 2099 as well as rainfall projections for changes in the 5-year storm event, demonstrating the increased intensity of large storm events and wet years in the future.

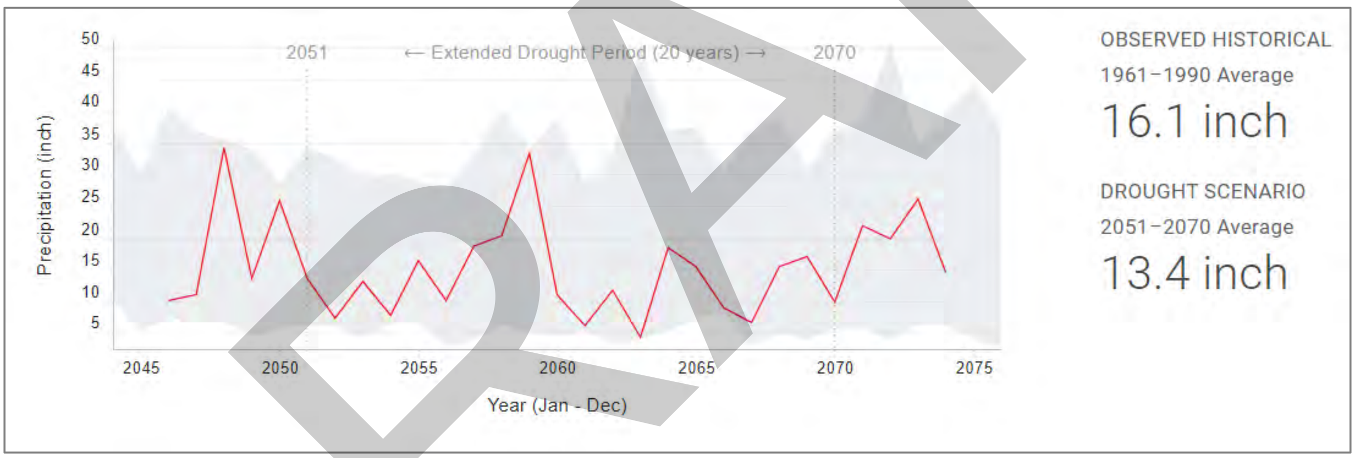
Table 13 Changes in Average Annual Precipitation and 5-Year Storm Event in San Luis Obispo County

Average Annual Precipitation	Historic Average Annual Precipitation (1961-1990)	Near-Term (2021-2050)	Midterm (2035-2064)	Late-Century (2070-2099)	
				Medium Emissions	High Emissions
Average Annual Precipitation (inches)	16.1	18.1	17.8	17.2	19.8
5-Year Storm Event (2-day rainfall)	7.9	7.9	8	8.2	9.8

Source: CEC 2019a

As shown in Table 13 above, under both the low and high emissions scenarios, the County is expected to experience slight overall increases in average annual precipitation in the late century. However, projections show the County will experience increased variability and volatility in precipitation events such as droughts. The County and state have a highly variable climate that is susceptible to prolonged periods of drought, and recent research suggests that extended drought occurrence (a "mega-drought") could become more pervasive in future decades (OPR et al. 2018b).

Cal-Adapt uses data to model an extended drought scenario for all of California from 2051 to 2070 specifically using the HadGEM2-ES GCM model under a high emissions scenario. The extended drought scenario is based on the average annual precipitation over 20 years. As shown in Table 13, the County's observed historical (1961-1990) average annual rainfall accumulation is 16.1 inches. Under the anticipated drought scenario between 2051 and 2070, the County's average annual rainfall accumulation would decrease to 13.3 inches (CEC 2019a), resulting in an approximately 18 percent decrease in annual average rainfall over a 20-year period.



Source: Cal-Adapt 2021

Figure 18 Projected Drought Conditions between 2051 and 2070 for San Luis Obispo County

2.4.2 Drought Sensitivities and Impacts

This section discusses the City's existing sensitivities to long-term drought and analyzes potential effects on the City, discussed in the three general impact categories (e.g., Natural Systems, Built Environment, Community Resilience).

DROUGHT AND NATURAL SYSTEMS

Open Space and Ecosystem Functions

The City's designated open space areas include a mixture of vegetation types including oak woodland, grassland, coastal sage scrub, and chaparral that are anticipated to be impacted by changes in annual average temperatures, extreme heat, and long-term droughts (OPR et al. 2018b). Historically, the duration and intensity of droughts in California varies substantially with elevation, latitude, distance to coast, and local soil characteristics. Native perennial grasses tend to concentrate growth periods during wet winter months, adapting to the annual summer drought (Vaughn et al. 2011). Some native perennial grasses can survive prolonged droughts in a non-green state and then regenerate after it rains (Potter 2015). As a result, it is projected that most grassland species should be adaptive to tolerate climate extremes and variability (OPR et al. 2018b). The diversity of ecological communities along the California coast are linked to the summer marine layer of fog and low clouds, allow for adaptations. Chaparral shrubs, in general are more drought tolerant. Future changes in precipitation and drought will impact grasslands and wildflowers on the Central Coast and will be dependent on the proximity to the coast as well as the relative proportion of native to non-native, and perennial to annual species (OPR et al. 2018b).

In dryer years and drought periods, demographic rates for annual plants (e.g., survival, reproduction) are lower than in wetter years (Fox et al. 2006). As dry years and long-term droughts become more common in the future, population growth rates of annual plant species will become marginal, and populations are likely to become locally extinct. Foraging on these annuals, particularly by deer, rabbits, and woodrats reduces population growth even more than drought in some species, but not others (OPR et al. 2018b).

Deer browse (e.g., leaves, twigs, and buds of woody plants eaten by deer) reduces growth, reproduction, and survival in ceanothus (e.g., California Lilac). As the abundances of deer and other wildlife declined during the recent drought of 2011-2017, previously browsed shrubs grew and reproduced well and then responded rapidly to the two wet years since. These observations suggest that unless deer populations increase again between droughts, or in areas without much deer browse, ceanothus shrub are likely to grow rapidly, but will become vulnerable with further droughts projected under climate change (OPR et al. 2018b).

Key Findings and Policy Considerations

- The City's designated open space areas include a mixture of vegetation types including oak woodland, grassland, coastal sage scrub, and chaparral that are anticipated to be impacted by changes in annual average temperatures, extreme heat, and long-term droughts (OPR et al. 2018b).
- As dry years and long-term droughts become more common in the future, population growth rates of annual plant species will become marginal, and populations are likely to become locally extinct (OPR et al. 2018b).

DROUGHT AND THE BUILT ENVIRONMENT

Water Supply

While increasingly frequent and prolonged droughts affect the City's drinking water supply, the City's built environment (e.g., buildings, roadways) will not experience direct physical impacts associated with this climate-related hazard. However, drought conditions and other climate-related effects will likely effect reservoirs, located outside the City boundaries, which provide water to the City. For the Central Coast, a 50-year projection for land uses from 2012 to 2062 suggest potential changes that could affect groundwater supplies including a large amount of grassland habitat loss over 50 years that will exacerbate challenges in preserving and recharging groundwater aquifers, as well as increased water demand due to urbanization and expansion of berries and vineyards (Wilson et al. 2016).

As shown in Figure 18, even during a future long-term drought scenario, there would be years with above average rainfall for one or even multi-year periods. However, these one or multi-year periods with above average rainfall may not be sufficient to restore reservoirs to normal water levels compared to non-drought periods. For example, during the statewide drought between approximately 2011 and 2016, water supplies on the Central Coast were severely affected with increases in reservoirs and groundwater levels varying significantly across the Central Coast region following the above average 2016-2017 winter rain season (OPR et al. 2018b). As noted in the City's 2017 Water Resources Status Report, between January 2017 and June 2017 the water supply in the Salinas Reservoir went from 10 percent to 100 percent, the Whale Rock Reservoir went from 32 percent to 79, and the Nacimiento Reservoir shifted from 25 percent to 78 percent (City of San Luis Obispo 2021b). This dramatic shift from a multi-year drought between 2011 and 2015 drought followed by an above average wet year in the 2016-2017 winter rain season was characteristic of a whiplash event (Swain et al. 2018) and allowed the City to replenish its water supplies. However, these whiplash events may affect water supply management practices over the long-term, particularly as the swings from multi-year dry to wet periods become more prolonged and more severe (Persad et al. 2020).

As part of the City's 2020 Urban Water Management Plans (UWMP), climate change modeling was conducted to determine future projections on the City's safe annual yield. Safe annual yield is generally defined as a measurement used to determine the average replenishment rate of a water body or aquifer from natural and artificial recharge, which factors in evaporation, transpiration, and basin outflow into the replenishment rates. Safe annual yields are calculated as the quantity of water which can be withdrawn regularly and permanently without dangerous depletion of the storage reserve. Based on the climate modeling included in the 2020 UWMP, it was determined that, when accounting for future precipitation patterns due to climate change, the safe annual yield for Whale Rock and Salinas Reservoirs (two reservoirs included in the City's water supply portfolio) could shift from a decrease of as much as 850-acre-feet per year (AFY) to an increase of as much as 160 AFY. However, these potential shifts are relatively small compared to the City's overall safe annual yield of 10,130 acre-feet from the full water supply portfolio, with shifts from climate change accounting for an approximately 8 percent decrease to 2 percent increase in the City's overall supply (City of San Luis Obispo 2021b).

Sediment Deposition

The buildup of sedimentation in reservoirs can reduce a reservoir's available storage volume. As noted in the City's 2020 Urban Water Management Plan (UWMP), the Whale Rock and Salinas Reservoirs, which provide water to City, are projected to experience an total loss of 500 acre-feet of water between 2010 to 2060 period (a rate of 10 acre-feet per year over 50 years). Intense, long-duration winter storm rainfall can result in the movement of large sediment quantities into reservoirs (OPR et al. 2018b). In the Central Coast region, annual sediment movement from individual watersheds varies by a factor of 500 or more between extreme dry and extreme wet years (Conaway et al., 2013; East et al., 2018). Landscape disturbances including wildfire, post-wildfire runoff, or landslides after wet winters, is projected to increase sediment yield from watersheds along the Central Coast (OPR et al. 2018b) and will reduce the amount of water-storage capacity in dammed Central Coast reservoirs (Smith et al. 2018). Changes in vegetation and fire regimes could also potentially add to the likelihood of increased sediment flux (Sankey et al., 2017). Sediment, including the nutrients and chemicals adsorbed in sediment, can result in decreased water quality and make water treatment more technically complex and more costly.

Key Findings and Policy Considerations

- Dramatic shifts from multi-year dry periods to wet periods, similar to the 2011-2015 drought followed by an above average wet year in the 2016-2017, are known as whiplash events (Swain et al. 2018) and they are expected to become more severe in the future. These whiplash events may affect water supply management practices over the long-term, particularly as the swings from multi-year dry to wet periods become more prolonged and more severe, with an emphasis on increasing rainfall storage when it does occur during the wet periods (Persad et al. 2020).
- Buildup of sedimentation that reduces a reservoir's available volume already occurs in the City's water storage system, with the City implementing programs and policies to address this storage loss over the long term. However, landscape disturbances including wildfire, post-wildfire runoff, or landslides after wet winters, is projected to increase sediment yield from watersheds along the Central Coast (OPR et al. 2018b), with the potential to further reduce the amount of water-storage capacity in dammed Central Coast reservoirs (Smith et al. 2018).
- The City's Safe Annual Yield analysis included in the 2020 UWMP modeled potential impacts on the City's water supplying, finding that changes in precipitation could result in a decrease of as much as 850 AFY to an increase of as much as 160 AFY, accounting for an approximately 8 percent decrease to 2 percent increase in the City's overall water supply (City of San Luis Obispo 2021b).

DROUGHT AND COMMUNITY RESILIENCE

Vector-borne and Infectious Disease

Increases in temperature and extreme heat events are associated with increases in vector-borne and infectious disease transmission (OPR et a. 2018b). Based on recent research, summarized in the Central Coast Report, future long-term drought scenarios have the potential to increase the prevalence of certain vector-borne diseases present on in the central coast region. For example, long-term drought can affect the life cycles and extend the habitat range of native tick species that can harbor Lyme disease and other illnesses (OPR et a. 2018b). Cases of vector-borne disease, including Lyme disease, are projected to increase in the future due to climate change (Estrada-Pena, A., N. Ayllon, and J. de la Fuente 2012). However, in the Central Coast region, the spread of Lyme disease has likely been contained due to the area's drier climate and differing vegetation (MacDonald, A.J. et al. 2017). A newly identified vector-borne disease, Pacific Coast tick fever (PCTP), has been identified (Padgett, K.A., et al. 2016). Although an emerging illness, a few of the human cases originated specifically in the Central Coast. PCTP has exhibited a summer trend so far. Therefore, increasing temperatures have the potential to extend PCTP's transmittal season in the Central Coast.

A lack of soil moisture during long-term droughts can increase dust particle concentration, which can include harmful fungal spores and viruses, including coccidioidomycosis (valley fever) (OPR et a. 2018b). The California Department of Public Health (CDHP) has highlighted the Central Coast as a high-risk area for valley fever (OPR et a. 2018b). Valley fever is found in disturbed, dry soil particles that must be inhaled. Symptoms of Valley fever include chest pain, exhaustion, fever, coughing, joint and muscle pain, and difficulty breathing. Certain populations including pregnant women, the elderly, African, and Filipino Americans are particularly vulnerable to the severe cases of the disease (Brown et al. 2013). Santa Barbara and San Luis Obispo Counties, where the Valley fever fungus, *C. immitis*, is endemic, reported larger numbers of cases in 2017, with the CDPH reporting over 500 cases for these two counties (San Luis Obispo Tribune 2016).

Key Findings and Policy Considerations

- Increases in temperature and extreme heat events are associated with increases in vector-borne and infectious disease transmission, with future long-term drought scenarios potentially increasing the prevalence of certain vector-borne diseases present on in the central coast region including Lyme disease and Valley fever.

2.4.3 Adaptive Capacity for Drought Impacts

ADAPTIVE CAPACITY RATING: HIGH

Utilities Department and Water Management

Short- and long-term droughts have historically been an issue for the City and the Central Coast region. As a result, the City already has a comprehensive set of initiatives and resources in place to address drought periods when they do occur. In 2021, the City adopted the 2020 UWMP which evaluates the current and projected water supplies through the year 2040. The UWMP was prepared in accordance with the Urban Water Management Planning Act, and accordingly, will be updated every 5 years and submitted to the California Department of Water Resources. Goals in the UWMP related to this this Report include the following:

- assess current and future water use trends in the community;
- summarize the water supply and the water system;
- assess water supply reliability;
- document the water demand; and
- manage measures in place to balance supply and demand.

The 2020 UWMP includes a section specially on Water Resiliency Planning which highlights a set of strategies the City has taken to ensure long-term water resiliency and to mitigate the impacts from a long-term drought scenario. These include:

- a multi-source water supply;
- conservative water supply projections;
- water use efficiency;
- water recycling; and
- future groundwater recharge.

As noted in the 2020 UWMP, the City has a Reliability Reserve and a Secondary Water Supply which have been incorporated in water management planning and calculations to provide a buffer for future unforeseen or unpredictable long-term impacts to the City's available water resources such as loss of yield from an existing water supply source and impacts due to climate change. The Reliability Reserve provides a twenty percent buffer beyond the City's projected water demand at build out. As discussed in Section 2.4.2, the 2020 UWMP includes forecasted projections on the City's safe annual yield which accounts for potential shifts in precipitation caused by climate change. The 2020 UWMP also includes key considerations on how climate change may affect water demand in years with less rainfall (City of San Luis Obispo 2021b).

In 2006, the City completed the Water Reuse Project, creating the first new source of water for the City since 1961. The project included improvements to the City's Water Resource Recovery Facility and an initial eight miles of distribution pipeline for use by City residents and businesses for landscape irrigation and other approved uses. In 2017, the City completed the Recycled Water Master Plan. The plan describes future opportunities for the City to consider potable reuse, presents a plan to serve recycled water to developing areas of the community for use as landscape irrigation, prioritizes opportunities to retrofit existing sites to offset potable water use, and explores use of recycled water outside the City limits during periods where much of the City's recycled water supply goes underutilized. Chapter 7 of the plan includes a capital improvement plan for future expansion of the City's recycled water distribution system, which is consistent with the City's larger water supply management strategy to maintain multi-source water supply. The City's current recycled water program can generate over 1,000 acre-feet of recycled water for approved uses, reducing water demand from the City's other water supply sources. In 2020, 245 acre-feet of recycled water were delivered to the community (City of San Luis Obispo 2021b).

As part of the 2020 UWMP, the City has also developed the 2020 Water Shortage Contingency Plan, which establishes the foundation for a staged response to worsening water shortage conditions that could occur due to drought, earthquake, infrastructure failure, or other emergencies. The 2020 Water Shortage Contingency Plan establishes the City's water supplies for a normal year, single dry year (2013) and a multiple dry year scenario, identified as the years 2011 to 2015, with combined rainfall total for those five years being the lowest on record. Alongside developing a water shortage assessment, the plan also includes a comprehensive water shortage response to temporarily augment supply and/or reduce water demand. This response would include voluntary reduction measures, mandatory reduction measures, water use prohibitions, and supplemental water supply options.

General Plan Water and Wastewater Management Element

The City's General Plan Water and Wastewater Management Element, most recently updated in 2020, includes a comprehensive set of goals, policies, and programs manage the City's water supply and includes measures to address the potential impacts of climate change on the City's water supply. The updated Water and Wastewater Management Element coincides with the City's efforts to incorporate climate change projections into the City's safe annual yield assessment and water management practices. Goals in the element focus on the various components of successful water management including managing the City's multi-source water supply, water supply accounting and water demand projections, water conservation practices, and the implementing the City's recycled water program. The Water and Wastewater Element also includes a goal specifically for siltation management in the City's reservoirs, noting the potential for the increasing intensity of rainfall events as well as post-wildfire runoff to increase siltation rates and reduce the overall storage capacity of the City's reservoirs. Noting this potential threat, the Siltation portion of the element includes a set of policies and programs to proactively implement best management practices to reduce erosion and subsequent siltation consistent with other City watershed management goals.

Sustainable Groundwater Management Act and Groundwater Recharge

The City, in coordination with the County and partner agencies, are increasing efforts to achieve sustainable groundwater management through requirements in the Sustainable Groundwater Management Act. The City and County, in coordination with local water purveyors including the Edna Valley Growers Mutual Company, Edna Ranch Mutual Water Company, Varian Ranch Mutual Water Company and Golden State Water Company, developed a Groundwater Sustainability Plan to sustainably manage groundwater resources in the San Luis Obispo Valley Groundwater Basin and prevent an unreasonable reduction of groundwater storage in the basin. The City's portion of the San Luis Valley Groundwater Basin is currently estimated to have a 700 acre-foot per year surplus of groundwater. This is largely because the City is not currently pumping groundwater. The City plans to resume groundwater pumping within the next five years to better balance surface water and groundwater use in order to mitigate climate change impacts.

Alongside development and implementation of the Groundwater Sustainability Plan, through implementation of the State mandated NPDES Stormwater Program and the Post Construction Requirements, new and re-developments are required to retain and infiltrate water that would have previously been piped off the property. This requirement helps to mitigate stormwater runoff and supports groundwater recharge in the San Luis Valley Groundwater Basin.

For these reasons, the adaptive capacity ranking for increased long-term drought is high.

2.4.4 Vulnerability Summary

Due to increases in annual average temperatures and extreme heat discussed in Section 3.2, as well as the increased likelihood of a long-term drought scenario, the City is vulnerable to impacts from drought caused by climate change. These changes will result in varying impacts on the City and its residents as discussed above. Based on the analysis of various impacts discussed in Section 3.3.2, the City's potential impact scoring is High (3). Impacts that are unique to the City and should be given increased consideration during the adaptation strategy development process are discussed below.

Natural System Findings

- The City's designated open space areas include a mixture of vegetation types including oak woodland, grassland, coastal sage scrub, and chaparral that are anticipated to be impacted by changes in annual average temperatures, extreme heat, and long-term droughts (OPR et al. 2018b).
- As dry years and long-term droughts become more common in the future, population growth rates of annual plant species will become marginal, and populations are likely to become locally extinct.

Built Environment Findings

- Dramatic shifts from multi-year dry periods to wet periods, similar to the 2011-2015 drought followed by an above average wet year in the 2016-2017, are known as whiplash events (Swain et al. 2018) and they are expected to become more severe in the future. These whiplash events may affect water supply management practices over the long-term, particularly as the swings from multi-year dry to wet periods become more prolonged and more severe, with an emphasis on increasing rainfall storage when it does occur during the wet periods (Persad et al. 2020).
- Buildup of sedimentation that reduces a reservoir's available volume already occurs in the City's water storage system, with the City implementing programs and policies to address this storage loss over the long term. However, landscape disturbances including wildfire, post-wildfire runoff, or landslides after wet winters, are projected to increase sediment yield from watersheds along the Central Coast (OPR et al. 2018b), with the potential to further reduce the amount of water-storage capacity in dammed Central Coast reservoirs (Smith et al. 2018).
- The City's 2020 UWMP modeled potential impacts on the City's water supplying, finding that changes in precipitation could result in a decrease of as much as 850 AFY to an increase of as much as 160 AFY, accounting for an approximately 8 percent decrease to 2 percent increase in the City's overall water supply (City of San Luis Obispo 2021b).
- With more rapid shifts from dry to wet periods known as "whiplash events," precipitation will occur over shorter more intense periods. This shift has the potential to reduce groundwater recharge which ideally occurs during prolonged wet periods to allow for soil infiltration, deeper percolation, and more effective groundwater recharge. However, increases in the intensity of rainfall events, when they do occur in the wet periods, provides an opportunity to offset potential losses in storage during periods of drought.
- The 2020 UWMP includes a section specially on Water Resiliency Planning which highlights a set of strategies the City has taken to ensure long-term water resiliency and mitigate the impacts from a long-term drought scenario. These strategies include a multi-source water supply; conservative water demand projections; water use efficiency; water recycling; and future ground water recharge.

Community Resilience Findings

- Increases in temperature and extreme heat events are associated with increases in vector-borne and infectious disease transmission, with future long-term drought scenarios potentially increasing the prevalence of certain vector-borne diseases present on in the central coast region including Lyme disease and valley fever.

Long-Term Drought Vulnerability Score

Adaptive Capacity: High (1.5)

Potential Impact: High (3)

Vulnerability Score: 3.5

2.5 WILDFIRE ANALYSIS

This section discusses future changes in wildfire in the County and areas surrounding the City and analyzes how these changes are likely to impact City and its population as well as highlighting what capacity the City and partner agencies already have in place to address these future impacts.

2.5.1 Future Exposure to Wildfire Risk

Wildfire risk is determined by several factors, such as wind speeds, drought conditions, available wildfire fuel (i.e., vegetation), past wildfire suppression activity, and expanding wildland-urban interface (WUI) in and around forests, grasslands, shrub lands, and other natural areas (Westerling 2018). Climate change effects, including increased temperatures and changes to precipitation patterns, will exacerbate many of the factors that contribute to wildfire risk. Recent research has found that increases in global temperatures may be affecting wind patterns and increasing global wind speeds, however these changes would not be experienced uniformly across geographies in the future (Chen 2020). While the impact of climate change on wind speeds is still uncertain, it is important to recognize this potential effect and how it may also contribute to wildfire risk in the future.

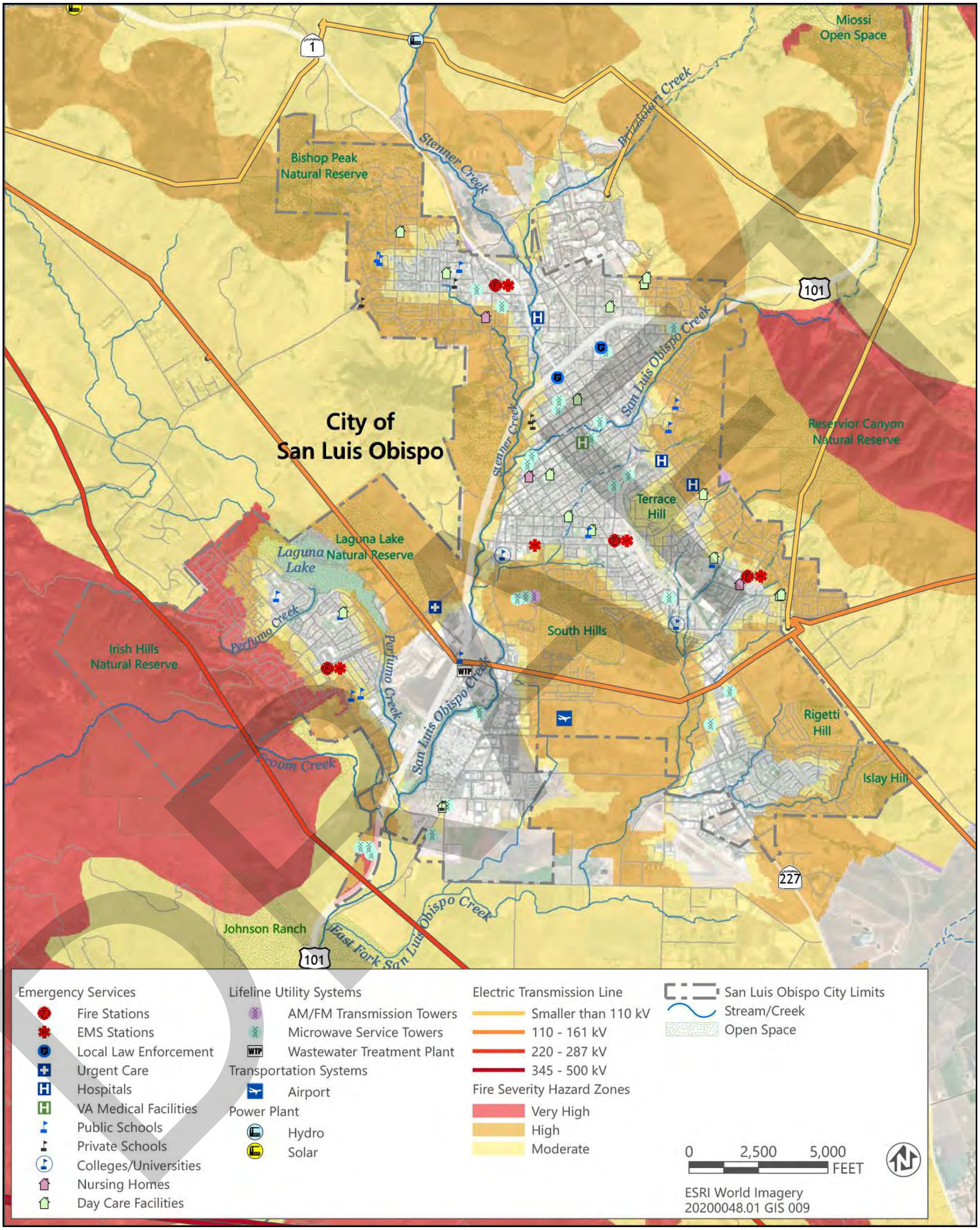
Increased variability in precipitation may lead to wetter winters and increased vegetative growth in the spring, and longer and hotter summer periods will lead to the drying of vegetative growth and ultimately result in a greater amount of readily burned fuel for fires. This has already been seen across the state in recent years, with the area burned by wildfires increasing in parallel with rising air temperatures (OEHHA 2018). These factors, combined with the increasing frequency and severity of intense wind conditions, will cause fires to spread rapidly and irregularly, making it difficult to predict fires' paths and effectively deploy fire suppression forces. Pacific Gas and Electric (PG&E) also has several electrical transmission lines running through the City, which carry significant potential fire risk.

Relative humidity is also an important fire-related weather factor; as humidity levels drop, the dry air causes vegetation moisture levels to decrease, which consequently increases the likelihood that plant material will ignite and burn. With an increase in hotter and drier landscapes, humidity levels may continue to drop and result in higher fuel levels, increasing the risk of wildfire (Schwartz et al., 2015).

Environmental and climatic conditions in and around the City influence the frequency and magnitude of wildfires. The City often experiences high-wind events, such as the Santa Lucia winds, which originate inland and flow westward during the late summer and early fall, counter to the prevailing westerly winds that occur throughout much of the year. Santa Lucia winds contain little humidity, and summers in the City are hot and dry, with precipitation primarily occurring in the winter months. Thus, the combination of the relatively hot, dry Santa Lucia winds occurring at a time when vegetation in the County and the City is particularly dry following the summer months can contribute to the ignition and spread of wildfires. Periods of low relative humidity, when dead trees and vegetation cannot absorb moisture from the air, can also increase the risk of wildfires (City of San Luis Obispo 2011).

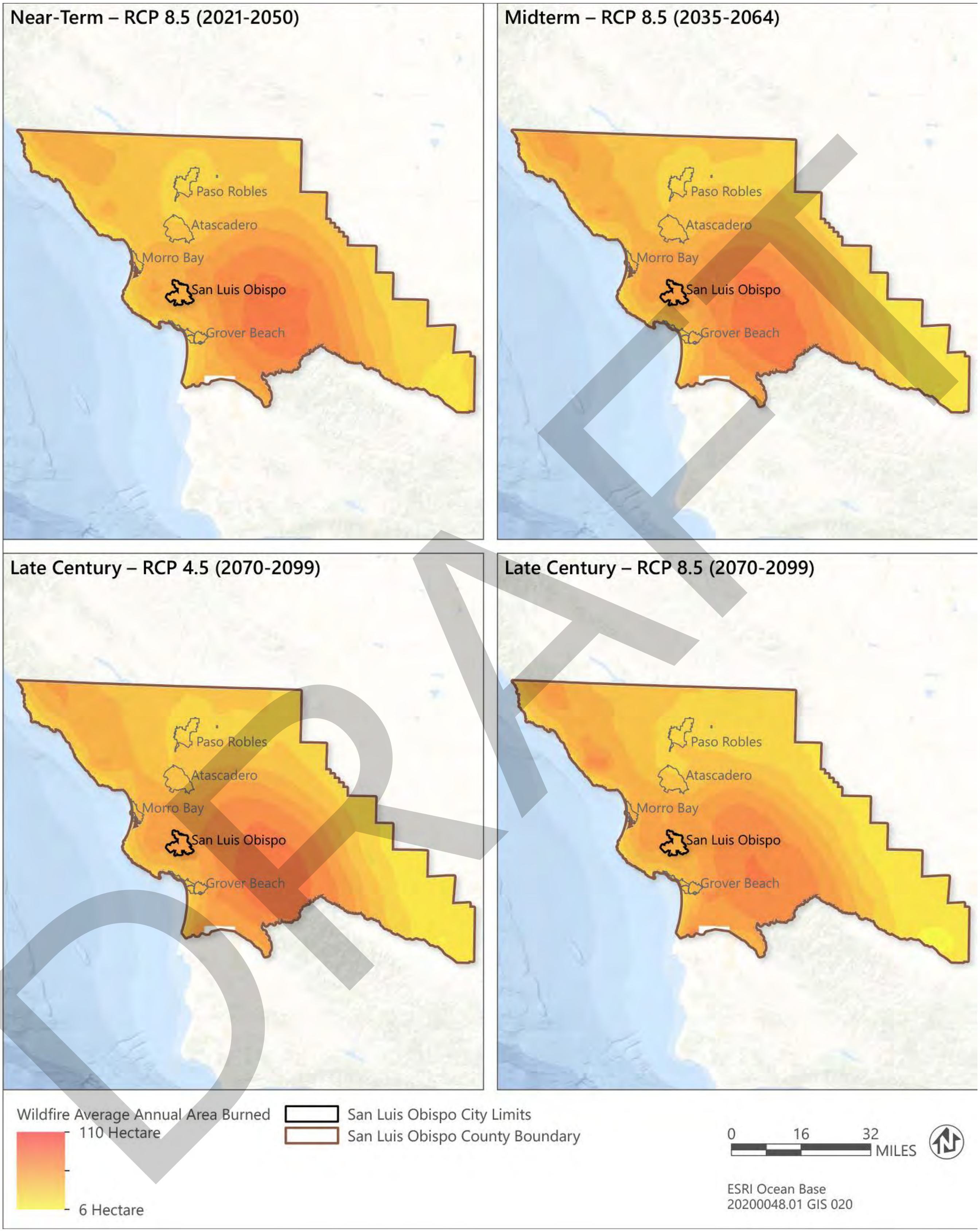
The risk of wildfires and subsequent impacts to property and life is greatest at the WUI, which is where urban development borders wildland fuels. Wildfire risk is compounded in areas of the WUI that are also located in or near High or Very High Fire Hazard Severity Zones (VHFHSZ). Figure 19 includes CAL FIRE designated Fire Hazard Severity Zones in and surrounding the City. Portions of southwestern (near the Irish Hills Natural Reserve) and northeastern (near Reservoir Canyon Natural Reserve) parts of the City are located in or near a VHFHSZ, and many of these portions of the City overlap with the WUI. Beyond these areas of the City, the risk of urban fires decreases, with most of the areas surrounding and some locations within the City designated as Moderate Fire Hazard Severity Zone.

Given the City's urban setting, with minor portions of the City in the VHFHSZ, the analysis for future wildfire risk incorporates County-level changes in wildfire risk to assess how larger regional risks and potential impacts may affect the City. Using a statistical model based on historical climate vegetation, population density, and large fire history, Cal-Adapt provides projections for future annual mean hectares burned within the County when wildfires do occur. Cal-Adapt does not account for current or planned wildfire management projects. Table 14 and Figure 20 shows the projected change in average annual area burned within the County under low and high emissions



Source: San Luis Obispo County 2019a

Figure 19 Wildfire Hazard Severity Zones In and Near the City of San Luis Obispo with Critical Facilities



Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020 and downloaded from Cal-Adapt in 2021

Figure 20 Change in Average Annual Maximum Temperature in San Luis Obispo County through 2099 scenarios for the central population growth scenario at midterm and late-century timescales. The total area burned annually by wildfire within the County is expected to rise 15 percent from the historic (1961-1990) annual average of 9,248 hectares to 10,723 hectares in the near-term and increase in the midterm to 10,728 hectares burned annually. In the late-century, average annual area burned in the County is projected to increase to 10,728 hectares and decrease slightly to 9,867 hectares under the low and high emissions scenarios, respectively (CEC 2019d). This reduction in annual average hectares burned in the late-century period is noted in the research conducted to develop the Cal-Adapt wildfire tool. As vegetation type and fuel amount, structure, and continuity change in the future due to altered disturbance regimes (e.g., changes in the frequency, seasonality, duration, extent and severity of wildfire and infestations by beetles and other pathogens) and climate, future wildfire activity and its response to climatic variability may reduce wildfire activity in some ecosystems (Westerling 2018).

Importantly, Figure 20 illustrates that anticipated changes in wildfire impacts are not homogenous across the County; for instance, the Santa Lucia Wilderness and the La Panza Mountain range located in the southern central portions of the County are projected to experience the largest increases in average area burned over the 21st century under both emissions scenarios. While these areas are outside of the City boundaries and jurisdiction, due to the regional characteristics of wildfire impacts, wildfire events in these areas could affect the City through secondary impacts such as short-term and long-term wildfire evacuees, wildfire smoke, and impacts on the County's regional transportation network.

Table 14 Changes in Annual Average Area Burned in San Luis Obispo County

Average Annual Area Burned	Historic Modeled[1] Average Annual Area Burned (1961-1990)	Near-Term (2021-2050)	Midterm (2035-2064)	Late-Century (2070-2099)	
				Medium Emissions	High Emissions
Average Annual Area Burned (hectares)	9,248	10,723	10,728	10,728	9,867

Notes: RCP = Representative Concentration Pathway.

[1] Observed historical average annual area burned data were not available from Cal-Adapt; the modeled historical average annual area burned data under the medium emissions scenario was available and used as proxy data.

Source: CEC 2019d.

2.5.2 Wildfire Sensitivities and Impact

This section discusses the City's existing sensitivities to wildfire impacts and analyzes future wildfire risk in the City, discussed in the three general impact categories (e.g., Natural Systems, Built Environment, Community Resilience).

WILDFIRE AND NATURAL SYSTEMS

Open Space and Ecosystem Functions

Changes in climate variables including increased average annual temperatures, annual climatic water deficit, and relative humidity are all strong predictors of fire occurrence and burned area in semi-arid regions. These changes in climate variables are projected to increase wildfire risk in open spaces and wooded areas in and surrounding the City. As noted in the Central Coast Region Report, the size of wildfires in the Central Coast region increases with both air temperature in the month of ignition and with lower rates of precipitation in the 12 months preceding the fire, which create conditions in the natural landscape that increase wildfire risk (Potter 2017).

Chaparral habitat, which is present in the City's designated open spaces and surrounding areas, is a fire-dependent evergreen shrubland vegetation community. Human ignitions, fire suppression, and short-term meteorological events have dominated variability in fire activity in chaparral zones in recent decades (Abatzoglou et al. 2016, Mann et al. 2016). Some research has shown that the increasing frequency of fire on these landscapes have caused coastal sage shrubs and chaparral to shift to grasses, including exotic grasses (OPR et al. 2018b). Some research has suggested that annual and some perennial grasses have the strongest effects on fire regimes and act as ecosystem transformers. Noting that in many ecosystems, the dense growth habit and flammable tissue of invasive grasses create continuous drier fuels that are not present in areas not invaded by non-native grasses (Linder et al. 2018). However, the impact of these shifting vegetation communities on wildfire risk specific to the City is not known at this time.

Plant communities in riparian habitats typically have higher foliar moisture than upland plants. This higher moisture content can help to reduce damage from fire, and further, riparian corridors are often considered to be functional barriers to the spread of wildfire (Pettit and Naiman 2007). However, some invasive plants such as the Giant reed (*Arundo donax*) and tamarisk (*Tamarix spp.*) are highly flammable in California riparian systems, and are changing these dynamics. However, both species recover rapidly from fire by regrowth from below-ground plant parts. By contrast, cottonwoods, willows, and other native woody plants are less tolerant of direct exposure to fire. The invasive plants mentioned above as well as Giant reed, a large, bamboolike grass, are making riparian systems fire-prone, particularly in drier periods when this vegetation can increase fuel loads and subsequent wildfire risk (Linder et al. 2018).

Wildfire impacts in riparian zones can reduce canopy cover, resulting in increased water temperatures in creeks and other shaded waterways, as well as increased sediment flux in stream beds and adjacent areas. These changes can directly affect the food web of burned stream areas, increasing the density of algae as well as the potential to decrease terrestrial vegetation inputs, resulting in more invertebrate algae consumers (Cooper et al. 2015).

Post-wildfire conditions can also alter runoff production and streamflow. Studies have shown that post-wildfire streamflow can increase between 82 and 200 percent in the first year after a wildfire event (OPR et al. 2018b). High intensity rainfall events increase the export of sediment flow in affected landscapes while lower intensity events stimulate post-fire regrowth and increase the pace of hydrologic recovery. Research has also shown the floatation of nutrients in post-wildfire streamflows in central portions of the state can affect nearshore marine and estuarine waters. Specifically, post-fire runoff typically has elevated nitrogen concentrations due to the amount of biomass burned in these landscapes during wildfire events (OPR et al. 2018b).

Post-Wildfire Runoff and Debris Flow

Wildfire events can result in post-wildfire scarring on effected landscapes and can alter the hydrologic response of a watershed with the potential for even modest rainstorms to produce dangerous flash floods and debris flows events, in which a mix of water, soils, vegetation, and fragmented rock can rush down mountainsides and funnel into waterways. These events are due to vegetation loss and soil exposure on scarred landscapes, which would otherwise support the stability of soils in steeper terrains. Post-wildfire runoff and debris flows can be affected by several factors but are generally triggered by one of two processes: surface erosion caused by rainfall runoff, and landslides caused by rainfall seeping into the ground. While it is difficult to determine the potential risks of post-wildfire runoff prior to wildfire events, the United States Geological Survey conducts post-fire debris-flow hazard assessments for select fires in the Western U.S that are deemed susceptible to potential post-fire debris-flow events. These assessments analyze burn severity, soil properties, and rainfall characteristics to estimate the probability and volume of debris flows that may occur in response to a design storm and can help communities better prepare for these events. Design storms are defined as hypothetical discrete rainstorms characterized by a specific duration, temporal distribution, rainfall intensity, return frequency, and total depth of rainfall. While the effect of climate change on post-wildfire runoff and debris flow is uncertain, climate change is projected to result in higher intensity rainfall events as well as "whiplash events" with oscillations between extremely dry and extremely wet periods, potentially affecting post-wildfire hazards. Additionally, drought inhibition of vegetation recovery in areas affected by wildfire can decrease soil stability and increase the risk of post wildfire events (OPR et al. 2018b). Impacts from post-wildfire runoff and debris flow can result in blockage of drainage systems causing further flooding, damage to infrastructure and property, as well as short-term and long-term roadway closures. Impacts from these hazards are more likely to affect areas surrounding waterways and areas with steeper terrain (USGS n.d.).

Key Findings and Policy Considerations

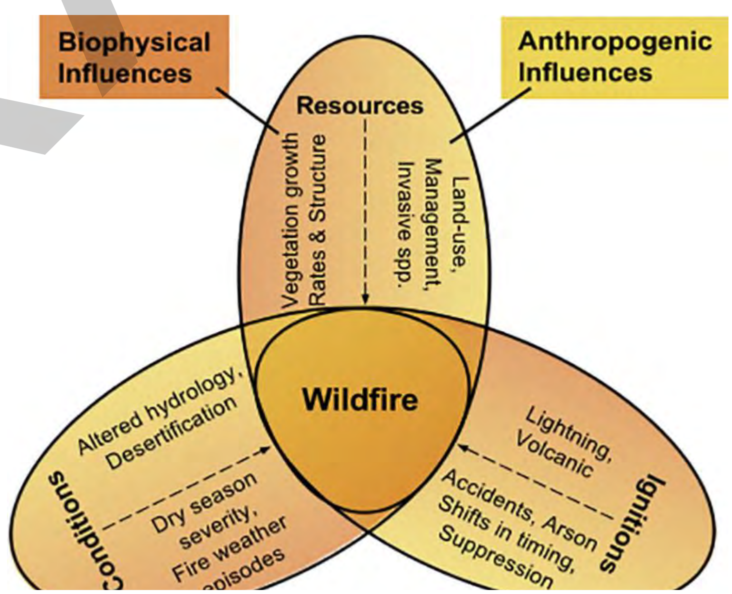
- The increasing frequency of fire on chaparral landscapes have caused coastal sage shrubs and chaparral to shift to grasses, including exotic grasses. Some research has suggested that annual and some perennial grasses have the strongest effects on fire regimes and act as ecosystem transformers.
- Wildfire impacts in riparian zones can reduce canopy cover, resulting in increased water temperatures in creeks and other shaded waterways as well as produce increased sediment flux in stream beds and adjacent areas, affecting the food web of burned stream areas and increasing the density of algae in waterways.
- Post-wildfire runoff and debris flows can be affected by several factors but are generally triggered by one of two processes: surface erosion caused by rainfall runoff, and landslides caused by rainfall seeping into the ground. While it is uncertain the effect climate change will have on post-wildfire runoff and debris flows event, climate change is projected to result in higher intensity rainfall events as well as "whiplash events" with oscillations between extremely dry and extremely wet periods, potentially affecting post-wildfire hazards.

WILDFIRE AND THE BUILT ENVIRONMENT

Anthropogenic Factors and Wildfire Risk

As noted extensively in research, while the effects of climate change are projected to increase the frequency and severity of wildfires when they do occur, approximately 95 percent of wildfires in the state are caused by human ignition (Mann et al. 2016). This fact helps to place into perspective the large influence human development has on the fire regime in the state even with the increasing influence of climate change throughout the 21st century. In assessing the influence of climate change on wildfire risk for the City, it is important to recognize and consider the other anthropogenic factors influencing risk. As show in Figure 21, the risk of wildfire is dependent on a variety of factors not excluding biophysical factors that are affected by climate change. These determinants, both anthropogenic and biophysical, can be organized into three categories: Resources (e.g., land use patterns, vegetation growth), Ignitions (e.g., lightning, accidental ignitions, arson), and Conditions (e.g., precipitation, wind, seasonal variation).

Modeling conducted on the anthropogenic influences of future wildfire risk in California note that there are three dominant anthropogenic mechanisms aside from climate change that will heavily influence wildfire risk. These are increasing ignitions, fire management practices, and the modification of land cover. The research also suggests that fire activity will increase in public lands, especially those surrounding urban areas, influenced by the promotions of fire suppression through firefighting and the physical properties of a dense urban environment (OPR et al. 2018b)



Source: Mann et al. 2016

Interactions of wildfire requirements as regulated by biophysical and anthropogenic influences.

Figure 21 Biophysical and anthropogenic determinants of wildfire

A part of this increased risk from anthropogenic factors is the presence electric transmission lines that travel from power plant substations to electric distribution substations via utility easements called rights-of-way which are present throughout the state including areas around the City as show in Figure 28. To reduce the risk of power outages, damage, or wildfire, the rights-of-way are cleared of trees or vegetation that can contact the transmission line. However, the combination of dry climate conditions and the seasonal high autumn winds in California can increase the risk of trees or branches falling on transmission lines and causing power outages or wildfires. High winds can also cause power lines to contact with one another and cause electrical arcs with sparks or hot molten materials that can cause fires in dry grasses underneath transmission lines. While there are variety of factors which affect the risk of wildfires being caused by damaged transmission lines, several recent wildfires have been blamed on electrical utility infrastructure including a wildfire in San Diego County in 2007, the Thomas Fire in 2017, and the Camp Fire in 2019. As climate change contributes to drier conditions and tree mortality rates, the risk of wildfires caused by transmissions lines will increase if actions are not taken to mitigate this risk (Congressional Research Service 2019).

Wildland Urban Interface (WUI)

As shown in Figure 22, portions of the City as well as areas immediately surrounding the City limits are increasingly at risk of wildfire impacts. As noted above, climate change will increase the frequency of wildfire events and increase the severity and average acreage burned when wildfire events do occur. Buildings and structures in and near VHFHSZ are at increased risk of damage or destruction in the event of wildfire. Increased wildfire risk may also result in a loss of housing stock and reduced regional housing affordability.

To better understand how anthropogenic influences, specifically development patterns, may affect wildfire risk, the degree of urbanization within WUI zones in the City over several decades was analyzed. Processed satellite imagery from the National Land Cover Database (Dewitz 2019) was used to determine changes in several land use categories over three periods: 2001-2006, 2006-2011, and 2011-2016. Specifically, changes in high, medium, and low-intensity development and developed open space over these three time periods for each of 18 WUI zones within the City were assessed using a geographic information system (GIS) analysis. The results of the analysis are illustrated in Figure 22 and in Table 15.

Table 15 Percent Change in Developed Area for WUI Areas within the City 2001-2016

WUI Area	Percent change in developed area in the WUI		
	2011-2016	2006-2011	2001-2006
Highland Area	-	-	-
Foothill Area	-	-	-
Buena Vista Area	-	-	-
San Luis Drive Area	-	-	-
Lizzie/Sunset Area	-	-	3.2%
Flora Area	-	-	-
Tanglewood Area	-	-	-
Woodbridge Area	-	-	-
Fontana Area	-	-	-
Margarita Area	86.3%	-	-
Tank Farm Road Area	-	-	0.2%
Prefumo Canyon Area	-	-	-
Madonna Area	-	0.2%	54.3%
North Broad	-	-	-
Stoneridge	-	-	1.0%
Terrace Hill	-	-	-
Righetti South	-	-	-
Righetti North	-	1.2%	-

Source: National Land Cover Database processed by Cbec eco-engineering 2021

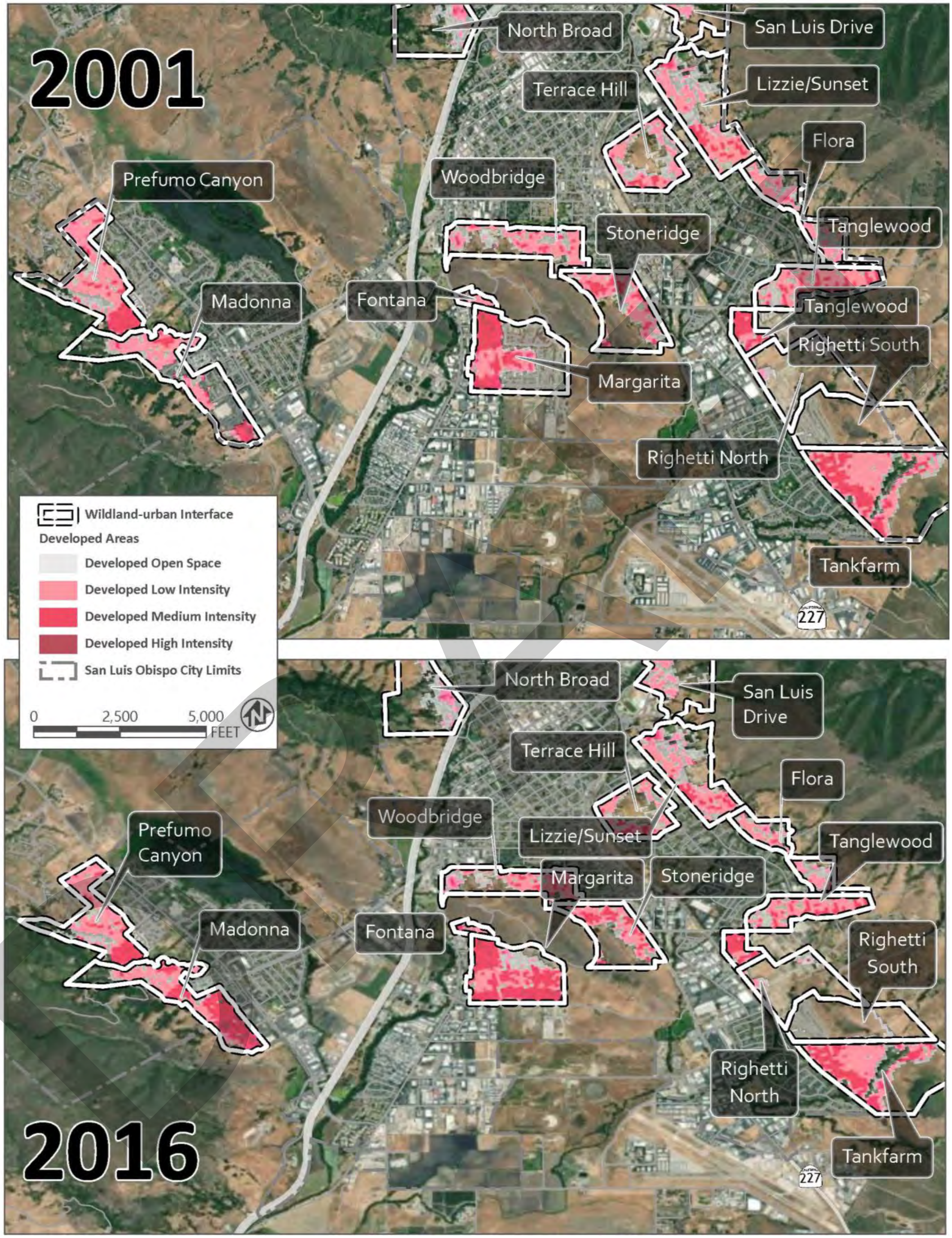


Figure 22 Changes in the WUI areas within the City 2001-2016

Overall, there was limited development within the WUI for the period of 2001 – 2016, with a few prominent exceptions. The Madonna Area experienced over a 50 percent increase in developed area in the early 2000's due to commercial and residential development on former agricultural land along Los Osos Valley Road. Secondly, the Margarita Area experienced an increase in developed area of over 85 percent in the 2011 – 2016 period as a result of residential development. These statistics represent a conservative estimate of development within the WUI areas, because areas that are classified as 'developed open space' may include grass and other open vegetated areas and in-fill into these zones by more intensive development is not considered. Instead, land cover needed to change from non-developed to developed for inclusion in the assessment. Increases in these WUI areas, although limited, do represent an increase in overall wildfire risk for the City, increasing the probability of ignitions that could have impacts on other portions of the City as well.

While buildings within the WUI are at risk from direct flame contact and radiant heat during wildfire events, buildings outside of the WUI are also at risk from ignition due to the spread of firebrands (or embers) that can initiate new spot fires up to one mile ahead from the main fire front. The risk of spot fires initiated by embers depends on several characteristics including fuel material type, condition of the fuel (e.g., live or dead fuels and moisture content levels), the thermal degradation characteristics of the fuel, the combustion properties of the fuel, and environmental conditions the fuel is subjected to (such as wind, relative humidity, temperature, and external heating condition) (U.S. Department of the Interior 2019). Once embers have been transported to new locations and have the potential to cause new spot fires, there are several pathways into structures such as eaves, vents, windows, roofs, fences, and decking as well as potential fuels (e.g., mulch, landscaping, woody vegetation) surrounding structures, all of which affect the risk of new spot fires igniting. Eaves and vents are seen to be significant sources of ignition for homes during wildfire events, which have historically been included in homes for thermal efficiency and to minimize the chance of moisture buildup in attics. The location and arrangement of homes and land uses can also contribute to the overall fire risk within a community. Research has determined that fire risk within communities is primarily governed by structure-to-structure spread and can vary significantly by the density and flammability of homes and associated landscaping within the WUI (Fire Protection Research Foundation 2015).

Key Findings and Policy Considerations

- The risk of wildfire is dependent on a variety of factors not excluding biophysical factors that are affected by climate change including Resources (e.g., land use patterns, vegetation growth), Ignitions (e.g., lightning, accidental ignitions, arson), and Conditions (e.g., precipitation, wind, seasonal variation). Approximately 95 percent of wildfires in the state are caused by human ignition. However, climate change is projected to increase the frequency and severity of wildfires, when they do occur (Mann et al. 2016).
- The combination of dry climate conditions and the seasonal high autumn winds in California can increase the risk of trees or branches falling on transmission lines and causing power outages or wildfires. While these events have occurred historically, the effect of climate change on biophysical features that increase the risk of wildfires (e.g., precipitation, wind, seasonal variation) will increase the frequency and severity of wildfires from transmission line ignitions.
- There was limited development within the WUI in the city for the period of 2001 – 2016, with a few prominent exceptions including the Madonna Area and the Margarita Area to the east of South Higuera Street. However, buildings outside of the WUI are also at risk from ignition due to the spread of firebrands (or embers) that can initiate new spot fires.

WILDFIRE AND COMMUNITY RESILIENCE

Wildfire Evacuation Route Analysis

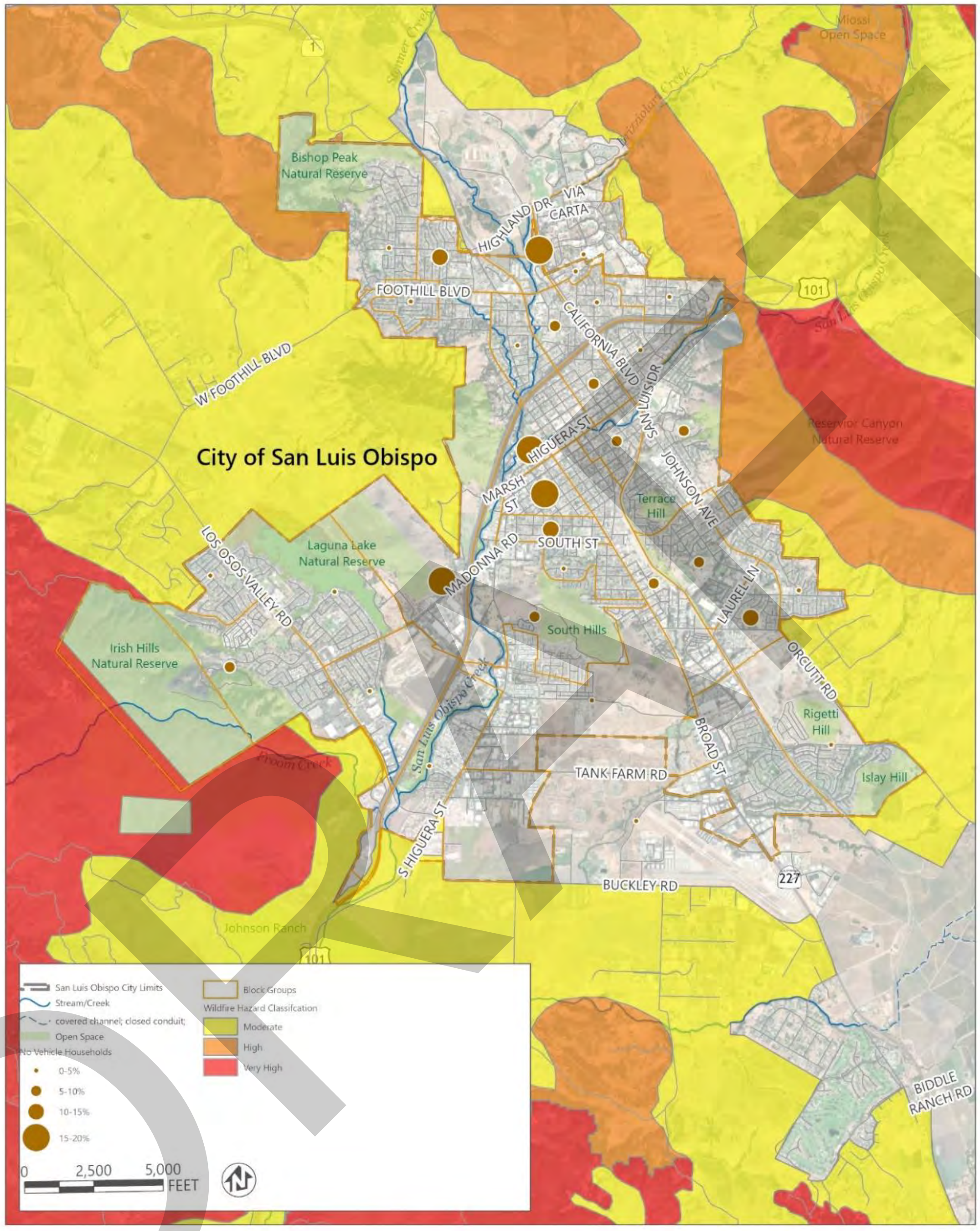
Wildfire events in or near the City, when they do occur, could result in emergency evacuations for certain areas. As show in Figure 22, the areas at highest risk from wildfire impacts are located in the WUI in the peripheral areas of the City Limits. As a result, impacts to the City's evacuation gateways (e.g., major ingress and egress points in and out of the City) are not projected to be affected by wildfires. Wildfire events in the VHFHSZ near the Irish Hills Natural Reserve could potentially have immediate impacts to some residential areas on Royal Way, Sterling Lane and Isabella Way. Additionally, areas in the northeast of the City south of US 101 along San Luis Road are at risk from wildfire impacts and could potentially compromise evacuation management when wildfires do occur in this area. Figure 23 identifies census block groups in the City based on the percentage of vehicle access. Table 16 summarizes the number of census blocks in the City relative to households with vehicle access. Although not located adjacent to any VHFHSZ, the neighborhoods north of Foothill Boulevard include areas with higher percentage of households without access to a vehicle, likely due to the high percentage of California Polytechnic State University at San Luis Obispo (Cal Poly) students who live in these neighborhoods located adjacent to the campus. As part of Cal Poly's emergency management planning, the University has contracted with multiple bus and shuttle companies in County to provide emergency transportation services, if needed, and worked with the County's Office of Emergency Services to ensure transportation resources would be available during large scale emergency events (Cal Poly 2018).

Table 16 Wildfire Hazard Severity Zones and Percent of No Vehicle Households per Block Group

Percent of No Vehicle Households	Number of Block Groups
0-5%	17
5-10%	8
10-15%	3
15-20%	4

Source: Fehr and Peers 2021

The other portion of the City with a noticeably high percentage of households without access to vehicles is the downtown area near Marsh Street and High Street, likely to due to the high-density housing and closer proximity to goods and services in these areas. It is important to note here that areas of the City with lower vehicle access do not necessarily mean increased vulnerability to emergency evacuation events but that more coordination is needed in these areas including Car Less Collection Points during evacuation scenarios for residents without vehicles. The City has identified Car Less Collection Points in this area including one in Meadow Park and one in the San Luis Obispo Mission Plaza. As the City continues to implement its CAP, which includes efforts to reduce single-occupancy vehicle trips and the needs for personal vehicle ownership, coordination and planning for evacuation scenarios for these areas of the City will need careful consideration.



Note: No vehicle Households: Low = 0-5%, High = 5-21%; Source: Fehr and Peers 2021

Figure 23 Wildfire Hazard Severity Zones and Percent of No Vehicle Household per Block Group

As shown in Figure 24, areas with a higher share of older adults and youth include areas of moderate to very high FHSZs. The Sinsheimer Neighborhood (Census Tract 110.01) is particularly vulnerable to wildfire impacts as the neighborhood is adjacent to moderate to very high FHSZs, and has the highest percentage of elderly (20 percent) and youth (7 percent) populations in the city, as well as the second highest percentage of disabled populations (12 percent). The Laguna Lake and Los Osos Valley Road (Census Tract 113) is also particularly vulnerable to wildfire risk, with a high percentage of elderly residents (14 percent), disabled (10 percent) populations, and households experiencing linguistic isolation (8 percent), which may present issues during emergency evacuation events.

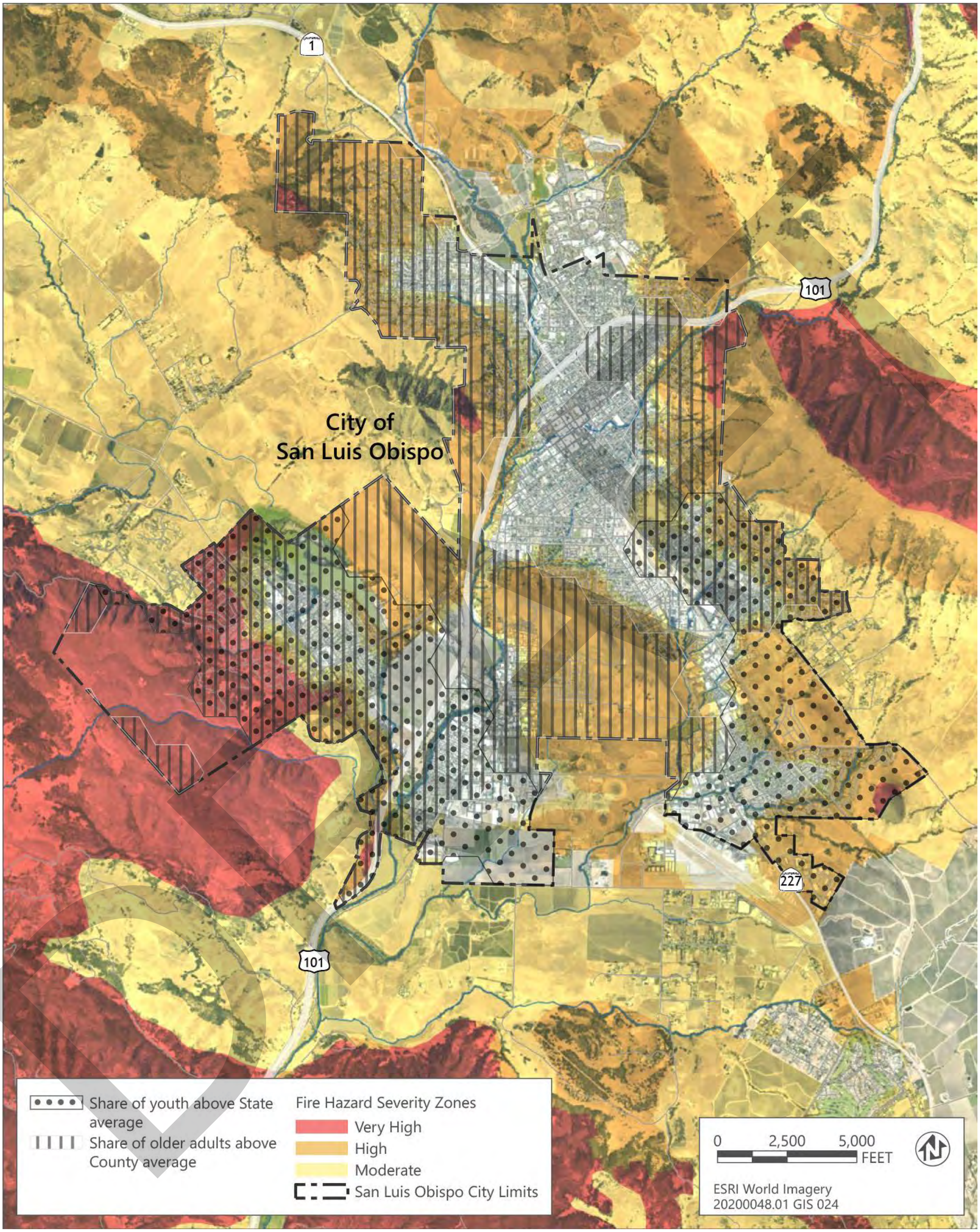
Wildfire Smoke

While the City is at risk from the impacts of wildfires, the City and its residents are also susceptible to impacts of smoke from wildfires in the coastal mountain ranges of central California and the Los Padres National Forest to the east of the City. Wildfire smoke in the surrounding region and, due to wind patterns, wildfires along the central coast in general, can greatly reduce air quality in the City and cause public health impacts as well as impacts to tourism and normal community functions. Community public health factors that can increase the impacts of wildfire smoke include the prevalence of asthma in children and adults; chronic obstructive pulmonary disease; hypertension; diabetes; obesity; percent of population 65 years of age and older; and indicators of socioeconomic status, including poverty, income, and unemployment. In addition to health risks from smoke inhalation, older adults may also be less mobile and experience challenges with evacuation. Disadvantaged communities are vulnerable to wildfire impacts because they score high on many of the public health factors and socioeconomic indicators described above. As shown in Figure 25 and in Figure 26, disadvantaged communities and low-income areas in the City are also located in high and very high fire hazard severity zones. This overlap may present challenges for low-income residents, who may not have resources to recover from wildfire events when they do occur or resources for increasing their preparedness for wildfire events (e.g., defensible space improvements, emergency resources). Figure 27 includes the high and very high fire hazard severity zones as well as the location and density of homeless encampments in the City. The co-location of homeless populations and areas with higher wildfire risk places these populations at higher risk to wildfire impacts when they do occur as well as higher risk of wildfire occurrence due to ignitions at these encampments.

Exposure to wildfire smoke, particularly exposure to vulnerable populations, can result in worsening of respiratory symptoms, increased rates of cardiorespiratory emergency visits, hospitalizations, and even death (Rappold et al. 2017). In the summer of 2020, wildfire smoke alerts were issued for the County due to poor air quality caused by the Dolan Fire near Big Sur (The Tribune 2020a). Wildfire smoke can also have impacts on the labor market and the economy in general, with air quality affecting the ability of outdoor workers to perform their work, industries that operate partially or entirely outdoor (e.g., wineries, recreation activities, sporting events), and the tourism industry (Borgschulte et al. 2019).

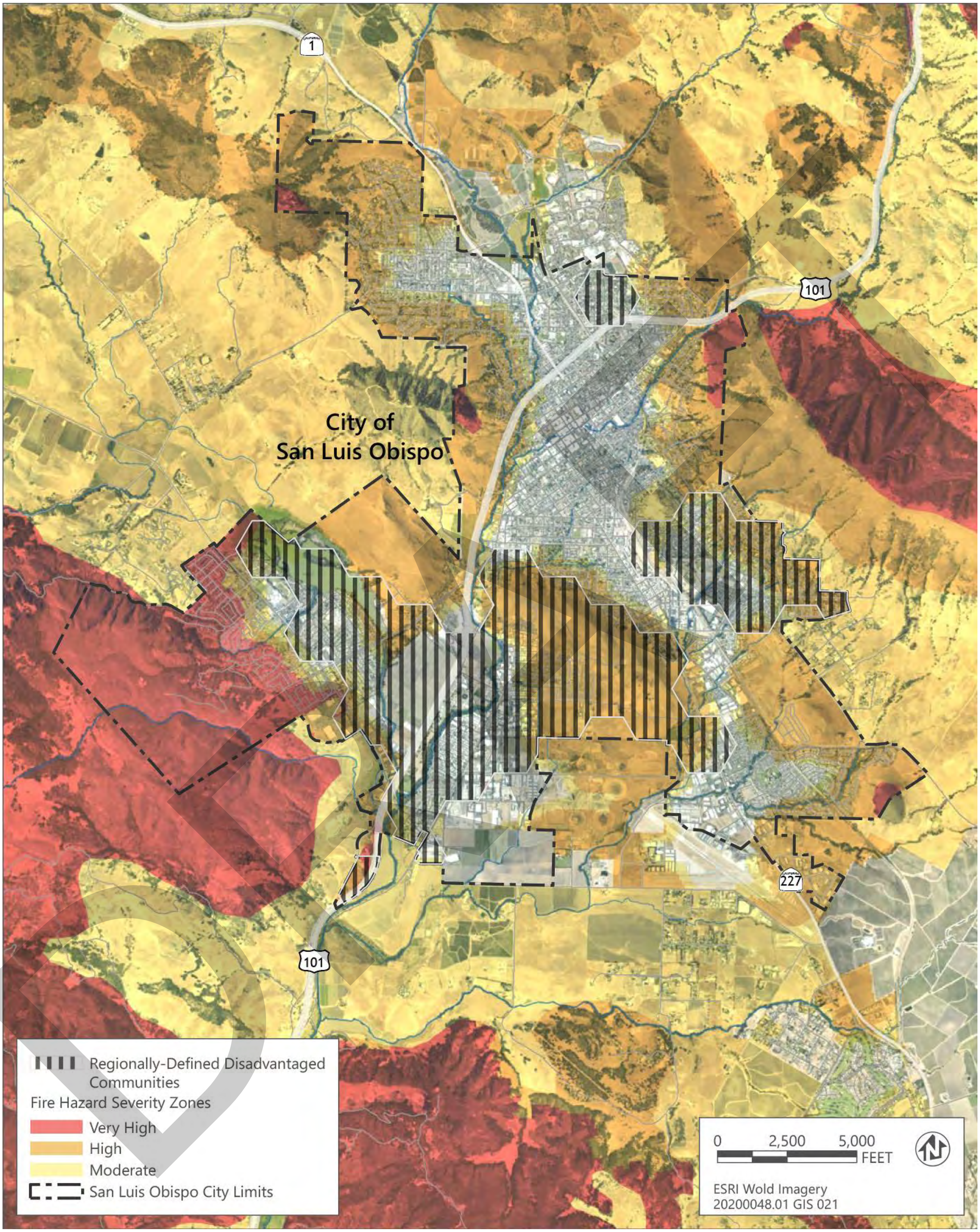
Tourism and Economic Impacts

Wildfires can damage not only buildings and infrastructure, but also the natural environment, including portions of the City and the areas in the County that serve as regional recreation and tourism opportunities. Hiking, camping, biking, wine tasting, fairs, music festivals, and other popular tourism and recreation activities can be disrupted by wildfires both during and in post-wildfire periods. In addition to reducing the abilities of individuals to partake in these activities, the financial impacts caused by wildfires on these industries and the economy at large can be devastating. Major wildfires often result in damage to transportation infrastructure and/or closure of roadways. Combined with potential impacts of wildfire smoke from surrounding areas, wildfires may significantly reduce the overall desirability of the City and County for visitors coming from other areas in the state as well as locations outside the state.



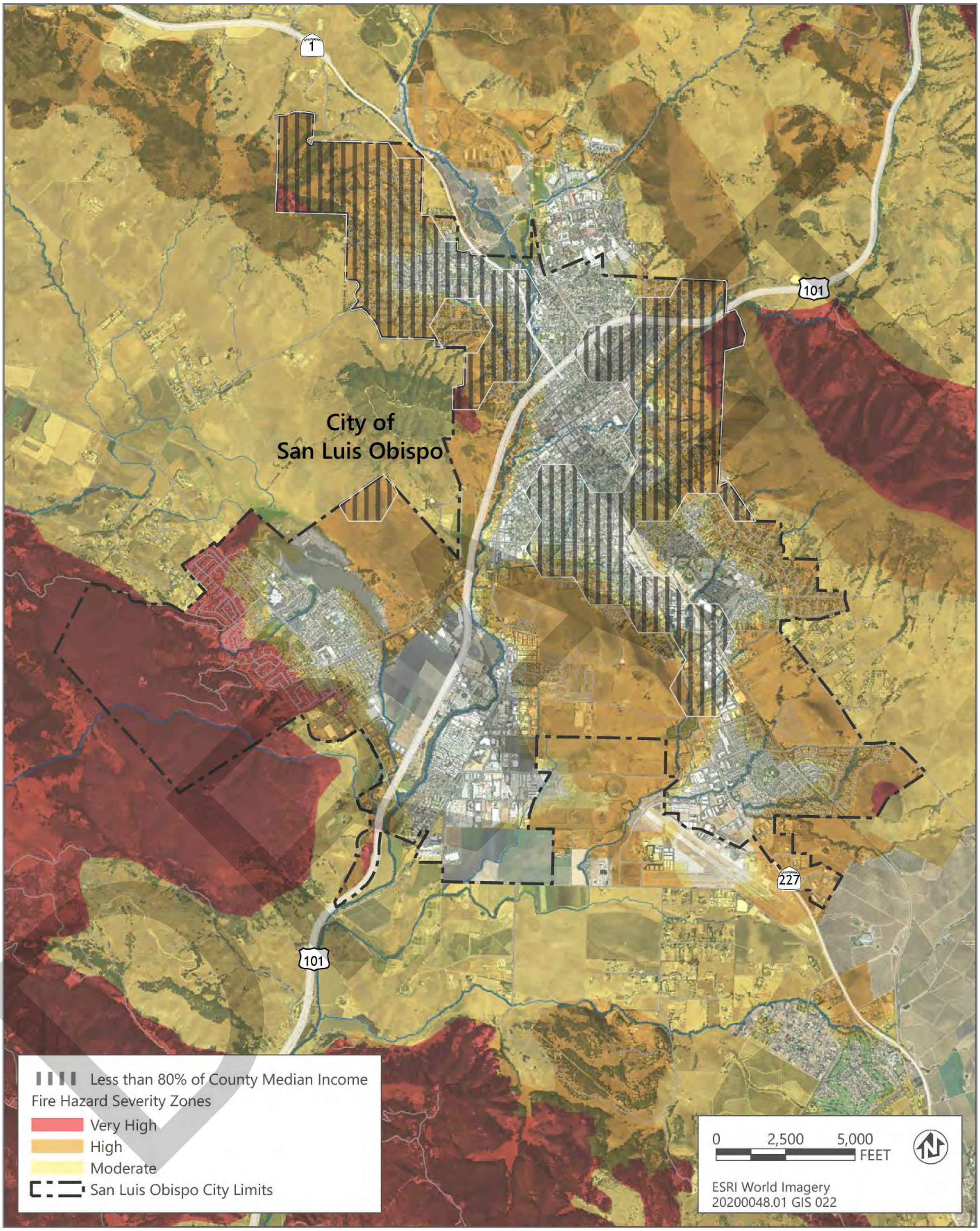
Sources: Data received from SLOCOG in 2021 and data downloaded from CAL FIRE in 2008 & 2020, City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 24 Share of Older Adults and Youth and Fire Hazard Severity Zone in the City



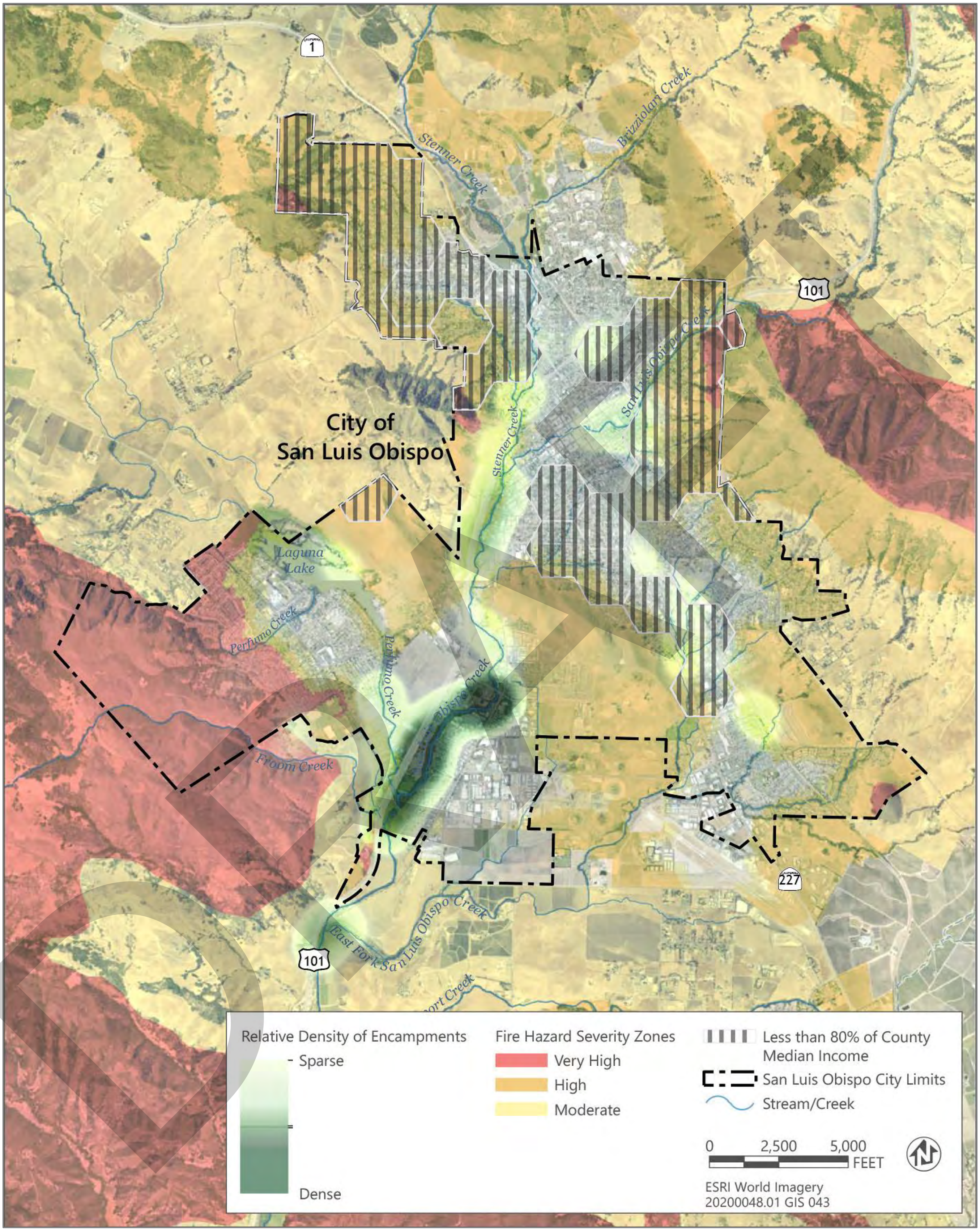
Sources: Data received from SLOCOG in 2021 and data downloaded from CAL FIRE in 2008 & 2020, City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 25 SLOCOG Identified Disadvantaged Communities and Fire Hazard Severity Zone in the City



Sources: Data received from SLOCOG in 2021 and data downloaded from CAL FIRE in 2008 & 2020, City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 26 Low-Income Populations and Fire Hazard Severity Zone in the City



Sources: Data received from SLOCOG in 2021 and data downloaded from CAL FIRE in 2008 & 2020, City of San Luis Obispo in 2020, 2021 and County of San Luis Obispo in 2020

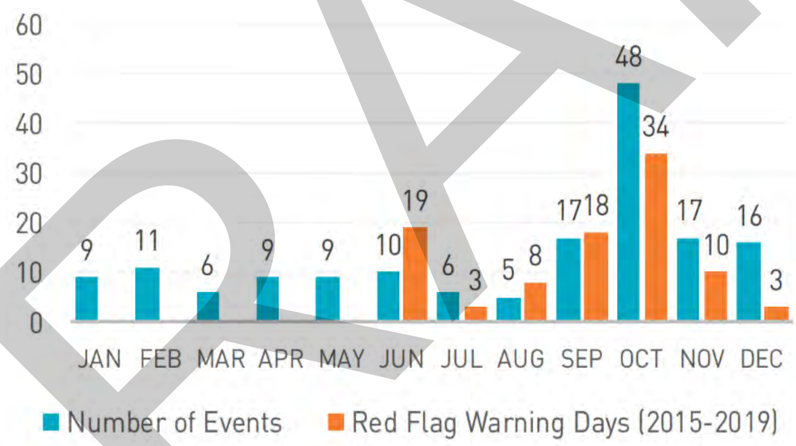
Figure 27 Homeless Encampments and Fire Hazard Severity Zone in the City

Public Safety Power Shutoffs

Beginning in 2019, electrical utilities in the state began to administer pre-emptive power shutoffs known as Public Safety Power Shutoffs (PSPSs) to portions of the electricity grid that were experiencing increased risk of wildfire due to specific weather conditions. PG&E, which operates the transmission lines in and around the City and has administered several PSPS events throughout their service territory, use specific criteria when determining a PSPS events (PG&E 2020). These include:

- Low humidity levels (generally 20 percent or below)
- High wind forecasts (sustained winds above 25 miles per hour and wind gusts above 45 miles per hour)
- Low moisture content of live vegetation
- Red Flag Warnings declared by the National Weather Service
- Real-time ground observations from the PG&E Wildfire Safety Operations Center

PG&E has projected that future occurrence of these events will occur across their service territory more frequently with most events occurring in the late summer and fall months during the historic fire season as shown in Figure 28. Additionally, to help identify areas in the state with increased risk from wildfires caused by utility infrastructure, the California Public Utilities Commission has developed a Fire Threat Map. As shown below in Figure 29, while future frequency of PSPS events in the City is unknown, the City is in a location adjacent to "Elevated" and "Extreme" Fire Threat Hazard Zones and transmission lines that help provide power to the City transverse both Elevated and Extreme Fire Threat Hazard Zones, making the City more likely to experience PSPS events in the future as the climate conditions that lead to these events become more common due to climate change.

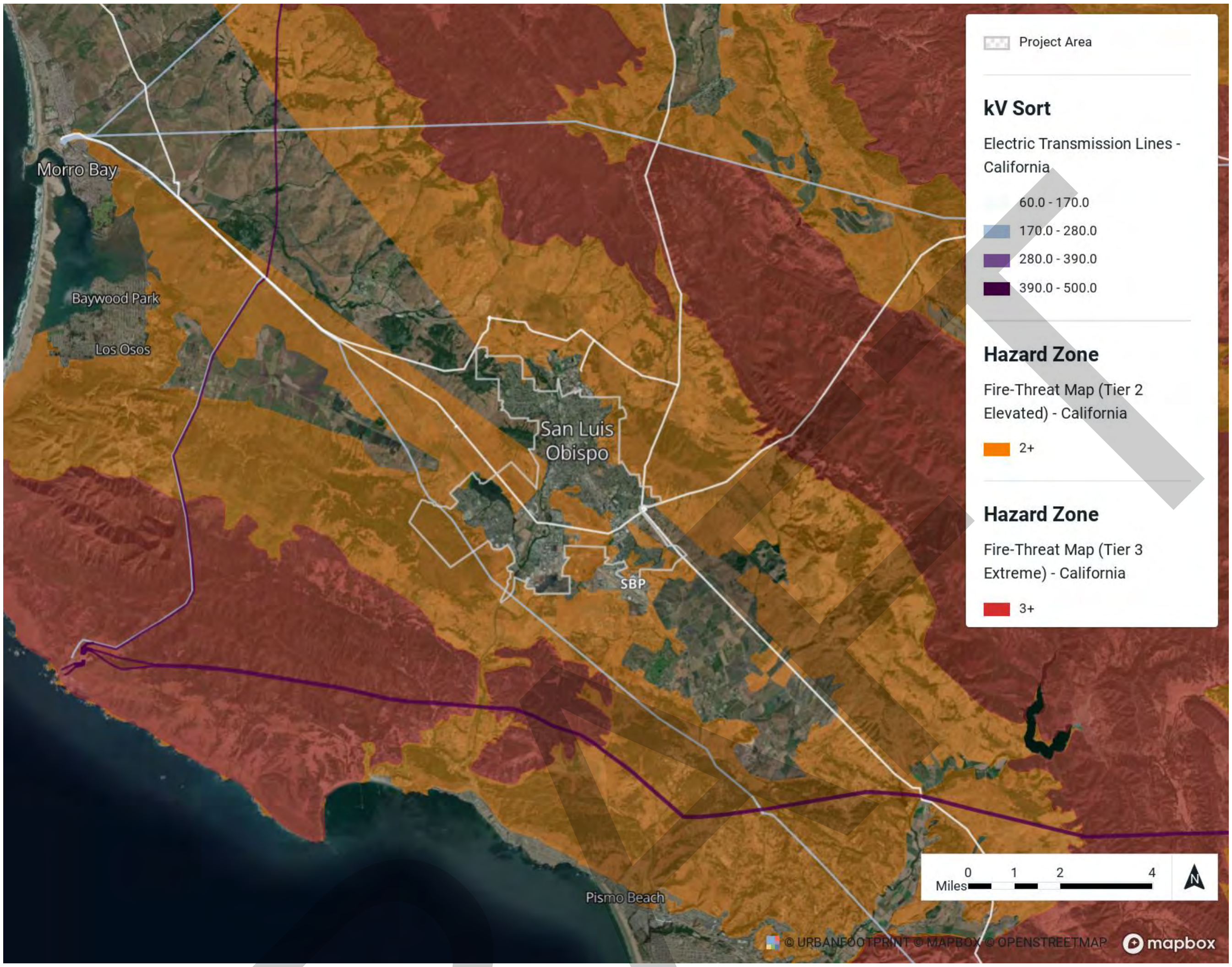


Projected PSPS events per month based on weather data collected over the last 30 years.

Source: PG&E 2020

Figure 28 Potential PG&E PSPS Events per Year by Month

Electricity to the City is provided by PG via a 115 kilovolt (kV) transmission line and three 21kV distribution lines from the Morro Bay area. Currently, there are no redundant or backup facilities or resources for continuous electrical service if a utility disruption were to occur to these facilities. Through coordination with PG&E, the City will be notified during planned shut offs to any of the distribution lines servicing the City.



The CPUC Fire-Threat Map depicts areas with increased risk from wildfires caused by transmission lines and where enhanced fire safety regulations have been enacted for utilities by the CPUC.

Source: CPUC 2021

Figure 29 California Public Utility Commission Fire Threat Map

Although residents in the City may not live or work in a high fire-threat area, their power may also be shut off if their neighborhood or home relies upon a line that passes through an area experiencing extreme fire danger conditions. During PSPS events, businesses and homes in the City lose power temporarily which can result in a variety of short-term impacts on the community including access to pharmacies, grocery stores, and other essential businesses for residents; secondary economic impacts on these businesses; loss of productivity for employees and employers; and loss of products for businesses requiring refrigeration such as grocery stores and restaurants. PSPS events may also affect telecommunication services such as cell towers and inhibit the ability to communicate information to residents during emergency events. However, in January 2020, SB 431 was adopted, which requires telecommunications service providers to develop backup power supplies to maintain minimum service for at least 72 hours during power outages. The bill also requires that during a utility deisruption, telecommunications servicee providers must provide communication services to emergency communication dispatch centers, emergency operations centers, federally-qualified health centers, fire stations, general acute care hospitals, police stations, and rural health clinics.

Considering that PSPS events are projected to occur in the late summer and fall months which are typically the warmest months in the City, the compounded effect of power loss during heat wave events could have considerable public health impacts leaving residents and businesses without power and air conditioning during heat wave periods.

These impacts would be even more severe for populations who are at increased risk from heat-related illnesses including persons over the age of 65, infants and children, individuals with chronic health conditions (e.g., cardiovascular disease, asthma), low-income populations, athletes, and outdoor workers (CDC 2019). Residents who require at home supplemental oxygen, refrigerated medications, and other medical equipment that requires electricity are also at increased risk during PSPS events. Additionally, a loss of power can disrupt heating, ventilation, and air conditioning (HVAC) systems in homes and business, which are critical for maintaining indoor air quality. The combination of PSPS events occurring during periods of poor air quality caused by wildfire smoke can lead to poor indoor air quality and result in increased public health impacts.

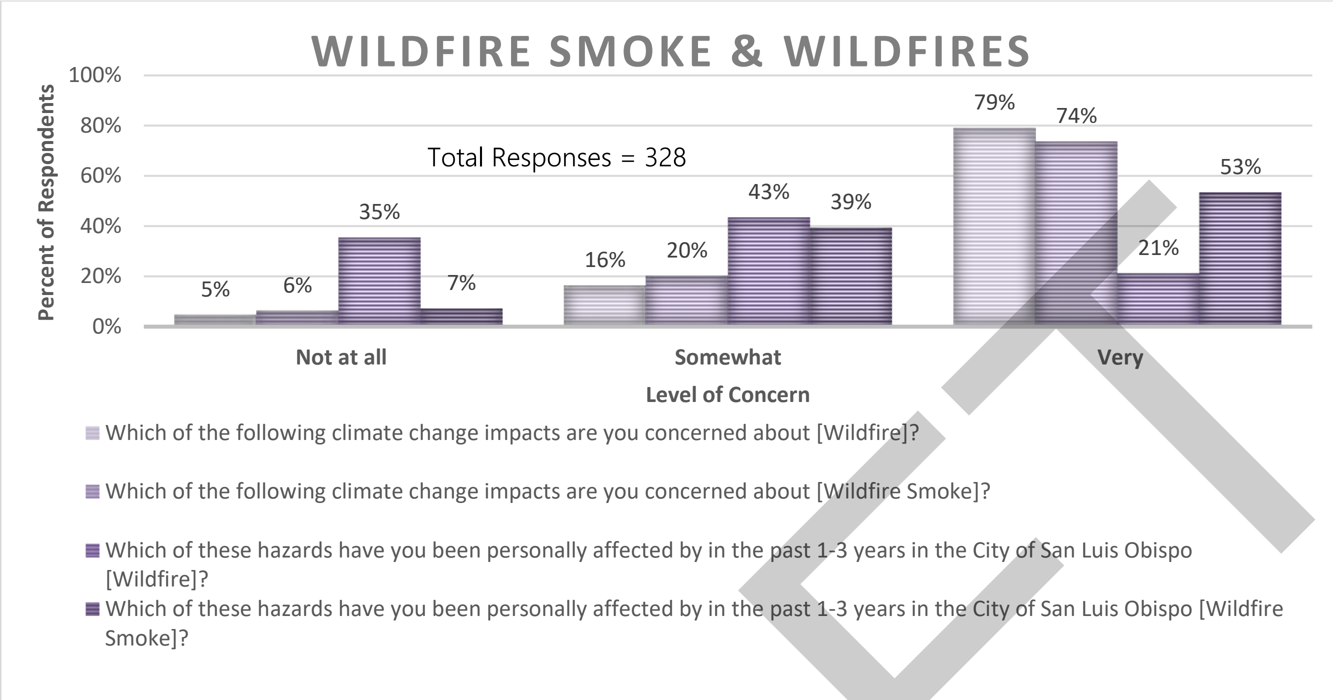
Aside from the power supply related impacts of PSPS events, recent research has shown that PSPS events likely result in a 'looming threat' that can be linked to unintended poor mental health outcomes compounded by self-reported trauma lingering from previous wildfire experiences. Specific concerns expressed by individuals affected by PSPS events in 2019 included, rotting food in refrigerators, people with medical needs being unable to access needed electricity, in addition to personal concerns about individuals' ability to conduct their normal daily activities. Other concerns included worries about how the PSPS events affected their ability to go to work or school, having to personally care or find childcare for children who were out of school due to the PSPS, and being unable to use air conditioning or a fan when needed. Regardless of actual impacts, the persistent "looming threat" of PSPS events for residents was a clear concern that led to worse mental health outcomes for some (Wong-Parodi 2020).

Local Impacts from Regional Wildfires

As shown in Figure 120, climate change is projected to increase the frequency and severity of wildfires not only in and near the City but at the County and regional level as well. Wildfires that occur at other locations in the County can have secondary impacts on the City as well including short-term impacts from route closures or delays, regional wildfire smoke impacts as discussed above, and economic impacts for employees who work in affected areas. Wildfires that occur in the County or in the larger central coast region can also result in temporary or permanent wildfire refugees who need to relocate due to property loss or damage and may relocate in the city. This influx of new residents can place increased pressure on local resources and infrastructure as well as exacerbate housing supply and affordability issues that already exist (National Academies of Sciences, Engineering, and Medicine 2020).

Community Wildfire and Wildfire Smoke Concerns

As part of the community priorities survey, when asked about their concern for wildfires and wildfire smoke, as shown in Figure 30, 94 percent of participants indicated "Somewhat" or "Very" concerned. When asked about whether they have been personally affected by either event, 64 percent of respondents indicated "Somewhat" or "Very" for wildfires and 92 percent of respondents indicated "Somewhat" or "Very" for wildfire smoke. Additionally, wildfire smoke was of paramount concern for individuals within the lowest income group (i.e., 84 percent). Renters and individuals between the ages of 18 and 24 expressed the highest level of concern for wildfire and wildfire smoke. Individuals who identify as White or Caucasian express a slightly higher level of concern both wildfire and wildfire smoke than individuals who identify as all other Races/Ethnicities.



Sources: Resilient SLO Community Priorities Survey

Figure 30 City Resident's Wildfire and Wildfire Smoke Concern and Impact

Key Findings and Policy Considerations

- Wildfire events in the VHFHSZ near the Irish Hills Natural Reserve could potentially have immediate impacts to some residential areas on Royal Way, Sterling Lane and Isabella Way. Additionally, areas in the northeast of the City south of US 101 along San Luis Road are at risk from wildfire impacts and could potentially compromise evacuation management when wildfires do occur in this area.
- The City serves as regional employment center, regional destination for tourism, and home to a university (Cal Poly) with approximately 20,000 students. These factors create an environment in which the City experiences a large influx of daily visitors to the City with a daytime population is estimated to be 90,000 (City of San Luis Obispo 2021c). If a wildfire event was to occur in or near the City during daytime hours, evacuation management would be particularly difficult and pose additional challenges due to this large influx of daily visitors. Additionally, because US 101 serves the main commuter corridor for locations north and south, wildfire events that occur along this route causing route closures (e.g., Cuesta Grade) can disproportionately impact employers and employees in the City.
- While the majority of the City is not at high risk from direct wildfire impacts, regional PSPS events have the potential to result in secondary impacts. Specifically, PSPS events occurring during heat wave events could have considerable public health impacts, leaving residents and businesses without power and air conditioning and further threaten residents who are medically-reliant on electricity for supplemental oxygen and refrigeration.
- The confluence of PSPS, bad air quality, wildfire threat, and high heat days underscores the importance of homes and businesses as places of potential refuge.
- The Sinsheimer Neighborhood (Census Tract 110.01) and the Laguna Lake and Los Osos Valley Road (Census Tract 113) areas are particularly vulnerable to wildfire impacts as these areas of the City are located near moderate to very high FHSZs and include higher percentages of elderly (20 percent) and youth (7 percent) populations. Additionally, these areas have a high percentage of households experiencing linguistic isolation (8 percent) which may present issues during emergency evacuation events.

- Exposure to wildfire smoke, particularly exposure to vulnerable populations, can result in worsening of respiratory symptoms, increased rates of cardiorespiratory emergency visits, hospitalizations, and even death (Rappold et al. 2017). Wildfires can damage not only buildings and infrastructure, but also the natural environment, including portions of the City and the areas in the County that serve as regional recreation and tourism destinations. Accordingly, wildfire smoke has the potential to harm the local economy by reducing tourism and its related industries.

2.5.3 Adaptive Capacity for Wildfire Impacts

As discussed in the previous section, portions of the City are at considerable risk from wildfire impacts as well secondary impacts to residents and businesses from wildfire smoke and PSPS events. However, wildfire risk is not a new hazard for the City and partner agencies have taken considerable steps to mitigate wildfire impacts when they do occur.

WILDFIRE RISK REDUCTION AND PREPAREDNESS

Wildfire risk is addressed in the City's Annex G of the County's Multi-Jurisdictional Hazard Mitigation Plan and includes a set of mitigation goals, objectives, and actions specifically focused on addressing wildfire risk. Additionally, the City of San Luis Obispo adopted the Community Wildfire Protection Plan in 2019 which focuses on fire protection planning in the City, working on minimizing wildfire risk to areas in and around the City limits. Section IV of the plan includes a comprehensive set of goals and policies with implementation timelines to reduce wildfire risk in the community. The strategy categories include:

- Education policies to prepare response organizations, communities, the public, and policy makers regarding appropriate community actions and interactions to reduce the unwanted impacts of fires in the wildland urban interface.
- Fuels Management policies to mitigate the unwanted impacts of wildfires on communities through proper vegetation management techniques that reduce hazardous fuels and the resulting wildfire intensity.
- Planning policies to help mitigate wildfire impacts in the City through community planning (including new resilient community design, retrofitting existing communities, and community recovery from the impact of fire), response planning, evacuation planning, and preparedness planning for responders, communities, individuals, animals, and livestock.
- Emergency Response policies to mitigate wildfire impacts on life, property, and resources by having an efficient and effective response that includes properly trained personnel, appropriate equipment, and a community prepared to take appropriate action or evacuate.
- Ignition Resistance policies mitigate structural ignitions from radiant heat, flame contact, or embers from wildland urban interface fires.

In regard to helping prepare the general public for wildfire hazards, the City's Fire Department has provided a comprehensive set of videos and resources through the Prepare SLO information campaign to inform residents and businesses on how to reduce risk from wildfires, prepare for wildfire events when they do occur, as well as how to recover from wildfire impacts. In addition to the City's wildfire preparedness efforts, the County's Office of Emergency Services (OES) works to help coordinate emergency response efforts between the County, the City, and relevant partner agencies including CAL FIRE during emergency events. The County OES also manages the Ready SLO website which provides a comprehensive set of resources to help County residents prepare for hazard events including information needed in preparing for hazards, key hazard resources such as evacuation routes, and the County's emergency alert system which residents can sign up for to receive notifications and alerts during emergency events.

ENERGY RESILIENCE

In recent years, PG&E has also taken considerable steps to reduce the severity of impacts of PSPS events when they do occur (PG&E 2020). These steps include:

- electricity grid upgrades to break the grid into smaller parts to limit the size of outages when they do occur;
- preparing microgrids in areas most likely to experience PSPS events to safely provide electricity to areas that are safe to keep energized during PSPS events;
- supporting communities and customers to develop their own multi-customer or community-level microgrids;
- implementing system hardening improvements including installing stronger, fire resistant poles, covered lines and conducting targeted undergrounding in areas of high wildfire risk; and
- using better weather monitoring technology and installing new weather stations to more precisely forecast the weather that could lead to PSPS events.

The City also benefits from the efforts undertaken by the San Luis Obispo County Fire Safe Council (Fire Safe Council). The Fire Safe Council is a diverse group of local and regional stakeholder that work to create fire safe communities in the County. The group provides educational resources to residents and businesses to reduce wildfire risk at the neighborhood and property level as well as help manage and fund wildfire fuel reduction projects throughout the County.

Central Coast Community Energy (3CE) is a Community Choice Energy agency established by local communities to source clean and renewable electricity for Monterey, San Benito and Santa Cruz counties, and parts of Santa Barbara and San Luis Obispo counties (including the City of San Luis Obispo). 3CE has begun to implement Resiliency Programs to help increase energy resilience for their customers. Most notably, 3CE has allocated $25 million to create the Uninterruptible Power Supply (UPS) Fund to accelerate and help finance the adoption of reliable backup power for public and private entities operating critical facilities, helping to ensure continuity of service and operations during PSPS events. 3CE is also working to develop a Residential Resiliency Incentive Program 2021 to help residential customers increase energy resilience through reliable backup power systems.

UTILITY DISRUPTION EMERGENCY OPERATIONS

Annex I of the City's Comprehensive Disaster Leadership Plan focuses specifically on procedures to ensure a continuity of operations during a Utility Disruption event affecting portions or all of the City. This document is in in part a response to the potential increase in PSPS events effecting the City as well as other climate related hazards that may affect utility services. The City of San Luis Obispo has adopted the Incident Command System, the Standard Emergency System, and the National Incident Management System as the emergency organization and the emergency management system for response to a Utility Disruption event impacting the City. The document includes a set of actions to be taken prior to a Utility Disruption when any notification of anticipated severe fire weather concerns are issued by PG&E as well as assigned roles for appropriate City departments during a Utility Disruption event. As stated in Annex I, the PG&E event notification will include:

- Estimated start time of a potential event
- Forecasted weather duration
- Estimated time range to full restoration
- Number of medical baseline customers in the potentially impacted area
- Weather and Utility Disruption information can be found at www.pge.com/weather
- Maps that include boundaries of the area subject to de-energization and affected circuits will be posted at www.pge.com/pspsportal

Annex I also includes an initial assessment of what impacts may occur to various operations in the City during a Utility Disruption including disruptions to leadership operation, emergency reporting, evacuation, resource center information, animal sheltering, school disruptions, emergency services, City utilities (discussed below), transportation systems, communication systems, emergency public information communications, and security. The document also includes recovery actions to be taken once a Utility Disruption event has ended.

As a result of potential future PSPS, the City's Utility Department has begun to develop precautionary measures to ensure the City is able to provide uninterrupted water service during short-duration power outages. The City's 2020 UWMP includes discussion of efforts to prepare for power outages of up to seven days and to ensure water is provided to critical facilities including the City's Emergency Operations Center, area hospitals, the SLO County Emergency Operations Center, the Cal Poly campus, and the SLO County airport. The City has a set of portable generators that are deployed as needed to various locations in the City's water conveyance system during power outages. The City also has a set of permanent back-up generators at key facilities including the City's Water Treatment Plant, Whale Rock Reservoir, and other pump stations and lift stations to ensure uninterrupted water service is provided in power outage scenarios.

For these reasons, the adaptive capacity ranking for wildfire risk is medium.

2.5.4 Vulnerability Summary

As discussed above, climate change is projected to cause an increase in the size and frequency of wildfire events due to changes in average temperatures, extreme heat events, and long-term drought scenarios over the 21st century. While the City includes some areas that are a high risk from wildfire impacts, the majority of the City is at moderate risk from direct wildfire impacts. However, due to the regional characteristics of wildfire impacts the City is still vulnerable to secondary wildfire impacts including untended consequences of PSPS events as well as public health impacts from regional wildfires that generate wildfire smoke and poor air quality in the City. These changes will result in varying impacts on the City and its residents as discussed above. Based on the analysis of various impacts discussed in Section 3.3.2, the City's potential impact scoring is High (3). Wildfire impacts that are unique to the City and should be given increased consideration during the adaptation strategy development process are discussed below.

Natural System Findings

- The increasing frequency of fire on chaparral landscapes have caused coastal sage shrubs and chaparral to shift to grasses, including exotic grasses. Some research has suggested that annual and some perennial grasses have the strongest effects on fire regimes and act as ecosystem transformers.
- Wildfire impacts in riparian zones can reduce canopy cover, resulting in increased water temperatures in creeks and other shaded waterways, as well as increased sediment flux in stream beds and adjacent areas, affecting the food web of burned stream areas and increasing the density of algae in waterways.
- Post-wildfire runoff and debris flows can be affected by several factors but are generally triggered by one of two processes: surface erosion caused by rainfall runoff, and landslides caused by rainfall seeping into the ground. While it is uncertain the effect climate change will have on post-wildfire runoff and debris flow events, climate change is projected to result in higher intensity rainfall events as well as "whiplash events" with oscillations between extremely dry and extremely wet periods, potentially affecting post-wildfire hazards.

Built Environment Findings

- The risk of wildfire is dependent on a variety of factors not excluding biophysical factors that are affected by climate change including Resources (e.g., land use patterns, vegetation growth), Ignitions (e.g., lightning, accidental ignitions, arson), and Conditions (e.g., precipitation, wind, seasonal variation). Approximately 95 percent of wildfires in the state are caused by human ignition. However, climate change is projected to increase the frequency and severity of wildfires, when they do occur (Mann et al. 2016).
- The combination of dry climate conditions and the seasonal high autumn winds in California can increase the risk of trees or branches falling on transmission lines and causing power outages or wildfires. While these events have occurred historically, the effect of climate change on biophysical features that increase the risk of

wildfires (e.g., precipitation, wind, seasonal variation) will increase the frequency and severity of wildfires from transmission line ignitions.

- There was limited development within the WUI in the city for the period of 2001 – 2016, with a few prominent exceptions including the Madonna Area and the Margarita Area to the east of South Higuera Street. However, buildings outside of the WUI are also at risk from ignition due to the spread of firebrands (or embers) that can initiate new spot fires.
- Wildfire events in the VHFHSZ near the Irish Hills Natural Reserve could potentially have immediate impacts to some residential areas on Royal Way, Sterling Lane and Isabella Way. Additionally, areas in the northeast of the City south of US 101 along San Luis Road are at risk from wildfire impacts and could potentially compromise evacuation management when wildfires do occur in this area.

Community Resilience Findings

- The City serves as regional employment center, regional destination for tourism, and home to a university (Cal Poly) with approximately 20,000 students. These factors create an environment in which the City experiences a large influx of daily visitors to the City. If and when a wildfire event was to occur in or near the City during daytime hours, evacuation management would be particularly difficult and pose additional challenges due to this large influx of daily visitors. Additionally, because US 101 serves the main commuter corridor for locations north and south, wildfire events that occur along this route causing route closures (e.g., Cuesta Grade) can have a disproportionate impact on employers and employees in the City.
- While the majority of the City is not at high risk from direct wildfire impacts, regional PSPS events that affect the City will result in a set of potential secondary impacts. Specifically, PSPS events occurring during heat wave events could have considerable public health impacts, leaving residents and businesses without power and air conditioning and further threaten residents who are medically-reliant on electricity for supplemental oxygen and refrigeration.
- The confluence of PSPS, bad air quality, wildfire threat, and high heat days underscores the importance of homes and businesses as places of potential refuge.
- The Sinsheimer Neighborhood (Census Tract 110.01) and the Laguna Lake and Los Osos Valley Road (Census Tract 113) are particularly vulnerable to wildfire impacts as these areas of the City are located near moderate to very high FHSZs and include the higher percentages of elderly (20 percent) and youth (7 percent) populations. Additionally, these areas have a high percentage of households experiencing linguistic isolation (8 percent) which may present issues during emergency evacuation events.
- Exposure to wildfire smoke, particularly exposure to vulnerable populations, can result in worsening of respiratory symptoms, increased rates of cardiorespiratory emergency visits, hospitalizations, and even death (Rappold et al. 2017). Wildfires can damage not only buildings and infrastructure, but also the natural environment, including portions of the City and the areas in the County that serve as regional recreation and tourism destinations. Accordingly, wildfire smoke has the potential to harm the local economy by reducing tourism and its related industries.

Wildfire Vulnerability Score

Adaptive Capacity: Medium (2)

Potential Impact: High (3)

Vulnerability Score: 4

2.6 PRECIPITATION AND FLOODING ANALYSIS

This section discusses future increases in annual precipitation and increases in the frequency and severity of large storm events in watersheds affecting the City. The section analyzes how these changes are likely to impact the City and its population as well as highlights what capacity the City and partner agencies already have in place to address these future impacts.

2.6.1 Future Exposure to Changes in Precipitation and Flooding

According to Cal-Adapt, the historic average annual precipitation in the City is 21.2 inches. As shown in Table 17, the average annual precipitation in the County is projected increase to 22.6 inches in the near-term and 22.6 inches in the midterm under the high emissions scenario. Average annual precipitation is projected to be 21.6 inches under the medium emissions scenario and 25.2 inches under the high emissions scenario in the late century (CEC 2021a). Although the City is anticipated to experience only moderate increases in annual precipitation, research indicates that the majority of the increase in annual rainfallis anticipated to occur during large storm events, which are projected to increase in size and frequency in the future.

Table 17 Changes in Average Annual Precipitation in City of San Luis Obispo

Average Annual Precipitation	Historic Average Annual Precipitation (1961-1990)	Near-Term (2021-2050)	Midterm (2035-2064)	Late-Century (2070-2099)	
				Low Emissions	High Emissions
Average Annual Precipitation (inches)	21.2	22.6	22.6	21.6	25.2

Notes: RCP = Representative Concentration Pathway.
Source: CEC 2019a

CLIMATE-INFORMED FLOOD RISK MODELING

As part of the development of the vulnerability assessment, a climate-informed flood risk modeling exercise was conducted to understand how changes in precipitation caused by climate change could affect the frequency and severity of large storm events (e.g., 100-year storm event) and how these changes would affect the flow of water through the City's existing flood plains. The following section discusses the process used to develop this modeling and a summary of the modeling results.

Flooding Characteristics

Two interchangeable, technical terms that characterize flood frequency are used throughout the section and are defined as follows:

- Recurrence Intervals: A common way to describe floods is by stating their recurrence intervals, which refer to how often, on average, a given flood may occur. A 100-year event, for example, is described as an event that may occur about once in every 100 years, on average. However, this terminology can be misleading because flood events are statistical occurrences, and events may occur more frequently than their recurrence interval suggests.
- Exceedance Probability: The exceedance probability of a given flood event is the percent chance that a larger flood will occur in any given year, and it is calculated by dividing the number 1 by the recurrence interval. Thus, the "100-year event" becomes the "1-percent exceedance event," or a flow rate that has a 1-percent chance in any given year of being equaled or surpassed by a larger flow rate. This representation, although interchangeable with the recurrence interval, provides a more helpful way to think about flood risk.

There are several overall mechanisms by which flooding can occur:

- dam inundation flooding, in which impounded water is released because of dam breaching;
- localized flooding, which occurs when intense rainfall overwhelms the capacity of local drainage infrastructure; causing the ponding of water; and
- riverine flooding, which occurs when channels (i.e., the relatively deep, narrow sections of creeks and rivers) cannot contain the flow volume moving through them, causing water to spill out into the overbank areas (i.e., the relatively wide, flat regions on one or both sides of the channel, also called "floodplains").

According to the Annex G of the County's HMP, the City is not at risk of dam inundation flooding, as there are no major reservoirs within the watershed, and localized flooding is considered a minimal risk. The highest flooding concern for the City is riverine flooding, which may include "flash" flood risks (San Luis Obispo County 2019b).

Floods occur when the amount of water within the creek channels exceeds the channel capacity, causing water to spill over the banks and into the surrounding land. In these flat, flood-prone areas beyond the channel, called floodplains, slow moving or stagnant water that escapes the channel may remain until water levels within the channels recede or the areas are drained by infrastructure, percolation, or evapotranspiration. Naturally, these floodplain areas would have been flooded every few years, but as the City developed onto portions of the floodplains of the creeks within the San Luis Obispo Creek watershed, channel incision and flood protection measures constrained flows to the creeks. During periods of intense rainfall, however, the watershed outflow, including urban runoff, can exceed the capacity of the channels. Under existing conditions, different creeks within the watershed may experience flooding every 10-25 years (Questa Engineering Corporation 2003). The goal of the flood impacts assessment was to determine how the current level of flood risk is projected to vary as a result of climate change.

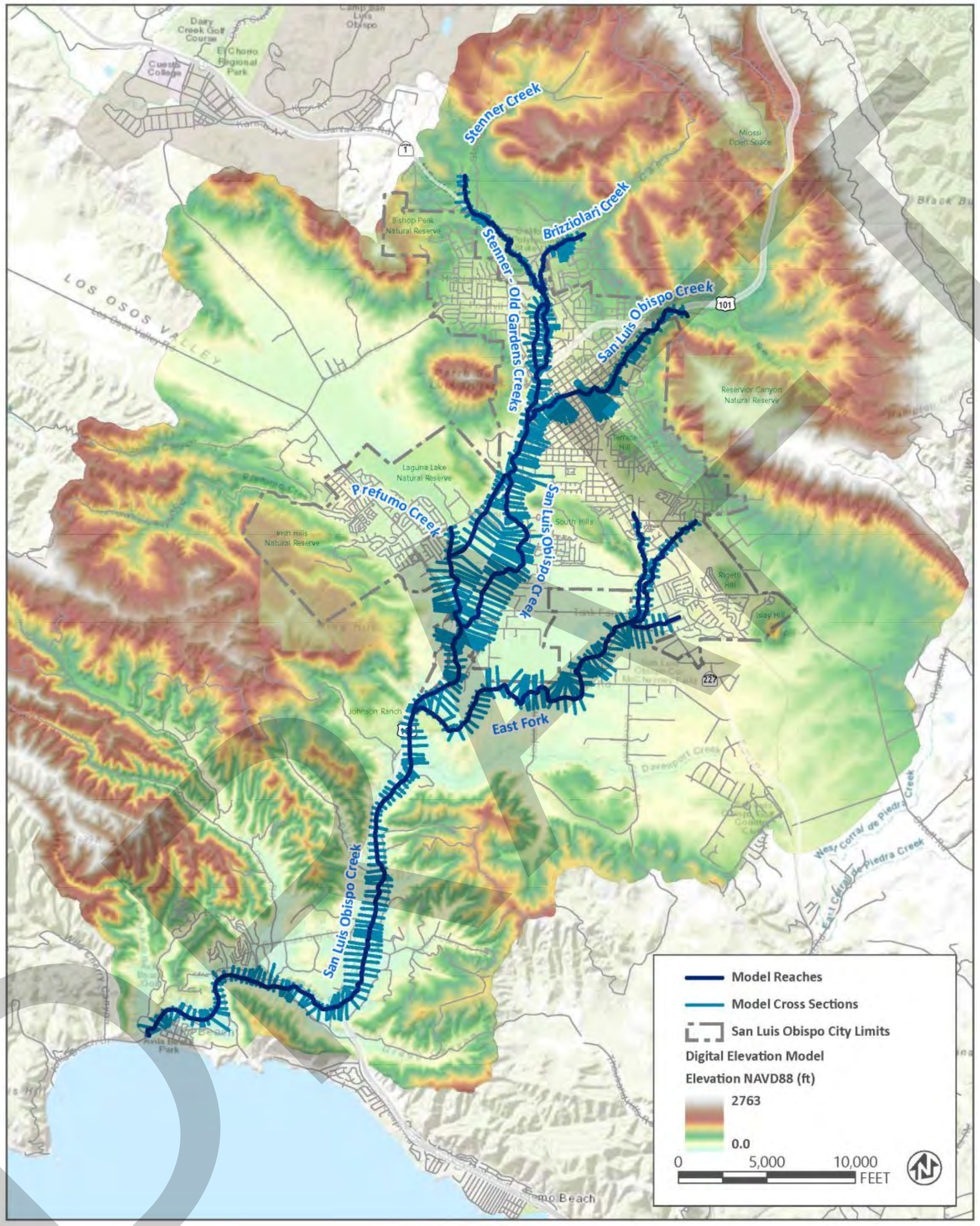
Flood Risk Modeling Methodology

To understand how flood risk for the City is likely to change in the future due to climate change, modeling software was used to assess projected changes in rainfall and analyze how these changes would affect flood inundation. The first step in determining the change in flood risk involves conducting long-term hydrologic modeling of the San Luis Obispo Creek watershed with historic and future daily precipitation data to understand changes in stream flow. This type of model simulates the ability of the watershed to store and release water over time through various processes, and by determining how quickly water is passed through the system, the model can be used to understand how flow within creek channels will respond to rainfall. It is based on physical watershed attributes such as slope, drainage area, land cover, geology, channel geometry, and initial soil moisture conditions, which control how much of the precipitation will be converted to streamflow versus being held within the watershed or lost to the atmosphere. For this analysis, a hydrologic model was developed using the Soil and Water Assessment Tool platform (SWAT), which was calibrated using historical gridded precipitation data (Livneh et al. 2015) and United State Geological Survey daily flow records from 1978 – 1985 for the Lower SLO Creek gage.

The SWAT hydrologic model was then used to simulate both historic (1970 – 1999) and future (2070-2099) daily precipitation records from 10 General Circulation Models recommended by the California Department of Water Resources for this type of modeling. These atmospheric models simulate global patterns for temperature, precipitation, and other atmospheric data over long periods of time. For the purpose of this assessment, the high emissions scenario over the long-term period (2070-2099) was used for this exercise. The 30-year future daily precipitation records were then simulated in the SWAT model, in addition to historic precipitation records (1970 – 1999). Using the average of the 10 future simulations, flow frequency statistics (England et al. 2019) were computed to determine how different flood events (e.g., the 100-year event) are projected to vary as a result of climate change.

To assess flood impacts on the City's existing floodplains from changes in precipitation, further hydraulic modeling was needed. Hydraulic modeling is a process that uses the physical representation of a river network, including channel geometries, land slopes, surface characteristics, and structural information, to understand how quickly water moves through different channel reaches, how deep it is, and where overbank flooding may occur. For example, water flowing across a smooth concrete surface will move much faster than water passing through vegetation or through gravelly waterways. From a hydraulics perspective, the vegetation is said to have higher 'roughness' than the concrete, and empirical values are available to indicate this concept of roughness within hydraulic models. Likewise, channels that have steeper slopes or greater cross-sectional areas will be able to move water more quickly than those with gentler slopes or smaller areas. Bridges, culverts, and other structures can also greatly affect flow. As illustrated in Figure 31, a suite of hydraulic models using the HEC-RAS platform was developed for the Waterway Management Plan (Questa Engineering Corporation 2003), spanning San Luis Obispo Creek from Reservoir Canyon to Avila Beach, Prefumo Creek from Madonna Road to the San Luis Obispo Creek confluence, East Fork San Luis Obispo Creek and portions of its tributaries, and portions of Stenner, Brizziolari, and Old Garden Creeks. These models were adapted to the current study by scaling the peak flows used in the WMP by the factors from Table 18. The 500-year event was not studied for the Waterway Management Plan, but 500-year flow rates were determined for Federal Emergency

Management Agency (FEMA) flood insurance studies (FEMA 1978) for all examined creeks except for East Fork San Luis Obispo Creek.



Source: cbec eco-engineering 2021

Figure 31 HEC-RAS Hydraulic Model Extent

Table 18 Climate-induced Changes in Peak Stream Flow for the San Luis Obispo Creek Watershed

Flood Event (Return Interval)	Percent chance of flood occurring in any given year	Percent increase in peak stream flow		
		90th Percentile	50th Percentile (median)	10th Percentile
500-Year	0.2%	122%	38%	4%
200-Year	0.5%	116%	38%	4%
100-Year	1%	110%	38%	4%
50-Year	2%	103%	37%	4%
20-Year	5%	93%	35%	3%
10-Year	10%	84%	33%	3%
5-Year	20%	73%	29%	3%
2-Year	50%	51%	28%	8%
1-Year	99%	64%	17%	-31%

Source: cbec eco engineering 2021. The late century (2070-2099), RCP 8.5 scenario was used to determine flood impacts.

For each flood event, historic flow rates (using WMP hydrology for 10-year, 50-year, and 100-year and FEMA [1978] hydrology for the 500-year excluding East Fork of San Luis Obispo Creek) and scaled future peak flow rates based on projections from Table 18 were simulated in the HEC-RAS models representing channel conditions in the early 2000's. Flood inundation maps were then generated by extending modeled water surface elevations over a digital elevation model of the watershed (Woolpert 2019) to determine inundated acreage and depth of water on floodplain areas (not including channels or Laguna Lake) that were physically connected to flood sources. The assessment was divided into 9 regions to understand how flood impacts varied throughout the City and outlying areas.

Modeling Results

The following section discusses the results of the climate-informed flood risk modeling exercise. Table 18 includes the modeling results for various size storm events in the San Luis Obispo Creek watershed for the long-term period (2070-2099) under a high emissions scenario.

As shown in Table 18, the 10th percentile results indicate an extremely dry scenario, which experiences decreases in flow for events with less than a 2-year recurrence interval, while the 90th percentile results represent an extremely wet future scenario and results in peak flows more than doubling for events that occur every 50 or more years. For flood events occurring more rarely than every 2-years, flows are expected to increase across all scenarios including the 10th percentile projection. Overall, the median projection represents the best available estimate at this time for the San Luis Obispo Creek watershed for how peak flows are likely to change if global GHG emissions maintain the high emissions scenario trajectory for the long-term period.

The climate-induced increases in flood magnitude are due to increases in precipitation intensity. As the atmosphere warms, its ability to hold water vapor increases. While total annual precipitation in different parts of the state is projected to increase, decrease, or stay the same depending on the location, the trend of increasing rainfall within shorter periods of time (increasing intensity) is projected to occur broadly (OPR et al. 2018). In this way, even areas that may become drier and experience water scarcity as a result of climate change may also experience increased flood risk. Based on California's location next to the Pacific Ocean, the state is exposed to the atmospheric river (AR) phenomenon, a narrow corridor of concentrated moisture in the atmosphere. California is subject to precipitation from an AR that transports water vapor from as far south as Hawaii to the state. The presence of the AR contributes to the frequency of "wet years" in the state, when there is an above-average number of AR storms and above-average annual precipitation. Projected peak stream flow increases are also greater for larger (less frequent) flood events than for smaller ones, as a result of the watershed's diminishing ability to absorb increasingly high levels of rainfall. For example, following a long, dry summer, the land surface, soils, and vegetation will have a relatively high capacity to hold incoming rain and very little stream flow may be generated from a notable amount of rainfall. In the mid-winter months, after a series of precipitation events has passed through, the soils are relatively saturated and generate runoff more quickly. For very large precipitation events, the capacity of the watershed to absorb incoming rainfall can be quickly exceeded, causing large increases in stream flow within the system. For the median scenario, peak flow rates are projected to increase from 17 percent to 38 percent for events that occur every year to every 500 years, on average, as show in Table 18.

While research indicates that the frequency of large storms events does increase in these wet years, the most severe flooding from ARs may not be in wet years (Swain et al. 2018). The largest flooding impacts are caused by persistent storm sequences on sub-seasonal timescales (i.e., short time periods, typically 2 weeks to 3 months), which bring a significant fraction of annual average precipitation over a brief period. These storms events are similar to the Great Flood events of 1861–1862, which caused widespread damage throughout northern California (Swain et al. 2016). Based on current climate modeling, the frequency of these large storm sequences over short timeframes is projected to increase noticeably under the high emissions scenario. It is estimated that a storm similar in magnitude to the Great Flood event is more likely than not to occur at least once between 2018 and 2060 (Swain et al. 2018).

Although annual precipitation is anticipated to increase in the City and the larger central coast region, California's climate oscillates between extremely dry and extremely wet periods with annual precipitation varying widely from year to year. Climate change is anticipated to exacerbate these seasonal extremes with dry periods becoming dryer and wet periods becoming wetter (OPR et al. 2018b:19). As a result, the frequency and severity of large storm events are anticipated to increase as well. These oscillations between extremely dry and extremely wet periods, which have occurred historically in the state, are anticipated to become more severe with rapid shifts from dry to wet periods known as "whiplash events" (Swain et al. 2016). As Swain et al. note in their research, the recent 2012–2016 drought followed by the 2016–2017 flood events throughout the state serve as a good example of the type of whiplash events that will occur more frequently over the next century. These types of events are estimated to increase by approximately 100 percent in southern California, with increases in frequency occurring largely after 2050 (Swain et al. 2016).

2.6.2 Precipitation and Flooding Sensitivities and Impact

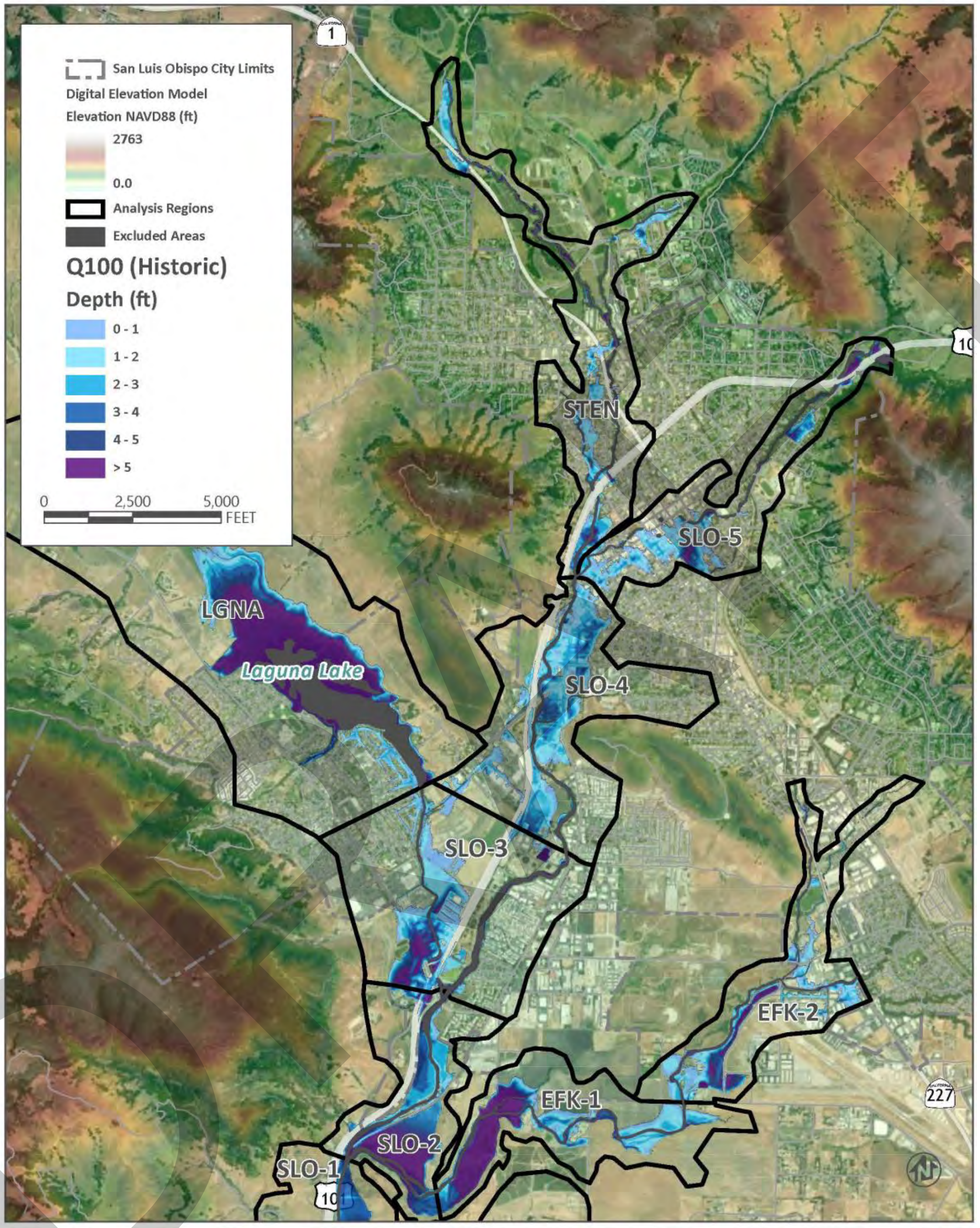
This section discusses the City's existing sensitivities to increases in annual precipitation and flooding events, analyzing potential effects on the City including a discussion of general impacts as well as secondary impacts. This impact analysis focuses specifically on impacts to the City's built environment and transportation network.

FLOODING AND NATURAL SYSTEMS

Future Flood Mapping Results

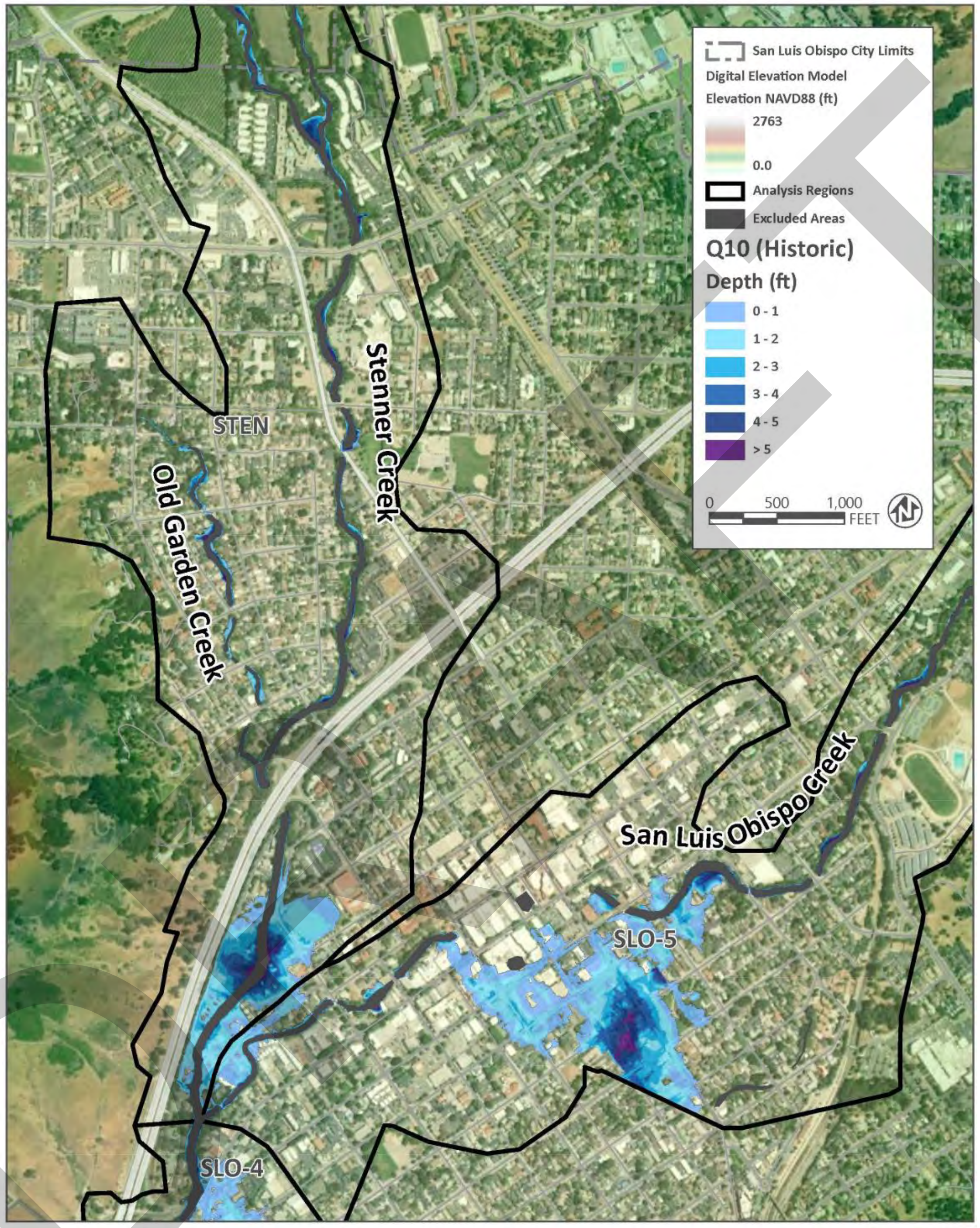
Based on hydraulic modeling discussed above, future floodplain maps were generated to understand how changes in precipitation for the 10-year, 50-year, and 100-year storms events would impact the City as shown in Figures 32 through 40. Additional modeling for the 10-year, 50-year, 100-year, and 500-year storms events is included in Appendix A. Figures 32 through 40 show the generated depth maps for historic and future (long-term high emissions [RCP 8.5] scenario) conditions for the 10-year (Q10) and 100-year (Q100 events within the San Luis Obispo Creek – Stenner Creek and San Luis Obispo Creek – Prefumo Creek confluence areas. These figures provide an illustration of the future extent of flood plains in the San Luis Obispo Creek watershed. However, there are limitations preventing these maps from being used for more detailed or more absolute flood extent delineations for historic and future conditions. One main limitation is the reliance upon hydraulic models that are almost two decades old and do not cover all areas of the City as well as an uncertain range of possibilities for future precipitation and future global emissions trends during the late-century period. However, the mapping exercise is useful for indicating the locations and extents of relative flood impacts that may reasonably be expected to occur due to climate change under the late-century high emissions scenario.

To further understand relative flood impacts, the hydraulic model domain was divided into nine analysis regions where changes in inundated area in acres and average depth on the floodplain (ft) were compared between historic and future conditions for each flood event, as shown in Tables 19 and 20. To determine these statistics for floodplain areas, the regions within the creek channels and Laguna Lake were removed from the analysis.



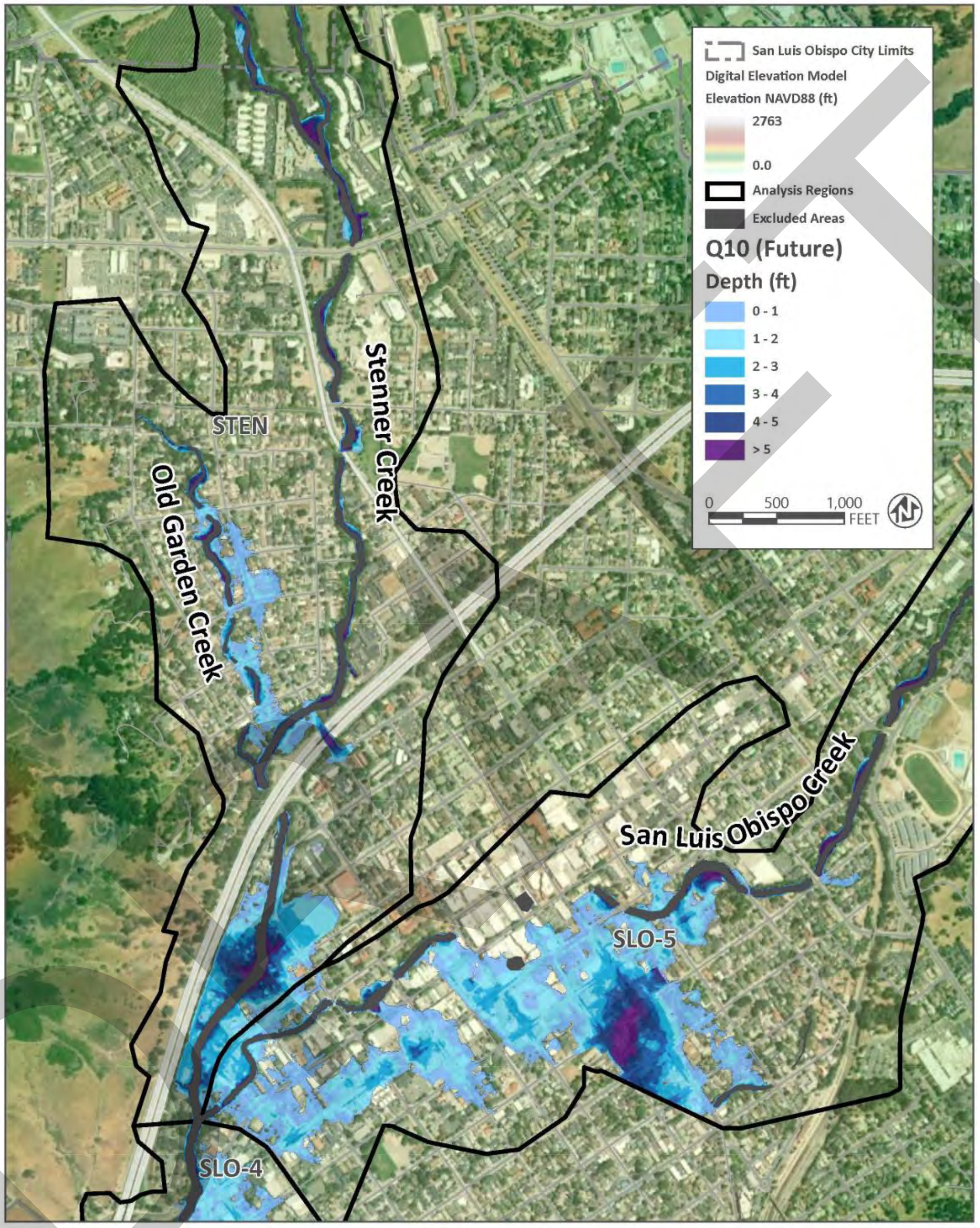
Source: cbec eco engineering 2021

Figure 32 Flood Depth: Full Extent - Q100 (Historic)



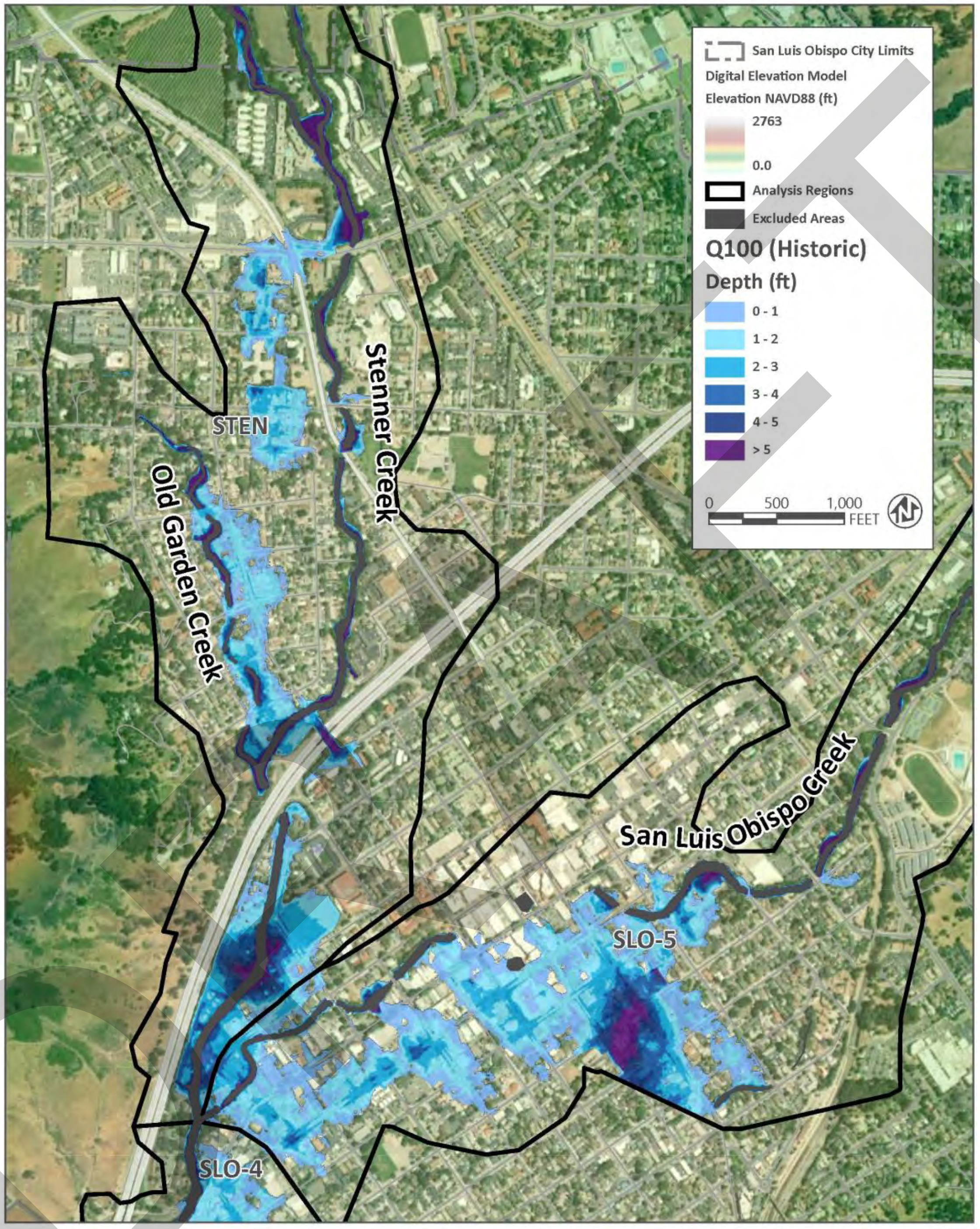
Source: cbec eco engineering 2021

Figure 33 Flood Depth: SLO-Stenner - Q10 (Historic) Flood Depth - Q100 (Historic)



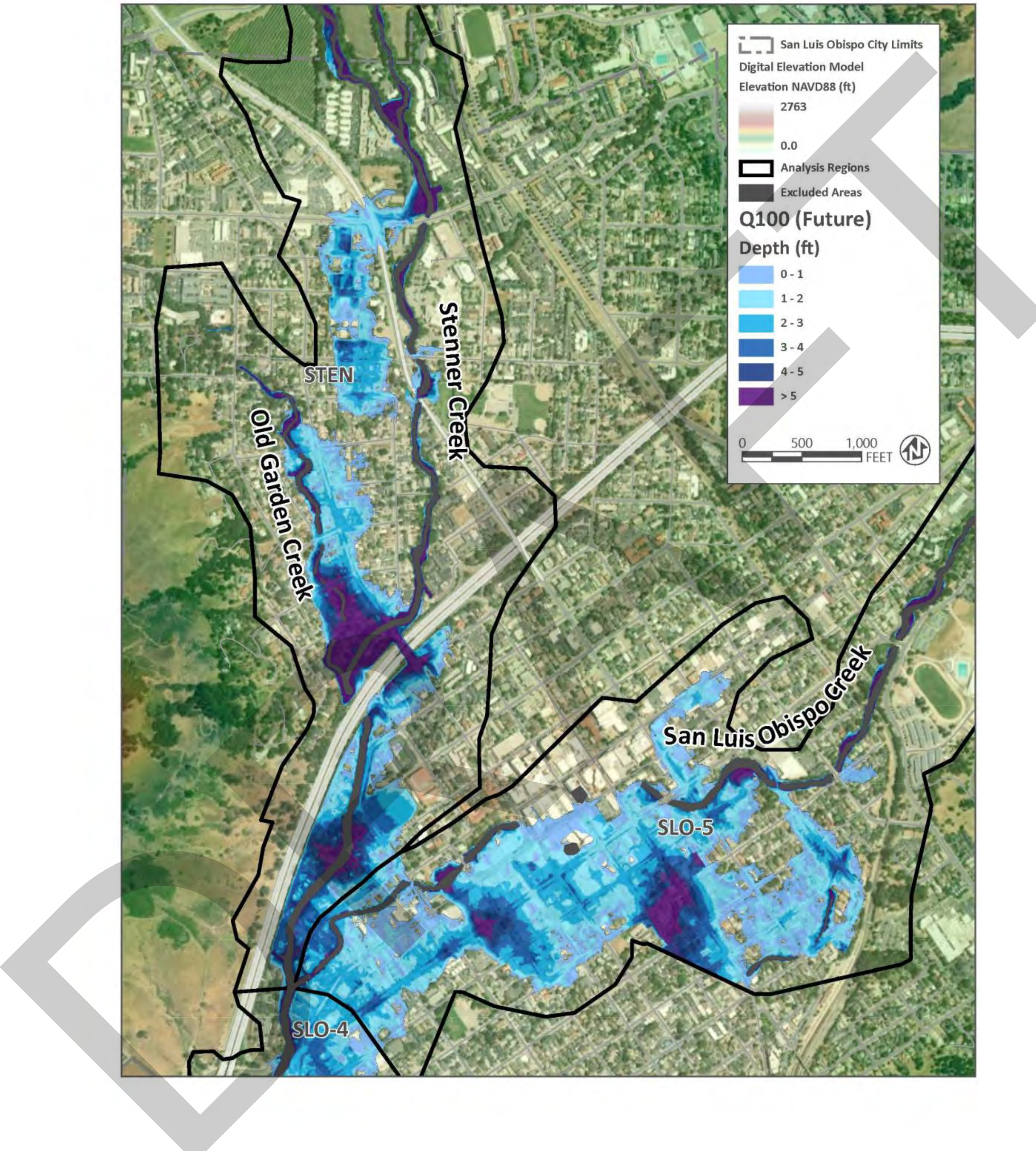
Source: cbec eco engineering 2021

Figure 34 Flood Depth: SLO-Stenner - Q10 (Future 2070-2099 – RCP 8.5)



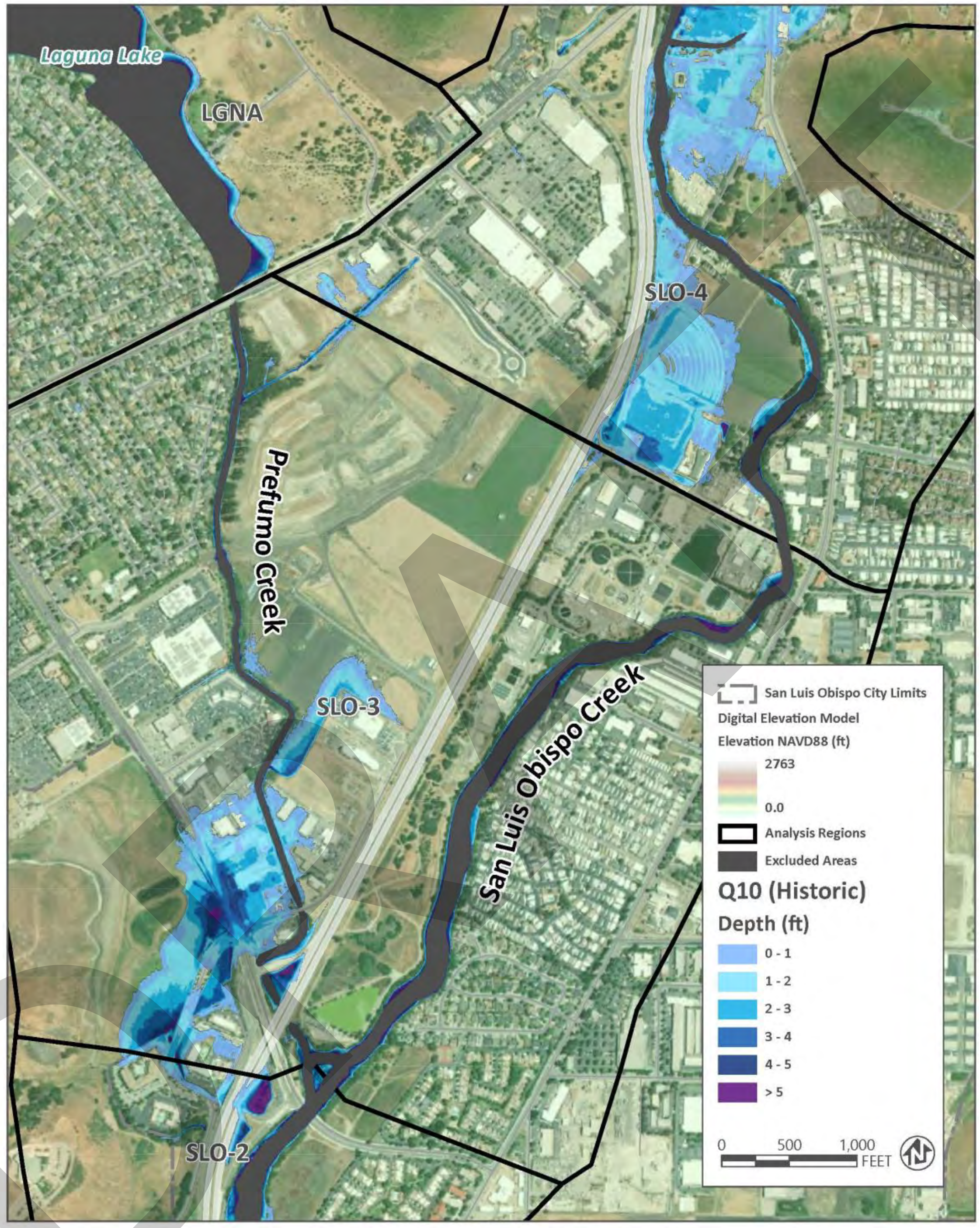
Source: cbec eco-engineering 2021

Figure 35 Flood Depth: SLO-Stenner - Q100 (Historic)



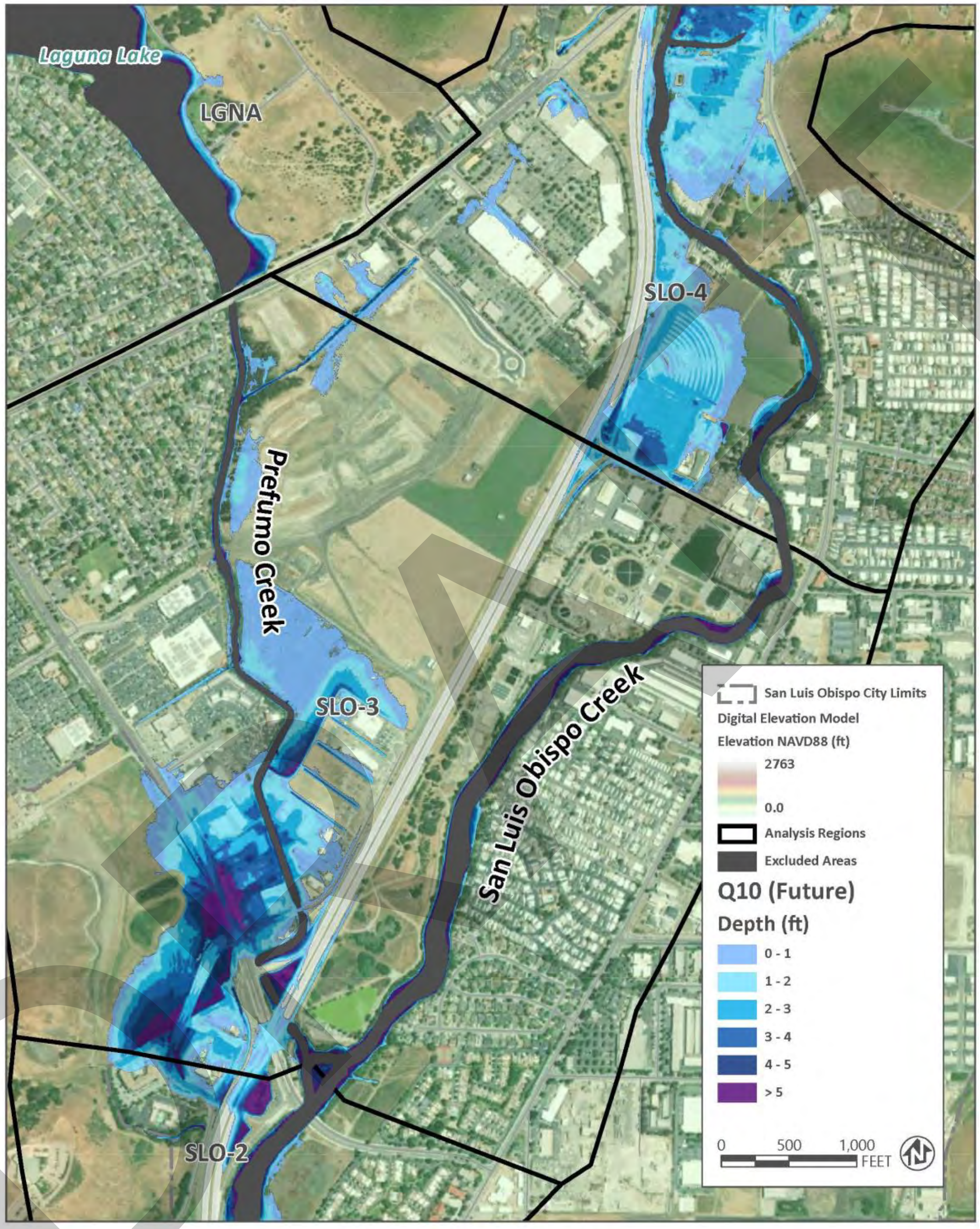
Source: cbec eco-engineering 2021

Figure 36 Flood Depth: SLO-Stenner - Q100 (Future 2070-2099 – RCP 8.5)



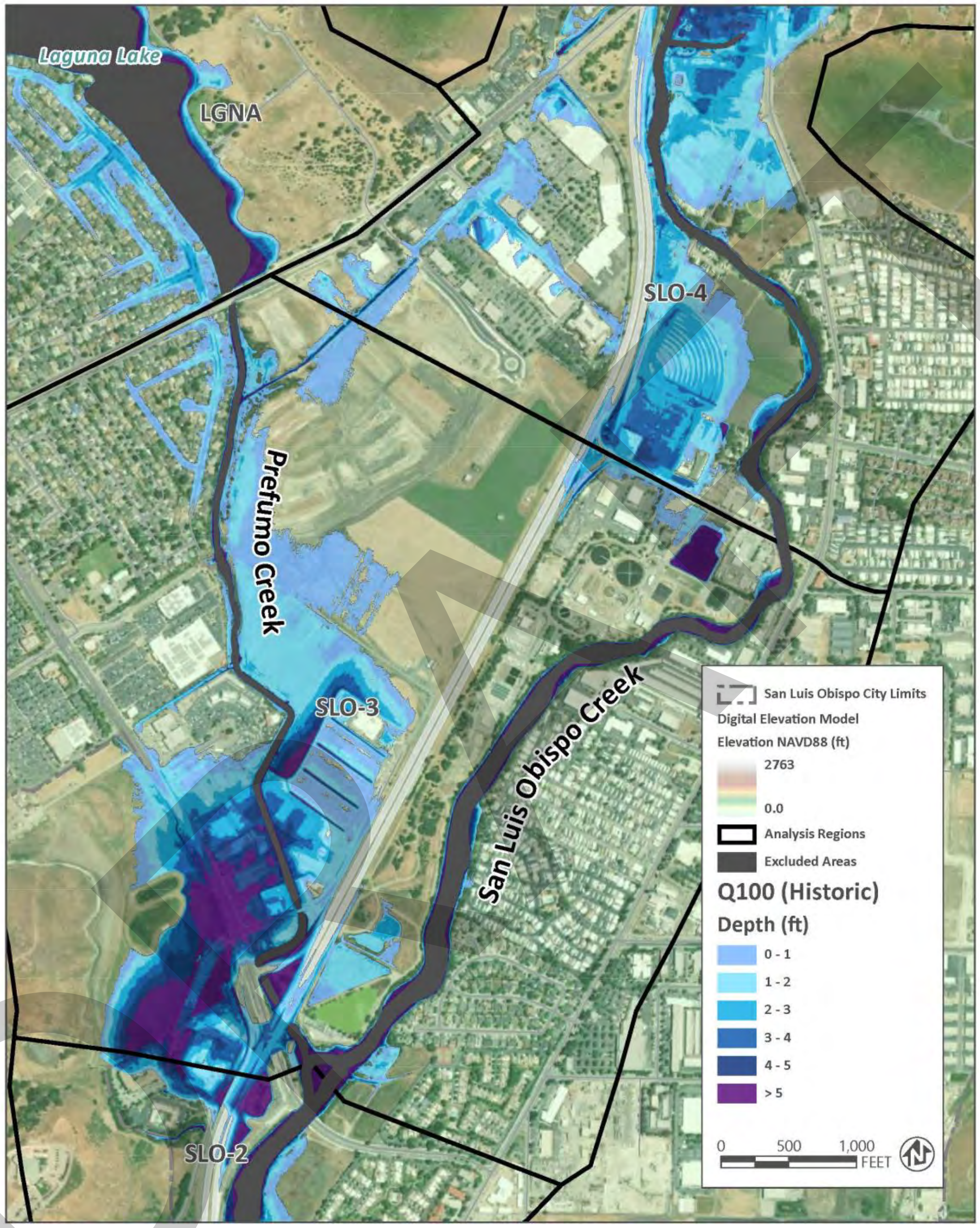
Source: cbec eco-engineering 2021

Figure 37 Flood Depth: SLO-Prefumo - Q10 (Historic)



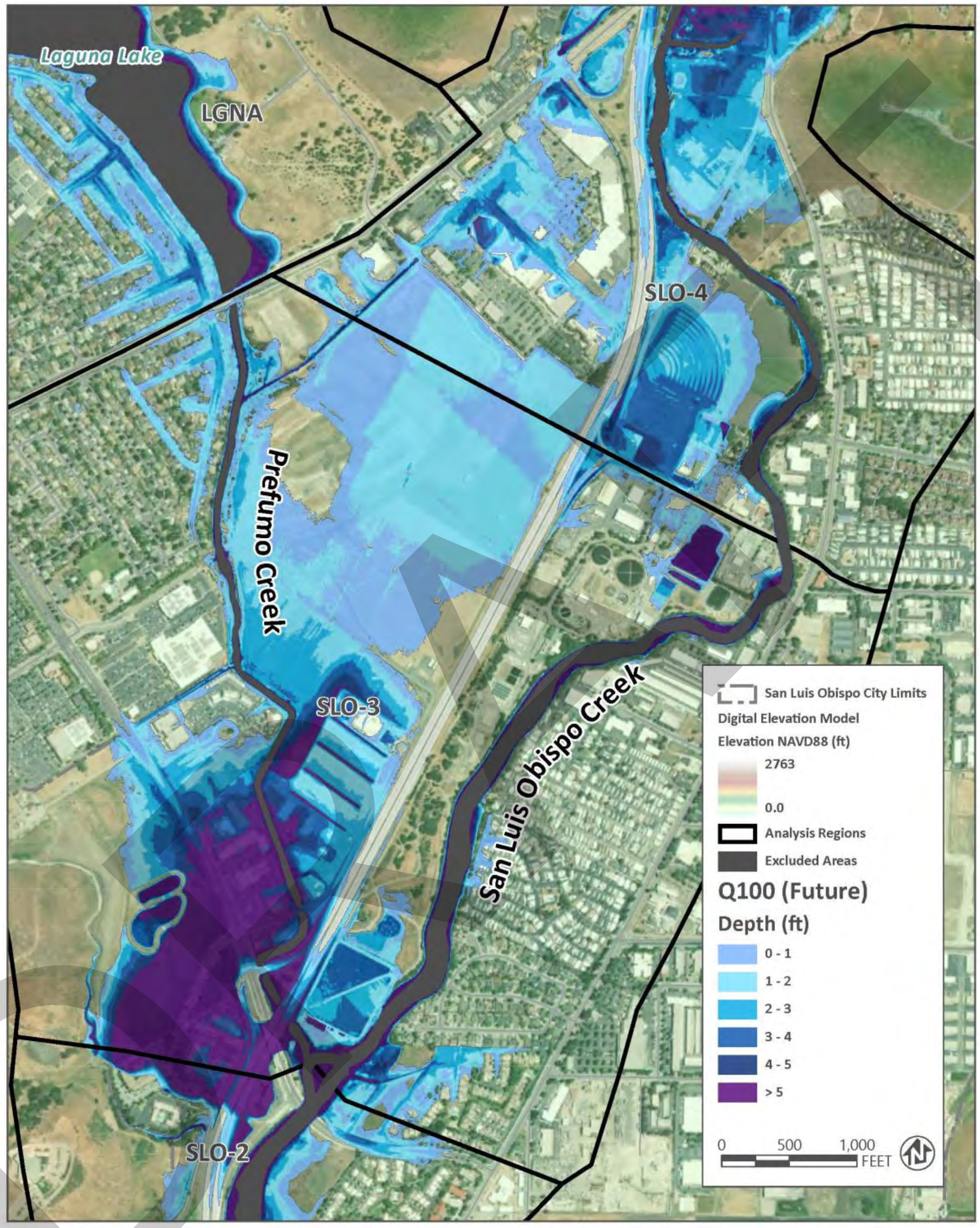
Source: cbec eco-engineering 2021

Figure 38 Flood Depth: SLO-Prefumo - Q10 (Future 2070-2099 – RCP 8.5)



Source: cbec eco-engineering 2021

Figure 39 Flood Depth: SLO-Prefumo - Q100 (Historic)



Source: cbec eco-engineering 2021

Figure 40 Flood Depth: SLO-Prefumo - Q100 (Future 2070-2099 – RCP 8.5)

Table 19 Change in Connected Floodplain Areas for 9 Analysis Regions from Historic to Future (median) Conditions.

Region	Description	Connected floodplain area (acres)											
		Q10			Q50			Q100			Q500		
		Historic	Future	Change	Historic	Future	Change	Historic	Future	Change	Historic	Future	Change
SLO-1	SLO Cr. below East Fork	456.49	483.01	5.8%	501.64	546.1	8.9%	518.52	570	9.9%	639.41	696.2	8.9%
SLO-2	SLO Cr. from Prefumo to East Fork	120.52	130.44	8.2%	135.11	151.6	12.2%	138.97	155.7	12.0%	165.46	179.8	8.7%
SLO-3	SLO Cr. / Prefumo Cr. confluence area	49.91	94.57	89.5%	119.76	240.7	101.0%	151.44	256.4	69.3%	306.49	365.3	19.2%
SLO-4	SLO Cr. from Stenner confluence to Prado Rd.	123.78	153.36	23.9%	163.81	227	38.6%	182.15	238.7	31.0%	271.45	296.3	9.1%
SLO-5	SLO Cr. upstream of Stenner confluence	43.39	91.53	110.9%	93.98	145.1	54.4%	99.79	149.7	50.0%	195.61	218.1	11.5%
STEN	Stenner, Brizziolari, and Old Garden Cr.	43.72	63.4	45.0%	78.73	109.9	39.6%	98.77	129.7	31.3%	152.21	183.8	20.7%
LGNA	Laguna Lake area	203.84	226.38	11.1%	260.8	287.1	10.1%	275.39	304	10.4%	367.98	409.5	11.3%
EFK-1	East Fork from SLO Cr. confluence to Buckley Rd.	105.86	124	17.1%	133.24	145.4	9.1%	143.3	154	7.5%	-	-	-
EFK-2	East Fork and tributaries upstream of Buckley Rd.	50.72	79.22	56.2%	93.19	120.3	29.1%	108.72	129.5	19.1%	-	-	-

Source: cbec eco-engineering 2021

Table 20 Change in Connected Floodplain Depths for 9 Analysis Regions from Historic to Future (median) Conditions.

Region	Description	Average connected floodplain depth (ft)											
		Q10			Q50			Q100			Q500		
		Historic	Future	Change	Historic	Future	Change	Historic	Future	Change	Historic	Future	Change
SLO-1	SLO Cr. below East Fork	4.1	4.8	17.1%	5.3	6.4	20.8%	5.8	6.8	17.2%	8.3	9.8	18.1%
SLO-2	SLO Cr. from Prefumo to East Fork	2.6	3.3	26.9%	3.8	4.8	26.3%	4.1	5.1	24.4%	6.1	7.6	24.6%
SLO-3	SLO Cr. / Prefumo Cr. confluence area	2	2.2	10.0%	2.3	2.5	8.7%	2.4	2.7	12.5%	3.6	4.9	36.1%
SLO-4	SLO Cr. from Stenner confluence to Prado Rd.	1.4	1.7	21.4%	1.8	2.1	16.7%	1.9	2.2	15.8%	2.8	3.4	21.4%
SLO-5	SLO Cr. upstream of Stenner confluence	1.7	2.1	23.5%	2.1	2.5	19.0%	2.2	2.6	18.2%	3.4	4.2	23.5%
STEN	Stenner, Brizziolari, and Old Garden Cr.	2	2.2	10.0%	2.3	2.7	17.4%	2.4	3	25.0%	3.5	4.3	22.9%
LGNA	Laguna Lake area	4.6	5	8.7%	5.1	5.4	5.9%	5.3	5.5	3.8%	6.1	6.4	4.9%
EFK-1	East Fork from SLO Cr. confluence to Buckley Rd.	4	4.1	2.5%	4.3	4.7	9.3%	4.6	4.8	4.3%	-	-	-
EFK-2	East Fork and tributaries upstream of Buckley Rd.	2.4	2.3	-4.2%	2.3	2.3	0.0%	2.3	2.4	4.3%	-	-	-

Source: cbec eco-engineering 2021

Key Findings and Policy Considerations

- Although annual precipitation is anticipated to increase in the City and the larger central coast region, California's climate oscillates between extremely dry and extremely wet periods with annual precipitation varying widely from year to year. These oscillations between extremely dry and extremely wet periods are anticipated to become more severe with rapid shifts from dry to wet periods known as "whiplash events" (Swain et al. 2016). These types of events are estimated to increase by approximately 100 percent in southern California, with increases in frequency occurring largely after 2050 (Swain et al. 2016).
- Based on California's location next to the Pacific Ocean, the state is exposed to the atmospheric river (AR) phenomenon, a narrow corridor of concentrated moisture in the atmosphere. The presence of the AR contributes to the frequency of "wet years" in the state, when there is an above-average number of AR storms and above-average annual precipitation. While research indicates that the frequency of large storms events does increase in these wet years, the most severe flooding from ARs may not be in wet years (Swain et al. 2018). The largest flooding impacts are caused by persistent storm sequences on sub-seasonal timescales (i.e., short time periods, typically 2 weeks to 3 months), which bring a significant fraction of annual average precipitation over a brief period. Based on current climate modeling, the frequency of these large storm sequences over short timeframes is projected to increase noticeably under a future high emissions scenario. It is estimated that a storm similar in magnitude to the Great Flood events is more likely than not to occur at least once between 2018 and 2060 (Swain et al. 2018).
- For very large precipitation events, the capacity of the watershed to absorb incoming rainfall can be quickly exceeded, causing large increases in stream flow within the system. By as early as 2070 under a high future emissions scenario, peak flow rates in the San Luis Obispo Creek watershed are projected to increase, on average, from 17 percent to 38 percent depending on the size of the storm event. By this period, for the storm event with a 50 percent chance of occurring in any given year (2-year storm event), the median peak stream flow is projected to increase by 28 percent with a small likelihood (90th percentile) of stream flow increasing by 51 percent.
- By as early as 2070 under a high future emissions scenario, for the 100-year event, dramatic increases are observed on Stenner and Old Garden Creeks upstream of the San Luis Obispo Creek confluence and within the downtown area. In both cases, flooding is exacerbated by the capacity of the existing infrastructure to manage historic flooding events. Similar, during the 100-year event, increases in flow within San Luis Obispo Creek increasingly cause flood waters to break out of the channel upstream of the culvert and flow along the Higuera and Marsh Street corridor towards the Stenner Creek confluence

FLOODING AND THE BUILT ENVIRONMENT

Key Flood Impact Areas

Areas with the greatest increases in connected floodplain inundation for the 10-year through 100-year events included SLO Creek upstream of the Stenner confluence (SLO-5, including parts of downtown SLO), the SLO Creek – Prefumo Creek confluence area (SLO-3, including SLO Creek from Prado Road to the Prefumo Creek confluence and Prefumo Creek below Madonna Road), East Fork and its tributaries upstream of Buckley Road (EFK-2), and Stenner, Brizziolari, and Old Garden Creeks (STEN). In the modeling, these areas tended to have greater expanses of floodplain areas, such as the SLO Creek – Prefumo Creek confluence area, or limiting infrastructure, as is the case with the undercity culvert through downtown. Areas that were more confined by topography, such as SLO Creek below East Fork (SLO-1), experienced smaller increases in area, as shown in Table 19. Average connected floodplain depth, on the other hand, can be slightly more difficult to assess because it was calculated as the average of wet areas with greater than 0.1 ft of depth. Therefore, the average depth can decrease even if the inundated area increases with large areas of shallow depth flooding in a future scenario that are currently inundated under existing flood conditions. Percent increases in depth for the region containing parts of downtown were on the order of 18 to 23.5 percent across the range of flood events, with an increase in average floodplain depth for the 100-yr event of 0.4 ft increasing to 2.2 to 2.6 ft, as shown in Table 20.

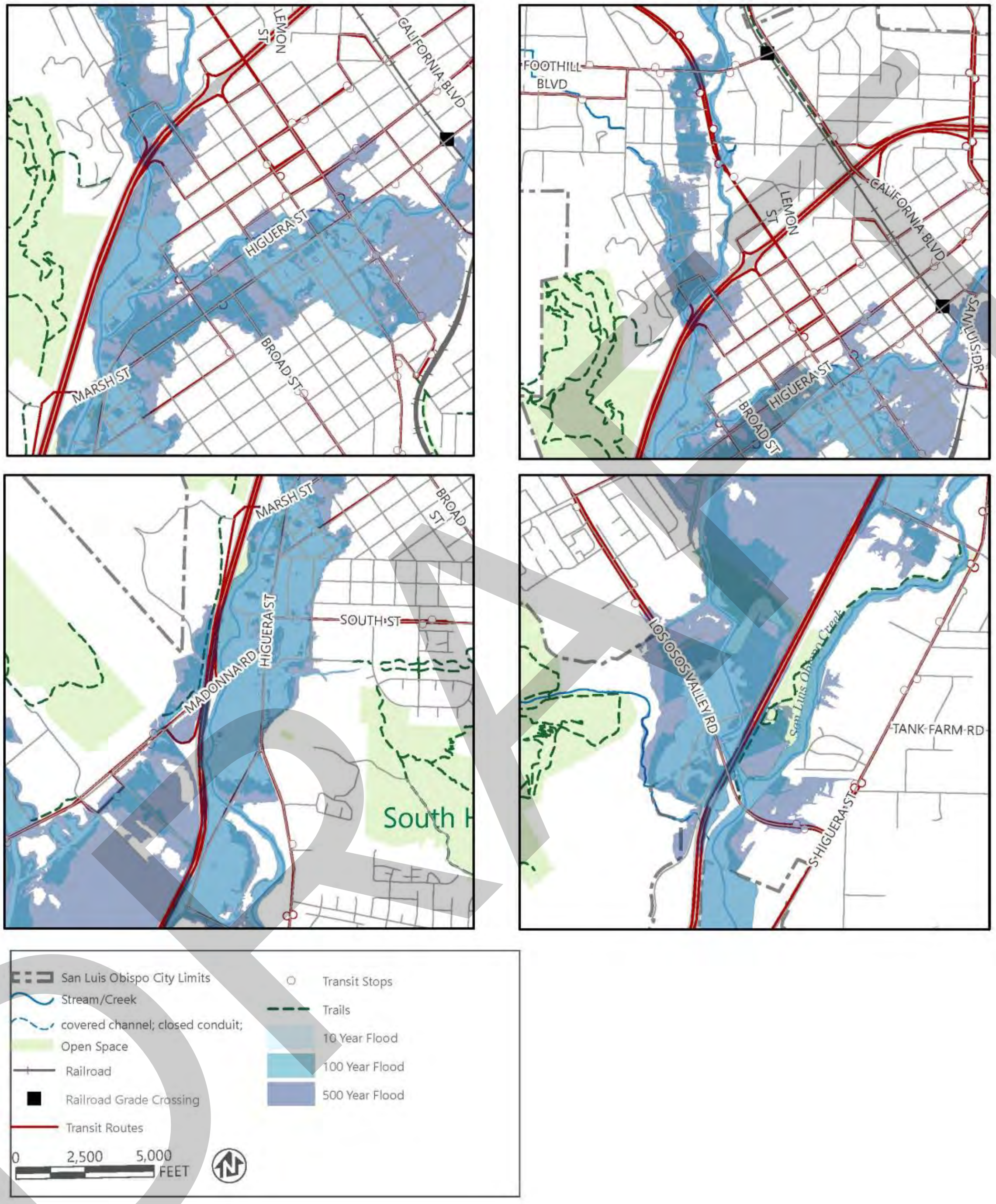
Figures 32 through Figure 36 show inundation depth for the 10-year and 100-year events for the San Luis Obispo Creek – Stenner Creek confluence area, including a portion of downtown. For the 10-year event, increases in flooding along Old Garden Creek are apparent, along with portions of downtown and at the confluence of the two creeks (Figures 32 and 33). Some of the flooding within the downtown area from the 10-year event may be due to the model generally over-predicting flood levels (Questa Engineering Corporation 2003). For the 100-year event, dramatic increases are observed on Stenner and Old Garden Creeks upstream of the San Luis Obispo Creek confluence and within the downtown area. In both cases, flooding is exacerbated by the capacity of the existing infrastructure to manage historic flooding events. For Stenner Creek, the water level passing underneath Highway 101 reaches up to the bottom of the bridge and begins to exceed the flow capacity of the structure. Similarly, the undercity culvert within downtown has a capacity of about a 15-year event under historic conditions (Questa Engineering Corporation 2003). For larger events, such as the 100-year, increases in flow within San Luis Obispo Creek increasingly cause flood waters to break out of the channel upstream of the culvert and flow along the Higuera and Marsh Street corridor towards the Stenner Creek confluence, as shown in Figures 35 and 36.

Figures 37 through 39 show similar results for the San Luis Obispo – Prefumo Creek confluence area. Within these regions of the City, large expanses of relatively flat, low-lying land persist between and along the two creeks. Flood waters can spill into these areas by crossing Highway 101 near Madonna Road from San Luis Obispo Creek or by escaping the creek channels in the confluence area and causing backwater conditions for upstream reaches. The City undertakes regular maintenance activities within Prefumo Creek from Laguna Lake to Los Osos Valley Road to manage flood risk in this area. The southern end of the Los Osos Valley Road area north of Highway 101 is particularly vulnerable. For the 100-year event, large areas of agricultural land between Prefumo and San Luis Obispo Creeks may become inundated under future conditions, as shown in Figures 39 and 40.

Ultimately, changes in flood risk need to be understood using multiple metrics. The flood maps and summary tables of changes in inundated area and average depth are important for understanding how different levels of risk are present within different areas of the City. These varying levels of risk may be due to the topography of the landscape and channels, but they may also be affected by infrastructure. In either case, changes in flood risk do not necessarily vary in the same way as changes in stream flow, which in turn may not directly mirror changes in precipitation, reinforcing the importance of conducting hydrologic and hydraulic modeling. For the 100-year event, there was a 38 percent increase in stream flow for the median future scenario compared to historical conditions, as show in Table 19. However, this does not necessarily translate to flooding being 38 percent worse. The reach of San Luis Obispo Creek upstream of the Stenner Creek confluence and the San Luis Obispo – Prefumo Creek confluence areas experienced increases in inundated floodplain acreage of 50 and 69.3 percent, respectively, as shown in Table 19, while average floodplain depths increased from 2.2-2.4 ft to 2.6-2.7 ft, as shown in Table 20. Further, it is helpful to think about flood risk statistically. As shown in Table 19, the future 50-year event has similar levels of inundation to the historic 100-year event. This means that with a 37 percent increase in flow (from the historic 50-year event, Table 19), the level of inundation from an event that used to occur about once every 100-years would be experienced twice as frequently.

IMPACT ANALYSIS OF THE TRANSPORTATION SYSTEM

Using the climate-informed flood analysis discusses above, a high-level impact analysis on the City's transportation system was conducted, focusing on the facilities identified through community feedback including impacts to the transit network, the City's open space trails network, and the viability of the City's roadway network and evacuation routes during emergency evacuation scenarios related to flooding. The analysis was conducted using the 10-year, 100-year, and 500-year flood mapping layers, assessing how these flood events would affect the City's transportation system. Figure 41 overlays the flood zones on the transportation network and is discussed below.



Source: Fehr and Peers 2021

Figure 41 City Transportation Assets Impacted by Flooding

Roadways

The City's roadway network is identified as local streets, arterials, freeway, and bicycle and pedestrian facilities, providing circulation within the City as well as roadway network connections to the other areas in the County. The extent of roadway network impacts on the City is dependent on the varying size of the storm events analyzed. Figure 41 illustrates those potential impacts adjacent to San Luis Obispo Creek along US 101, specifically at the Madonna Road interchange and the Los Osos Valley Road interchange during the 10-year,100-year, 500-year storm events. The greatest area of impact to local roads during these events would be areas just south of San Luis Obispo Creek through the downtown area with the farthest extent along Santa Barbara Street as far South as Leff Street occurring during the 100-year storm event. Moving away from the downtown area, flooding occurs to the east of the SLO Creek between US 101 and Higuera Street between the US 101 and Broad Street interchange and the US 101 and Madonna Road interchange. During the 100-year and 500-year storm events, flooding would likely occur along US 101 in the northbound lanes at the Prado Road on and off ramp. Flooding would also occur along Prado Road near San Luis Obispo Creek. The flood modeling analysis also identifies the Chorro Street undercrossing at US 101 would be impacted by the 10-year, 100-year, and 500-year floods. These same flood zones would also result in potential impacts between Foothill Boulevard and US 101 between Broad Street and State Route 1.

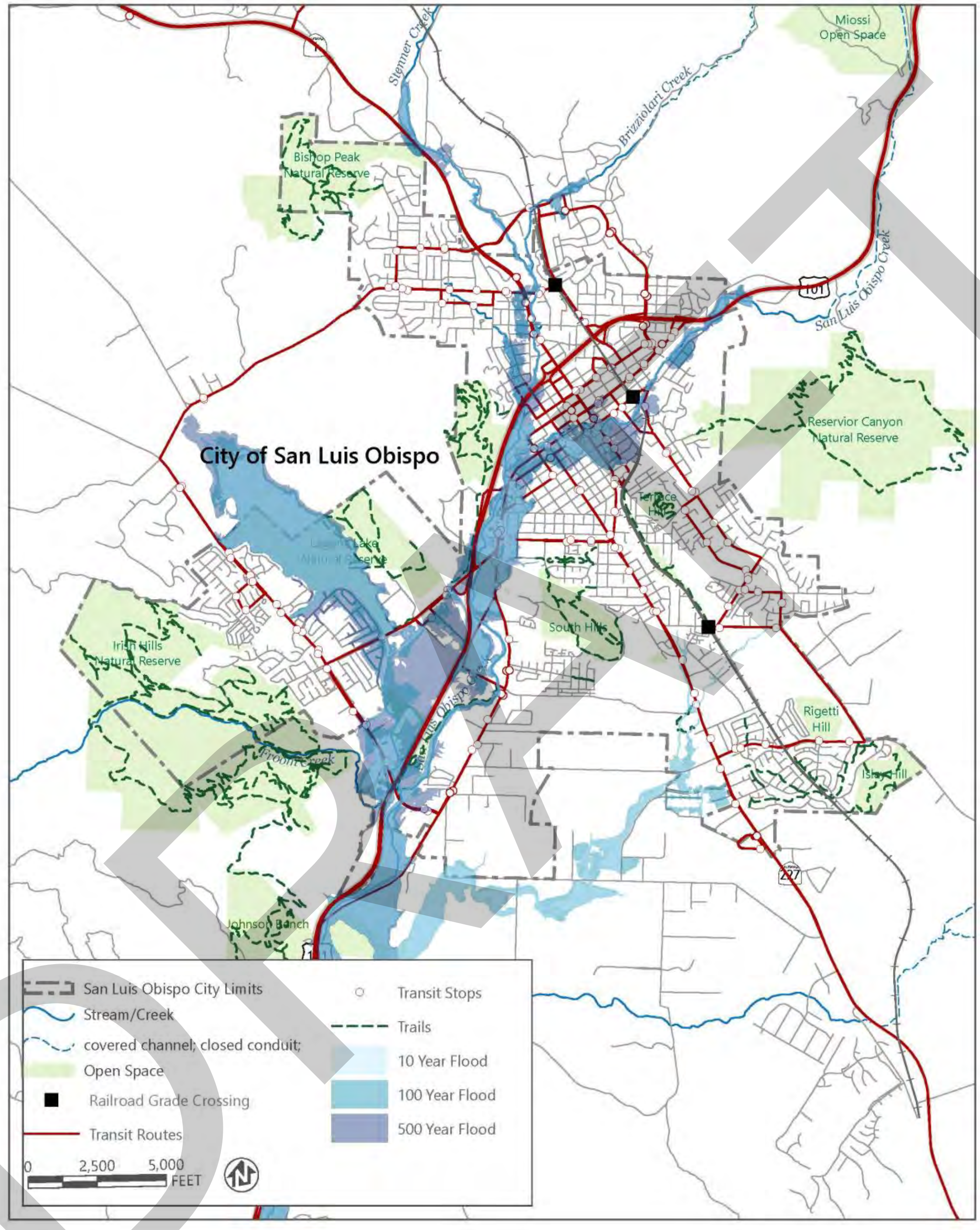
Transit

Alongside the roadway network, future flood impacts would also affect transit operations and assets. Extensive flooding has the potential to limit transit service, thus eliminating transport options for populations in the City dependent on transit. Table 21 illustrates the number of impacted transit stops and percent of stops in the total network that would be affected, categorized by each size storm event and transit provider. The rail network in the City would not be affected during the potential flood events. The exact location of the transit stops impacted by the 10-year, 100-year, and 500-year storm events are visualized in Figure 42.

Table 21 Transit Stops Impacted by Storm Event

Transit Agency	Total Number of Stops	10-year	100-year	500-year
SLO Transit	161	7 - 11 %	16 - 26 %	35 - 57%
San Luis Obispo Regional Transit Authority (RTA)	26	2- 8%	3 - 12%	6 – 23%

Source: Fehr and Peers 2021



Source: Fehr and Peers 2021

Figure 42 Transit Assets Impacted by Flooding

Recreation Trails and Existing Bicycle Transportation

Flood related impacts on the City's bicycle and recreational trails network were similar to impacts on the roadway network. Bicycle infrastructure through the downtown area south of the San Luis Obispo creek are likely to be affected by future flood impacts. As shown in Figure 42, the following recreational trail are also likely to be impacted by flooding.

- Bob Jones Trail
- Johnson Ranch
- Madonna Inn Bike Trail
- Laguna Lake Upper Loop Trail

The areas of highest concern are located in the downtown area South of the San Luis Obispo Creek, the Chorro Street undercrossing, and around the Los Osos Valley Road interchange at US 101. It is important to define transit options for the limited number of stops impacted by flooding during flood events. If applicable, mitigation and engineering can remedy the flooding sources, transit would likely be unimpacted. Alternatively, the use of bicycle transit to transport populations without adequate mobility resources should be considered for evacuation plans.

Key Findings and Policy Considerations

- From the results of the climate-informed flood modeling, areas with the greatest increases in connected floodplain inundation for the 10-year through 100-year events included SLO Creek upstream of the Stenner confluence (including parts of downtown SLO), the SLO Creek – Prefumo Creek confluence area, East Fork and its tributaries upstream of Buckley Road, and Stenner, Brizziolari, and Old Garden Creeks. In the modeling, these areas tended to have greater expanses of floodplain areas, such as the SLO Creek – Prefumo Creek confluence area, or limiting infrastructure, as is the case with the undercity culvert through downtown.
- By as early as 2070 under a high future emissions scenario, for the 100-year event, dramatic increases are observed on Stenner and Old Garden Creeks upstream of the San Luis Obispo Creek confluence and within the downtown area. In both cases, flooding is exacerbated by the capacity of the existing infrastructure to manage historic flooding events. Similar, during the 100-year event, increases in flow within San Luis Obispo Creek increasingly cause flood waters to break out of the channel upstream of the culvert and flow along the Higuera and Marsh Street corridor towards the Stenner Creek confluence.
- Near the San Luis Obispo – Prefumo Creek confluence area near Higuera Street and Madonna Road, large expanses of relatively flat, low-lying land persist between and along the two creeks. During larger storm events (50-year and 100-year storms), flood waters can spill into these areas by crossing Highway 101 near Madonna Road from San Luis Obispo Creek or by escaping the creek channels in the confluence area and causing backwater conditions for upstream reaches.
- The greatest area of impact to local roads during large storm events (100-year storm) would be areas just south of San Luis Obispo Creek through the downtown area with the farthest extent along Santa Barbara Street as far South as Leff Street. The Chorro Street undercrossing at US 101 would be impacted by the 10-year, 100-year, and 500-year floods.
- Extensive flooding from larger storm events also has the potential to limit transit service, thus eliminating transport options for populations in the City dependent on transit, with between 16 to 26 percent of SLO Transit stops being affected depending on the storm size.

FLOODING AND COMMUNITY RESILIENCE

Evacuation Routes and Emergency Communications

As part of this analysis, an assessment of the underlying hazards and appropriate access to gateways (e.g., major ingress and egress points in and out of the City) and evacuation centers has been completed to facilitate the development of reliable accurate communication for emergency needs and evacuations. With the projected increases in the frequency and severity wildfire events, and large storm events expected to occur due to climate change, new methods of administering evacuation information have been evolving. Iterative development and updating of the emergency preparedness plan are critical and should identify a communication plan for residents and visitors on how to evacuate in case of an emergency. To support the communication components of evacuation planning, a detailed analysis of access to City gateways and evacuation centers is provided below to assist in identifying areas where infrastructure improvements would benefit future evacuation planning.

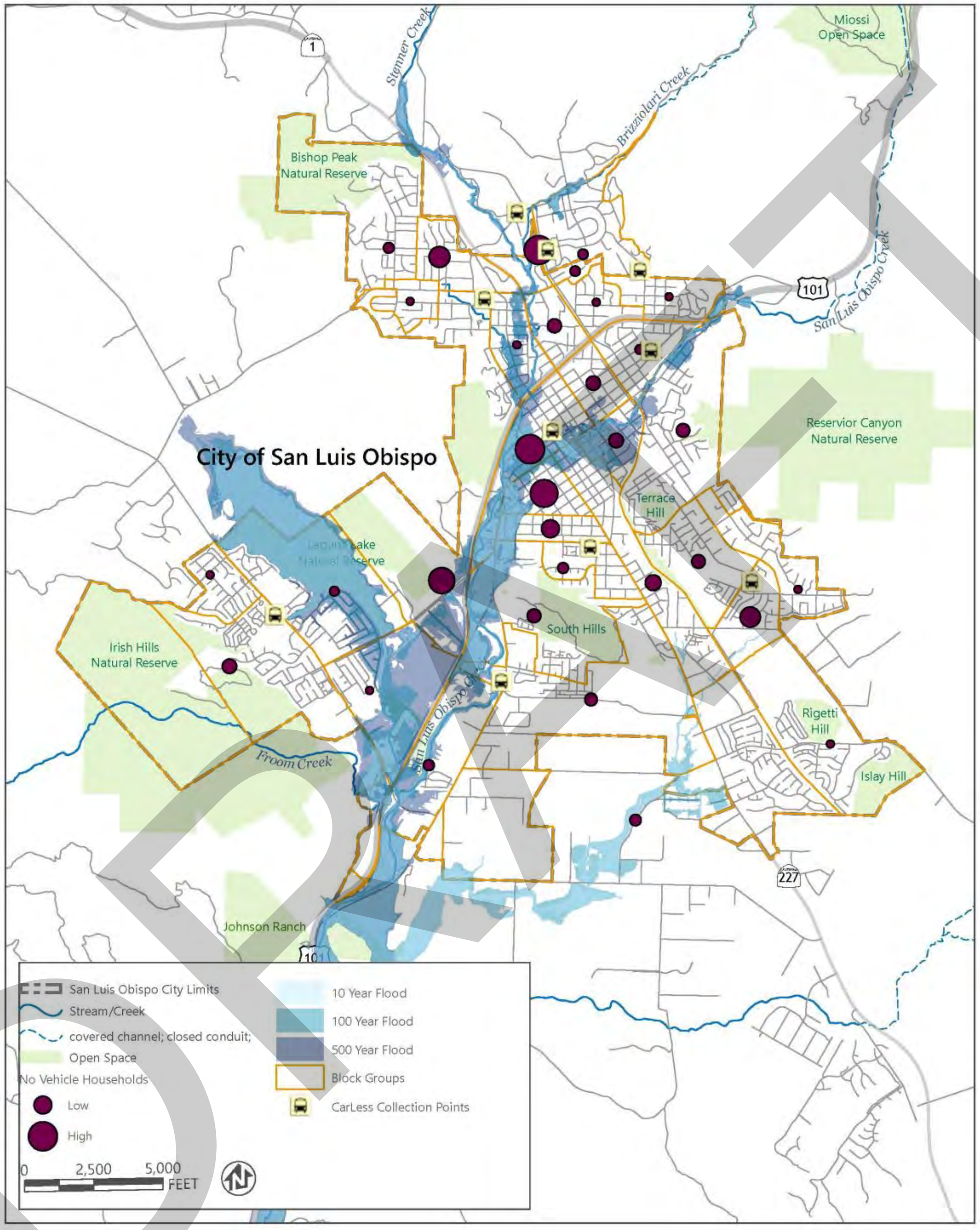
Flood Impacts and Low-Vehicle Access

Using the US Census block group data, Figure 43 illustrates census blocks in the City with the percentage of occupied housing units without access to a vehicle. According to the Census data, in the City, approximately 8 percent of occupied housing units do not have access to at least one vehicle. However, the range for all the block groups within the City is 0 to 21.4 percent. Certain block groups have higher numbers of households without vehicles available, therefore specific consideration for services to access evacuation centers or assistance of these populations to leave the City during an emergency should be prepared. The City's Car Less Collection Points layer is included and shows some correspondence to the census block groups with a higher portion of households without vehicles. These populations tend to primarily be located adjacent to US 101 and the San Luis Obispo Creek.

Gateway and Evacuation Center Access Assessment

This section includes a scenario level review of residential access to City gateways and evacuation centers from the centroids of census block groups for the City. This assessment is based on an evolving methodology created for evacuation studies consistent with Assembly Bill (AB) 747 and SB 99, which requires an assessment of residential evacuation routes during the City's next Safety Element update. The analysis included here is not a comprehensive assessment of the City's evacuation routes but provides supporting resources for an evacuation study consistent with AB 747 and SB 99.

This document is intended to provide an assessment of roadway access under the described flood scenarios but should not be considered a full evacuation plan. Additionally, flooding patterns are, to a certain degree, unpredictable as is individual behavior related to evacuation events. As such, this assessment is intended to provide the City with a broad "planning level" assessment of the access of the transportation system during flood events; it does not provide guarantees as to the adequacy of the transportation system nor can it guarantee that the findings are applicable to any or all situations.



Source: Fehr and Peers 2021

Figure 43 Census Block Groups with No Vehicles per occupied housing unit

Evacuation Route Analysis Methodology

This analysis was developed in ArcGIS using network analyst as a variation on an evacuation scenario tool including the centroid of census block groups, and the flood zone layers provided by the City. The analysis calculates the closest route by distance from the centroid of a block group to the gateway outside of the City or the evacuation center nearest the centroids. As it relates to this study, gateways are defined as major arterials and highways located at the City limit. The gateways used in this analysis include the following roads, US 101 Northbound and Southbound at the respective City limits, State Route (SR) 227 or Broad Street, Orcutt Road, South Higuera Street, SR 1, and Los Osos Valley Road. The gateways matched the evacuation routes the City designated and communicates through the fire evacuation plan (City of San Luis Obispo n.d.).

Census block groups are statistical divisions of census tracts, are generally defined to contain between 600 and 3,000 people. In this analysis, the centroids of these block groups were calculated and joined with specific demographic data, citing whether vehicles were available for occupied housing units. This was done to visualize an even distribution of population and access throughout the City. When required the centroid locations were adjusted to reflect street network connectivity. The block group centroids were used to begin the travel analysis to both City gateways and evacuation centers. Flood zone for the analysis is defined by FEMA as the area that will be inundated by the 100-year flood event and 500-year flood event as discussed previously on section 2.5.1. CBEC generated the 10-, 100-, and 500-year flood waters data used in our transportation models.

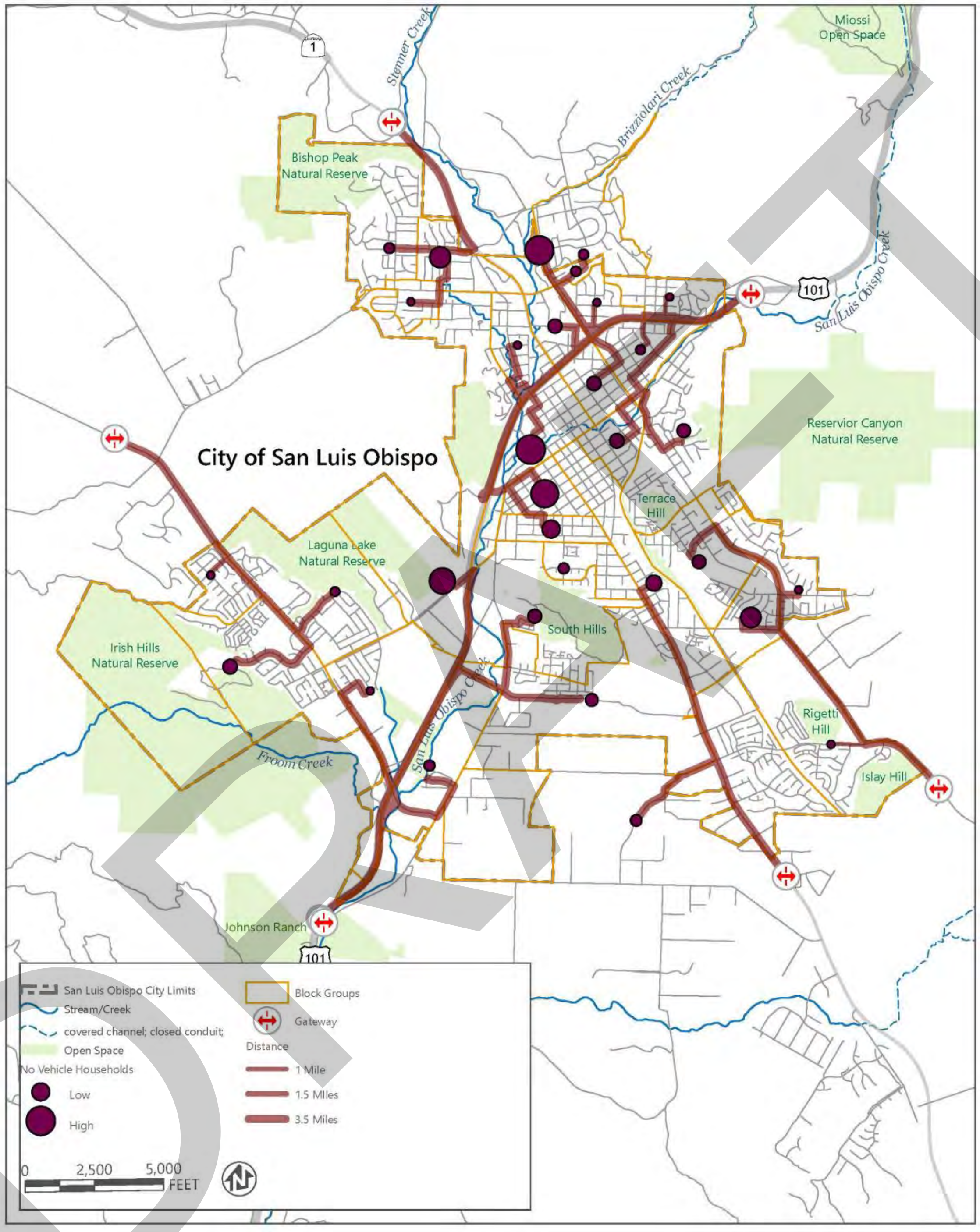
Evacuation Route Analysis Results

For this analysis, access to the City's gateways and evacuations centers were assessed without any flooding as a baseline condition. Access to these locations was then analyzed for the 10-year, 100-year, 500-year flood events to identify transportation route and asset vulnerabilities under each of these events. The following figures represent a visual representation of the analysis for the defined year flood events discussed above.

As shown in Figures 44 through 49, access from census block group centroids to City gateways for the 10-year, 100-year, and 500-year flood events are relatively similar as the locations of flooding occur in generally the same location under various storm events. As shown, under each flood event some routes within the City's street network are compromised, in which case, an alternative route is created to analyze route diversions as a result of flood impacts. In many cases, this may result in a longer distance to be travelled to access the gateway or evacuation center under different flood scenarios.

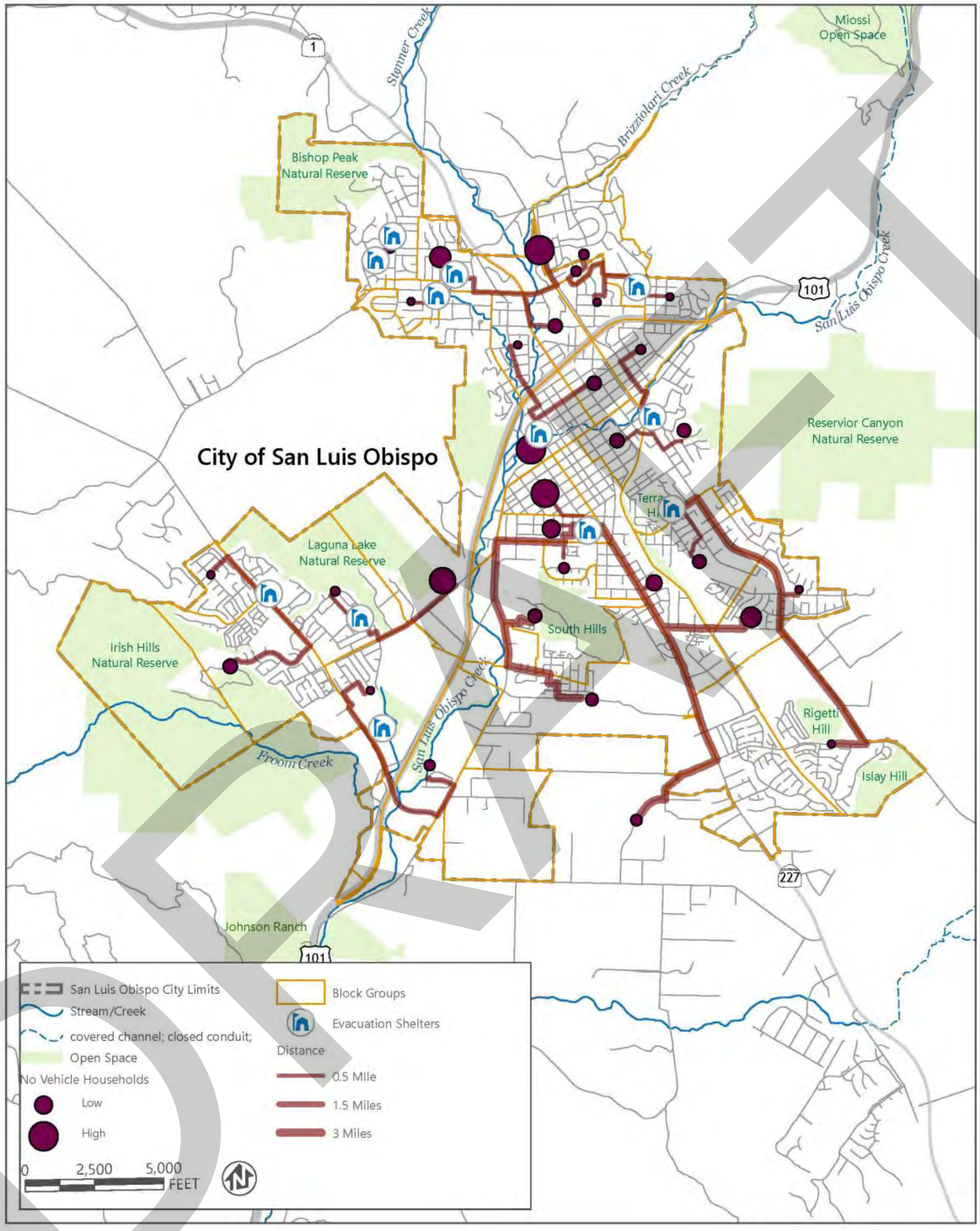
For all flooding events (i.e., 100-year and 500-year flood events), access to the Southern Gateway of US 101 is compromised due to potential flooding of US 101 and Los Osos Valley Road. However, all centroids under these scenarios are able to access at least one alternative City gateway, which means no portions of the City would be closed off due to roadway network flooding. The 100-year flood scenario shows impacted access to many neighborhoods throughout the City, resulting in one Block Group centroid being cut off to both a gateway and evacuation center. This is in the area North of US 101 and West of SR 1.

The 500-year flood scenario shows an inability of four census block group centroids to access either the City gateways or evacuation centers as they experience extensive flooding, isolating their ability to connect to a route. These centroids are located within the 500-year flood layer, thus preventing a routed network to be completed. The depth of the flooding is available however further analysis identifying the height of the infrastructure would be required to understand the extent of actual access from neighborhoods to gateways and evacuation centers.



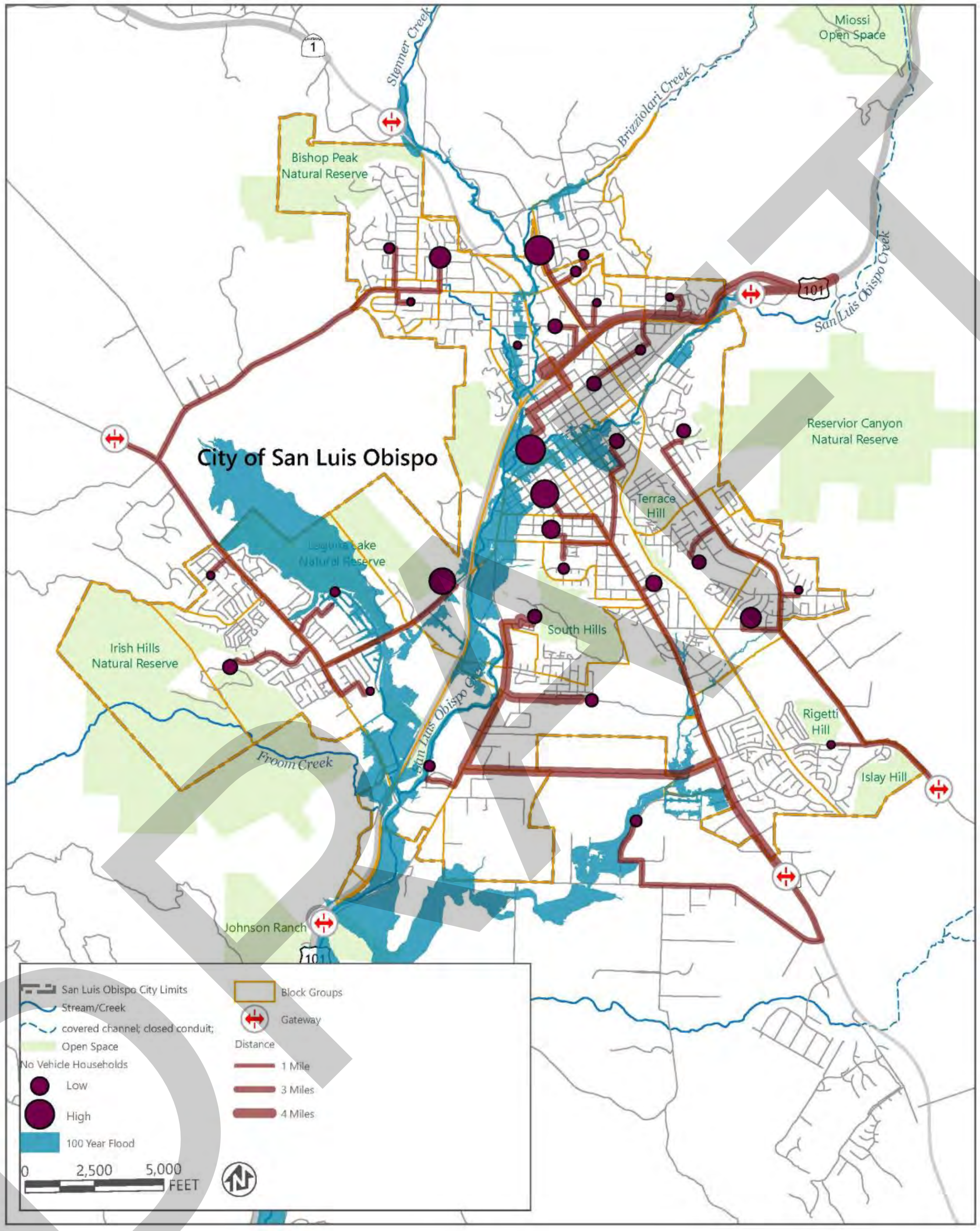
Source: Fehr and Peers 2021

Figure 44 Access from Census Block Group Centroid to City Gateways



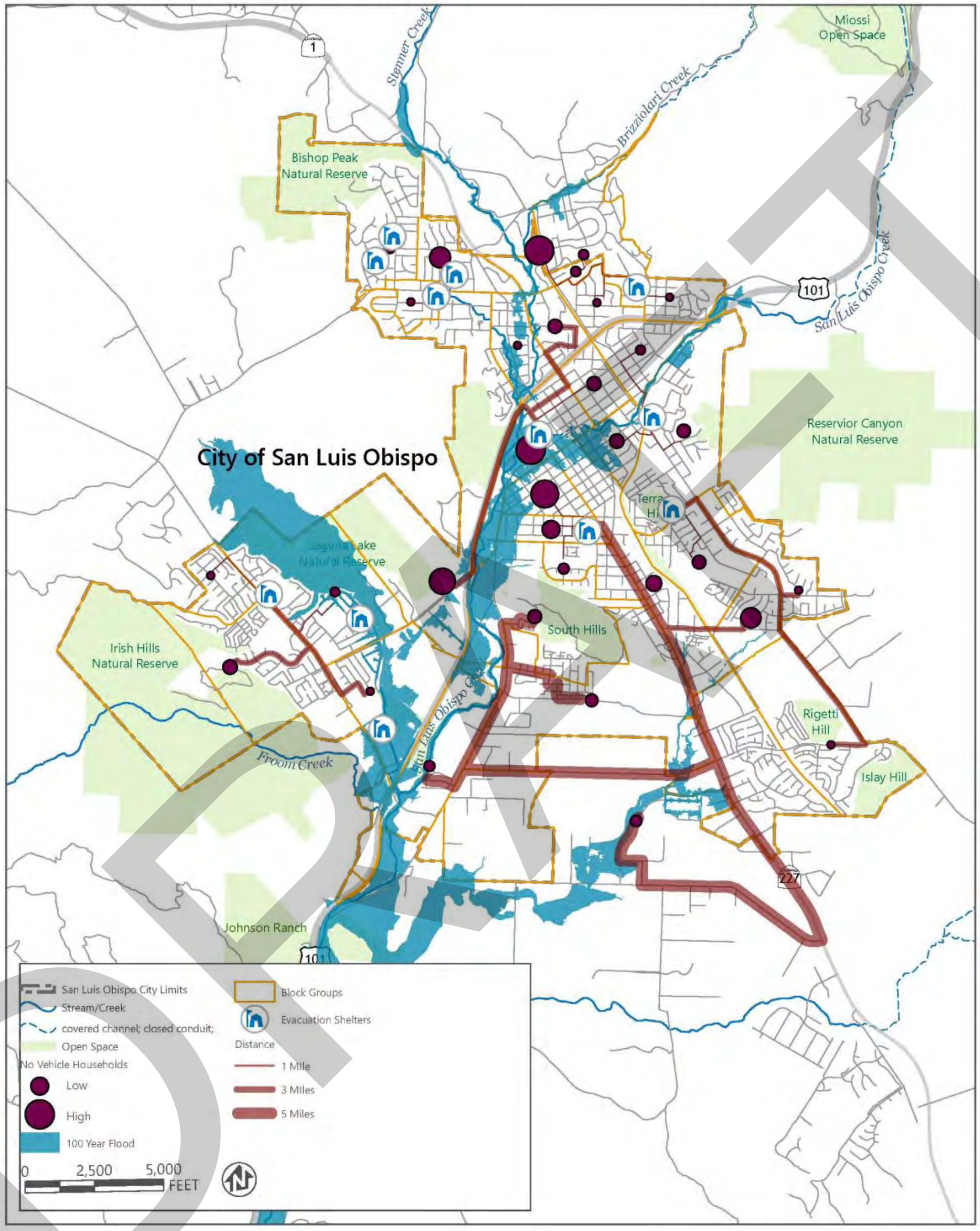
Source: Fehr and Peers 2021

Figure 45 Access from Census Block Group Centroid to City Evacuation Centers



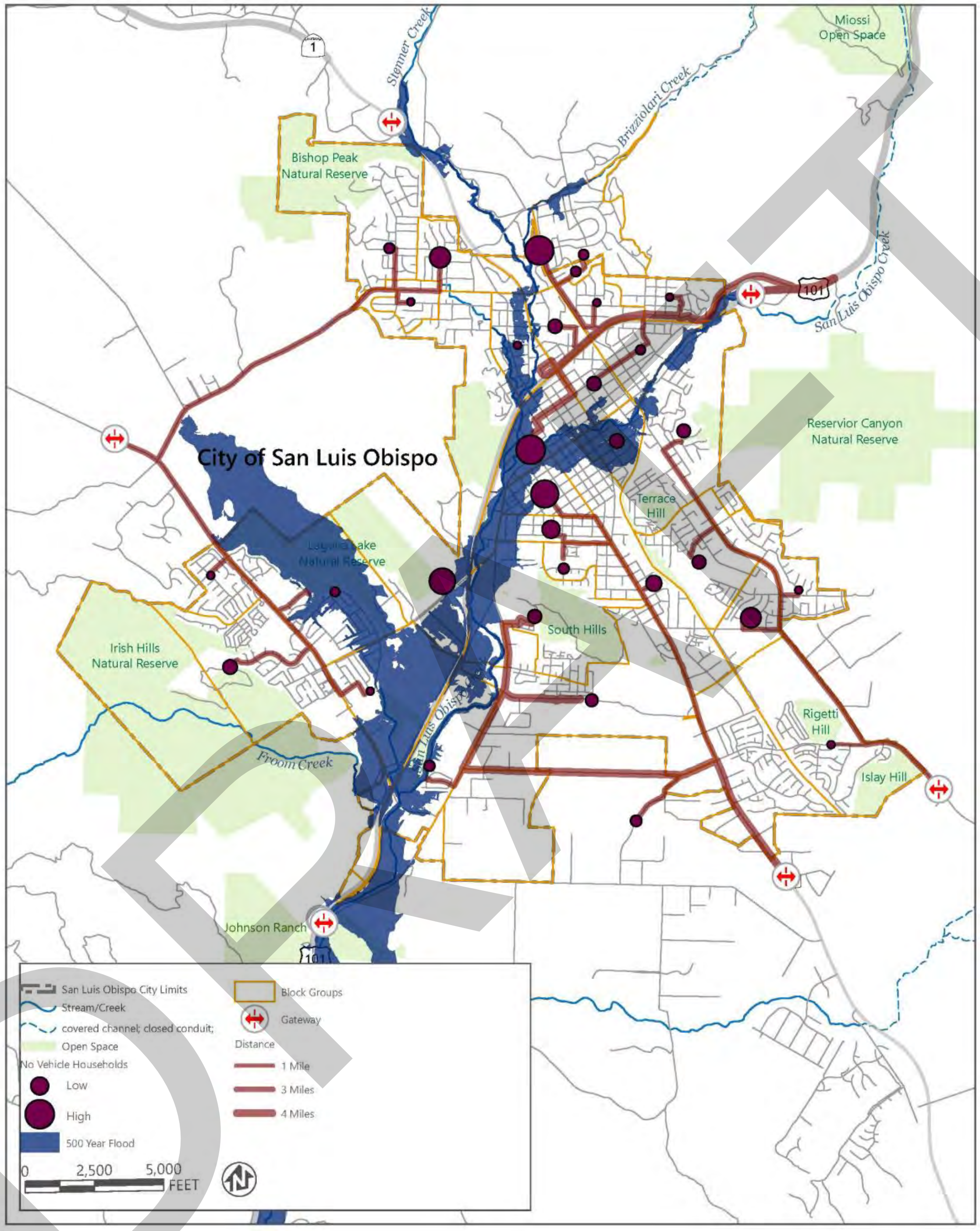
Source: Fehr and Peers 2021

Figure 46 Access from Census Block Group Centroid to City Gateways with 100 Year Flood



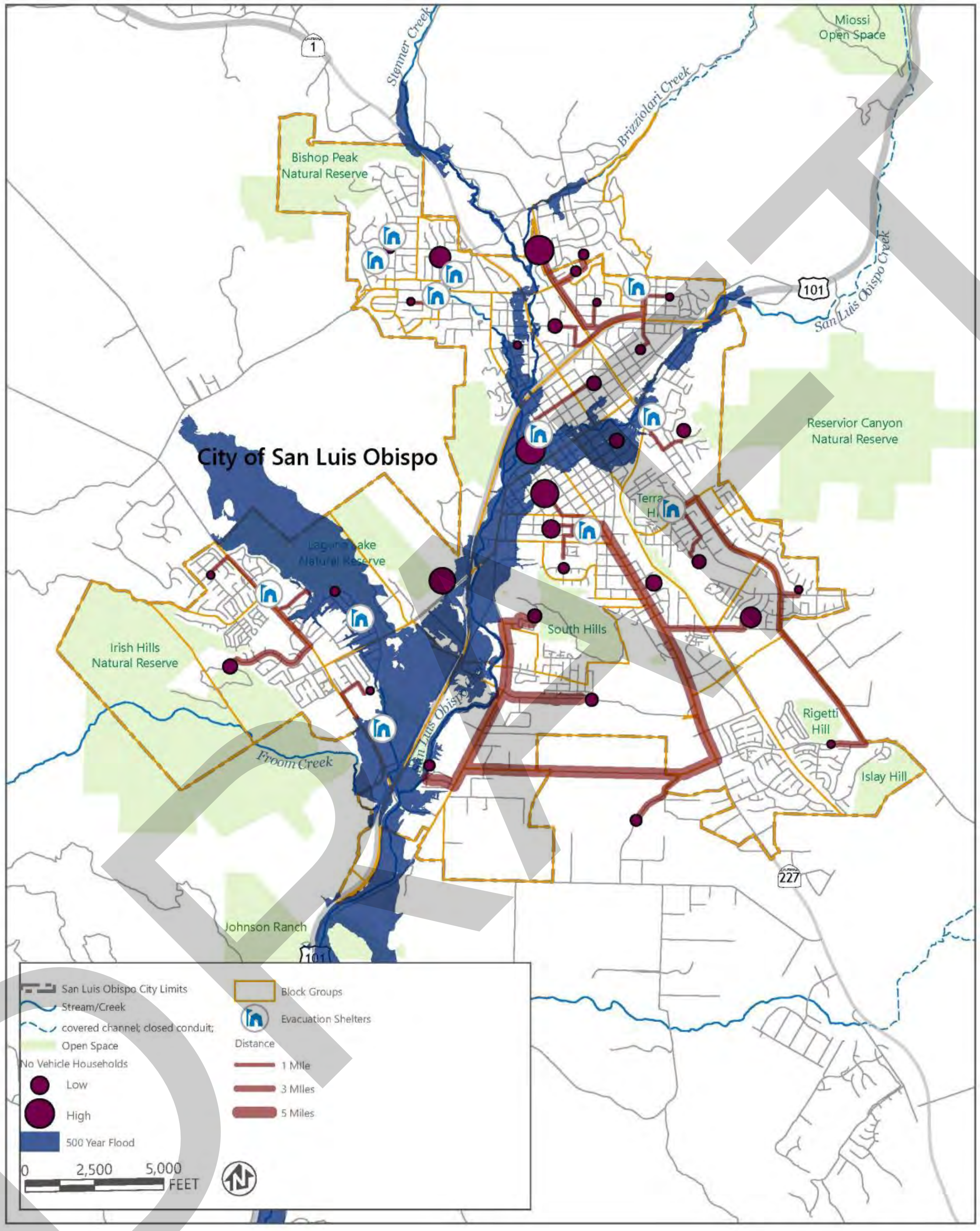
Source: Fehr and Peers 2021

Figure 47 Access from Census Block Group Centroid to City Evacuation Centers with 100 Year Flood



Source: Fehr and Peers 2021

Figure 48 Access from Census Block Group Centroid to City Gateways with 500 Year Flood



Source: Fehr and Peers 2021

Figure 49 Access from Census Block Group Centroid to City Evacuation Centers with 500 Year Flood

Table 22 shows the difference between the baseline conditions access and each flood scenario.

Table 22 Flood Year and Longest Distances to City Gateways and Evacuation Centers

Destination	Baseline – No flood	100 year*	500 year**
Gateways	3.5 miles	4 miles	4 miles
Evacuation Centers	3 miles	5 miles	5 miles

Note: * = Signifies 1 Block Group centroid was cut off from both gateways and evacuation centers. ** - Signifies 4 Block Group centroids were cut off from both gateways and evacuation centers.

Source: Fehr and Peers 2021

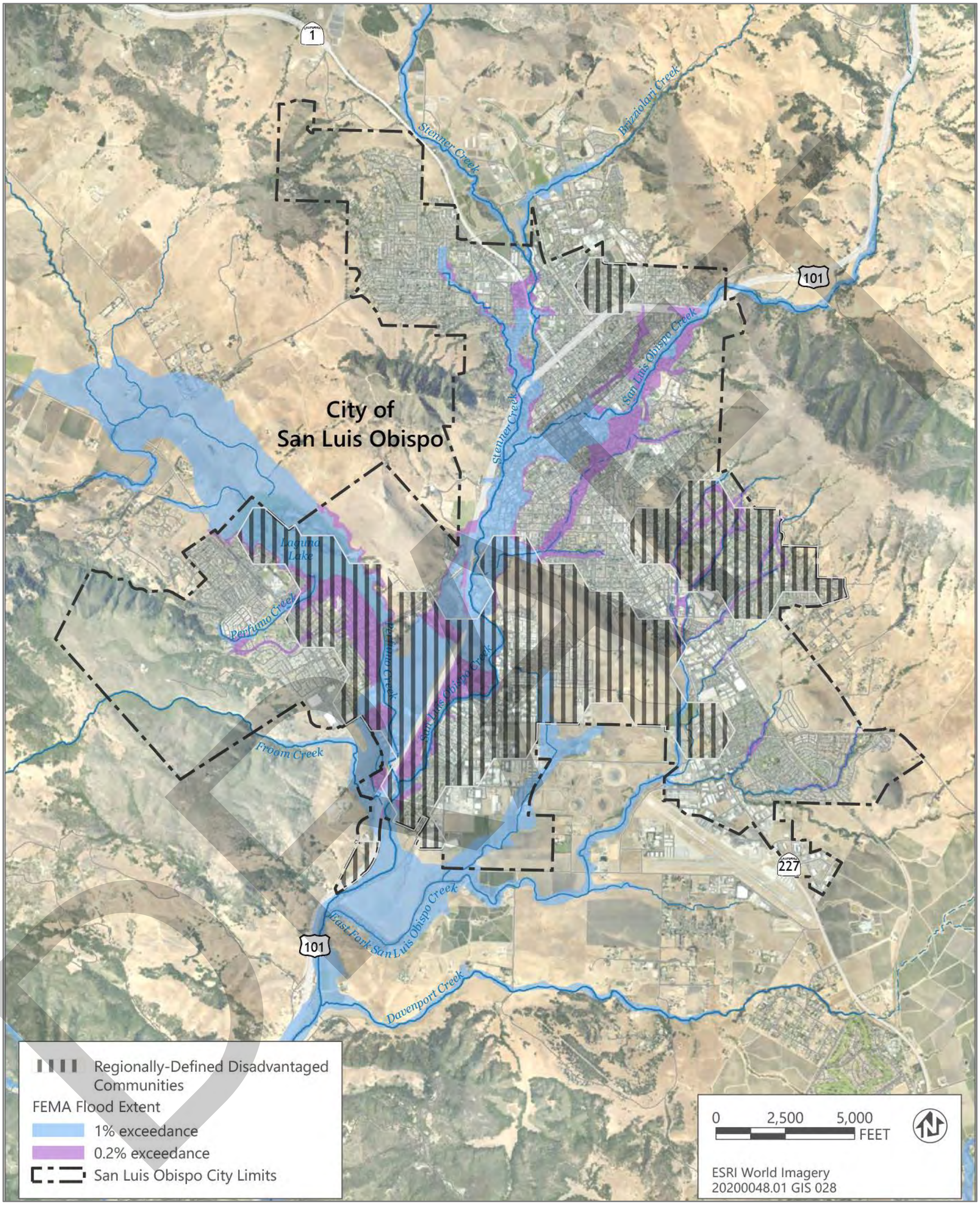
Flooding and Vulnerable Populations

Several populations within the City may experience disproportionate impacts from flooding due to social characteristics and environmental burdens. Disadvantaged communities are more likely to be located in flood prone areas, may be linguistically isolated and unable to interpret and respond to warning messages and evacuation notices, and have limited mobility. As shown in Figure 50, the disadvantaged communities in the central portion of the City are located within the 100- and 500-year flood zones.

Lack of vehicle access is another social factor that may lead to increased vulnerability to flood events. Using the US Census block group data, Figure 43 illustrates census blocks in the City with the percentage of occupied housing units without access to a vehicle. According to the Census data, in the City, approximately 8 percent of occupied housing units do not have access to at least one vehicle. However, the range for all the block groups within the City is 0 to 21.4 percent. Certain block groups have higher numbers of households without vehicles available, therefore specific consideration for services to access evacuation centers or assistance of these populations to leave the City during an emergency should be prepared. The City's Car Less Collection Points layer is included and shows some correspondence to the census block groups with a higher portion of households without vehicles. These populations tend to primarily be located adjacent to US 101 and the San Luis Obispo Creek.

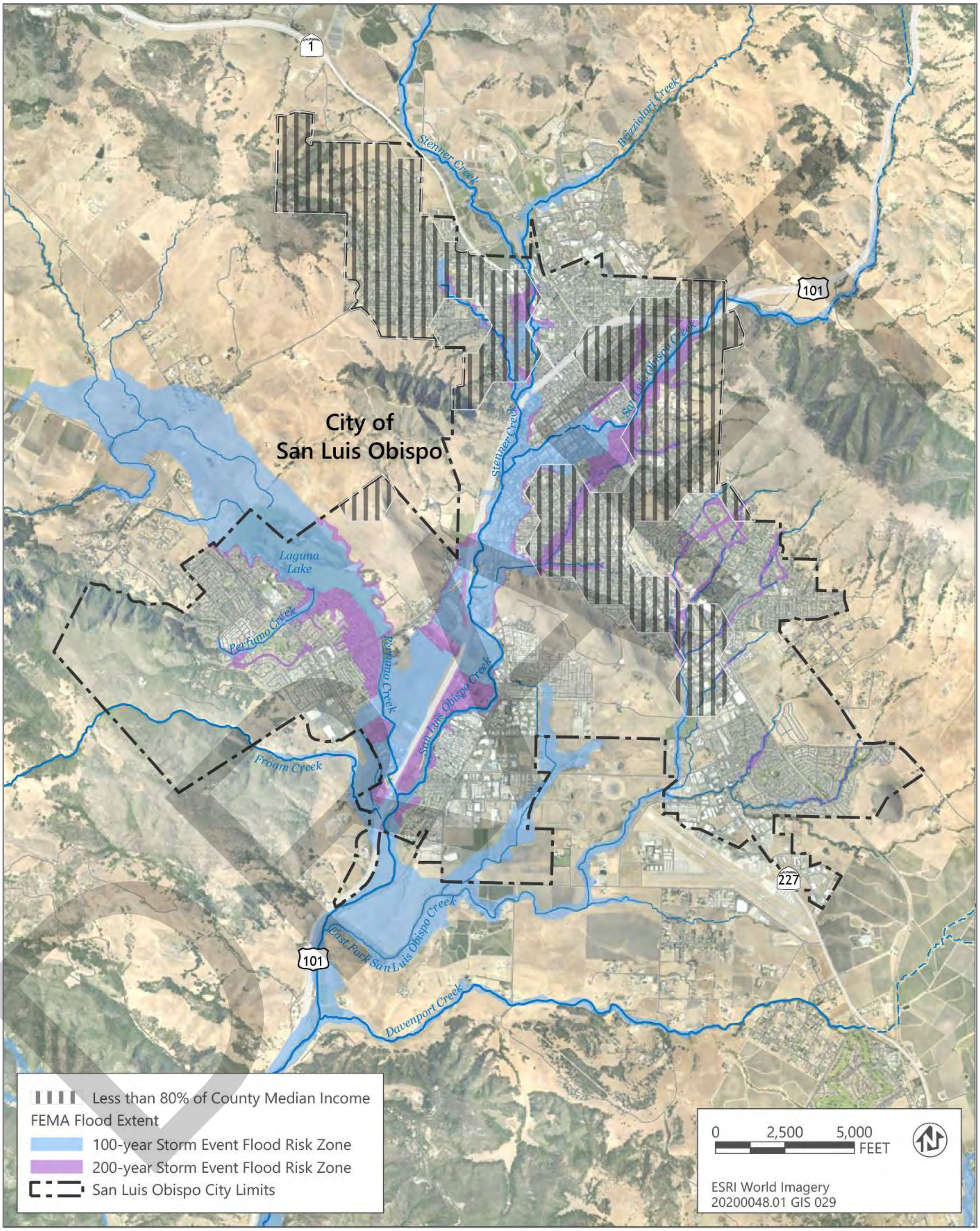
A key environmental burden is the presence of cleanup sites, which are sites monitored by the Department of Toxic Substances Control that are contaminated with harmful chemicals. Flooding could release hazardous and/or toxic materials if cleanup sites are inundated, exposing nearby communities to public health impacts. CalEnviroScreen 4.0 includes a cleanup sites indicator that considers the number and types of cleanup sites in or near each census tracts, as well as how close the sites are to where people may live. As shown in Figure 52, there are several cleanup sites located within the 100-year flood zone. There are also census tracts in the City within the City's 100- and 500-year flood zones that score in the 70th percentile and higher for clean up site exposure, based on the weighted score of potential pollution exposure used in CalEnviroScreen. This means these census tracts have higher potential exposure than 70 percent of all census tracts in the State, indicating that there is a potential for residents in these areas to be exposed to contaminants in the event of a flood.

As show in Figure 50, the area West of South Higuera Street (Census Tract 115.01) is located almost entirely within the 100- and 500-year flood plain which is anticipated to expand in the future due to climate change. This area is particularly vulnerable with high percentage of elderly residents (17 percent) as well as a high percent of disabled residents (15 precent), presenting potential challenges during emergency evacuation events. Figure 51 includes areas in the City with low-income households (i.e., households earning 80 percent less of the County median income) as well as the 100- and 500-year flood plain. During larger flood events, these households are at a potential disadvantage during the post-disaster recovery period with less financial or other resources available for recovery efforts. Additionally, as show in Figure 53 there is significant overlap between the location of homeless encampments throughout the City and the location of the existing and future 100- and 500-year flood plains. Shelters and encampments built by unhoused individuals are often developed in or near flood plains, placing these populations at increased risk during flood events, particularly in areas with lower levels of access to transportation in emergency events. Increased heavy precipitation and flooding will disproportionately impact homeless populations because they occupy marginal areas, they are less able to transport themselves out of flood areas and they are more likely to suffer sequelae (i.e., exacerbation of existing health conditions) from such disasters. (Ramin and Svoboda 2009).



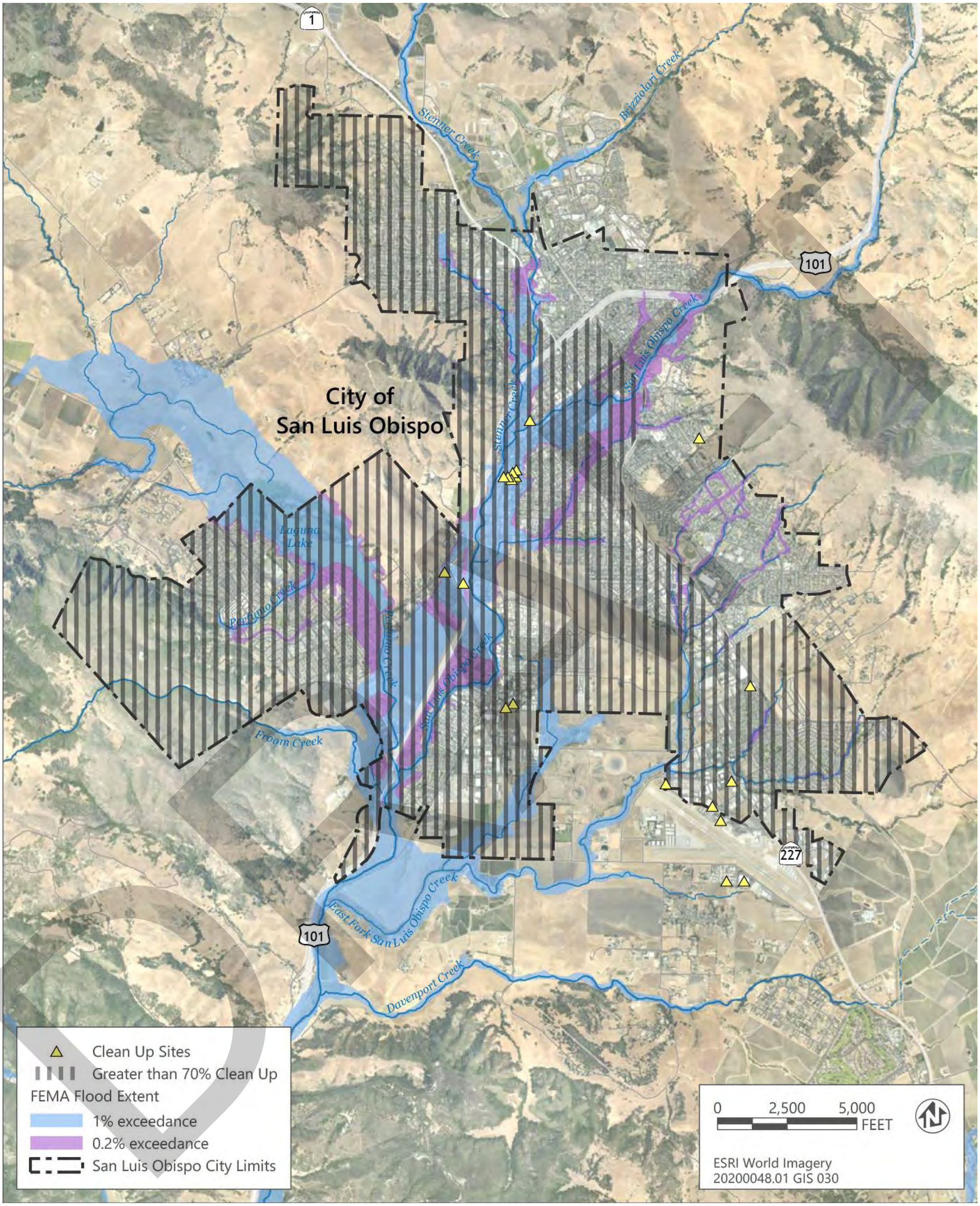
Sources: Data received from SLOCOG in 2021 and from CBEC Engineering in 2020, and downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 50 Disadvantaged Communities and 100-year and 500-year Flood Plains



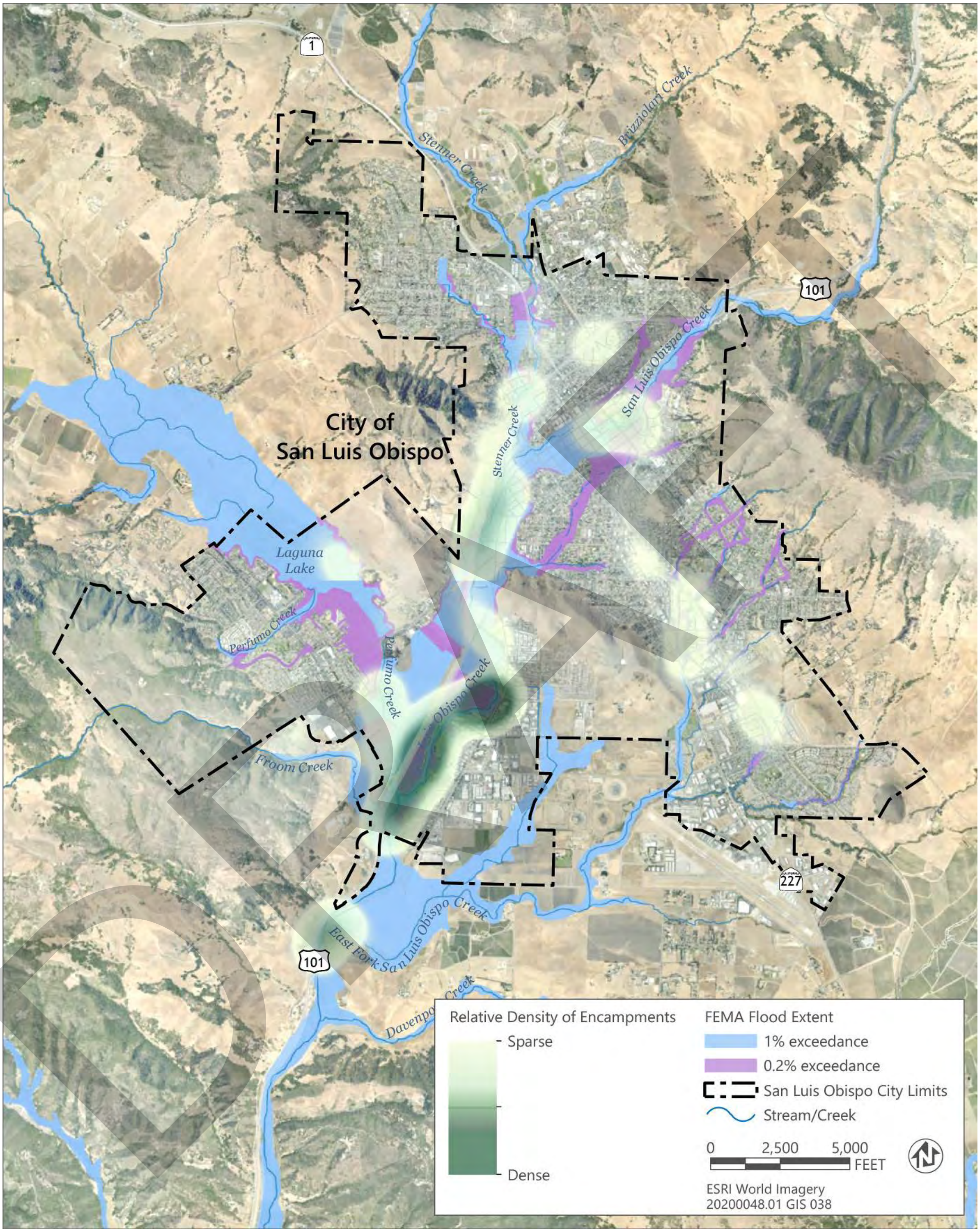
Sources: Data received from SLOCOG in 2021 and from CBEC Engineering in 2020, and downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 51 Low-Income Areas and Flood Plains in the City



Sources: Data downloaded from OEHHA in 2021 and received from CBEC Engineering in 2020, and downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 52 Hazardous Material Clean Up Sites and Flood Plains in the City

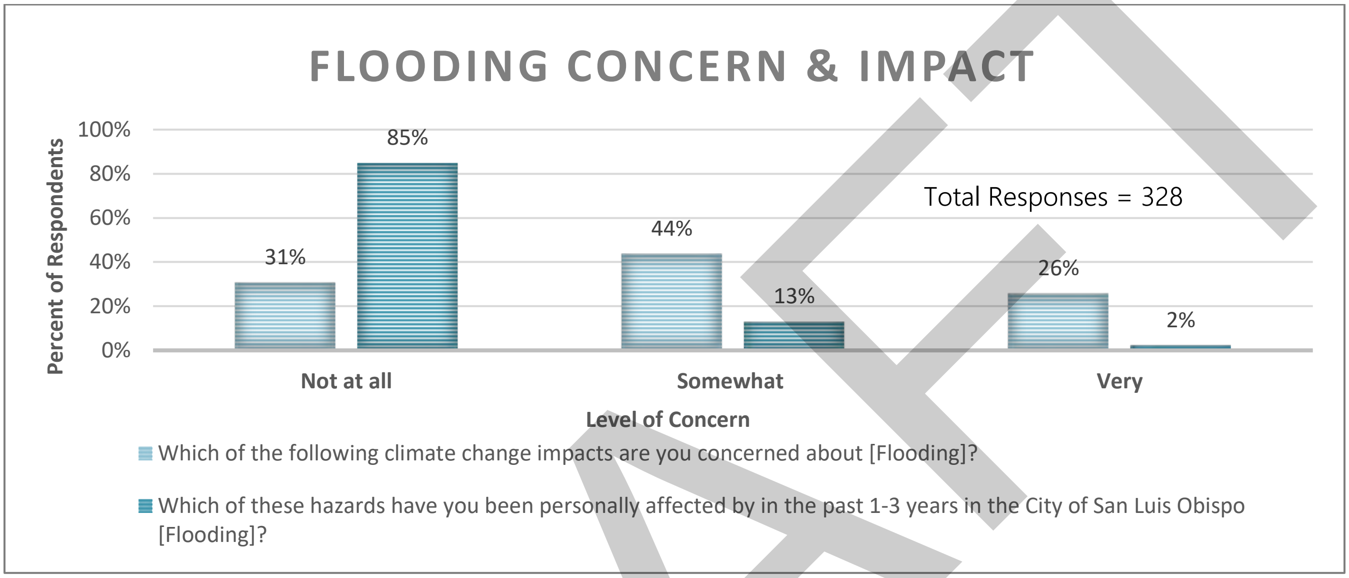


Sources: Data downloaded from US Census in 2019, City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 53 Location and Relative Density of Homeless Encampments in the City of San Luis Obispo

Community Flooding Concerns

As part of the community priorities survey, when participants were asked to report on their level of concern for flooding, as shown in Figure 54, 70 percent of respondents indicated that they were "Somewhat" or "Very Concerned" about the issue. When asked about whether they had been impacted by flooding in the last 1-3 years, only 15 percent of respondents indicated "Somewhat" or "Very". Additionally, individuals with a household income of less than $50,000 and individuals aged 18 to 24 reported the highest level of concern for flooding. Individuals who identify as all other races and ethnicities, compared to individuals who identify as white or caucasian, also expressed a higher level of concern for flooding (i.e., 36 percent v. 24 percent, respectively).



Sources: Resilient SLO Community Priorities Survey

Figure 54 City Resident's Flooding Concern and Impact

Key Findings and Policy Considerations

- For all flooding events (i.e., 100-year and 500-year flood events), access to the Southern Gateway of US 101 is compromised due to potential flooding of US 101 and Los Osos Valley Road. However, all centroids under these scenarios are able to access at least one alternative City gateway, which means no portions of the City would be closed off due to roadway network flooding.
- The 500-year flood scenario, illustrated in Figure 42, shows an inability of four census block groups to access either the City gateways or evacuation centers as they experience extensive flooding, isolating their ability to connect to a route.
- There is significant overlap between areas in the City where disadvantaged communities have been identified and the 100- and 500-year floodplain, resulting in potentially disproportionate impacts on these populations in the City during large storm events.
- The area West of South Higuera Street (Census Tract 115.01) is located almost entirely within the 100- and 500-year flood plain which is anticipated to expand in the future due to climate change. This area is particularly vulnerable with high percentage of elderly residents (17 percent) as well as a high percent of disabled residents (15 precent), presenting potential challenges during emergency evacuation events.
- Increased heavy precipitation and flooding will disproportionately impact homeless populations because they occupy marginal areas, they are less able to transport themselves out of flood areas during these events.

2.6.3 Adaptive Capacity for Precipitation and Flooding Impacts

Adaptive Capacity Rating: Medium/Low

Given its geographical location and the presence of several waterways within its boundaries, the City has been subject to a number of significant flooding events in the past. As a result, the City has taken considerable steps to analyze potential impacts from larger flooding events and mitigate the effects of these events when they do occur. Annex G of the Multi-Jurisdictional Hazard Mitigation Plan (San Luis Obispo County 2019b) includes a thorough analysis of flooding impacts from the 100-year and 500-year storm events, assessing the critical facilities that would be affected by these storms. Annex G also includes a capability assessment that provides an inventory of existing regulatory tools (e.g., ordinances, plans), personnel resources, financial resources (e.g., grants, fees), and partnerships that are currently used or could be used in the future to implement hazard mitigation activities.

Although the City has some authority under the City's Municipal Code for emergency removal of vegetation and other debris, general maintenance of the creeks falls upon the owners of property adjacent to the creek. Additionally, the creek corridor is highly confined in areas, particularly through downtown, making projects such as channel widening infeasible. Following the 1973 flood, the George S. Nolte & Associates study, completed in 1977, identified proposed flood control projects, but few were adopted because of the environmental effects associated with channel widening and other alternatives (Questa Engineering Corporation 2003). Several areas of the City, including downtown areas along San Luis Obispo Creek, the intersection of U.S. 101 and Los Osos Valley Road, the Johnson Avenue railroad underpass, and areas surrounding Laguna Lake, have been at a high risk for frequent flooding (City of San Luis Obispo 2011). To address these issues, large projects have been proposed to manage flood risk in the increasingly urbanized City. One such project is a high-flow bypass channel for the confluence of Laguna Lake and (the upstream portion) Prefumo Creek. An additional proposed project is the Mid-Higuera Bypass Project, which would increase conveyance capacity of San Luis Obispo Creek between Marsh Street and Madonna Road. This area, downstream of the confluence of Stenner and San Luis Obispo Creeks, has flooded and received extensive damage in some of the historical floods previously mentioned. The planned removal of sediment and Arundo stands from San Luis Obispo Creek south of Los Osos Valley Road will also serve to reduce local flood risk.

In 2003, the City developed and adopted its current Waterway Management Plan in coordination with the San Luis Obispo County Flood Control and Water Conservation District Zone 9 Advisory Committee (Questa Engineering Corporation 2003). The purpose of this plan is to adopt an approach and schematic plans to address flooding, erosion, water quality, and ecological issues in the San Luis Obispo Creek Watershed that can be implemented with approval from various regulatory agencies.

The plan includes five key components to achieve the plan's objective. These include the following:

- Stream Maintenance and Management Program and guidance document for routine stream maintenance;
- New Drainage Design Manual for storm water, flood control, and bank repair design;
- Flood Management Plan that outlines the conceptual flood control alternatives;
- Bank Stabilization Program that provides a management framework and conceptual plans for addressing current and future bank instability problem areas; and
- Habitat Enhancement and Restoration Program that provides a conceptual plan and framework for stream resource enhancement, restoration, and protection.

The City is currently enrolled in the State's mandated National Pollution Discharge Elimination System Program which includes requirements to help manage urban stormwater. One of the Best Management Practices (BMP) included in these requirements are practices to address sediment and debris in the storm drain system so the material/pollutants can be removed, and the capacity can be restored to system and allow it to function as designed. The City has undertaken this BMP and achieved significant improvements in the performance of the stormwater management system. In the first 5 years of this BMP, over 80 percent of the storm drain system was restored and was able to convey water from the streets to the creeks and drainages under full capacity (City of San Luis Obispo, Otte pers. comm., 2021).

In current practice, the stormwater management system for the City is designed to manage small and large storm events based on characteristics of rainfall specific to the region from observed historical data. These characteristics are described using the intensity, duration, frequency (IDF) curves of historic storm events. These IDF curves are used to design various components of urban drainage systems including pipes, culverts, and waterway channels. Given that the City's existing water management system has been designed and built to manage historic precipitation levels, this infrastructure can be difficult to retrofit and adjust to manage larger storm events, limiting the City's options for managing more intense storm events due to climate change (CEC 2018).

For the reasons discussed above, the adaptive capacity ranking for increased precipitation and flooding is medium/low.

2.6.4 Vulnerability Summary

Under existing conditions, without the influence of climate change, the City has experienced larger scale flood events in the past. As discussed in Sections 2.5.1 and 2.5.2, the City is particularly vulnerable to increased future flooding risk due to climate change with the intensity and frequency of large storm events increasing significantly by the end of the century. Because the City's existing stormwater management and flood management infrastructure have been designed and built to manage historic flood events, as the size of large storm events increases, the City's existing infrastructure will be compromised in its ability to successfully manage these events. Flooding impacts on the City's physical infrastructure could result in secondary impacts including interruptions to the City's evacuation routes as discussed in Section 2.5.2, impacts to life and property for homes and businesses located in existing floodplains and new more extensive floodplains, faster degradation of infrastructure, and economic impacts during post-disaster recovery. Based on the analysis of various impacts discussed above, the City's potential impact scoring is High (3). Precipitation and flooding impacts that are unique to the City and should be given increased consideration during the adaptation strategy development process are discussed below.

Natural Systems Findings

- Although annual precipitation is anticipated to increase in the City and the larger central coast region, California's climate oscillates between extremely dry and extremely wet periods with annual precipitation varying widely from year to year. These oscillations between extremely dry and extremely wet periods are anticipated to become more severe with rapid shifts from dry to wet periods known as "whiplash events" (Swain et al. 2016). These types of events are estimated to increase by approximately 100 percent in southern California, with increases in frequency occurring largely after 2050 (Swain et al. 2016).
- Based on California's location next to the Pacific Ocean, the state is exposed to the atmospheric river (AR) phenomenon, a narrow corridor of concentrated moisture in the atmosphere. The presence of the AR contributes to the frequency of "wet years" in the state, when there is an above-average number of AR storms and above-average annual precipitation. While research indicates that the frequency of large storms events does increase in these wet years, the most severe flooding from ARs may not be in wet years (Swain et al. 2018). The largest flooding impacts are caused by persistent storm sequences on sub-seasonal timescales (i.e., short time periods, typically 2 weeks to 3 months), which bring a significant fraction of annual average precipitation over a brief period. Based on current climate modeling, the frequency of these large storm sequences over short timeframes is projected to increase noticeably under a future high emissions scenario. It is estimated that a storm similar in magnitude to the Great Flood events is more likely than not to occur at least once between 2018 and 2060 (Swain et al. 2018).
- For very large precipitation events, the capacity of the watershed to absorb incoming rainfall can be quickly exceeded, causing large increases in stream flow within the system. By as early as 2070 under a high future emissions scenario, peak flow rates in the San Luis Obispo Creek watershed are projected to increase, on average, from 17 percent to 38 percent depending on the size of the storm event. By this period, for the storm event with a

50 percent chance of occurring in any given year (2-year storm event), the median peak stream flow is projected to increase by 28 percent with a small likelihood (90th percentile) of stream flow increasing by 51 percent.

Built Environment Findings

- By as early as 2070 under a high future emissions scenario, for the 100-year event, dramatic increases are observed on Stenner and Old Garden Creeks upstream of the San Luis Obispo Creek confluence and within the downtown area. In both cases, flooding is exacerbated by the capacity of the existing infrastructure to manage historic flooding events. Similar, during the 100-year event, increases in flow within San Luis Obispo Creek increasingly cause flood waters to break out of the channel upstream of the culvert and flow along the Higuera and Marsh Street corridor towards the Stenner Creek confluence
- From the results of the climate-informed flood modeling, areas with the greatest increases in connected floodplain inundation for the 10-year through 100-year events included SLO Creek upstream of the Stenner confluence (including parts of downtown SLO), the SLO Creek – Prefumo Creek confluence area, East Fork and its tributaries upstream of Buckley Road, and Stenner, Brizziolari, and Old Garden Creeks. In the modeling, these areas tended to have greater expanses of floodplain areas, such as the SLO Creek – Prefumo Creek confluence area, or limiting infrastructure, as is the case with the undercity culvert through downtown.
- By as early as 2070 under a high future emissions scenario, for the 100-year event, dramatic increases are observed on Stenner and Old Garden Creeks upstream of the San Luis Obispo Creek confluence and within the downtown area. In both cases, flooding is exacerbated by the capacity of the existing infrastructure to manage historic flooding events. Similar, during the 100-year event, increases in flow within San Luis Obispo Creek increasingly cause flood waters to break out of the channel upstream of the culvert and flow along the Higuera and Marsh Street corridor towards the Stenner Creek confluence.
- Near the San Luis Obispo – Prefumo Creek confluence area near Higuera Street and Madonna Road, large expanses of relatively flat, low-lying land persist between and along the two creeks. During larger storm events (50-year and 100-year storms), flood waters can spill into these areas by crossing Highway 101 near Madonna Road from San Luis Obispo Creek or by escaping the creek channels in the confluence area and causing backwater conditions for upstream reaches.
- The greatest area of impact to local roads during large storm events (100-year storm) would be areas just south of San Luis Obispo Creek through the downtown area with the farthest extent along Santa Barbara Street as far South as Leff Street. The Chorro Street undercrossing at US 101 would be impacted by the 10-year, 100-year, and 500-year floods.
- Extensive flooding from larger storm events also has the potential to limit transit service, thus eliminating transport options for populations in the City dependent on transit, with between 16 to 26 percent of SLO Transit stops being affected depending on the storm size.

Community Resilience Findings

- For all flooding events (i.e., 100-year and 500-year flood events), access to the Southern Gateway of US 101 is compromised due to potential flooding of US 101 and Los Osos Valley Road. However, all centroids under these scenarios are able to access at least one alternative City gateway, which means no portions of the City would be closed off due to roadway network flooding.
- The 500-year flood scenario, illustrated in Figure 42, shows an inability of four census block groups to access either the City gateways or evacuation centers as they experience extensive flooding, isolating their ability to connect to a route.
- There is significant overlap between areas in the City where disadvantaged communities have been identified and the 100- and 500-year floodplain, resulting in potentially disproportionate impacts on these populations in the City during large storm events.

- The area West of South Higuera Street (Census Tract 115.01) is located almost entirely within the 100- and 500-year flood plain which is anticipated to expand in the future due to climate change. This area is particularly vulnerable with high percentage of elderly residents (17 percent) as well as a high percent of disabled residents (15 precent), presenting potential challenges during emergency evacuation events.
- Increased heavy precipitation and flooding will disproportionately impact homeless populations because they occupy marginal areas, they are less able to transport themselves out of flood areas during these events.

Adaptive Capacity: Medium/Low (2.5)

Potential Impact: High (3)

Vulnerability Score: 4.5

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3 VULNERABILITY SCORING SUMMARY

As described in this Report, the City's vulnerability to each identified impact has been assessed based on the magnitude of risk to and potential impacts on Natural Systems, the Built Environment, and Community Resilience. Importantly, the assessment also considers the City's current adaptive capacity to mitigate these climate-related hazards when impacts do occur. Table 23 presents a list of important plans, resources, and documents that already exist and are being used to help mitigate risk from these climate-related hazards.

Table 23 Summary of Existing Plans and Reports

Plan or Report	Climate Change Hazard			
	Increased Temperatures and Extreme Heat	Increased Wildfire Risk	Increased Precipitation and Flooding	Drought and Water Supply
California's Fourth Climate Change Assessment, Central Coast Region Report	✓	✓	✓	✓
City Local Hazard Mitigation Plan Annex		✓	✓	✓
City General Plan		✓	✓	✓
City Emergency Operations Plan		✓	✓	
Waterway Management Plan			✓	
City Community Wildfire Protection Plan		✓		
City Urban Water Management Plan				✓
City Open Space Vegetation Management Plan		✓		

Source: Ascent Environmental 2021

Based on the ratings of potential impacts and adaptive capacity, an overall vulnerability score was determined for each climate change effect. This scoring process can help the City understand which effects pose the greatest threats and should be prioritized in future planning efforts.

As shown in Table 24, increased extreme precipitation and flooding is assigned a vulnerability rating of 4.5 and has the highest vulnerability score. Increases in temperature and extreme heat as well as increase wildfire risk are both given a vulnerability score of 4. Although ranked slightly lower, these climate change effects are also likely to have significant impacts on the City in the near-term and midterm periods. Although a variety of adaptive efforts related to both climate change effects are in place and underway, the magnitude of the impacts posed by these hazards contributes to high vulnerability for the City and its populations. Finally, increased long-term drought is characterized as having a vulnerability rating of 3.5. This climate change effect is currently being addressed adequately based on existing conditions, but additional adaptation and resilience planning will still be required in the future to mitigate impacts and protect the City.

Table 24 Summary of Vulnerability Scoring

Climate Change Effect	Vulnerability Score		
	Adaptive Capacity	Potential Impact	Vulnerability
Increased Extreme Precipitation and Flooding	Medium/Low	High	4.5
Increased Temperatures and Extreme Heat	Low	Medium	4
Increased Wildfire	Medium	High	4
Long-Term Drought	High	Medium	3.5

Source: Ascent Environmental in 2021

Provided below is a summary of impacts that are unique to the City for each of the four climate-related hazards and should be given increased consideration during the adaptation strategy development process are discussed below.

TEMPERATURES AND EXTREME HEAT KEY FINDINGS

Natural System Findings

- Changes in temperature and extreme heat are likely to have negative impacts on the City's tree canopy with some tree species no longer suitable for future minimum and maximum temperatures. Any future policies focused on improving the City's tree canopy or green spaces to mitigate the urban heat island effect should carefully consider what plant and tree species will be suitable for future climate conditions.
- Climate change is projected to encourage the spread of invasive species in the City's open spaces, affecting coastal sage scrub habitats as well as the City's oak species from Sudden Oak Death.
- Regional impacts on agriculture and viticulture industries from shifting temperatures have the potential to impact the City via decreases in wine and vineyard-based tourism, with the City relying heavily on revenue and employment opportunities in these industries. Resilience strategies focused on economic impacts should consider potential impacts on viticulture vineyard-based tourism and potential diversification of the City's tax revenue sources and employment industries.

Built Environment Findings

- The Margarita Avenue Neighborhood (Census Tract 111.03) includes population characteristics that make this area particularly vulnerable to extreme heat and is located in an area of the City with increased urban heat island severity. Resilience strategies that mitigate impacts of the urban heat island effect should focus on supporting this area of the City.
- Shifts in temperature and extreme heat will result in changes in energy demand for cooling in the City, with increased demand in areas experiencing more severe urban heat island hotspots. As the City implements it's recently adopted Climate Action Plan and as well as the Resilient SLO strategies, solutions that both reduce GHG emissions and help the City adapt to impacts of climate change should be prioritized.
- The City's historically moderate climate has, in general, not required the City's existing building stock to be designed or equipped with air conditioning. However, as average temperatures and extreme heat events increase in the future, residents are ill-equipped to prepare for these events. Additionally, increases in temperature and extreme heat will result in increased energy demand for cooling, which underscores the need to support distributed energy resources, customer sited energy storage, demand response, and grid/building connected appliances and vehicles.
- Extreme heat days and heat waves will have a disproportionate impact on electricity demand, with higher electricity demand projected for these events in the future. These projections place an increased urgency on electricity utilities to plan for higher electricity demand during these events in future.

Community Resilience Findings

- The Margarita Avenue Neighborhood (Census Tract 111.03) West of South Higuera neighborhood (Census Tract 115.01) is an area of the city with a particularly vulnerable population in regard to extreme heat, with a high percentage of elderly, disabled, or low-income residents. The West of South Higuera neighborhood (Census Tract 115.01) also includes a high percentage of elderly and disabled residents, making this area particularly vulnerable to extreme heat impact.
- Low-income residents are particularly vulnerable to extreme heat impacts due to a number of factors including a higher reliance on public transit (leaving these residents more exposed to extreme heat during transit use), a higher percentage of income being devoted toward utility bills, and a trend of lower income neighborhoods having less tree cover. Unhoused individuals are also at increased risk from extreme heat events with, generally, less access to places to cool off and healthcare resources during these events.

- The City and the County, in general, have historically served as a destination for summer tourists to escape more extreme summer heat in the San Joaquin Valley and southern California. As extreme heat events continue to increase disproportionately in those areas of the state compared to less severe increases locally, the City may experience increases in this phenomenon placing increased demand on services, impacts on City infrastructure and resources, as well increased pressure on the housing shortage issue in the City from new permanent residents.

LONG-TERM DROUGHT KEY FINDINGS

Natural System Findings

- The City's designated open space areas include a mixture of vegetation types including oak woodland, grassland, coastal sage scrub, and chaparral that are anticipated to be impacted by changes in annual average temperatures, extreme heat, and long-term droughts (OPR et al. 2018b).
- As dry years and long-term droughts become more common in the future, population growth rates of annual plant species will become marginal, and populations are likely to become locally extinct.

Built Environment Findings

- Dramatic shifts from a multi-year dry periods to wet periods, similar to the 2011-2015 drought followed by an above average wet year in the 2016-2017, are known as whiplash events (Swain et al. 2018), and are expected to become more severe in the future. These whiplash events may affect water supply management practices over the long-term, particularly as the swings from multi-year dry to wet periods become more prolonged and more severe, with an emphasis on increasing rainfall storage when it does occur during the wet periods (Persad et al. 2020).
- Buildup of sedimentation that reduces a reservoir's volume available already occurs in the City's water storage system, with the City implementing programs and policies to address this storage loss over the long term. However, landscape disturbances including wildfire, post-wildfire runoff, or landslides after wet winters, are projected to increase sediment yield from watersheds along the Central Coast (OPR et al. 2018b) and with the potential to further reduce the amount of water-storage capacity in dammed Central Coast reservoirs (Smith et al. 2018).
- The City's 2020 UWMP modeled potential impacts on the City's water supplying, finding that changes in precipitation could result in a decrease of as much as 850 AFY to an increase of as much as 160 AFY, accounting for an approximately 8 percent decrease to 2 percent increase in the City's overall water supply (City of San Luis Obispo 2021b).
- With more rapid shifts from dry to wet periods known as "whiplash events," precipitation will occur over shorter more intense periods. This shift has the potential to reduce groundwater recharge which ideally occurs during prolonged wet periods to allow for soil infiltration, deeper percolation, and more effective groundwater recharge. However, increases in the intensity of rainfall events, when they do occur in the wet periods, provides an opportunity to offset potential losses in storage during periods of drought.
- The 2020 UWMP includes a section specially on Water Resiliency Planning which highlights a set of strategies the City has taken to ensure long-term water resiliency and mitigate the impacts from a long-term drought scenario. These strategies include a multi-source water supply; conservative water demand projections; water use efficiency; water recycling; and future groundwater recharge.

Community Resilience Findings

- Increases in temperature and extreme heat events are associated with increases in vector-borne and infectious disease transmission, with future long-term drought scenarios potentially increasing the prevalence of certain vector-borne diseases present on in the central coast region including Lyme disease and valley fever.

WILDFIRE KEY FINDINGS

Natural System Findings

- The increasing frequency of fire on chaparral landscapes have caused coastal sage shrubs and chaparral to shift to grasses, including exotic grasses. Some research has suggested that annual and some perennial grasses have the strongest effects on fire regimes and act as ecosystem transformers.
- Wildfire impacts in riparian zones can reduce canopy cover, resulting in increased water temperatures in creeks and other shaded waterways as well as produce increased sediment flux in stream beds and adjacent areas, affecting the food web of burned stream areas and increasing the density of algae in waterways.
- Post-wildfire runoff and debris flows can be affected by several factors but are generally triggered by one of two processes: surface erosion caused by rainfall runoff, and landslides caused by rainfall seeping into the ground. While it is uncertain the effect climate change will have on post-wildfire runoff and debris flows event, climate change is projected to result in higher intensity rainfall events as well as "whiplash events" with oscillations between extremely dry and extremely wet periods, potentially affecting post-wildfire hazards.

Built Environment Findings

- The risk of wildfire is dependent on a variety of factors not excluding biophysical factors that are affected by climate change including Resources (e.g., land use patterns, vegetation growth), Ignitions (e.g., lightning, accidental ignitions, arson), and Conditions (e.g., precipitation, wind, seasonal variation). Approximately 95 percent of wildfires in the state are caused by human ignition. However, climate change is projected to increase the frequency and severity of wildfires, when they do occur (Mann et al. 2016).
- The combination of dry climate conditions and the seasonal high autumn winds in California can increase the risk of trees or branches falling on transmission lines and causing power outages or wildfires. While these events have occurred historically, the effect of climate change on biophysical features that increase the risk of wildfires (e.g., precipitation, wind, seasonal variation) will increase the frequency and severity of wildfires from transmission line ignitions.
- There was limited development within the WUI in the city for the period of 2001 – 2016, with a few prominent exceptions including the Madonna Area and the Margarita Area to the east of South Higuera Street. However, buildings outside of the WUI are also at risk from ignition due to the spread of firebrands (or embers) that can initiate new spot fires.
- Wildfire events in the VHFHSZ near the Irish Hills Natural Reserve could potentially have immediate impacts to some residential areas on Royal Way, Sterling Lane and Isabella Way. Additionally, areas in the northeast of the City south of US 101 along San Luis Road are at risk from wildfire impacts and could potentially compromise evacuation management when wildfires do occur in this area.

Community Resilience Findings

- The City serves as regional employment center, regional destination for tourism, and home to a university (Cal Poly) with approximately 20,000 students. These factors create an environment in which the City experiences a large influx of daily visitors to the City. If and when a wildfire event were to occur in or near the City during daytime hours, evacuation management would be particularly difficult and pose additional challenges due to this large influx of daily visitors. Additionally, because US 101 serves the main commuter corridor for locations north and south, wildfire events that occur along this route causing route closures (e.g., Cuesta Grade) can have disproportionate impact on employers and employees in the City.
- While the majority of the City is not at high risk from direct wildfire impacts, regional PSPSs events that affect the City will result in a set of potential secondary impacts. Specifically, PSPS events occurring during heat wave events could have considerable public health impacts, leaving residents and businesses without power and air conditioning and create health impacts to those who are reliant of electricity for supplemental oxygen and refrigerated medications.

- The confluence of PSPS, bad air quality, wildfire threat, and high heat days underscores the importance of homes and businesses as places of potential refuge.
- The Sinsheimer Neighborhood (Census Tract 110.01) and the Laguna Lake and Los Osos Valley Road (Census Tract 113) are particularly vulnerable to wildfire impacts with this areas of the City near moderate to very high FHSZs and include the higher percentages of elderly (20 percent) and youth (7 percent) populations as well as the Laguna Lake and Los Osos Valley Road area with a high percentage of households experiencing linguistic isolation (8 percent) which may present issues during emergency evacuation events.

Exposure to wildfire smoke, particularly exposure to vulnerable populations, can result in worsening of respiratory symptoms, increased rates of cardiorespiratory emergency visits, hospitalizations, and even death (Rappold et al. 2017). Wildfires can damage not only buildings and infrastructure, but also the natural environment, including portions of the City and the areas in the County that serve as regional recreation and tourism opportunities, resulting in economic impacts on the tourism and related industries when wildfire smoke impacts occur.

Precipitation Key Considerations

Natural Systems Findings

- Although annual precipitation is anticipated to increase in the City and the larger central coast region, California's climate oscillates between extremely dry and extremely wet periods with annual precipitation varying widely from year to year. These oscillations between extremely dry and extremely wet periods are anticipated to become more severe with rapid shifts from dry to wet periods known as "whiplash events" (Swain et al. 2016). These types of events are estimated to increase by approximately 100 percent in southern California, with increases in frequency occurring largely after 2050 (Swain et al. 2016).
- Based on California's location next to the Pacific Ocean, the state is exposed to the atmospheric river (AR) phenomenon, a narrow corridor of concentrated moisture in the atmosphere. The presence of the AR contributes to the frequency of "wet years" in the state, when there is an above-average number of AR storms and above-average annual precipitation. While research indicates that the frequency of large storms events does increase in these wet years, the most severe flooding from ARs may not be in wet years (Swain et al. 2018). The largest flooding impacts are caused by persistent storm sequences on sub-seasonal timescales (i.e., short time periods, typically 2 weeks to 3 months), which bring a significant fraction of annual average precipitation over a brief period. Based on current climate modeling, the frequency of these large storm sequences over short timeframes is projected to increase noticeably under a future high emissions scenario. It is estimated that a storm similar in magnitude to the Great Flood events is more likely than not to occur at least once between 2018 and 2060 (Swain et al. 2018).
- For very large precipitation events, the capacity of the watershed to absorb incoming rainfall can be quickly exceeded, causing large increases in stream flow within the system. By as early as 2070 under a high future emissions scenario, peak flow rates in the San Luis Obispo Creek watershed are projected to increase, on average, from 17 percent to 38 percent depending on the size of the storm event. By this period, for the storm event with a 50 percent chance of occurring in any given year (2-year storm event), the median peak stream flow is projected to increase by 28 percent with a small likelihood (90th percentile) of stream flow increasing by 51 percent.

Built Environment Findings

- By as early as 2070 under a high future emissions scenario, for the 100-year event, dramatic increases are observed on Stenner and Old Garden Creeks upstream of the San Luis Obispo Creek confluence and within the downtown area. In both cases, flooding is exacerbated by the capacity of the existing infrastructure to manage historic flooding events. Similar, during the 100-year event, increases in flow within San Luis Obispo Creek increasingly cause flood waters to break out of the channel upstream of the culvert and flow along the Higuera and Marsh Street corridor towards the Stenner Creek confluence

- From the results of the climate-informed flood modeling, areas with the greatest increases in connected floodplain inundation for the 10-year through 100-year events included SLO Creek upstream of the Stenner confluence (including parts of downtown SLO), the SLO Creek – Prefumo Creek confluence area, East Fork and its tributaries upstream of Buckley Road, and Stenner, Brizziolari, and Old Garden Creeks. In the modeling, these areas tended to have greater expanses of floodplain areas, such as the SLO Creek – Prefumo Creek confluence area, or limiting infrastructure, as is the case with the undercity culvert through downtown.
- By as early as 2070 under a high future emissions scenario, for the 100-year event, dramatic increases are observed on Stenner and Old Garden Creeks upstream of the San Luis Obispo Creek confluence and within the downtown area. In both cases, flooding is exacerbated by the capacity of the existing infrastructure to manage historic flooding events. Similar, during the 100-year event, increases in flow within San Luis Obispo Creek increasingly cause flood waters to break out of the channel upstream of the culvert and flow along the Higuera and Marsh Street corridor towards the Stenner Creek confluence.
- Near the San Luis Obispo – Prefumo Creek confluence area near Higuera Street and Madonna Road, large expanses of relatively flat, low-lying land persist between and along the two creeks. During larger storm events (50-year and 100-year storms), flood waters can spill into these areas by crossing Highway 101 near Madonna Road from San Luis Obispo Creek or by escaping the creek channels in the confluence area and causing backwater conditions for upstream reaches.
- The greatest area of impact to local roads during large storm events (100-year storm) would be areas just south of San Luis Obispo Creek through the downtown area with the farthest extent along Santa Barbara Street as far South as Leff Street. The Chorro Street undercrossing at US 101 would be impacted by the 10-year, 100-year, and 500-year floods.
- Extensive flooding from larger storm events also has the potential to limit transit service, thus eliminating transport options for populations in the City dependent on transit, with between 16 to 26 percent of SLO Transit stops being affected depending on the storm size.

Community Resilience Findings

- For all flooding events (i.e., 100-year and 500-year flood events), access to the Southern Gateway of US 101 is compromised due to potential flooding of US 101 and Los Osos Valley Road. However, all centroids under these scenarios are able to access at least one alternative City gateway, which means no portions of the City would be closed off due to roadway network flooding.
- The 500-year flood scenario, illustrated in Figure 42, shows an inability of four census block groups to access either the City gateways or evacuation centers as they experience extensive flooding, isolating their ability to connect to a route.
- There is significant overlap between areas in the City where disadvantaged communities have been identified and the 100- and 500-year floodplain, resulting in potentially disproportionate impacts on these populations in the City during large storm events.
- The area West of South Higuera Street (Census Tract 115.01) is located almost entirely within the 100- and 500-year flood plain which is anticipated to expand in the future due to climate change. This area is particularly vulnerable with high percentage of elderly residents (17 percent) as well as a high percent of disabled residents (15 precent), presenting potential challenges during emergency evacuation events.
- Increased heavy precipitation and flooding will disproportionately impact homeless populations because they occupy marginal areas, they are less able to transport themselves out of flood areas during these events.

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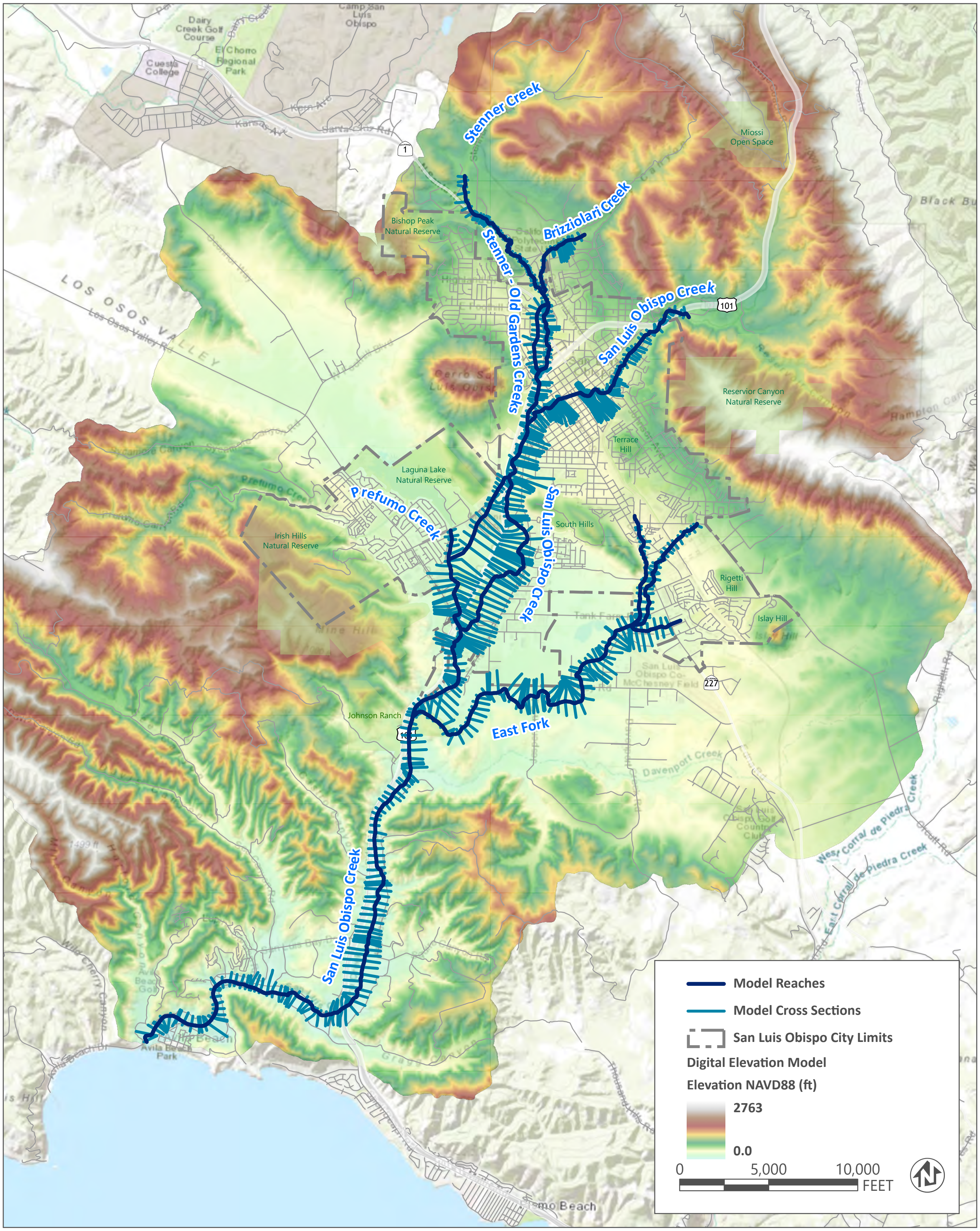
Appendix A

Flood Risk Modeling and Wildland Urban Interface Maps



Stenner Creek
Brizziolari Creek
Stenner - Old Gardens Creeks
San Luis Obispo Creek
Prefumo Creek
San Luis Obispo Creek
East Fork
San Luis Obispo Creek
Bishop Peak Natural Reserve
Miossi Open Space
Reservior Canyon Natural Reserve
Terrace Hill
Laguna Lake Natural Reserve
South Hills
Irish Hills Natural Reserve
Rigetti Hill
Islay Hill
Johnson Ranch
Cuesta College
Dairy Creek Golf Course
El Chorro Regional Park
Camp San Luis Obispo
LOS OSOS VALLEY
Avila Beach Park
Model Reaches
Model Cross Sections
San Luis Obispo City Limits
Digital Elevation Model
Elevation NAVD88 (ft)
2763
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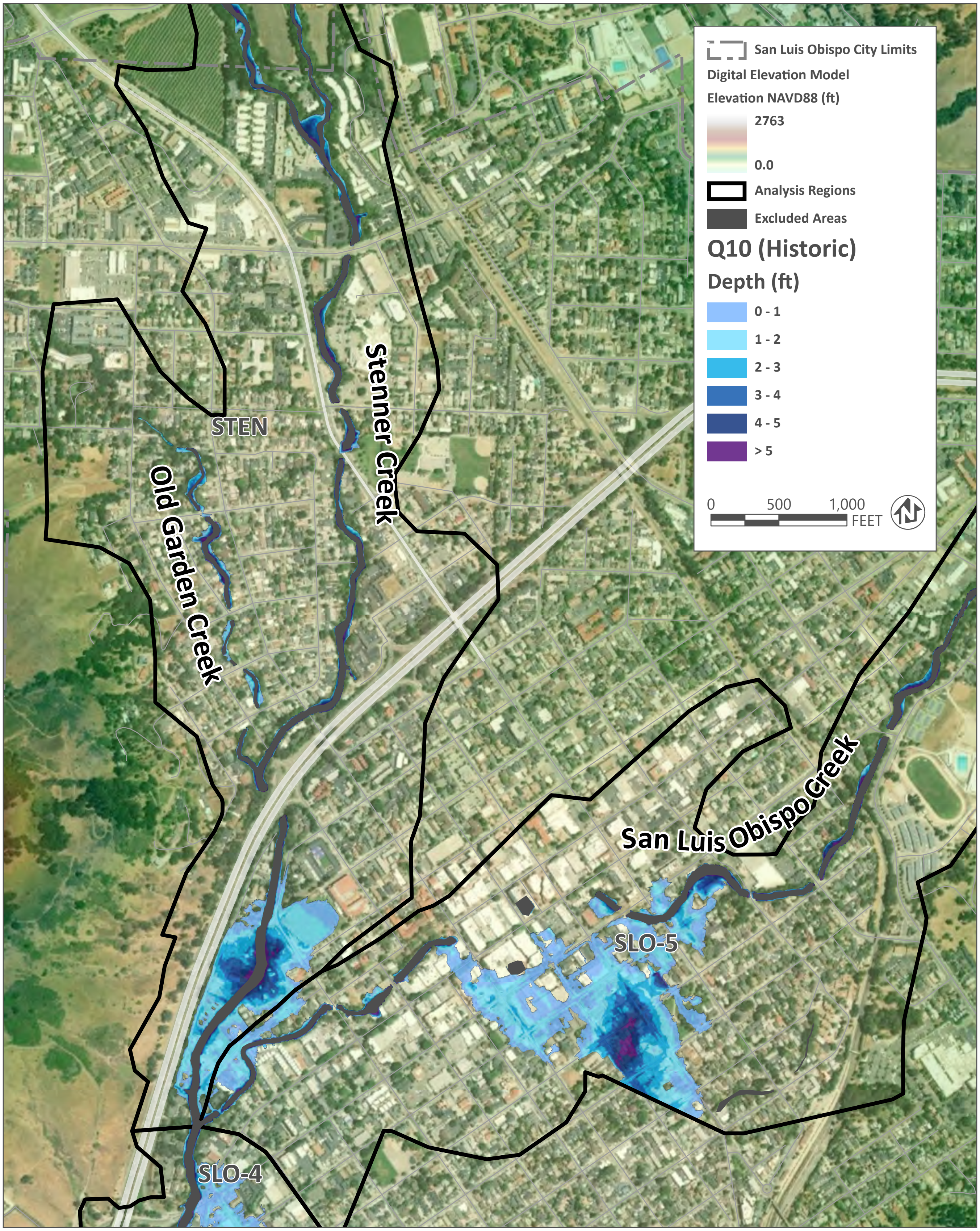
10,000
FEET



San Luis Obispo City Limits
Digital Elevation Model
Elevation NAVD88 (ft)
2763
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Analysis Regions
Excluded Areas
Q10 (Historic)
Depth (ft)
0 - 1
1 - 2
2 - 3
3 - 4
4 - 5
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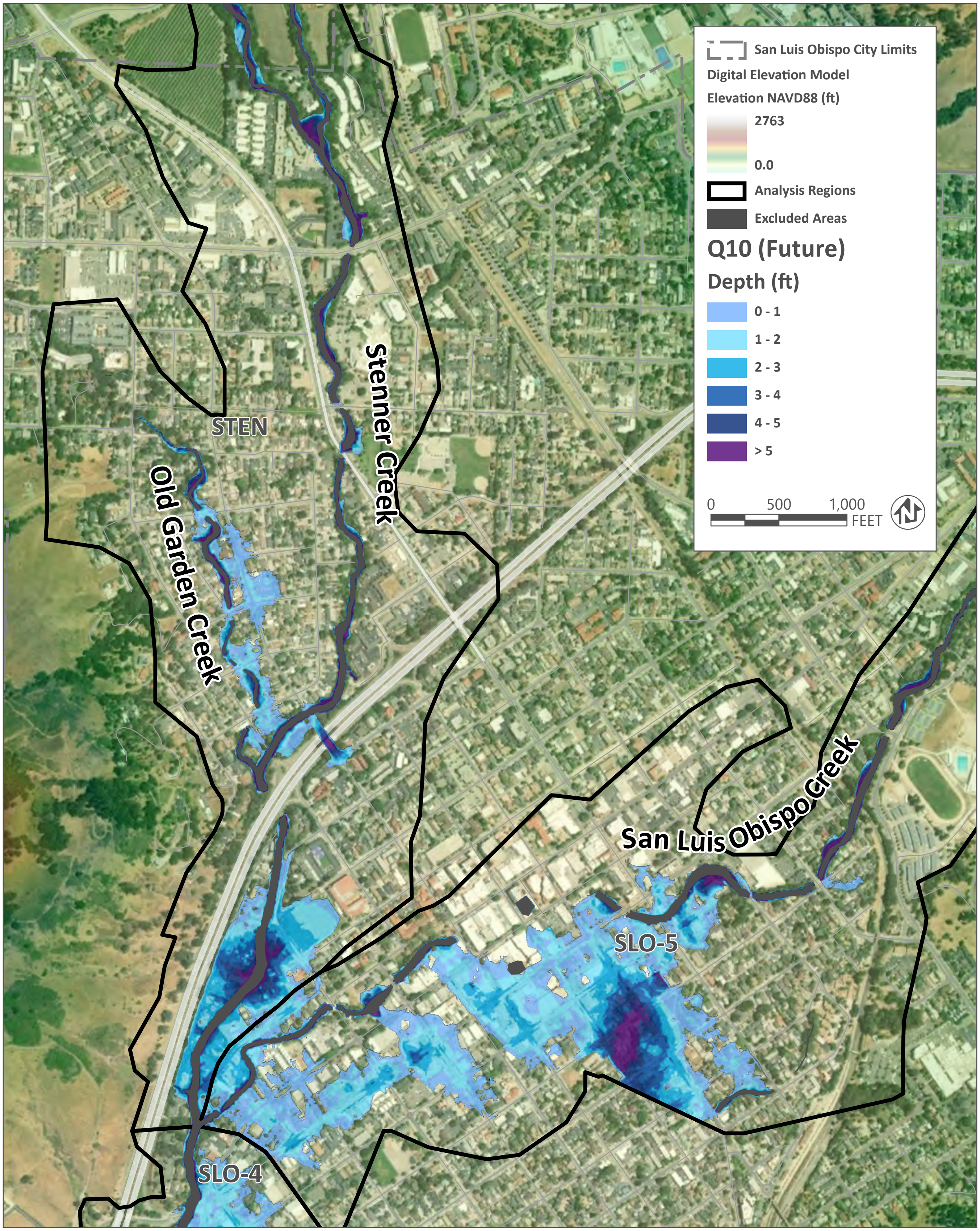
FEET
Stenner Creek
Old Garden Creek
STEN
San Luis Obispo Creek
SLO-5
SLO-4


San Luis Obispo City Limits
Digital Elevation Model
Elevation NAVD88 (ft)
2763
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Analysis Regions
Excluded Areas
Q10 (Future)
Depth (ft)
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1 - 2
2 - 3
3 - 4
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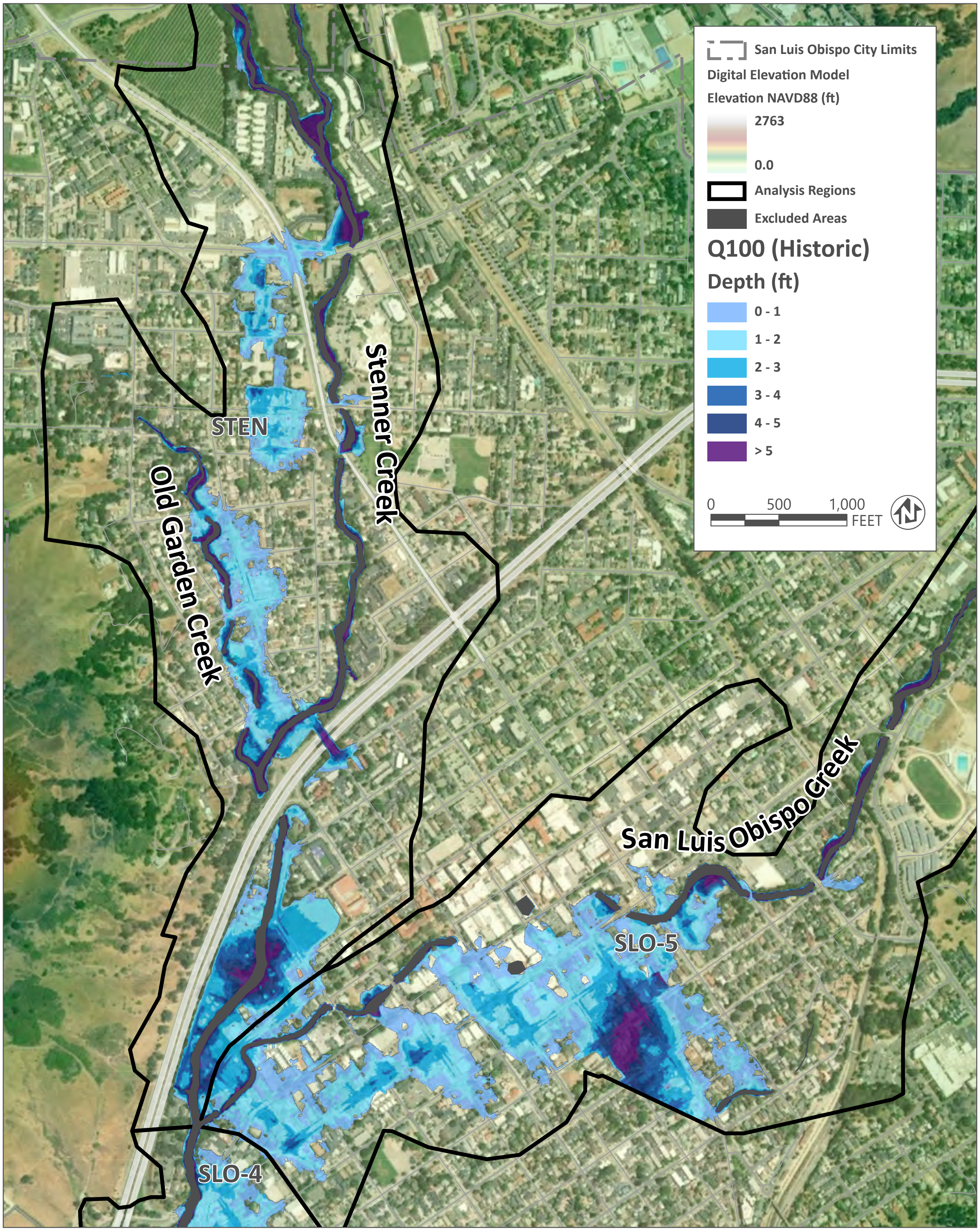
STEN
Stenner Creek
Old Garden Creek
San Luis Obispo Creek
SLO-5
SLO-4



San Luis Obispo City Limits
Digital Elevation Model
Elevation NAVD88 (ft)
2763
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Analysis Regions
Excluded Areas
Q100 (Historic)
Depth (ft)
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2 - 3
3 - 4
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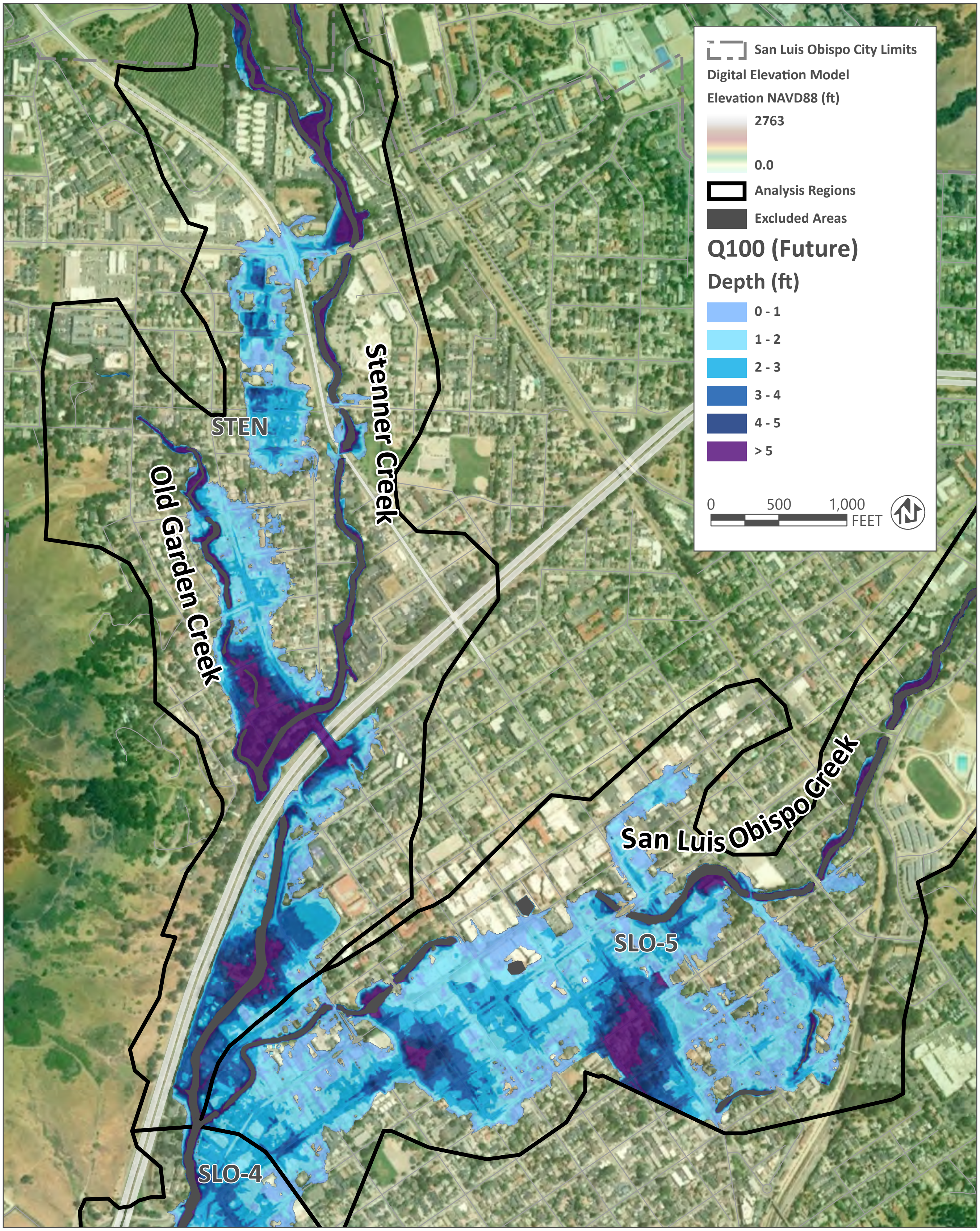
Stenner Creek
STEN
Old Garden Creek
San Luis Obispo Creek
SLO-5
SLO-4



San Luis Obispo City Limits
Digital Elevation Model
Elevation NAVD88 (ft)
2763
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Analysis Regions
Excluded Areas
Q100 (Future)
Depth (ft)
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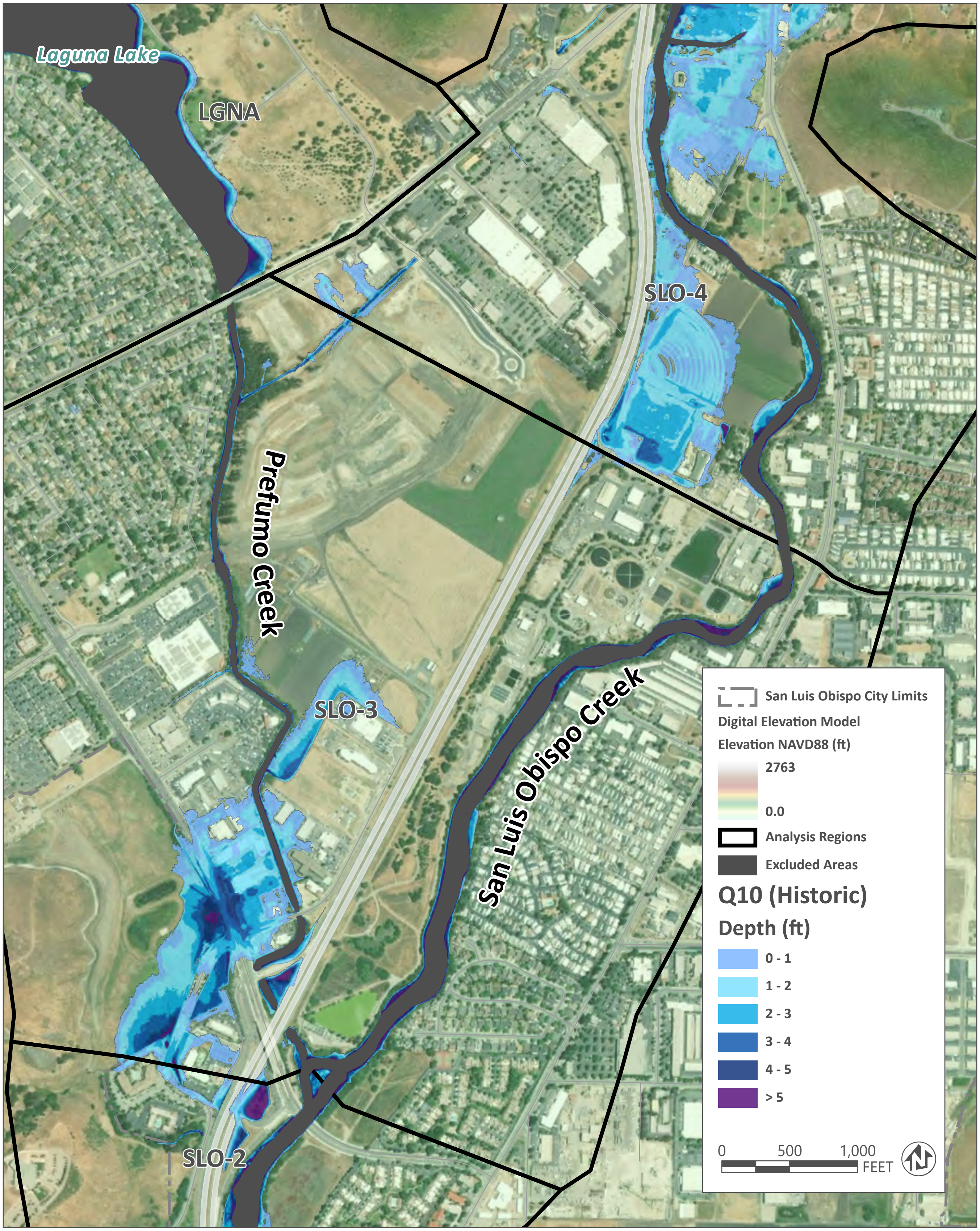
FEET
STEN
Stenner Creek
Old Garden Creek
San Luis Obispo Creek
SLO-5
SLO-4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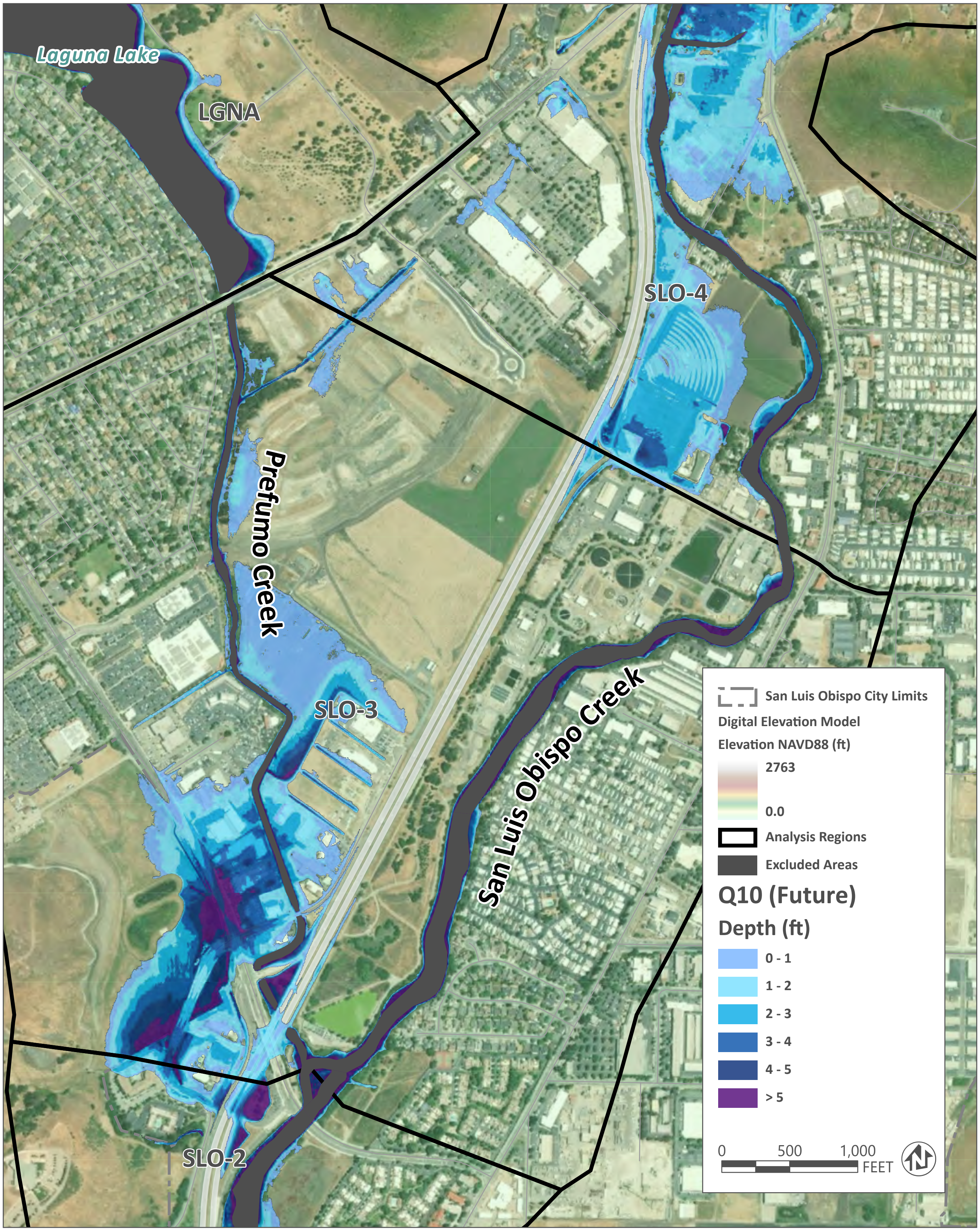

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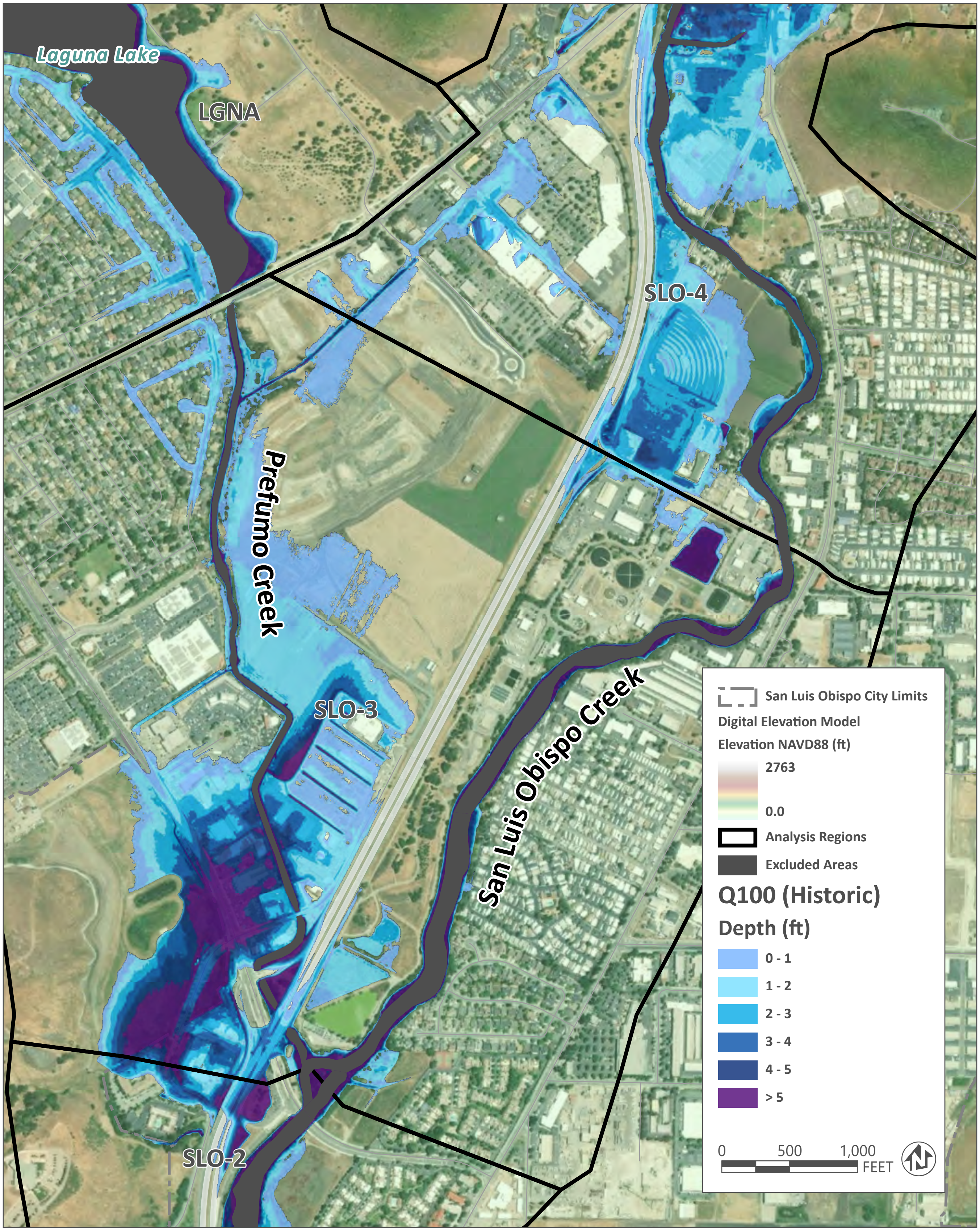

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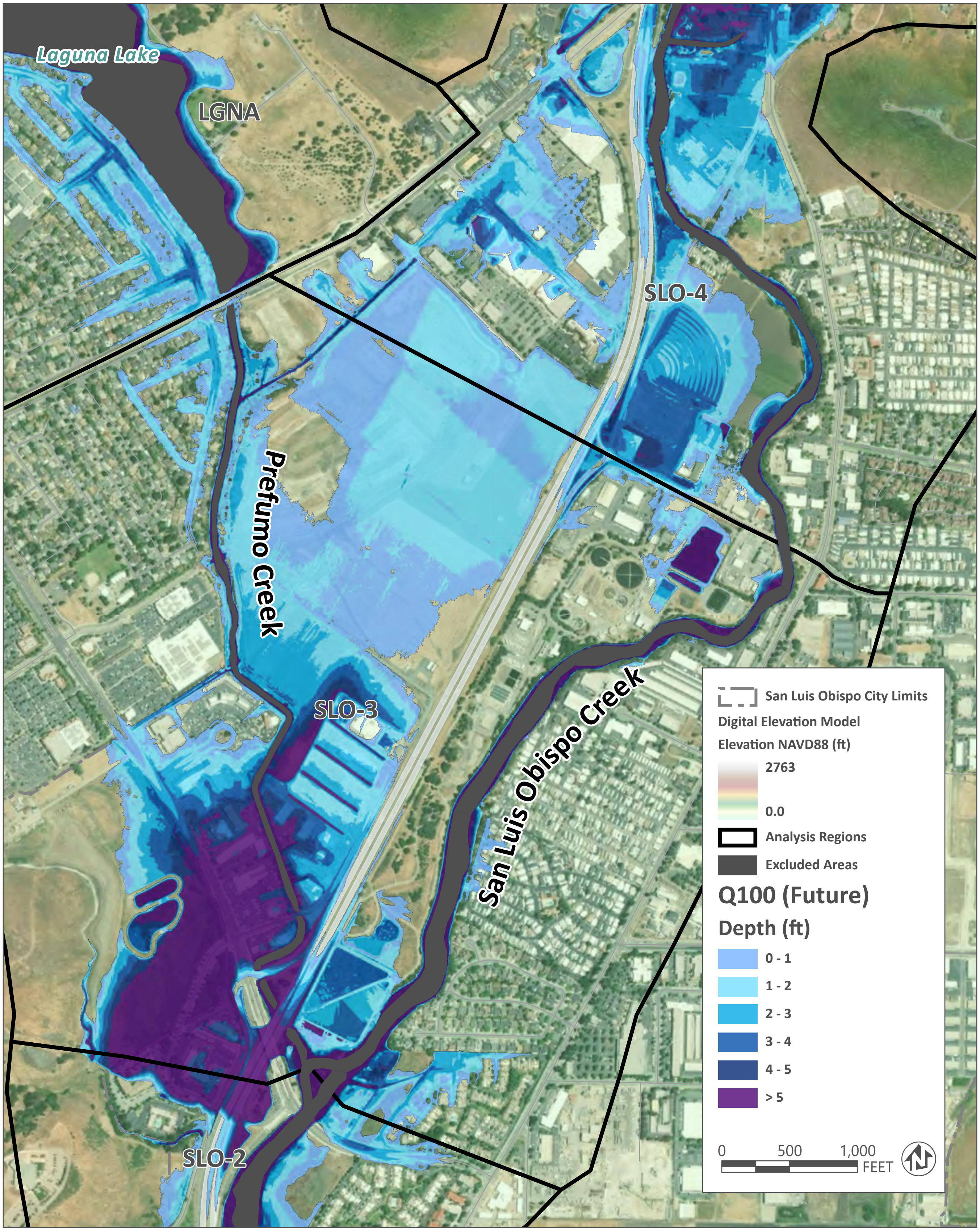

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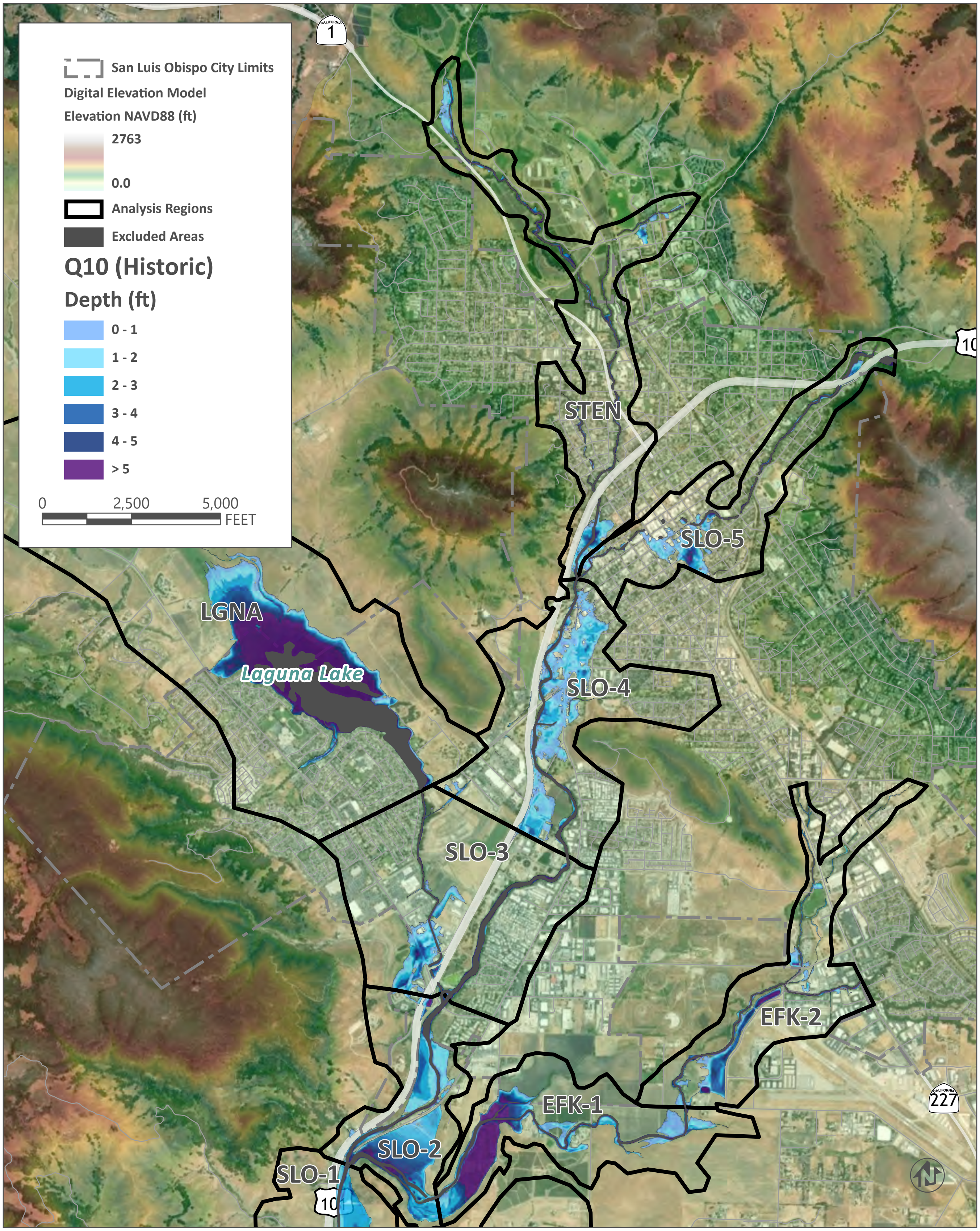
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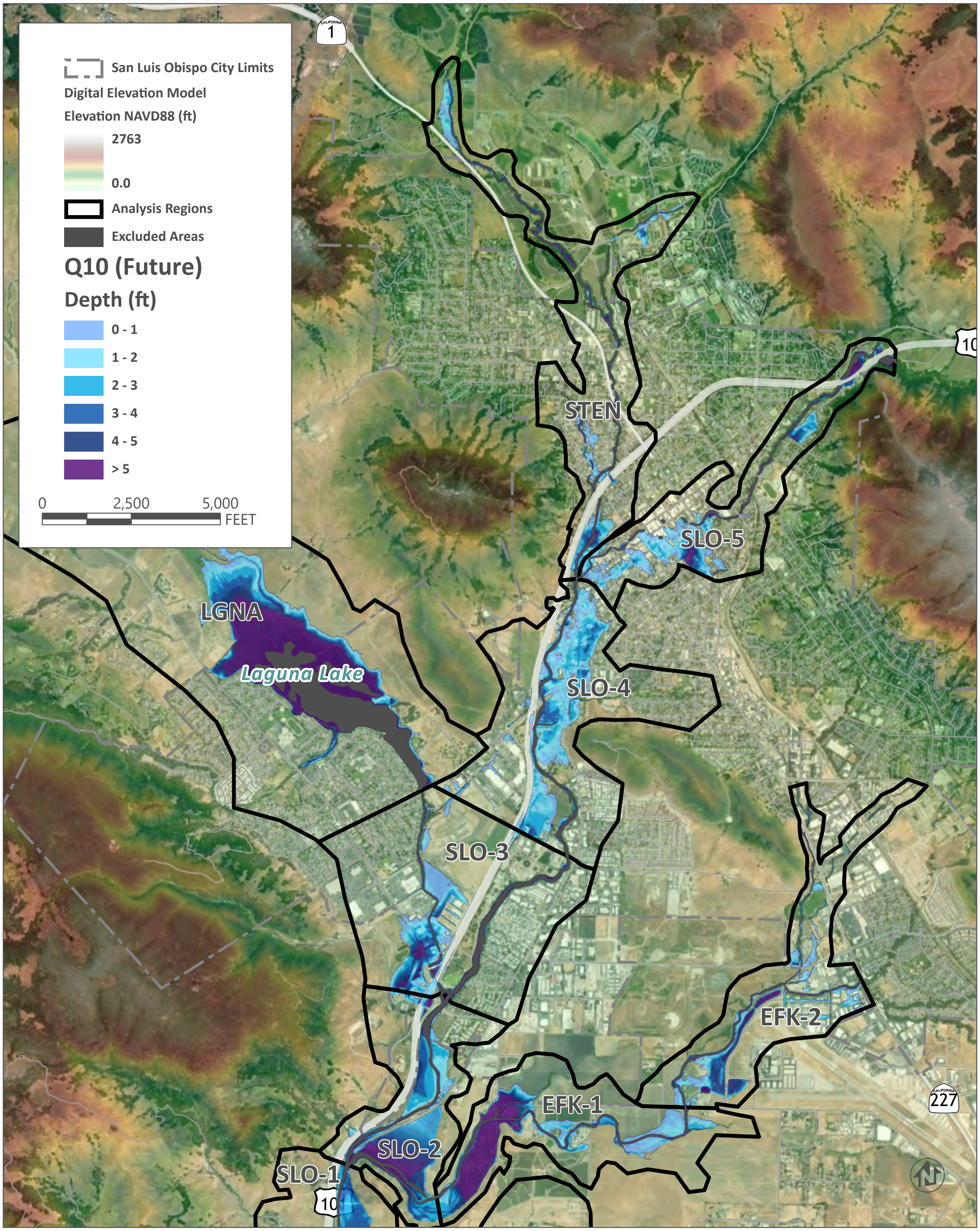

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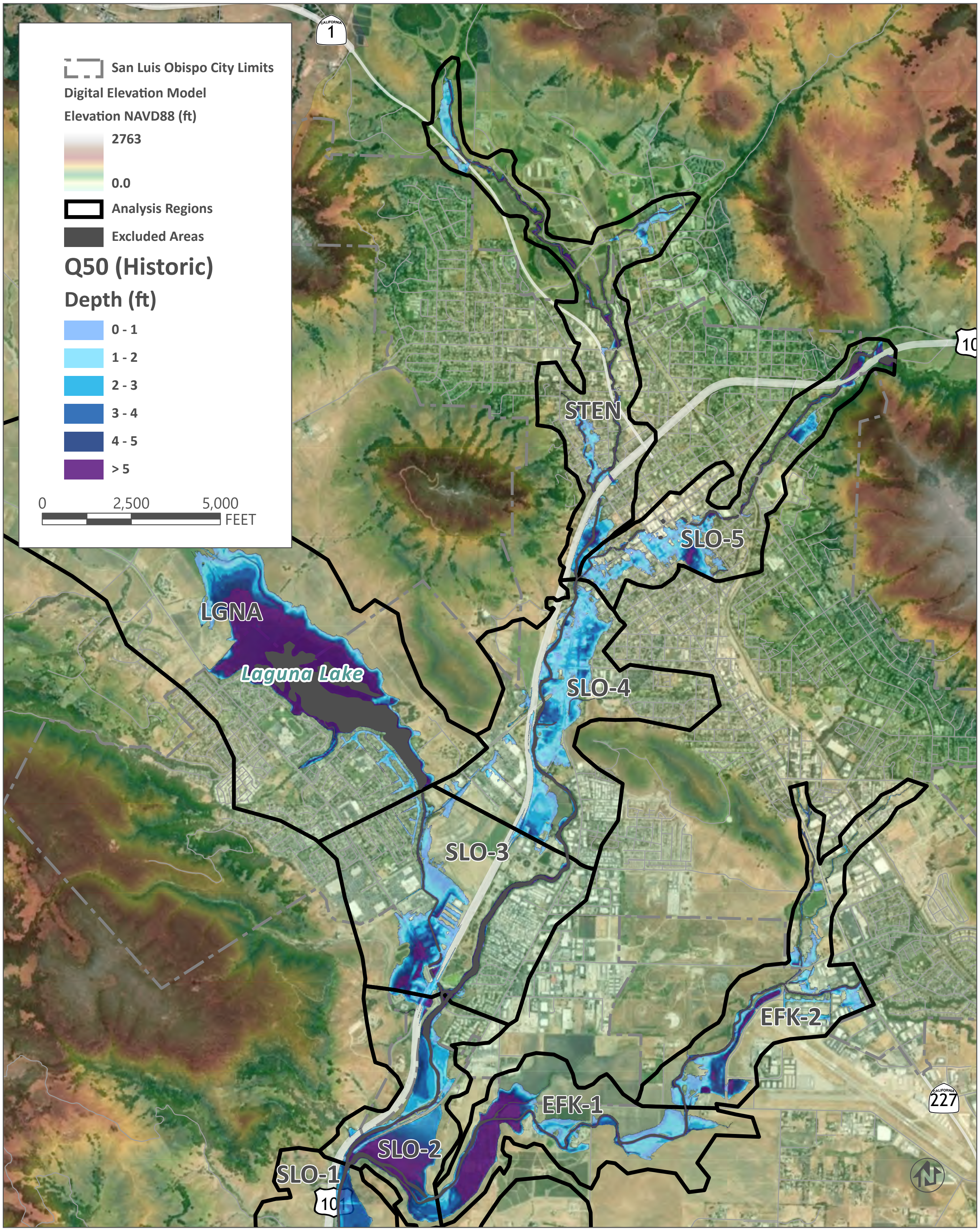

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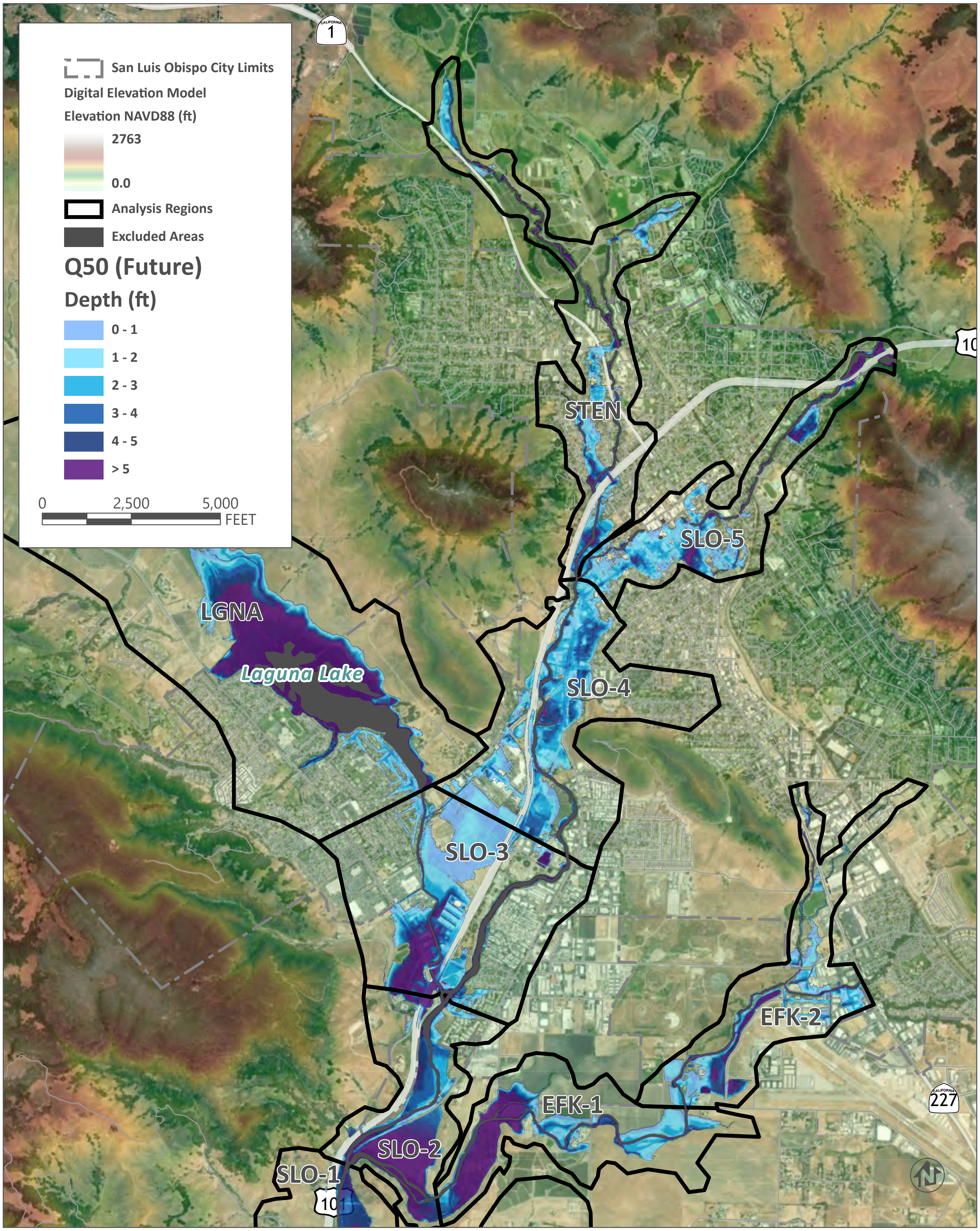
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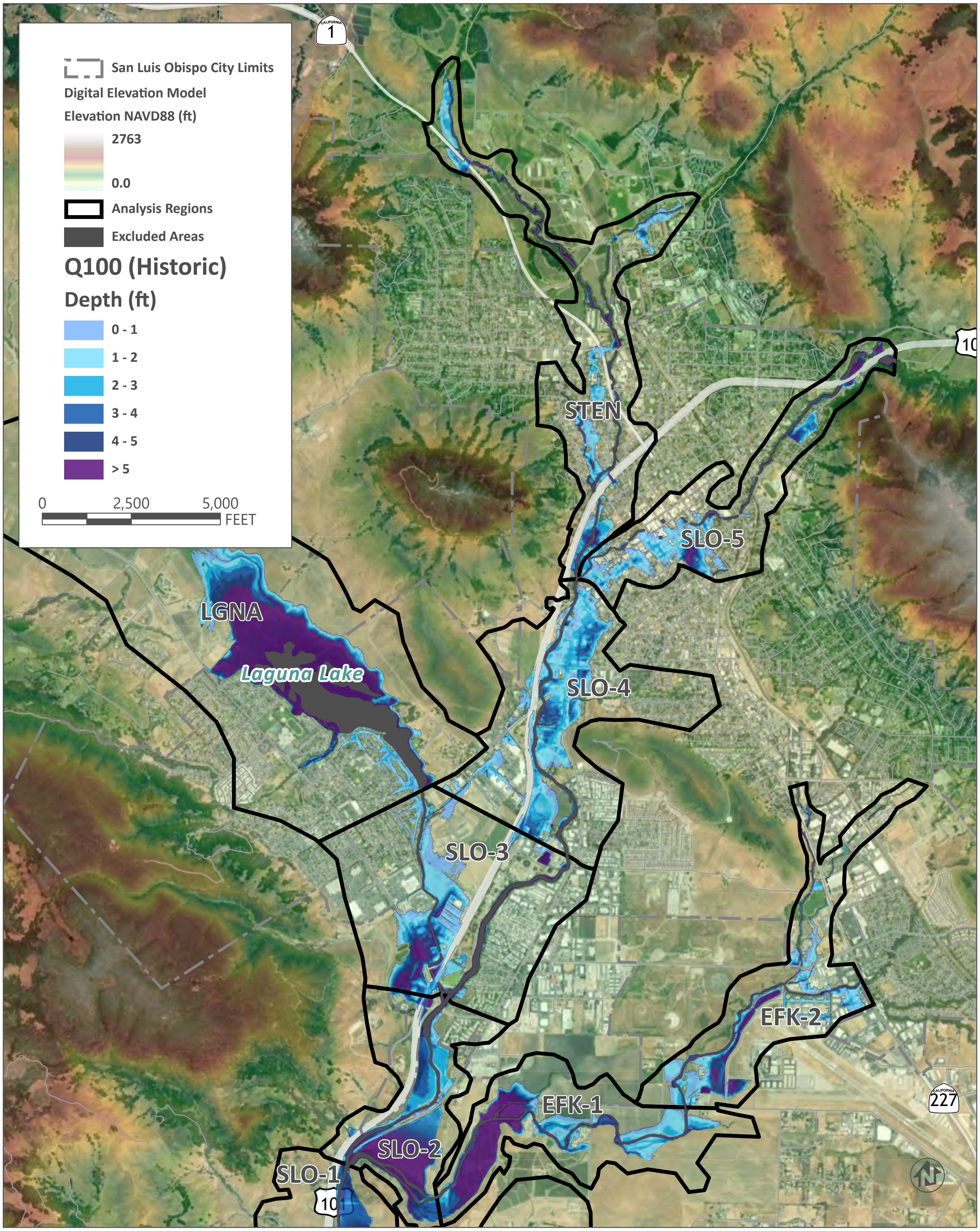

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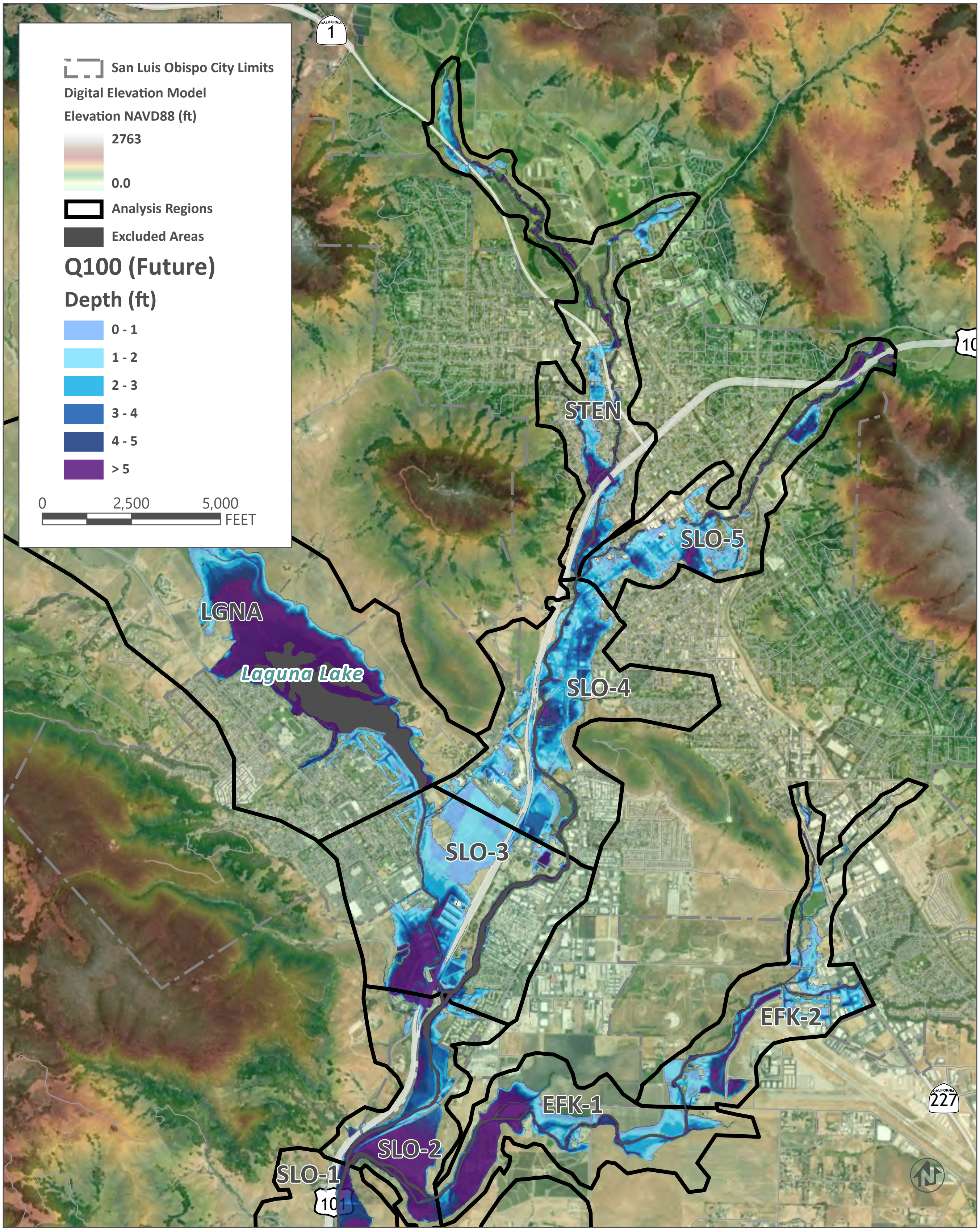

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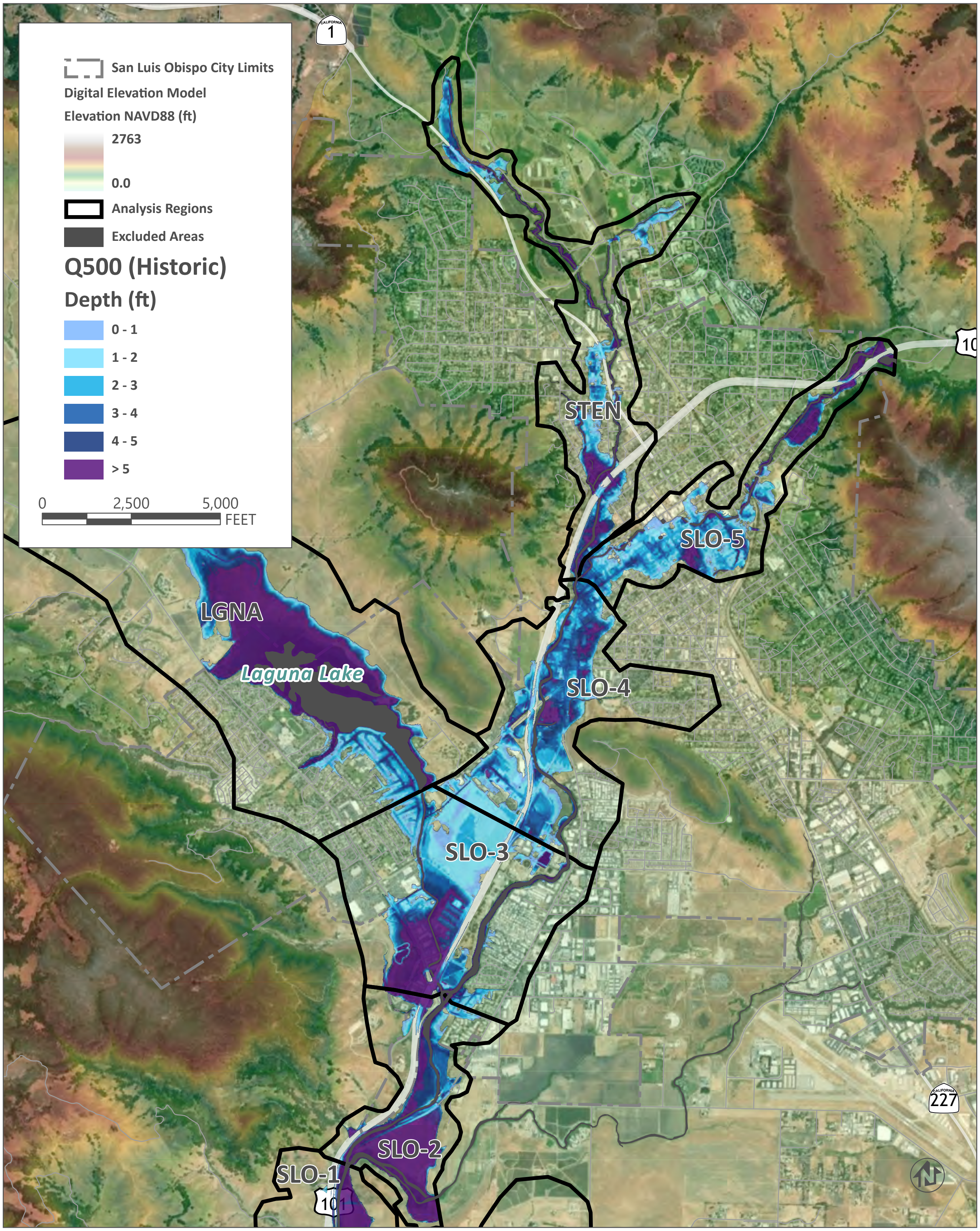

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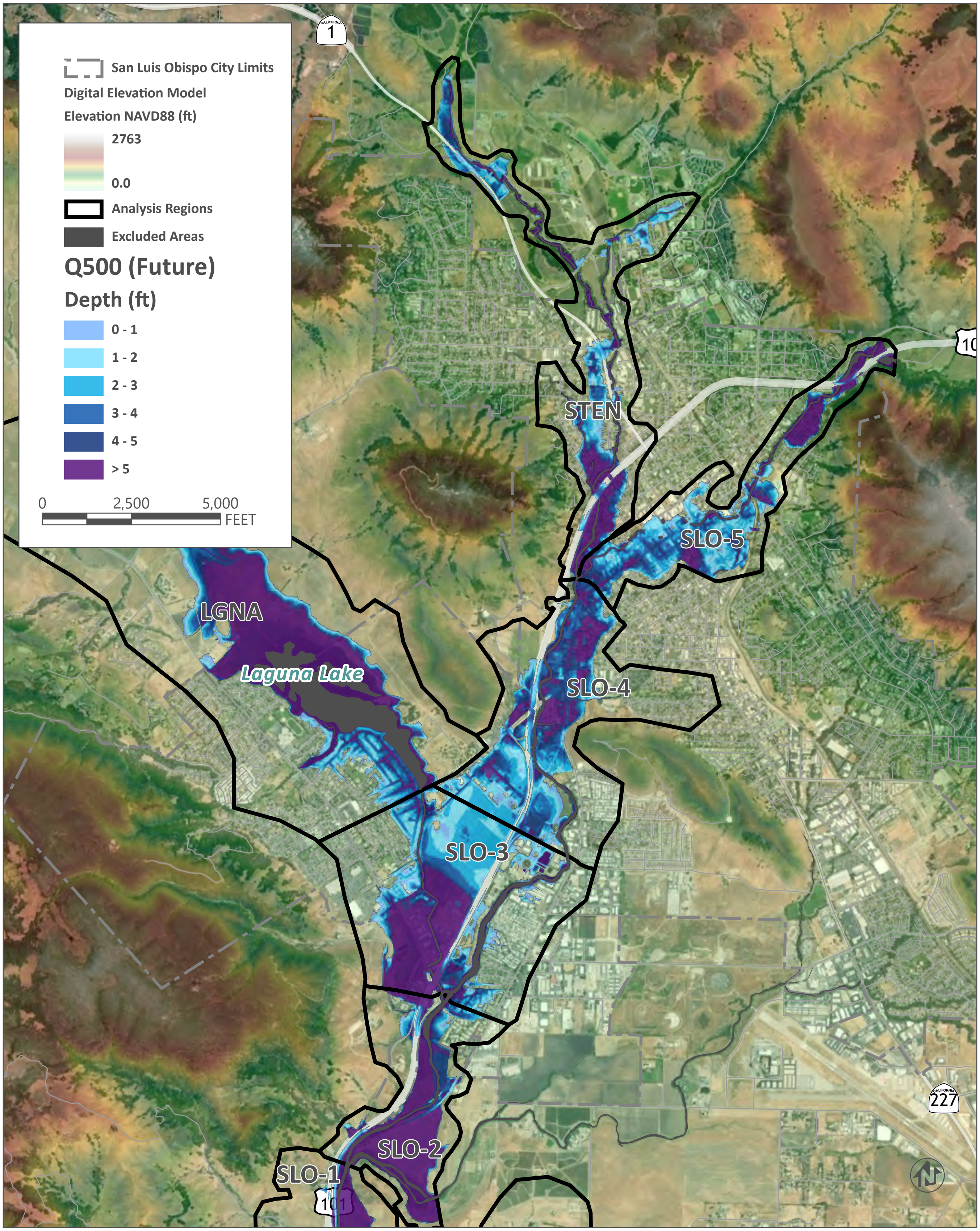
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Appendix A Compliance with State Laws and Regulations

Senate Bill 379 (Climate Change Adaptation and Resilience)

SB 379 (2015) mandates that climate adaptation and resilience are considered in safety elements. The legislation specifically requires that safety elements include a vulnerability assessment that identifies climate change impacts to the jurisdiction, and a suite of goals, policies, objectives, and feasible implementation measures to protect the community from risks posed by climate change.

Senate Bill 99 (Emergency Evacuation Routes)

SB 99 (2019) requires safety elements to include information that identifies residential developments in hazard areas without at least two emergency evacuation routes.

Assembly Bill 747 (Emergency Evacuation Routes)

Assembly Bill (AB) 747 (2019) requires that safety elements are reviewed and updated as needed to identify evacuation routes and their capacity, safety, and viability under a range of emergency scenarios. An adopted local hazard mitigation plan, emergency operations plan, or other document that fulfills these requirements, may be summarized, and incorporated by reference into the safety element to comply.

Senate Bill 1000 (Environmental Justice)

SB 1000 (2016) requires communities with disadvantaged communities to address environmental justice in the general plan. Disadvantaged communities are defined by State law and generally refer to areas disproportionately affected by environmental pollution or other hazards that can lead to negative health effects, exposure, or environmental degradation. Under the law, cities and counties with communities that meet the definition of disadvantaged under the law must address unique or compound health risks in these communities, promote civil engagement in the public decision-making process, and prioritize programs and improvements that address the needs of these communities. While the city does not have any State designated disadvantaged communities, some of its populations may be less resilient to hazards due to socioeconomic factors. Therefore, the City has voluntarily chosen to address environmental justice issues through this element.

Alquist-Priolo Earthquake Faulting Zone Act

The Alquist-Priolo Earthquake Faulting Zone Act was passed in 1971 with the intent of reducing risk of loss from surface fault rupture. The act provides guidance for cities on prohibiting development across the trace of active faults.

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) insures properties against flooding losses through the National Flood Insurance Program. The City has been a participant in the National Flood Insurance Program since April 16, 1979 and will continue to participate and remain in compliance with the National Flood Insurance Program. The City joined the Community Rating System on October 1, 1991, and currently has a Class 6 rating.

CODE+A1A 1:G23	LOCAL PLANNING REQUIREMENTS	TIMELINE / ENFORCEMENT	TOPIC	STATE GUIDANCE	LEGISLATION
§ 65302 g.1.	**SAFETY ELEMENT** A safety element for the protection of the community from any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence; liquefaction; and other seismic hazards, and other geologic hazards known to the legislative body; flooding; and wildland and urban fires.	Before preparing or revising its safety element, each city and county shall consult the California Geological Survey of the Department of Conservation, the Central Valley Flood Protection Board, if the city or county is located within the boundaries of the Sacramento and San Joaquin Drainage District, and the Office of Emergency Services for the purpose of including information known by and available to the department, the agency, and the board required by this subdivision. To the extent that a county's safety element is sufficiently detailed and contains appropriate policies and programs for adoption by a city, a city may adopt that portion of the county's safety element that pertains to the city's planning area in satisfaction of the requirement imposed by this subdivision.			
§ 65302 g.1.	Include mapping of known seismic and other geologic hazards.		Hazards		
§ 65302 g.1.	Address evacuation routes, military installations, peak load water supply requirements, and minimum road widths and clearances around structures, as those items relate to identified fire and geologic hazards.		Hazards		
§ 65302 g.2.A.	**Identify information regarding flood hazards, including but not limited to:**	Cities and counties that have flood plain management ordinances that have been approved by FEMA that substantially comply with this section, or have substantially equivalent provisions to this subdivision in their general plans, may use that information in the safety element to comply with this subdivision, and shall summarize and incorporate by reference into the safety element the other general plan provisions or the flood plain ordinance, specifically showing how each requirement of this subdivision has been met.	Flood		
§ 65302 g.2.A.i.	Flood hazard zones. As used in this subdivision, "flood hazard zone" means an area subject to flooding that is delineated as either a special hazard area or an area of moderate or minimal hazard on an official flood insurance rate map issued by FEMA. The identification of a flood hazard zone does not imply that areas outside the flood hazard zones or uses permitted within flood hazard zones will be free from flooding or flood damage.		Flood		
§ 65302 g.2.A.ii.	National Flood Insurance Program maps published by FEMA.		Flood		
§ 65302 g.2.A.iii.	Information about flood hazards that is available from the United States Army Corps of Engineers.		Flood		
§ 65302 g.2.A.iv.	Designated floodway maps that are available from the Central Valley Flood Protection Board.		Flood		
§ 65302 g.2.A.ix.	Historical data on flooding, including locally prepared maps of areas that are subject to flooding, areas that are vulnerable to flooding after wildfires, and sites that have been repeatedly damaged by flooding.		Flood		
§ 65302 g.2.A.v.	Dam failure inundation maps prepared pursuant to Section 6161 of the Water Code that are available from the Department of Water Resources.		Flood		
§ 65302 g.2.A.vi.	Awareness Floodplain Mapping Program maps and 200-year flood plain maps that are or may be available from, or accepted by, the Department of Water Resources.		Flood		
§ 65302 g.2.A.vii.	Maps of levee protection zones.		Flood		
§ 65302 g.2.A.viii.	Areas subject to inundation in the event of the failure of project or nonproject levees or floodwalls.		Flood		
§ 65302 g.2.A.x.	Existing and planned development in flood hazard zones, including structures, roads, utilities, and essential public facilities.		Flood		
§ 65302 g.2.A.xi.	Local, state, and federal agencies with responsibility for flood protection, including special districts and local offices of emergency services.		Flood		

§ 65302 g.2.B.	Establish a set of comprehensive goals, policies, and objectives based on flood hazard information for the protection of the community from the unreasonable risks of flooding, including but not limited to:		Flood		
§ 65302 g.2.B.i.	Avoiding or minimizing the risks of flooding to new development.		Flood		
§ 65302 g.2.B.ii.	Evaluating whether new development should be located in flood hazard zones, and identifying construction methods or other methods to minimize damage if new development is located in flood hazard zones.		Flood		
§ 65302 g.2.B.iii.	Maintaining the structural and operational integrity of essential public facilities during flooding.		Flood		
§ 65302 g.2.B.iv.	Locating, when feasible, new essential public facilities outside of flood hazard zones, including hospitals and health care facilities, emergency shelters, fire stations, emergency command centers, and emergency communications facilities or identifying construction methods or other methods to minimize damage if these facilities are located in flood hazard zones.		Flood		
§ 65302 g.2.B.v.	Establishing cooperative working relationships among public agencies with responsibility for flood protection.		Flood		
§ 65302 g.2.C.	Establish a set of feasible implementation strategies to carry out the goals, policies, and objectives established for the protection of the community from the unreasonable risks of flooding.		Flood		
§ 65302 g.3.	**Address the risk of fire for land classified as state responsibility areas, as defined in Section 4102 of the Public Resources Code, and land classified as very high fire hazard severity zones, as defined in Section 51177. Consider the advice included in the Office of Planning and Research's most recent publication of "Fire Hazard Planning, General Plan Technical Advice Series."**	Fire safety plan or document separate from the general plan, an attachment of, or reference to, a city or county's adopted fire safety plan or document that fulfills commensurate goals and objectives and contains information required pursuant to this paragraph.	Fire	OPR Fire Hazard Technical Advisory (2020 Public Review Draft)	
§ 65302 g.3.A.	Include information regarding fire hazards, including, but not limited to:		Fire		
§ 65302 g.3.A.i.	Fire hazard severity zone maps available from the Department of Forestry and Fire Protection.		Fire		
§ 65302 g.3.A.ii.	Any historical data on wildfires available from local agencies or a reference to where the data can be found.		Fire		
§ 65302 g.3.A.iii.	Information about wildfire hazard areas that may be available from the United States Geological Survey.		Fire		
§ 65302 g.3.A.iv.	General location and distribution of existing and planned uses of land in very high fire hazard severity zones and in state responsibility areas, including structures, roads, utilities, and essential public facilities. The location and distribution of planned uses of land shall not require defensible space compliance measures required by state law or local ordinance to occur on publicly owned lands or open space designations of homeowner associations.		Fire		
§ 65302 g.3.A.v.	Local, state, and federal agencies with responsibility for fire protection, including special districts and local offices of emergency services.		Fire		
§ 65302 g.3.B.	Include a set of comprehensive goals, policies, and objectives based on fire hazard information for the protection of the community from the unreasonable risk of wildfire.		Fire		
§ 65302 g.3.C.	A set of feasible implementation strategies to carry out the goals, policies, and objectives for the protection of the community from the unreasonable risk of wildfire.		Fire		
§ 65302 g.3.C.i.	Avoiding or minimizing the wildfire hazards associated with new uses of land.		Fire		
§ 65302 g.3.C.ii.	Locating, when feasible, new essential public facilities outside of high fire risk areas, including, but not limited to, hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities, or identifying construction methods or other methods to minimize damage if these facilities are located in a state responsibility area or very high fire hazard severity zone.		Fire		
§ 65302 g.3.C.iii.	Designing adequate infrastructure if a new development is located in a state responsibility area or in a very high fire hazard severity zone, including safe access for emergency response vehicles, visible street signs, and water supplies for structural fire suppression.		Fire		
§ 65302 g.3.C.iv.	Working cooperatively with public agencies with responsibility for fire protection.		Fire		

§ 65302 g.4.	**Address climate adaptation and resiliency strategies applicable to the city or county. Consider advice provided in the Office of Planning and Research's General Plan Guidelines.**	If a city or county has adopted the local hazard mitigation plan, or other climate adaptation plan or document that fulfills commensurate goals and objectives and contains the information required pursuant to this paragraph, separate from the general plan, an attachment of, or reference to, the local hazard mitigation plan or other climate adaptation plan or document. Cities or counties that have an adopted hazard mitigation plan, or other climate adaptation plan or document that substantially complies with this section, or have substantially equivalent provisions to this subdivision in their general plans, may use that information in the safety element to comply with this subdivision, and shall summarize and incorporate by reference into the safety element the other general plan provisions, climate adaptation plan or document, specifically showing how each requirement of this subdivision has been met.	Adaptation	OPR General Plan Guidelines	SB-379 (2015) Vulnerability Assessment and Hazard Mitigation Plan in Safety Element
§ 65302 g.4.A.	Include a vulnerability assessment that identifies the risks that climate change poses to the local jurisdiction and the geographic areas at risk from climate change impacts.		Adaptation	Cal-Adapt, 2020 California Adaptation Planning Guide	
§ 65302 g.4.B.	Include a set of adaptation and resilience goals, policies, and objectives based on the information specified in the vulnerability assessment for the protection of the community.		Adaptation		
§ 65302 g.4.C.	Include a set of feasible implementation measures designed to carry out the goals, policies, and objectives identified for the protection of the community.		Adaptation		
§ 65302 g.4.C.i.	Feasible methods to avoid or minimize climate change impacts associated with new uses of land.		Adaptation		
§ 65302 g.4.C.ii.	The location, when feasible, of new essential public facilities outside of at-risk areas, including, but not limited to, hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities, or identifying construction methods or other methods to minimize damage if these facilities are located in at-risk areas.		Adaptation		
§ 65302 g.4.C.iii.	The designation of adequate and feasible infrastructure located in an at-risk area.		Adaptation		
§ 65302 g.4.C.iv.	Guidelines for working cooperatively with relevant local, regional, state, and federal agencies.		Adaptation		
§ 65302 g.4.C.v.	The identification of natural infrastructure that may be used in adaptation projects, where feasible. Where feasible, the plan shall use existing natural features and ecosystem processes, or the restoration of natural features and ecosystem processes, when developing alternatives for consideration. For purposes of this clause, "natural infrastructure" means using natural ecological systems or processes to reduce vulnerability to climate change related hazards, or other related climate change effects, while increasing the long-term adaptive capacity of coastal and inland areas by perpetuating or restoring ecosystem services. This includes, but is not limited to, the conservation, preservation, or sustainable management of any form of aquatic or terrestrial vegetated open space, such as beaches, dunes, tidal marshes, reefs, seagrass, parks, rain gardens, and urban tree canopies. It also includes systems and practices that use or mimic natural processes, such as permeable pavements, bioswales, and other engineered systems, such as levees that are combined with restored natural systems, to provide clean water, conserve ecosystem values and functions, and provide a wide array of benefits to people and wildlife.		Adaptation		
§ 65302 g.5.	**Identify residential developments in any hazard area identified in the safety element that do not have at least two emergency evacuation routes**	Upon the next revision of the housing element on or after January 1, 2020.	Evacuation		SB-99 (2019) General Plans/Safety Element/Emergency Evacuation
§ 65302 g.6.	**Review and, if necessary, revise the safety element to identify new information relating to flood and fire hazards and climate adaptation and resiliency strategies applicable to the city or**	Upon each revision of the housing element or local hazard mitigation plan, but not less than once every eight years.	Adaptation		SB-1035 (2018) General Plans
§ 65302 h.1.	**ENVIRONMENTAL JUSTICE ELEMENT** An environmental justice element, or related goals, policies, and objectives integrated in other elements, that identifies disadvantaged communities within the area covered by the general plan of the city, county, or city and county, if the city, county, or city and county has a disadvantaged community. "Disadvantaged community" - low income area that is disproportionately affected by environmental	A city, county, or city and county subject to this subdivision shall adopt or review the environmental justice element, or the environmental justice goals, policies, and objectives in other elements, upon the adoption or next revision of two or more elements concurrently on or after January 1, 2018.		General Plan Guidelines Chapter 4: Environmental Justice Element	SB-1000 (2016) Environmental Justice Requirements in General Plan
§ 65302 h.1.A.	Identify objectives and policies to reduce the unique or compounded health risks in disadvantaged communities by means that include, but are not limited to, the reduction of pollution exposure, including		Environmental Justice		
§ 65302 h.1.B.	Identify objectives and policies to promote civic engagement in the public decisionmaking process.		Environmental Justice		
§ 65302 h.1.C.	Identify objectives and policies that prioritize improvements and programs that address the needs of disadvantaged communities.		Environmental Justice		

G.1 Community Profile

G.1.1 Mitigation Planning History and 2019 Process

Annex G, City of San Luis Obispo (City), was created during the development of the 2019 Multi-Jurisdictional San Luis Obispo Hazard Mitigation Plan update (HMP). This Jurisdictional Annex builds upon and supersedes the 2014 City of San Luis Obispo Local Hazard Mitigation Plan (LHMP). The 2014 Plan was not integrated into the City's Land Use Element; that integration will be done after the approval of this updated Plan. The General Plan Safety Element references the 2014 Local Hazard Mitigation Plan in Chapter 5:

- Additional information on hazards in the San Luis Obispo area can be found in the Technical Background Report for the San Luis Obispo County and Cities Safety Element (June 1999). Additionally, the City of San Luis Obispo Local Hazard Mitigation Plan presents a comprehensive risk assessment of natural hazards that have the potential to affect the City of San Luis Obispo. The Local Hazard Mitigation Plan was developed by the City in accordance with the Federal Disaster Mitigation Act of 2000, adopted by the City Council and approved by the Federal Emergency Management Agency. The Local Hazard Mitigation Plan suggests possible mitigation actions for reducing the effects of potential hazards. It is incorporated by reference into the Safety Element and should be consulted when addressing known hazards to ensure the general health and safety of people within the City of San Luis Obispo. The goals and policies within this Safety Element support and are consistent with the recommended mitigation strategy within the Local Hazard Mitigation Plan.

The City had representation on the County multi-jurisdictional Hazard Mitigation Planning Committee and utilized a Local Planning Team (LPT) subcommittee to develop input into the annex.

Table G.1 City of San Luis Obispo Local Planning Team

Department or Stakeholder	Title
Fire Department	Fire Chief
Fire Department	Fire Marshall
Fire Department	Administrative Analyst
Administration	Natural Resources Manager
Administration	Sustainability Manager

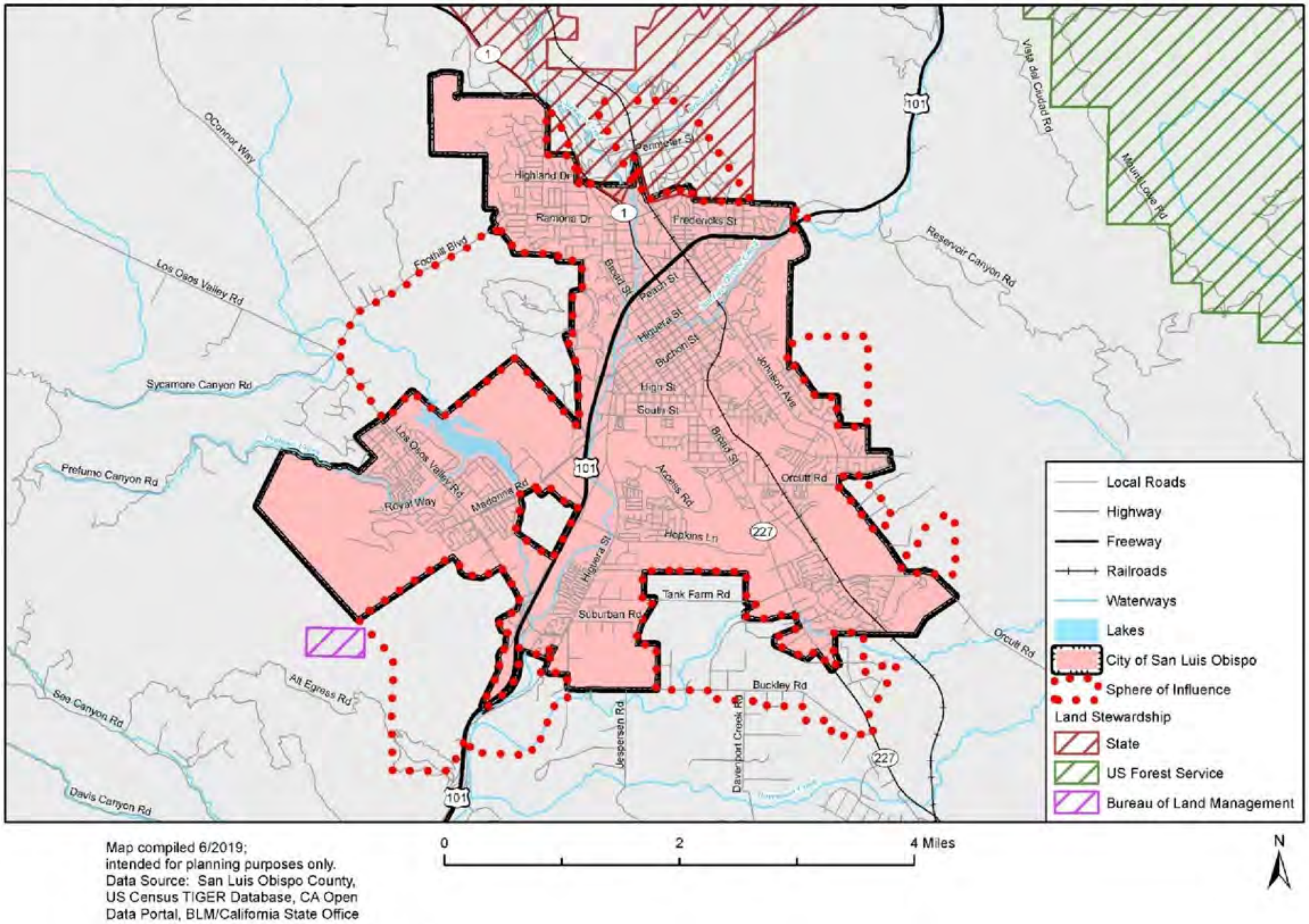
More details on the planning process and participating jurisdictions, service districts and stakeholders can be found in Section 3 of the Base Plan, along with the public's role during the 2019 update.

G.1.2 Geography and Climate

The City is located in California's Central Coast region approximately 200 miles north of Los Angeles and 230 miles south of San Francisco. The City is situated to the west of the Santa Lucia Mountains and is located eight miles east of the Pacific Ocean. The San Luis Obispo Creek originates from the mountains and flows westward in confluence with the Pacific Ocean at Avila Beach. The mountain ranges form a natural barrier to development in San Luis Obispo. The City is an estimated 10.7 square miles and is surrounded by protected open space and productive agricultural lands. San Luis Obispo is regionally accessible via US Highway 1, US Highway 101, and State Route 227 (Broad Street). The City terrain stands at an average elevation of 300 feet above sea level, with prominent peaks such as Cerro San Luis and Bishop Peak at 1,292 and 1,559 feet, respectively, above sea level.

The City's Sphere of Influence includes approximately 5,930+/- acres outside of the City limits and includes nine unincorporated areas: Cal Poly, Florita-Alrita, Orcutt, Broad Street, Airport, Chevron, Los Osos Valley Road/US Highway 101, San Luis Ranch, and Cerro San Luis area. All lands outside of the City's Sphere of Influence are regulated by the San Luis Obispo County General Plan and zoning designations. State law requires that cities maintain plans for areas outside of their immediate jurisdiction if the areas have a direct relationship to planning needs.

Figure G.1 The City of San Luis Obispo



San Luis Obispo is characterized by a Mediterranean climate with an average temperature of 70.2 degrees Fahrenheit. While generally considered a mild climate, weather patterns and events have historically observed both unseasonably warm periods and cold spells. The City receives an average precipitation of 19 inches per year, with increased amounts of rainfall in the winter and spring months between November and April (US Climate Data 2019). Due to its close proximity to the Pacific Ocean, San Luis Obispo is also subject to coastal weather influences such as dense fog that typically rolls into the City through the Chorro Valley, steady on-shore wind patterns, and coastal storms. For general details on climate characteristics of the region refer to the Adverse Weather Section of the Risk Assessment in the HMP (Section 5.3.1).

G.1.3 History

The native Chumash Tribe was the first known settled human population in the City of San Luis Obispo area. The Chumash established a network of villages along the San Luis Obispo Creek. Spanish Colonization of the area began in 1769 with the founding of Mission San Luis Obispo de Tolosa in 1772 by Father Junipero Serra, resulting in devastating impacts to the Chumash culture. Diseases and significant alterations of culture due to the establishment of the mission caused a significant decrease in the Native American population. Spanish and Mexican ranchos were established in the area in the late 1700s. The development of the area of San Luis Obispo has historically been connected to the San Luis Obispo Creek, where the first settlements could be found, and to the emphasis on agricultural production by the Mission and later the adjacent ranchos.

The California Land Act of 1851 caused a shift to residential development in San Luis Obispo. By 1870, the community had grown to a population of 1,579 and it became a charter city in 1876. Historic influences on the growth and development of San Luis Obispo include the City's beginnings as a center for agricultural productivity, the extension of the Southern Pacific Railroad in 1894, and the establishment of California Polytechnic State University (Cal Poly) in 1901.

Agriculture, transportation, government, and education related activities continue to play a significant role in the demographic, economic, land use, and development characteristics of the City. These characteristics and proactive protection of the City's natural and scenic resources contribute to the small-town charm and high quality of life of the City's residents.

G.1.4 Economy

As the civic, economic, and cultural hub of the Central Coast, the City serves as the seat of the County of San Luis Obispo. With major regional employers such as Cal Poly, state agencies, PG&E, Tenet Health Care, and the County of San Luis Obispo, the City has an estimated daytime population of more than 70,000 people. The San Luis Obispo Chamber of Commerce and the Downtown Association are active collaborators and leaders in supporting the retention and expansion of local businesses in the City. The City's leading industries include hospitality, food services, retail, professional services, health care, information and technology, public administration, and educational sectors.

To support the high quality of life and economic vitality of the community, San Luis Obispo is considered a full-service city, providing police, fire, water, sewer, streets, transit, parking, planning, building, engineering, and parks and recreation services to the community.

Select estimates of economic characteristics for the City of San Luis Obispo are shown in Table G.2.

Table G.2 City of San Luis Obispo Economic Characteristics, 2017

Characteristic	City of San Luis Obispo
Families below Poverty Level	6.9%
All People below Poverty Level	32.4%
Median Family Income	$87,635
Median Household Income	$49,640
Per Capita Income	$29,748
Population in Labor Force	25,363
Population Employed*	41,668
Unemployment	1,128

Source: U.S. Census Bureau American Community Survey 2017, www.census.gov/
*Excludes armed forces

Table G.3 and Table G.4 show the occupational and industry breakdown of the City of San Luis Obispo's labor force based on estimates from the 2017 American Community Survey.

Table G.3 City of San Luis Obispo's Employment by Occupation, 2017

Occupation	# Employed	% Employed
Sales and Office Occupations	5,630	21.6%
Management, Business, Science, and Arts Occupations	10,777	44.5%
Natural Resources, Construction, and Maintenance Occupations	934	3.9%
Production, Transportation, and Material Moving Occupations	1,632	6.7%
Service Occupations	5,240	21.6%
Total	**24,213**	

Source: U.S. Census Bureau American Community Survey 2017, www.census.gov/
*Excludes armed forces

Table G.4 City of San Luis Obispo's Employment by Industry, 2017

Industry	# Employed	% Employed
Retail Trade	3,044	12.6%
Professional, Scientific, and Mgmt., and Administrative and Waste Mgmt. Services	2,879	11.9%
Manufacturing	1,585	6.5%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	4,292	17.7%
Construction	886	3.7%
Finance and Insurance, and Real Estate and Rental and Leasing	846	3.5%
Public Administration	948	3.9%
Other Services, Except Public Administration	1,281	5.3%
Wholesale Trade	509	2.1%
Transportation and Warehousing, and Utilities	731	3.0%
Agriculture, Forestry, Fishing and Hunting, and Mining	269	1.1%
Information	457	1.9%
Educational Services, and Health Care, and Social Assistance	6,486	26.8%
Total	**24,213**	

Source: U.S. Census Bureau American Community Survey 2017, www.census.gov/

G.1.5 Population

In May 2019, the State Department of Finance released preliminary population data for the state to reflect wildfire-driven changes to local populations. The City of San Luis Obispo has a population of 46,802 persons as of January 2019, which accounts for approximately 16.7% of the County's population. The City experienced a growth of 0.1% from 46,741 residents from January 2018 (Department of Finance 2019). The U.S. Census Bureau's American Community Survey 2017 5-Year Estimates provide select demographic and social characteristics and changes from 2012 to 2017 for the City of San Luis Obispo (Table G.5).

Table G.5 City of San Luis Obispo's Demographic and Social Characteristics, 2012 to 2017

Characteristic	2012	2017
Population	270,121	280,119
Median Age	39.3	39.0
Total Housing Units	117,318	120,182
Housing Occupancy Rate	86.7%	87.4%
% of Housing Units with no Vehicles Available	4.5%	4.5%
Median Home Value	$449,300	$499,800
Unemployment	8.7%	4.8%
Mean Travel Time to Work (minutes)	20.9	21.8
Median Household Income	$59,628	$67,175
Per Capita Income	$30,218	$33,972
% of Individuals Below Poverty Level	13.7%	13.8%
# of Households	101,708	105,044
Average Household Size	2.49	2.51
% of Population Over 25 with High School Diploma	89.5%	90.5%
% of Population Over 25 with Bachelor's Degree or Higher	31.5%	34.0%
% with Disability	11.1%	11.1%
% Speak English less than "Very Well"	6.7%	6.8%

Source: U.S. Census Bureau American Community Survey 2017 5-Year Estimates, www.census.gov/

Between 1950 and 1990, the City grew from a population of 14,180 to just under 42,000. Since 1990, the City has maintained an average growth rate of less than one percent per year. Owner-occupied housing units account for 39% of all households, while approximately 61% of households are renter-occupied. The City's population is growing steadily at a relatively slow rate at approximately 1% or less per year with an estimated of 5.3% growth since the 2010 Census. The SLO 2035 Land Use and Circulation Elements update provides population estimates

Table G.6 City of San Luis Obispo Population Growth

Year	Approximate Maximum Number of Housing Units	Projected Population
2013	20,697	45,541
2015	21,113	46,456
2020	22,190	48,826
2025	23,322	51,317
2030	24,512	53,934
2035	25,762	56,686

Source: SLO 2035 Land Use Element Update

G.1.6 Development Trends

The City has traditionally expanded through annexation of County lands and increased development of diverse land uses; these include low to high density residential, general retail and commercial, services, and manufacturing uses bordering the San Luis Obispo Regional Airport, and dispersed undeveloped open space. With Mission Plaza and downtown at the heart of the City, development trends have included transition from the historic neighborhoods immediately adjacent to Downtown, to post-World War II growth in areas along the foothills of the Santa Lucia Mountains, surrounding Laguna Lake, and in the northern areas of town near the growing Cal Poly. Recent development efforts have focused on incorporating additional housing opportunities in the historic downtown core, through the renovation of historic structures and infill development on underutilized and vacant land. The Land Use Element of the City's General Plan provides designated land use and establishes development standards for new and existing structures and uses. The Safety Element further identifies hazards that may influence the locations and types of proposed land uses and provides policies that reduce exposure to hazards. These policies have also encouraged changes to development in San Luis Obispo's hazard prone/vulnerable areas, decreasing the City's vulnerability. Any future development within the City will be informed by the most up to date hazard maps as well as state and local development ordinances (e.g. floodplain) that restrict development in hazard prone areas to minimize risk.

In recent years, more residents and visitors are staying and living in the downtown core. This change in demographic could impact response capabilities if a hazard impacts the downtown core. The City also has a greenbelt protection program and have acquired thousands of acres of land around the City to minimalize development in areas around the City. Thus, the redevelopment of already developed areas or infill development is likely to be the trend in the future.

Specific to hazards, continuing moderate population growth is increasing exposure to earthquake hazards, though new or re-developed areas built to modern codes will be more resistant to collapse and damage.

G.2 Hazard Identification and Summary

San Luis Obispo's planning team identified the hazards that affect the region and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the City (see Table G.7). There are no hazards that are unique to the City. The overall hazard significance takes into account the geographic area, probability and magnitude as a way to identify priority hazards for mitigation purposes. This is discussed further in the Vulnerability Section (4.3).

Table G.7 City of San Luis Obispo – Hazard Summaries

Hazard	Geographic Area	Probability of Future Occurrence	Magnitude/ Severity (Extent)	Overall Significance
Adverse Weather: Thunderstorm/ Heavy Rain/Hail/Lightning/Dense Fog/Freeze	Extensive	Likely	Limited	Medium
Adverse Weather: High Wind/ Tornado	Extensive	Occasional	Limited	Medium
Adverse Weather: Extreme Heat	Extensive	Occasional	Negligible	Low
Agricultural Pest Infestation and Disease	Limited	Highly Likely	Negligible	Medium
Biological Agents	Extensive	Occasional	Critical	Medium
Drought and Water Shortage	Extensive	Likely	Limited	Medium
Earthquake	Extensive	Occasional	Catastrophic	High
Flood	Limited	Occasional	Limited	Medium
Landslides and Debris Flow	Limited	Occasional	Limited	Low
Subsidence	Significant	Occasional	Negligible	Low
Wildfire	Significant	Occasional	Limited	Medium
Human Caused: Hazardous Materials	Significant	Highly Likely	Negligible	Medium

Geographic Area
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year or happens every year.
Likely: Between 10-100% chance of occurrence in next year or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.

Magnitude/Severity (Extent)
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

G.3 Vulnerability Assessment

The intent of this section is to assess the City's vulnerability separately from that of the County as a whole, which has already been assessed in Chapter 5 of the Base Plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance specific to the City.

The information to support the hazard identification and risk assessment was based on a combination of the pervious previous LHMP for the City and jurisdiction specific information collected during the 2019 update. A Local Hazard Mitigation Plan Update Guide and associated worksheets were distributed to each participating municipality or special district to complete during the 2019 update process. Information collected was analyzed and summarized in order to identify and rank all the hazards within the County, as well as to rank the hazards and identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the Base Plan (See Table 5.2). However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to each jurisdiction (See Table G.7).

Note: The hazard "Significance" reflects overall ranking for each hazard and is based on the City of San Luis Obispo LPT member input from the Data Collection Guide and the risk assessment developed during the planning process (see Chapter 5 of the Base Plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Table G.7 reflect the hazards that could potentially affect City. The discussion of vulnerability for each of the following hazards is located in Section G.3.2 Estimating Potential Losses. Based on this analysis, the highest priority hazard (High Significance) for mitigation is Earthquake. Those of Medium or High significance for the City of San Luis Obispo are identified below.

- Adverse Weather: Thunderstorm/Heavy Rain/Hail/Lighting/Dense Fog/Freeze
- Adverse Weather: High Wind/Tornado
- Agricultural Pest Infestation and Disease
- Biological Agents
- Drought and Water Storage
- Earthquake
- Flood
- Human Caused: Hazardous Materials
- Wildfire

Other Hazards

Hazards assigned a significance rating of Low and which do not differ significantly from the County ranking (e.g., Low vs. High) are not addressed further in this plan. In the City of San Luis Obispo, those hazards are:

- Landslide and Debris Flow
- Adverse Weather: Extreme Heat
- Subsidence

Additionally, the City's HMPC members decided to rate several hazards as Not Applicable (N/A) to the planning area due to a lack of exposure, vulnerability, and no probability of occurrence. Dam Incidents, Coastal

Storm/Coastal Erosion/Sea Level Rise, and Tsunami and Seiche Hazards are considered Not Applicable (N/A) to the City of San Luis Obispo.

G.3.1 Assets at Risk

This section considers San Luis Obispo's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends. The HMPC used a variety of data to define a baseline against which all disaster impacts could be compared. If a catastrophic disaster was to occur in the Planning Area, this section describes significant assets exposed or at risk in the City of San Luis Obispo.

Values at Risk

Parcel data was provided by ParcelQuest, a third-party service working alongside the San Luis Obispo County Assessor's Office to compile property information. This data provided the baseline for an inventory of the total exposure of developed properties within the county and helps to ensure that the updated HMP reflects changes in development. This data should only be used as a guideline to overall values in the City as the information has some limitations. The most significant limitation is created by Proposition 13; instead of adjusting property values annually, the values are not adjusted or assessed at fair market value until a property transfer occurs. As a result, overall value information is likely low and does not reflect current market value of properties. It is also important to note that in the event of a disaster, it is generally the value of the infrastructure or improvements to the land that is of concern or at risk. Generally, the land itself is not a loss. Table G.8 shows the exposure of properties (e.g., the values at risk) broken down by property type for the City of San Luis Obispo.

Table G.8 2019 Property Exposure for the City of San Luis Obispo by Property Types

Property Type	Property Count	Improved Value	Content Value	Total Value
Commercial	1,081	$1,023,078,842	$1,023,078,842	$2,046,157,684
Government/Utilities	168	$1,435,945	--	$1,435,945
Other/Exempt/Misc.	507	$189,186,968	--	$189,186,968
Residential	8,226	$1,896,071,588	$948,035,794	$2,844,107,382
Multi-Family Residential	2,885	$811,851,931	$405,925,966	$1,217,777,897
Mobile/Manufactured Homes	156	$25,110,344	$12,555,172	$37,665,516
Residential: Other	963	$368,632,456	$184,316,228	$552,948,684
Industrial	42	$60,310,187	$90,465,281	$150,775,468
Vacant	55	$36,862,009	--	$36,862,009
Total	**14,083**	**$4,412,540,270**	**$2,664,377,282**	**$7,076,917,552**

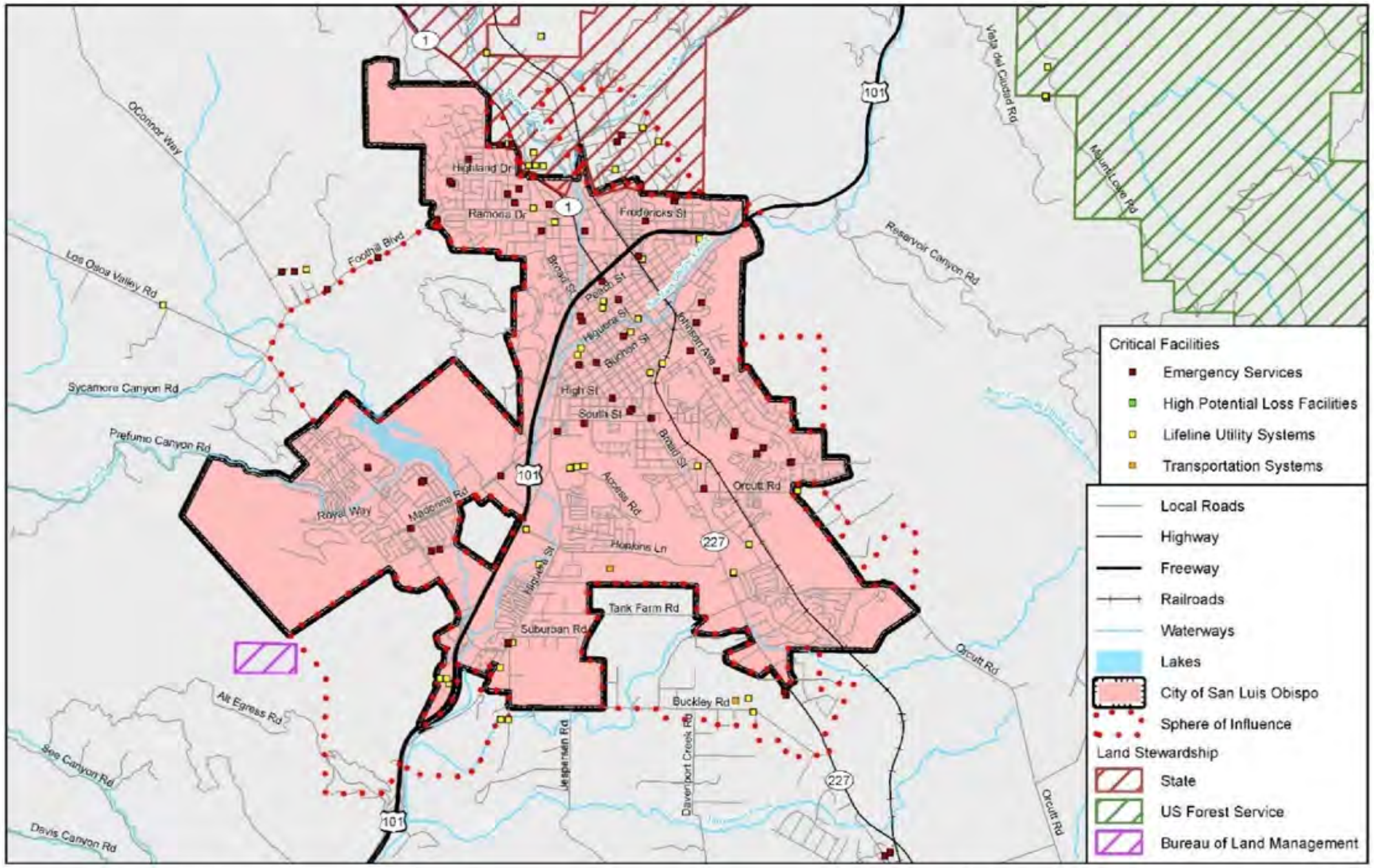
Source: Wood analysis based on ParcelQuest and San Luis Obispo County Assessor's Office data 2019.

Critical Facilities and Infrastructure

Critical Facilities are essential in providing utility or direction either during the response to an emergency or during the recovery operation. These facilities typically include hospitals, fire stations, and local law enforcement stations, and according to FEMA should be given special consideration when formulating regulatory hazard mitigation and floodplain management plans. See Section 5.2 of the Base Plan for more details on the definition s and categories of critical facilities.

A portion of the critical facilities data was provided by the San Luis Obispo County Planning & Building and GIS Departments. Supplemental data from the Homeland Infrastructure Foundation-Level Data (HIFLD) was used to capture additional facilities such as law enforcement facilities and centers, communications facilities, emergency operations centers, schools, and urgent care facilities among others. In addition, participating jurisdictions identified assets on a data collection guide worksheet or in previous LHMPs which may capture additional facilities and additional details not within the GIS database. An inventory of critical facilities in the City of San Luis Obispo determined with San Luis Obispo County GIS data is provided in Table G.9 and illustrated in Figure G.2.

Figure G.2 Critical Facilities in the City of San Luis Obispo



0 2 4 Miles

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Map compiled 6/2019;
intended for planning purposes only.
Data Source: San Luis Obispo County, US Census TIGER Database, CA Open Data Portal, BLM/California State Office, LAFCO, HIFLD

Table G.9 City of San Luis Obispo's Critical Facilities

Category	Asset Name	Asset IDs	Address	Replacement Value	Priority
Community and Recreational Facilities	City Hall	68	990 Palm St	$9,287,080	Critical
	Library	451	995 Palm St	$1,604,146	Essential
	Ludwick Community Center	452	864 Santa Rosa St	$2,559,501	Critical
	Meadow Park Recreational Center	453	2333 Meadow St	$1,448,126	Essential
	Mitchell Park Senior Center	456	1445 Santa Rosa St	$1,068,158	Essential
	Sinsheimer Pool and Park	97-110	900 Southwood Dr	$2,623,419	Essential
Infrastructure	Critical Bridges	10, 11, 19, 20, 23, 25, 27, 34, 35, 40, 41, 42, 44, 51, 56	Varies by bridge	Varies by bridge	Critical
	Essential Bridges	8, 9, 12-18, 21, 22, 24, 26, 28-33, 36-39, 43, 45-50, 52-55, 58, 59-62	Varies by bridge	Varies by bridge	Essential
	Higuera Box Culvert	57	Higuera St	$4,500,000	Critical
	Evacuation Route Roads		50 miles	$1 million/mile = $50,000,000	Critical
	Other Essential City-Owned Roads		120 miles	$1 million/mile = $120,000,000	Essential
	Communication Towers	614,616,617		N/A	Essential
Other City-Owned Facilities	City Corporation Yard	426	25 Prado Rd	$4,884,929	Critical
	Community Development and Public Works Administration	437	919 Palm St	$23,081,375	Essential
	Parking Garage	477	Marsh and Chorro St	$22,873,449	Essential
	Parking Garage	478	842 Palm St	$8,795,686	Essential
	Parks and Recreation Building	479	1341 Nipomo St	$1,282,662	Essential
	Prado Day Center	96	45 Prado Rd	$699,393	Essential
	Utilities Administration	541	879 Morro St	$1,060,252	Essential
Police and Fire Stations	Dispatch Center	78	1135 Roundhouse	$6,701,098	Critical
	Fire Station #1	69	2160 Santa Barbara	$5,483,205	Critical
	Fire Station #2	70	136 N Chorro St	$511,872	Critical
	Fire Station #3	71	1280 Laurel Ln	$594,009	Critical
	Fire Station #4	72	1395 Madonna Rd	$507,087	Critical
	Police Main Building, Garage, Annex	73-77	1042 and 1016 Walnut St	$4,854341	Critical
Potable Water and Wastewater Facilities	Fire Station #4 Well	619	1395 Madonna Rd	N/A	Essential
	Pacific Beach Well	620	11950 LOVR	N/A	Essential
	Reservoirs	63-67		N/A	Essential
	Sewer Lift Stations	555-564		N/A	Essential
	Sewer System Infrastructure (pipes)			N/A	Essential
	Storm Drain System			N/A	Essential

Category	Asset Name	Asset IDs	Address	Replacement Value	Priority
	Waste Water Treatment Plant (includes Water/Wastewater Laboratory)	615	35 Prado Rd	$77,296,765	Essential
	Water Pump Stations	1-7		N/A	Critical
	Water System Infrastructure (pipes)			N/A	Critical
	Water Tanks	566-613		N/A	Critical
	Water Treatment Plant and Stenner Hydro Plant	565	Stenner Creek Rd	$51,486,423	Essential

Source: San Luis Obispo County Planning & Building, HIFLD

High Potential Loss Facilities

High potential loss facilities are considered critical facilities that present significant risks if damaged and include nuclear power plants, dams, and military installations. The City has one classified high potential loss facility: The San Luis Obispo Wastewater Treatment Plant (WWTP). The WWTP is located within a 100-year floodplain and within a moderate liquefaction risk zone; however, other potential hazard impacts are low.

Transportation and Lifeline Facilities

The City contains a network of roadways and public transportation including the Pacific Coast Railway. US Highway 101, Highway 1, and State Route 227 (Broad Street) provide regional access to the City. The San Luis Obispo County Regional Airport serves the City and is located in the southern portion of the jurisdiction.

Lifeline Utility Systems are defined as those systems necessary to provide electric power, natural gas, water and wastewater, and other facilities and services that are essential to the well-being of the City. Lifeline utility systems within the City include:

- AM Transmission Towers (1)
- FM Transmission Towers (1)
- Microwave Service Towers (52)
- Wastewater Treatment Plants (1)
- Energy Commission Facilities (7)

Historic and Cultural Resources

The City of San Luis Obispo has a wealth of historic and culturally significant resources due to its rich and varied history. Such resources represent the City's diverse historical context from periods prior to Chumash settlement and Spanish colonization, through early development and mid-century growth that established many of the existing neighborhoods and set a precedent for community design. The City of San Luis Obispo Citywide Historic Context Statement (2014) identifies various historical factors that shaped the development of the area, and provides a framework for the continuing process of identifying historic, architectural, and cultural resources in the City. The City has an active historic preservation program, and historic preservation is prioritized throughout City policy. City Zoning Regulations also establish the Historical Preservation Overlay Zone, which describes the allowed uses and property development standards within designated Historic Districts. Historic Districts within the City include Downtown Commercial District, the Mill Street District, the Old Town Neighborhood, the Little

Italy District, the Monterey Heights District, the Mount Pleasanton/Anholm District, the Chinatown Historic District, and the Railroad Districts.

Historical resources in the context of the City are also identified by the National Register of Historic Places (NRHP), the California Register of Historic Resources (CRHR), and the County of San Luis Obispo's List of Historic Resources in addition to local designation. Such resources are buildings, structures, objects, places, and areas that have an association with important persons, events in history, or cultural heritage, or have distinctive architecture, design or construction method. State and local registers of historic resources also identify Historical Points of Interest that have primarily local significance and interest in preservation. The City of San Luis Obispo has several registered national, state, and local sites of historic and cultural significance (Table G.10). County-wide historic resources are further detailed in Chapter 5.2, Asset Summary, of the Base Plan.

Table G.10 Historic Places

Historic Site	Register	Date Listed	Address
Ah Louis Store	State/National	1965	800 Palm Street
Angel Myron House	National	1982	714 Buchon St.
Corral de Piedra	National	1978	S of San Luis Obispo on Price Canyon Rd.
Dallidet Adobe	State	1960	1185 Pacific Street
Jack Robert House	National	1992	536 Marsh St.
Mission San Luis Obispo De Tolosa	State	1939	751 Palm Street
Monday Club of San Luis Obispo	National	2016	1815 Monterey St.
Pacific Coast Railway Company Grain Warehouse	National	1988	65 Higuera St.
Pereira Octagon Barn	National	2014	4400 Octagon Way
Port San Luis Site	National	1978	Address Restricted
The Powerhouse	National	1993	Junction of S/ Perimeter Rd. and Cuesta Ave
Rancho Canada de los Osos y Pecho y Islay	National	1975	Address Restricted
San Luis Obispo Carnegie Library	National	1995	696 Monterey St.
Tribune Republic Building	National	1993	1763 Santa Barbara St.
William Shipsey House	National	2010	1266 Mill St.
Camp San Luis Obispo	State Point of Interest	1990	NA
Hollister Adobe	State Point of Interest	1972	NA

Natural Resources

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as attenuates and stores floodwaters.

The City's landscape is made up of creeks, hills, valleys, and rich farmland that supports a variety of plants and animal species. The San Luis Obispo area contains a diverse array of naturally occurring biological communities and extensive open space areas including the Irish Hills Natural Reserve, the Islay Hills Open Space, South Hills Open Space, Charles A. and Mary R. Maino Open Space, Ferrini Ranch, and the Laguna Lake Park and Open Space. The City's many creeks provide sheltered corridors that allow wildlife to move between dispersed habitats and open space areas.

Economic Assets

California Polytechnic State University is the largest employer in the City of San Luis Obispo with nearly 3,000 employees. San Luis Coastal Unified School District employs 384 regular classified employees. The industrial sector including education services, healthcare, and social assistance are the largest employers in the City at approximately 20.2% of the total employers. In 2007, approximately 5,127 individuals were employed in educational services, health care, and social assistance jobs. The General Plan Land Use Element (LUE) for the City includes policies to accommodate a maximum population of 57,200 persons. Assuming a 0.5% growth rate, the City would reach the anticipated residential capacity by year 2057. Tourism is an increasing trend in the City due to the diverse range of activities, small-town appeal and recent development of several hotels near and in the downtown core. Loss of a major employer from a hazard impact would result in a significant rise in unemployment and loss in sales tax revenue.

G.3.2 Estimating Potential Losses

Note: This section details vulnerability to specific hazards of high or medium significance, where quantifiable, and/or where (according to HMPC member input) it differs from that of the overall County.

Table G.9 above shows San Luis Obispo's exposure to hazards in terms of number and value of structures. San Luis Obispo County parcel and assessor data were used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. Impacts of past events and vulnerability to specific hazards are further discussed below. (See Section 4.1 Hazard Identification for more detailed information about these hazards and their impacts on the County as a whole.)

Adverse Weather: Thunderstorm/Heavy Rain/Hail/Lightning/Dense Fog/Freeze

Adverse weather in the City usually occurs as localized thunderstorms that bring heavy rains and strong winds, most often during the winter and spring months. Heavy rain has historically produced extensive flooding in the City. Dense fog can result in reduced visibility and slick road conditions that increase the likelihood for traffic accidents. Freeze is rarely a threat to human life in the City, but has the potential to impact agricultural operations where crop damage to high value products can be extensive. According to frost dates and temperature data published by the University of California Agriculture & Natural Resources, the lowest recorded temperature is 20°F, and average annual low temperatures of 42 to 43°F typically occur in January and December.

Adverse Weather: High Wind/Tornado

The City is subject to strong southeasterly winds associated with strong cold fronts and coastal storms, which generally occur during the winter months from November to February. Northwesterly winds that are typical of the central coast of California also occur throughout San Luis Obispo during the spring and summer. Both southeast and northwest wind events can reach sustained wind speeds of 35-45 mph with wind gusts of 65-75 mph within the City. Wind related events can have substantial destructive impacts, especially in urban areas where falling trees and branches can result in considerable property damage. Tornadoes have historically occurred in San Luis Obispo, with the first recorded tornado taking place in April 1926 due to a strong coastal storm front from the Pacific. Recorded tornadoes since then have typically been low severity, and caused minor damage such as broken tree branches and minor structural and roof damage to buildings. Refer to Section 5.3.1 Adverse Weather, in the Base Plan for analysis related to tree mortality in the County of San Luis Obispo.

Agricultural Pest Infestation and Disease

Agricultural pests and pathogens (insects, fungi, bacteria, viruses and invasive plants) cause injury or destruction to crops or livestock. The prominent agricultural uses in San Luis Obispo County can be impacted by a wide variety of invasive pests, which pose a significant threat to crops, economy, food supply, and native habitat.

Biological Agents

Public health impacts due to biological agents are a recognized potential threat to the City. The City is largely reliant on the County's Emergency Preparedness Program, which supports the Public Health Department in the management and coordination of public health emergencies including natural disasters, technological disasters, bioterrorism incidents, and pandemics. Food and waterborne illnesses are major health problems that present significant health risks to the City as well as threats to regional food and water supply. The City supports and participates in the County Public Health Department's up-to-date Pandemic Influenza Plan and Strategic National Stockpile Plan to facilitate prevention, early detection, and treatment to effectively respond to pandemics.

Drought and Water Storage

Periods of drought can have significant environmental, agricultural, health, economic, and social consequences. Prolonged drought has the potential to impact structures due to subsidence, and can reduce water quality due to lower water flows and reduced pollutant dilution. The City recently experienced its third driest period on record since 1870 when weather observations began at the San Luis Obispo Polytech Weather Station. Long-term precipitation information from the station indicates the variability that can occur, which is summarized in Figure 5-4 in Section 5.3.6 of the Base Plan. The City has invested in a multi-source water supply including Nacimiento, Whale Rock, and Santa Margarita Reservoirs, groundwater, and recycled water for landscape irrigation. Water demand modeling estimates that these sources provide a 7.5 year combined water supply, assuming an extended worst case historical drought.

Earthquake

Earthquake events have occurred in the City in the past, including a number of magnitude 5.0 to 7.0 earthquakes. Historically, most of the earthquakes that have occurred near the City have originated from movement along the San Andreas Fault, which lies approximately 35 miles northeast of the City. The most recent major earthquake to affect San Luis Obispo occurred at 11:15:56 am Pacific Standard Time on December 22, 2003. The epicenter of the magnitude 6.5 earthquake was approximately 7 miles northeast of San Simeon at a depth of 4.7 miles (35.706N, 121.102W), 45 miles from San Luis Obispo. The City of San Luis Obispo experienced some minor damage. The main strand of the Los Osos fault zone, also known as the Edna fault zone, traverses the City near the intersection of Los Osos Valley Road and Foothill Boulevard. Field evaluations by the California Geological Survey (CGS) for the main strand of the Los Osos fault found evidence of movement in the last 11,000 years. This evidence of recent activity resulted in the establishment of an Earthquake Fault Zone by CGS in 1989 under the Alquist-Priolo Fault Zoning Act. The Los Osos fault specifically presents a high to very high fault rupture hazard to developments near and southwest of the Los Osos Valley Road area.

Table G.11 Seismic Hazard Designation by Property Type

Seismic Designation	Property Type	Property Count	Improved Value
Los Osos Alquist-Priolo	Residential	28	$9,541,741
	Residential: Other	2	$693,134
TOTAL		**30**	**$10,234,875**

Source: San Luis Obispo County Planning & Building, County Assessor's Office, ParcelQuest, Wood Plc analysis

In addition to being at risk of groundshaking as a result of a fault rupture, the City of San Luis Obispo is also susceptible to the effects of liquefaction. Most of the City is underlain by alluvium and other liquefiable sediments that may present a risk of liquefaction during ground shaking; however, liquefaction risk is generally classified as low to medium on a scale of very low to very high. Liquefaction risk is visually displayed across the City under Figure G.4 below.

Table G.12 Parcels Susceptible to Moderate Liquefaction Risk

Parcel Type	Parcel Count	Improved Parcel Value
Commercial	992	$964,747,104
Government/Utilities	125	$1,435,945
Other/Exempt/Miscellaneous	418	$170,684,946
Residential	5,282	$1,076,982,642
Multi-Family Residential	2,387	$678,902,288
Mobile/Manufactured Homes	148	$16,744,811
Residential: Other	673	$272,473,739
Industrial	36	$55,659,992
Vacant	42	$31,483,257
TOTAL	**10,103**	**$3,269,114,724**

Source: San Luis Obispo County Planning & Building, County Assessor's Office, ParcelQuest, Wood Plc analysis

Figure G.3 Seismic Hazard Designation in the City of San Luis Obispo

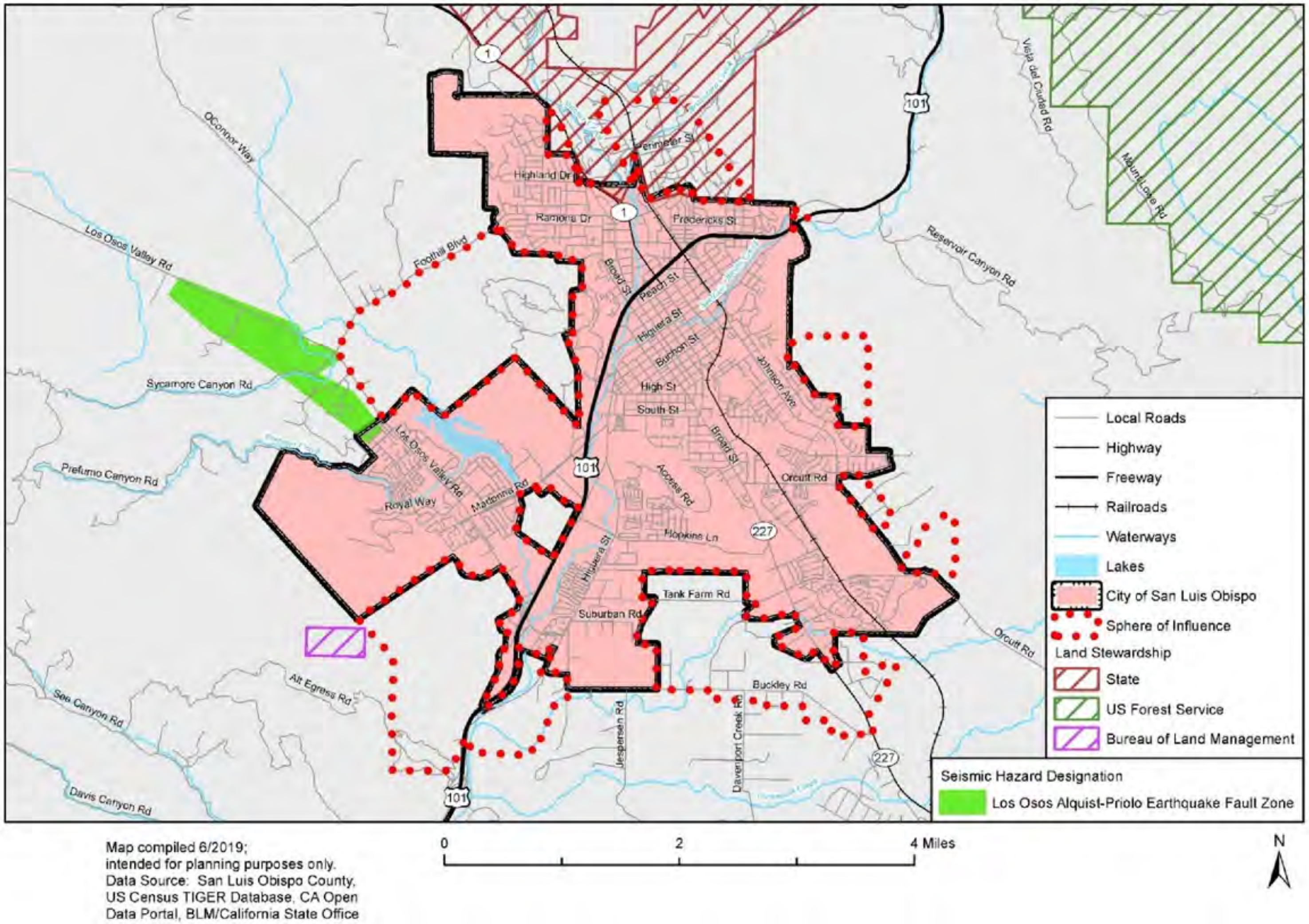
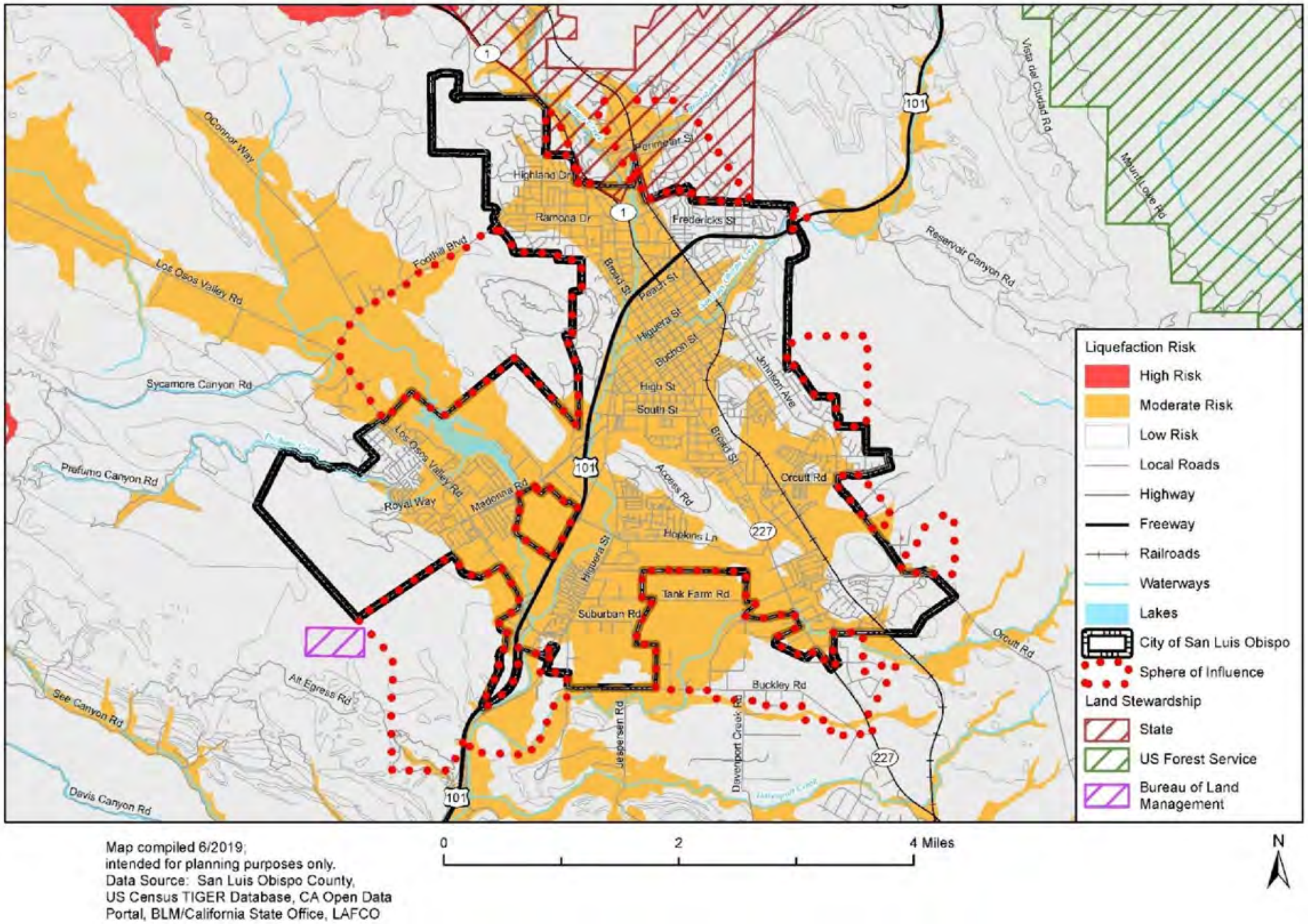


Figure G.4 Liquefaction Risk in the City of San Luis Obispo



Flood

In San Luis Obispo, the most common type of flooding event is riverine flooding, also known as overbank flooding. Riverine floodplains range from narrow, confined channels in the steep valleys of mountainous and hilly regions, to wide, flat areas in plains and coastal regions. The amount of water in the floodplain is a function of the size and topography of the contributing watershed, the regional and local climate, and land use characteristics. Flooding in steep, mountainous areas is usually confined, strikes with less warning time, and has a short duration. Larger rivers typically have longer, more predictable flooding sequences and broad floodplains.

In addition to riverine flooding, San Luis Obispo is susceptible to flash flooding. Flash flood is a term widely used by experts and the general population, but no single definition or clear means of distinguishing flash floods from other riverine floods exists. Flash floods are generally understood to involve a rapid rise in water level, high velocity, and large amounts of debris, which can lead to significant damage that includes the tearing out of trees, undermining of buildings and bridges, and scouring of new channels. The intensity of flash flooding is a function of the intensity and duration of rainfall, steepness of the watershed, stream gradients, watershed vegetation, natural and artificial flood storage areas, and configuration of the streambed and floodplain. Urban areas are increasingly subject to flash flooding due to the removal of vegetation, installation of impermeable surfaces over ground cover, and construction of drainage systems. Wildfires that strip hillsides of vegetation and alter soil characteristics may also create conditions that lead to flash floods and debris flows. Debris flows are particularly dangerous due to the fact that they generally strike without warning and are accompanied by extreme velocity and momentum. Dam failure may also lead to flash flooding; however, the County's dam inundation as well as the California Office of Emergency Services dam inundation data confirms that there are no dam inundation zones located within the City limits.

The most serious flood events on record resulting in property damage or loss of life in San Luis Obispo occurred in 1868, 1884, 1897, 1911, 1948, 1952, 1962, 1969, 1973, 1993, 1995, 1998, and 2001. Recent damaging floods occurred during January and March of 1995, with a lesser flooding problem in 1998. Flow during these events overtopped streambanks near the intersection of Marsh and Higuera Streets and remained out of the channel for nearly three miles downstream, with damage estimated at nearly $2.3 million. The City and Zone 9 spent approximately $1 million to repair bank erosion caused during the winter of 1995. Damage occurred near the town of Avila during both the January and March 1995 events, where high flow and debris blockages caused extensive damage to several bridges across the creek. Flooding during 1969 was significantly damaging; two floods occurred, one at the end of January and the second at the end of February. During this two-month period, a local rain gage recorded an accumulated precipitation total of 39.79 inches. Historically, the 1969 and 1973 events were more damaging than the 1995 floods in present day dollars. The 1969 flood caused approximately $6.92 million in damage within the SLO Creek watershed. The 1973 storm caused $13.6 million along Stenner Creek, Brizziolari Creek, Prefumo Creek, and See Canyon Creek.

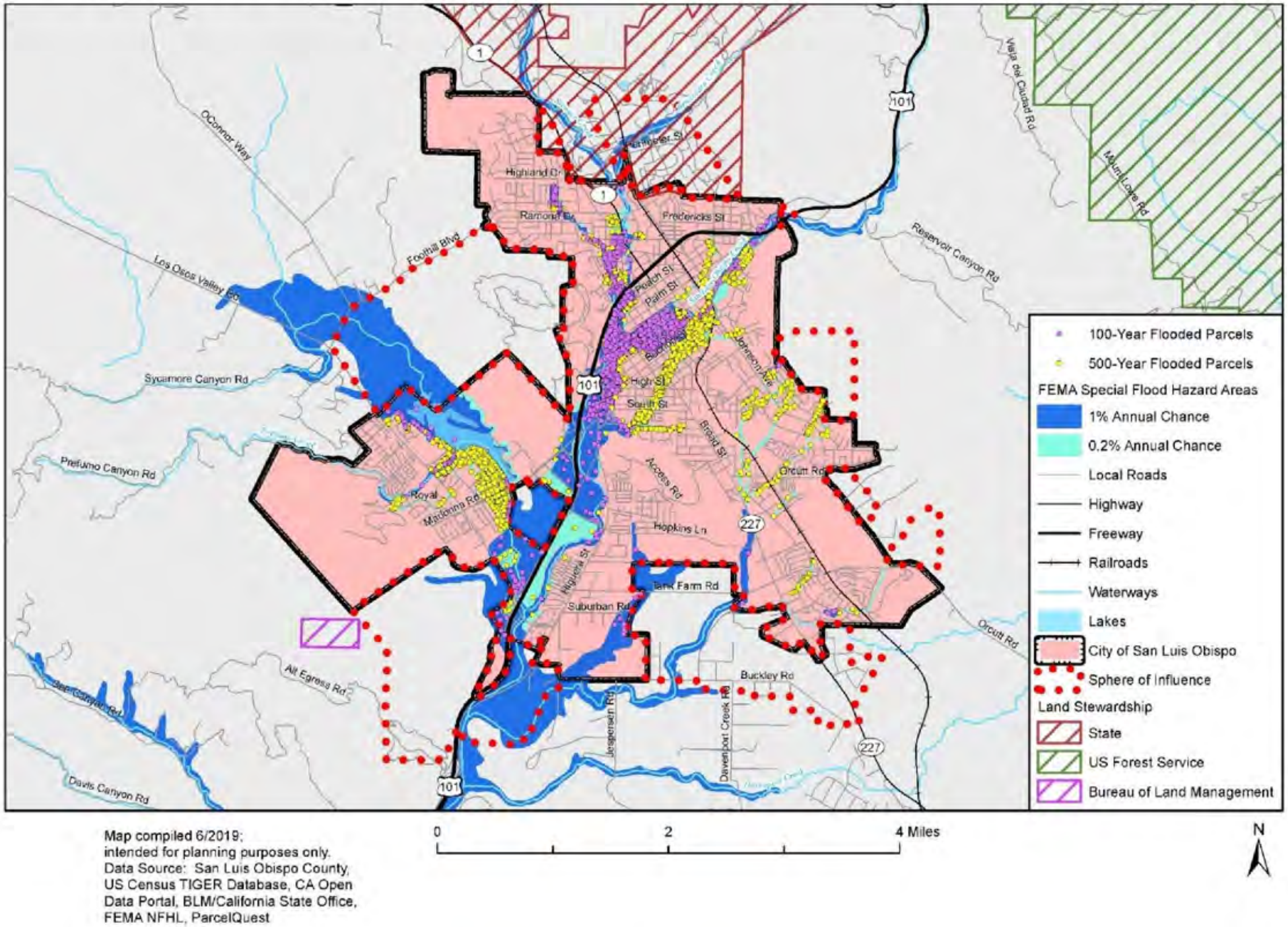
See Figure G.5 below illustrating the parcels at risk of flooding during a 100- or 500-year event based on the FEMA flood hazard areas.

Table G.13 100-Year and 500-Year Flooding by Jurisdiction and Parcel Type

Parcel Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate	Population
100-YEAR FLOOD EVENT						
Commercial	307	$310,143,384	$310,143,384	$620,286,768	$155,071,692	--
Government/Utilities	29	$10,050	--	$10,050	$2,513	--
Other/Exempt/Miscellaneous	75	$29,586,337	--	$29,586,337	$7,396,584	--
Residential	338	$71,676,715	$35,838,358	$107,515,073	$26,878,768	848
Multi-Family Residential	209	$66,889,696	$33,444,848	$100,334,544	$25,083,636	525
Mobile/Manufactured Homes	5	$591,404	$295,702	$887,106	$221,777	13
Residential: Other	25	$42,055,551	$21,027,776	$63,083,327	$15,770,832	63
Industrial	6	$2,632,168	$3,948,252	$6,580,420	$1,645,105	--
Vacant	11	$2,988,322	--	$2,988,322	$747,081	--
TOTAL	1,005	$526,573,627	$404,698,319	$931,271,946	$232,817,987	1,448
500-YEAR FLOOD EVENT						
Commercial	111	$74,714,129	$74,714,129	$149,428,258	$37,357,065	
Government/Utilities	8	--	--	$0	$0	--
Other/Exempt/Miscellaneous	35	$19,148,234	--	$19,148,234	$4,787,059	--
Residential	971	$190,774,098	$95,387,049	$286,161,147	$71,540,287	2,437
Multi-Family Residential	297	$66,546,672	$33,273,336	$99,820,008	$24,955,002	745
Mobile/Manufactured Homes	1	$245,631	$122,816	$368,447	$92,112	3
Residential: Other	51	$35,270,066	$17,635,033	$52,905,099	$13,226,275	128
Industrial	1	$312,120	$468,180	$780,300	$195,075	--
TOTAL	1,475	$387,010,950	$221,600,543	$608,611,493	$152,152,873	3,313
GRAND TOTAL	2,480	$913,584,777	$626,298,862	$1,539,883,439	$384,970,860	4,761

Source: San Luis Obispo County Planning & Building, County Assessor's Office, ParcelQuest, Wood Plc analysis, FEMA NFHL

Figure G.5 Flood Hazard Areas and Flooded Parcels in the City of San Luis Obispo



Insurance Coverage, Claims Paid, and Repetitive Losses

The City of San Luis Obispo has been a participant in the National Flood Insurance Program since April 16, 1979, and will continue to participate and remain in compliance with the National Flood Insurance Program (NFIP).

Table G.14 City of San Luis Obispo NFIP Insurance Policy Information

Policies	Insurance in Force	No. of Paid Losses	Total Losses Paid
736	$223,380,300	83	$456,370

Source: FEMA National Flood Insurance Program Community Information System

FEMA Community Information System shows that as of April 2019 the City of San Luis Obispo has two Repetitive Loss (RL) properties and no Severe Repetitive Loss (SRL) properties.

Table G.15 City of San Luis Obispo Repetitive Loss

Repetitive Loss Properties	Insured Properties	Repetitive Loss Payments (tota)
2	1	$54,204.80

Source: FEMA National Flood Insurance Program Community Information System

The City of San Luis Obispo joined the Community Rating Systm (CRS) on October 1, 1991. Currenlty the City has a Class 6 rating.

Critical Facilities at Risk

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. There are eight critical facilities found in the 100-year floodplain in San Luis Obispo, and five critical facility located in the City's 500-year floodplain. It is particularly important to note that the critical facilities in the 500-year floodplain are all facilities that serve vulnerable populations and should be given special attention. Table G.16 below summarizes the critical facilities in the City's 100- and 500-year floodplains. The impact to the community could be great if these facilities are damaged or destroyed during a flood event.

Table G.16 Critical Facilites in FEMA Flood Hazard Areas, City of San Luis Obispo

Floodplain	Critical Facility Type	Facility Count
100-year	Colleges / Universities	1
	Day Care Facilities	1
	Microwave Service Towers	3
	Nursing Homes	1
	VA Medical Facilities	1
	Wastewater Treatment Plant	1
500-year	Colleges / Universities	1
	Day Care Facilities	1
	Microwave Service Towers	1

Floodplain	Critical Facility Type	Facility Count
	Nursing Homes	1
	Private Schools	1
TOTAL		**13**

Source: San Luis Obispo County Planning and Building Dept., LAFCO, HIFLD, Wood Plc Parcel Analysis, FEMA NFHL

Wildfire

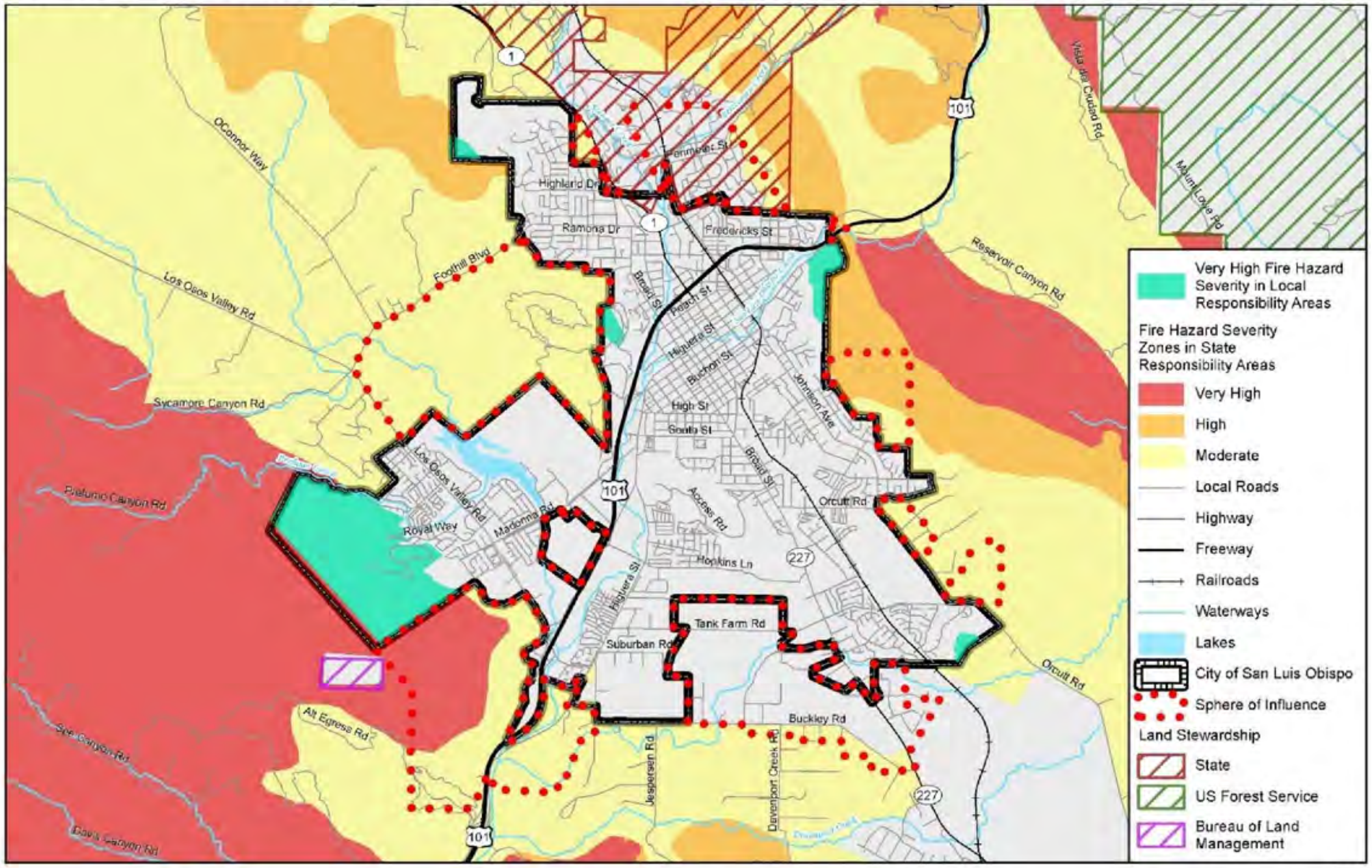
The risk of wildland fires is greatest near the City limits where development meets rural areas of combustible vegetation. Most of the community is within one mile of a High or Very High Fire Hazard Severity Zone, which indicates significant risk to wildland fire. The City of San Luis Obispo is confronted with one of the more hazardous wildfire risks in the County due to its location near the foothills of the Santa Lucia Mountains and the Irish Hills, with increased wildfire risk in these foothills as well as on Chumash Peak, Bishop Peak, Cerro San Luis, and Islay Hill. Figure G.6 illustrates, in map form, the wildfire hazard severity zones that cross over into the City and hence pose risk to the community and its people.

Table G.17 Properties Within Moderate and Very High Wildfire Hazard Severity Zones

Parcel Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate	Population
MODERATE WILDFIRE HAZARD SEVERITY						
Commercial	1	$2,392,765	$2,392,765	$4,785,530	$4,785,530	--
Government/Utilities	1	--	--	$0	$0	--
Other/Exempt/Miscellaneous	1	--	--	$0	$0	--
Residential	3	$218,358	$109,179	$327,537	$327,537	8
TOTAL	6	$2,611,123	$2,501,944	$5,113,067	$5,113,067	8
VERY HIGH WILDFIRE HAZARD SEVERITY						
Other/Exempt/Miscellaneous	2		--	$2	$2	--
Residential	14	$7,928,870	$3,964,435	$11,893,319	$11,893,319	35
Vacant	1	$40,500	--	$40,501	$40,501	--
TOTAL	17	$7,969,370	$3,964,435	$11,933,822	$11,933,822	35
GRAND TOTAL	23	$10,580,493	$6,466,379	$17,046,889	$17,046,889	43

Source: San Luis Obispo County Planning & Building, County Assessor's Office, ParcelQuest, Wood Plc analysis, CalFire

Figure G.6 Wildfire Hazard Severity Zones



0 2 4 Miles

N

Map compiled 6/2019;
intended for planning purposes only.
Data Source: San Luis Obispo County, US Census TIGER Database, CA Open Data Portal, BLM/California State Office, LAFCO, CalFire

Human Caused: Hazardous Materials

The Cal OES Warning Center reports 419 hazardous materials incidents in the City of San Luis Obispo from 1994 through October 24, 2018; as noted in Section 5.3.13 of the county plan, this likely excludes a large number of unreported minor spills. This constitutes 23% of the hazardous materials incidents reported countywide during the same time frame, and averages out to roughly 16.8 incidents per year. As noted in Section 5.3.13, only around 6% of reported hazardous materials incidents result in injuries, fatalities, or evacuations.

There is one CalARP regulated facilities and no EPA Risk Management Plan (RMP) facilities located in the City. Additionally, the City sits within the Emergency Planning Zone for the Diablo Canyon Nuclear Power Plant.

G.4 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capability assessment is divided into six sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, other mitigation efforts, and opportunities for enhancement.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory policies or programs in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Wood consultant team staff to update information where applicable and note ways in which these capabilities have improved or expanded. In summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of San Luis Obispo's updated capabilities are summarized below.

G.4.1 Regulatory Mitigation Capabilities

Table G.18 City of San Luis Obispo Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
General Plan	Yes	Land Use Element, Circulation Element, Housing Element, Noise Element, Safety Element, Conservation and Open Space Element, Parks and Recreation Element, and Water and Wastewater Element
Zoning ordinance	Yes	Title 17: Zoning Regulations of the City of San Luis Obispo Municipal Code
Subdivision ordinance	Yes	Title 16: Subdivisions, Subdivision Regulations
Growth management ordinance	Yes	Chapter 17.144: Residential Growth Management Regulations
Floodplain ordinance	Yes	Chapter 17.78: Flood Damage Prevention
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Ordinance 1543: Chapter 12.08 Urban Storm Water Quality Management and Discharge Control Ordinance 1490: Chapter 16.20 Physical Improvement Standards and Procedures - 16.20.040 Grading plan Ordinance 1490: Chapter 16.18 General Subdivision Design Standards

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
		Chapter 17.70.090: Hillside Development Standards Ordinances 1630 (part) and 1595 (part), Chapter 15.04 Construction and Fire Prevention Regulations A Stormwater Control Plan is required to be submitted for all projects to demonstrate exemption or level of compliance required. Post Construction Regulation outlines Stormwater Control Plan content in Performance Requirement 2 - Sections B.3.c, Performance Requirement 3 - Section B.4.g, and Performance Requirement 4 – Section B.5.b. Through the Stormwater Control Plan submittal, applicants demonstrate compliance with Post Construction Requirements or exemption status. Drainage Design Manual (Design Manual) has been developed to provide criteria and planning procedures for floodplains, waterways, channels, and closed conduits in the San Luis Obispo Creek watershed. This Drainage Manual will be used by the City of San Luis Obispo and San Luis Obispo County Flood Control and Water Conservation District Zone 9 (SLO/Zone 9) staff in their internal design of stormwater drainage, flood management and bank stabilization and restoration projects.
Building code	Yes	Title 15, Buildings and Construction of the City of San Luis Obispo Municipal Code. California Building Codes: CA Residential Code (2016); CA Plumbing Code (2015 UPC); CA Mechanical Code (2015 UMC); CA Electrical Code (2014 NEC); CA Energy Code (2016); CA Green Building Code (2016); CA Fire Code (2015 IFC); CA Reference Standards Code (2016)
Fire department ISO rating	Yes	2
Erosion or sediment control program	Yes	Chapter 17.78 Flood Damage Prevention Chapter 12.08 Urban Storm Water Quality Management and Discharge Control Chapter 16.20 Physical Improvement Standards and Procedures Ordinance 1543, Code Section 12.08.150 Requirement to prevent, control, and reduce storm water and pollutants City of SLO Waterway Management Plan and Drainage Design Manual Annual silt removal to maintain hydraulic capacity in San Luis Obispo creek beds to reduce flooding. City has 14 total sites in the management plan and complete silt removal on a rotating basis.
Stormwater management program	Yes	Chapter 12.08: Stormwater Regulations & Requirements
Site plan review requirements	Yes	Title 22 Article 3
Capital improvements plan	Yes	Department of Public Works 5-Year Strategic Plan
Economic development plan	Yes	5-Year Economic Development Strategic Plan Updated in 2015
Local emergency operations plan	Yes	City of San Luis Obispo Emergency Operations Plan (2011)
Other special plans	Yes	Open Space Conservation Plans, Climate Action Plan, Urban Water Management and Water Shortage Contingency Plans, Waterway Management Plan, Utilities Department Emergency Plan,

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
		Unreinforced Masonry Hazard Mitigation Program, Disaster Preparedness Program, Community Wildfire Preparedness Plan, Greenbelt Protection Program
Flood insurance study or other engineering study for streams	Yes	2012
Elevation certificates (for floodplain development)	Yes	Chapter 17.78: Flood Damage Prevention
Other	Yes	Water System Vulnerability Assessment, Floodplain Management Educational Program

G.4.2 Administrative/Technical Mitigation Capabilities

There are several key departments and staff within the City organization that serve a specific role in developing and implementing hazard mitigation activities. City government consists of approximately 399 full-time equivilent employees and 10 departments: Police, Fire, Public Works, Public Utilities, Community Development, Parks and Recreation, Human Resources, Finance and Information Technology, City Administration, and the City Attorney's Office. With a clear set of policies in place and a diverse range of staff available to mitigate identified hazards within the City, the City has many staff with specific training on the use of specialized equipment or particular areas of expertise that are essential in implementing mitigation actions. Technical resources are considered to be physical infrastructure or equipment available to the City to aid in implementing hazard mitigation or disaster response activities. Table G.19 identifies the personnel resources and technical resources that increase capabilities related to mitigation and loss prevention in the City.

Table G.19 City of San Luis Obispo Administrative/Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	Yes	Staff with knowledge of land development practices and local land development patterns.
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Professionals trained in construction practices associated with buildings and infrastructure and in storm water compliance during construction and operation of buildings and infrastructure projects.
Planner/engineer/scientist with an understanding of natural hazards	Yes	
Personnel skilled in GIS	Yes	Provide accurate and comprehensive Geographic Information System for managing resources, make informed decisions, and expedite work processes.
Full time building official	Yes	Community Development Department, Chief Building Official
Floodplain manager	Yes	Community Development Department, Supervising Civil Engineer
Emergency manager	Yes	Accomplished through contract services. City maintains funding for the 2019-21 Financial Plan to maintain an Emergency Manager position equivalent to 0.5 FTE.
Grant writer	Yes	Accomplished through Contract Services. The City maintains two-year contracts with both a local grant writing firm and grant advocate firm based out of Irvine, CA.

Personnel Resources	Yes/No	Department/Position
Mutual Aid Agreements	Yes	Establishes agreements among local jurisdictions to assist in emergency response efforts in neighboring jurisdictions during times of need. San Luis Obispo currently participates in the following mutual aid agreements: 1. California Master Mutual Aid Agreement, 2. SLO County Fire and Rescue Mutual Aid Agreement, 3. California Fire Assistance Agreement, 4. Region 1A Law Enforcement Mutual Aid Agreement, 5. Public Works Mutual Aid Agreement, 6. California Emergency Managers Mutual Aid Agreement, 7. Regional Disaster Medical/Health Coordination.
Code Enforcement and Neighborhood Services	Yes	Staff with training and expertise in identifying hazards to health, safety, and welfare, and assisting property owners with achieving code and policy compliance.
Fire Marshal	Yes	Measure G funded position, manages and directs the activities of the Fire Prevention Bureau. Oversees fire safety inspections for all facilities in the City. Ensures that development in the City meets fire safety standards. Obtains funding and implements wildland fuel reduction projects. Directs and oversees fire investigations.
Fire Inspectors	Yes	Professionals trained in fire prevention techniques and construction practices associated with buildings and infrastructure. Inspect all multi-family residential buildings and public assembly buildings. Review building plans and inspect construction projects for fire and life safety and proper installation of fire protection systems. Investigate fire for cause and origin.
Hazardous Materials Coordinator		Staff designated to inspect facilities and containers storing hazardous materials. There are approximately 244 facilities located within the City that are permitted for the use of hazardous materials.
Network Administrators	Yes	Provide technical support for wired/wireless network and radios.
Park Rangers	Yes	Staff familiar with brush clearance requirements and conditions of City-owned open space.
Police Officers	Yes	Emergency response to provide protection of life, property and address community safety/security needs. Work cooperatively with other first responders for an organized response to disaster mitigation plans.
Dispatchers	Yes	Provide communication links to responding personnel to transfer emergency information and direct resources as needed.
Construction Inspection	Yes	Ensures storm water compliance during construction of City projects, and private grading and encroachment projects.
Public Works Department – Department Operations Centers (DOC)	Yes	The Public Works DOC coordinates responses to road flooding and related problems during a storm with road crews, the County, Caltrans, and the California Highway Patrol. They also support other emergency response operations coordinated through the City's EOC.
Storm Water Compliance	Yes	Staff responsibility assigned to ensure storm water compliance during construction and operation of buildings and infrastructure projects.
Other personnel	Yes	Operations: Field staff provide assistance to Public Works DOC for flood response, and City EOC for general emergency response.

Personnel Resources	Yes/No	Department/Position
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Yes	
Warning systems/services (Reverse 9-11, outdoor warning signals)	Yes	
Voluntary Organizations Active in Disaster	Yes	Provides disaster preparedness courses to residents and community members and provides care and shelter to those threatened or impacted by natural hazards. Volunteer and private agencies are essential to the area's mutual aid system by providing for the care and shelter needs of disaster victims. Organizations active in San Luis Obispo include the American Red Cross and Salvation Army.

G.4.3 Fiscal Mitigation Capabilities

There are multiple financial and funding opportunities for the City to mitigate or respond to natural hazards. These capabilities include local revenues from the general fund, or the receipt of grant funds from state or federal agencies. The City's financial planning process includes a two-year goal setting and budget development based on community and council priorities. The City's five-year fiscal forecast identifies the City's forecast of revenues, expenditures, and changes in fund balance. The general fund receives revenues from a variety of sources including taxes (sales, property, transient occupancy, business, utility users), subventions and grants (vehicle license fees, gas tax, and other subventions), service charges (development review fees, recreation fees), and other revenues (fines, interest earnings, and rents). The City has and will continue to utilize the two-year goal setting and budget process to prioritize expenditures needed to mitigate future hazards. In the event of a natural disaster and a need for immediate City response, the City has the financial capacity to utilize reserve funds, when authorized by the City Council. The City has previously utilized the following financial resources to implement hazard mitigation activities. The added revenues to the General Fund from Measure "G" have allowed the City to financially support major improvements in the areas of public safety, flood protection, and open space preservation. Financial resources to mitigate hazards: Table G.20 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table G.20 City of San Luis Obispo Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	The City continues to seek grant opportunities through the CDBG program and identify potential eligible projects that would fund mitigation activities to benefit the health and welfare of the community.
Capital improvements project funding	Yes	The Capital Improvement Plan (CIP) enables the City to plan, schedule, and finance capital projects to ensure cost effectiveness and conformance with established plans and policies. The City's budget process guides the capital priorities through community input, Council goal setting, Local Revenue Measure priorities, and the biennially adopted Major City Goal work programs. The City's CIP includes all planned infrastructure projects over a five-year period. The first two years identify those projects that are planned to be funded and/or completed during the adopted two-year

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
		financial plan. The latter three years serve as the framework for future Financial Plans' capital budgets. The plan represents a phased approach to funding the projects needed to maintain the City's infrastructure and major facilities over the entire five-year period.
Authority to levy taxes for specific purposes	Yes	Taxes for specific purposes can be levied with authorization from the City Council and further approval through a local ballot measure.
Fees for water, sewer, gas, or electric services	Yes	The City's utilities department provides water and wastewater services to the residents and businesses of San Luis Obispo. Water and sewer revenues are collected to support operations and capital improvements, with rates reviewed on an annual basis and approved by the City Council. These revenues from customer water and sewer use are utilized by the utilities department to maintain, improve, expand and replace components of the City's water and wastewater infrastructure system, including improvements made to protect from natural hazards.
Impact fees for new development	Yes	New development projects proposed in the City affect the City's ability to provide adequate essential services (e.g. transportation, water and wastewater, and open space). To ensure these essential services can adequately serve the City's existing and future community needs, a series of development impact fees are levied on new development projects.
Incur debt through general obligation bonds	Yes	Debt can be incurred through general obligation bonds with authorization from the City Council and further approval through a local ballot measure.
Incur debt through special tax bonds	Yes	Debt can be incurred through special tax bonds with authorization from the City Council and further approval through a local ballot measure.
Incur debt through private activities	Yes	City Financial Policy allows debt to be incurred through private activities with approval from City Council
Withhold spending in hazard prone areas	Yes	Policy is accessible with authorization from City Council.
General Fund (including Measure G Funding)	Yes	In 2006, City voters approved measure Y to preserve and enhance essential City services by establishing a 1/2 –cent City sales tax. In the 2011/12 fiscal year, measure Y generated approximately $6.2 million in revenue. This funding has been used in recent years for public safety, infrastructure maintenance, traffic congestion relief, neighborhood code enforcement and open space acquisition project. Many of the projects funded through measure Y revenues are considered to help mitigate hazard throughout the community. In 2014 Measure Y was approved to be extended through ballot measure G, which will sunset in 2022 unless a new measure is passed to continue the collection of additional sales tax.

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Reserve Funds	Yes	The City's budget and fiscal policies includes a requirement to maintain adequate fund reserves for both general and enterprise funds. The minimum reserve level is 20% of annual operating expenditures.
Building Permit Inspection and Review Fees	Yes	Fees are collected by the planning and building divisions of the community development department to inspect and review construction documents on proposed projects within the City. The collection of these fees ensures buildings are designed and constructed in a manner consistent with applicable components of the municipal code and helps the department to recover staff costs associated with review and inspection.

G.4.4 Mitigation Outreach and Partnerships

Throughout the planning process of the Multi-jurisdictional HMP, the City participated in local outreach by promoting public meetings and circulating the Public Draft of the HMP for public comment and review. Public comments have been addressed and have been incorporated into the final HMP, where applicable. To further support implementation of hazard mitigation activities, the City has established strong partnerships with its neighboring jurisdictions, San Luis Obispo County, and multiple state organizations such as the California Highway Patrol, Cal Poly, CalFire, and Caltrans to collectively address local hazards. These partnerships have been formalized through the following:

- Mutual Aid Agreements
- Voluntary Organizations Active in Disaster
- San Luis Obispo County Community Fire Sage Council
- Department Operations Centers (DOC)

The City of San Luis Obispo also coordinates with many external (local, state, federal, and private sector) agencies which have capabilities to support hazard mitigation activities. Many of these agencies participated in the hazard mitigation planning process to update this plan, including the following:

- County of San Luis Obispo – Airports
- County of San Luis Obispo – Office of Emergency Services
- County of San Luis Obispo – Public Health Department
- Cal Poly – City & Regional Planning Department
- Cal Poly – Administration and Finance
- French Hospital Medical Center
- American Red Cross
- Sierra Vista Regional Medical Center
- San Luis Coastal Unified School District
- California Highway Patrol
- Pacific Gas and Electric Company (PG&E)

G.4.5 Other Mitigation Efforts

In addition to the plan and policy resources available to the City to mitigate hazards, the City has developed or participated in several hazard mitigation programs including:

- Unreinforced Masonry Hazard Mitigation Program
- Disaster Preparedness Program
- Floodplain Management Educational Program
- San Luis Obispo Chamber of Commerce Business Continuity Planning
- County Public Health Emergency Preparedness Advisory Committee
- National Flood Insurance Program (NFIP) and FEMA Repetitive Loss Properties
- Community Wildfire Protection Program
- Greenbelt Protection Program

G.4.6 Opportunities for Enhancement

Based on the capability assessment, the City has several existing mechanisms in place that help to mitigate hazards. There are also opportunities for the City to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Cal OES. Additional training opportunities will help to inform City staff members on how best to integrate hazard information and mitigation projects into their departments. Continuing to train City staff on mitigation and the hazards that pose a risk to the City will lead to more informed staff members who can better communicate this information to the public.

The following themes or opportunities were identified during the planning process of the 2014 LHMP:

- Actions to Prepare – While many members of the community have taken small actions to prevent damage to their home in the event of a natural hazard, only a small portion have completed larger structural items to prevent damage. The City may consider developing and implementing programs to support risk reduction activities by property owners. Using the data available as a result of the risk assessment in this HMP, the City is able to identify areas and structures with a higher risk or exposure to the identified hazards. Sharing this information with community members and evaluating opportunities to help property owners in funding risk reduction activities will increase the resiliency of San Luis Obispo.
- Awareness of Neighbor Needs – Given the high student population and regular turnover of neighbors in some neighborhoods, it can be challenging for community members to be fully aware of neighbors and their needs. Neighborhood events such as the annual community block parties are an opportunity for the City to support greater community interaction which can increase awareness of neighbors needs in the event of an emergency.
- Community or Workplace Awareness – In many cases, respondents were unaware or unsure of the hazards that may affect the community or their workplace and policies that may be in place to help respond to a natural disaster. The City can help to increase community awareness through wider promotion or participation in workshops or resources available to the community that have already been prepared by the City or volunteer organizations. The City may increase business owners' awareness of risk by providing emergency planning support, continuity of operations planning support, and potentially hosting seminars for the business community to learn about the hazard risks.
- Understanding the Extent of Damages – To better understand the extent of damages to homeowners from a natural disaster, the City could coordinate with homeowner insurance providers to track damages beyond those reported through the National Flood Insurance Program (NFIP).

G.5 Mitigation Strategy

G.5.1 Mitigation Goals and Objectives

The City of San Luis Obispo Planning Team determined the two goals from the 2014 LHMP continue to be appropriate for this plan update, with the addition of a third goal to address hazards exacerbated by the impacts of climate change. The following are the City of San Luis Obispo's 2019 mitigation goals:

- **Goal 1:** Cultivate a disaster-resistant and resilient community through implementation of risk reduction measures and increased public awareness to prepare for, respond to, and recover from natural and human-caused hazard events.
  - **Objective 1.A** Ensure that local plans, policies, and programs are consistent with the hazard information identified in the LHMP.
  - **Objective 1.B** Increase City employee capacity through SIMS and NIMS compliant training and EOC drills to identify hazards, and assist in emergency preparedness, response, and recovery.
  - **Objective 1.C** Pursue available grant funding to implement hazard mitigation efforts.
  - **Objective 1.D** Maintain critical and essential key assets to increase resiliency and minimize future damage from hazard events.
  - **Objective 1.E** Increase public awareness of hazards, emergency response, and recovery.
  - **Objective 1.F** Promote public/private partnerships to increase community resiliency.
- **Goal 2:** Reduce the severity of damage and losses due to natural and human-caused hazards.
  - **Objective 2.A** Protect and enhance, as practical, existing assets, as well as any future development, from the effects of natural and human-caused hazards.
- **Goal 3:** Prepare for and adapt to the impacts of climate change.
  - **Objective 3.A** Use, and update as needed, the best available science to estimate exposure, vulnerability, and risk of hazards as the result of climate change.
  - **Objective 3.B** Use the climate change exposure, vulnerability, and risk assessments to ensure mitigation investments, capital projects, and programs actively mitigate climate impacts.

Continued Compliance with the National Flood Insurance Program (NFIP)

The City has been an NFIP participating community since 1973 and will continue to comply with the NFIP. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is mitigated in accordance with the regulations. This will also include periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and reflects new or revised flood hazard mapping. The goals of the NFIP are to reduce future flood damage through floodplain management and to provide people in participating communities with flood insurance. Community participation is voluntary. The City is also part of the Community Rating System (CRS), currently rated at Class 7. The goals of the CRS are to reduce flood damages to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management. The City of San Luis Obispo maintains full compliance with the NFIP through Sections 17.84.010- 17.84.170 within Chapter 17.84 Flood Damage Prevention Regulations of the San Luis Obispo Municipal Code, which sets forth means to reduce losses from floods. These standards focus on areas located within or near the 100-year floodplain. Section 8.12.010-8.12.010 of the Municipal Code provides a mechanism for the City to require the removal of dangerous obstructions in streambeds that have the potential to obstruct water flow.

FEMA insures properties against flooding losses through the NFIP. As part of the process to reduce or eliminate repetitive flooding to structures across the United States, FEMA has developed an official Repetitive Loss Strategy. The purpose behind the national strategy is to identify, catalog, and propose mitigation measures to reduce flood losses due to the relatively few structures that represent the majority of claims from the National Flood Insurance Fund. A Repetitive Loss property is defined by FEMA as a "property for which two or more NFIP losses of at least $1,000 each have been paid within any 10-year period since 1978." The City of San Luis Obispo has two Repetitive Loss properties. As a CRS requirement, the City Public Works Department sends community outreach notifications and letters to property owners in repetitive loss areas, including the City's Mid Higuera Area, to inform residents of flooding and to offer ways in which property owners can prepare for and reduce the damage from repetitive flooding. In addition, the Public Works Department conducted storm drain improvements as part of a Capital Improvements Project that helped with flood control in the Mid Higuera Area, an area of repetitive flooding. FEMA also defines Severe Repetitive Loss properties; however, the City does not have any Severe Repetitive Loss properties.

G.5.2 Completed 2014 Mitigation Actions

During the 2019 planning process the City of San Luis Obispo Local Planning Team reviewed all the mitigation actions from the 2014 LHMP. The review indicated the City has completed one mitigation action since 2014 and made continued progress in implementing mitigation projects and building the community's resilience to disasters. Of the 29 mitigation actions identified in the 2014 LHMP, the Planning Team has completed the following action, which the Planning Team notes as being completed in January of 2017:

2.A.12 Add gas pipeline mapping to the City's GIS resources.

G.5.3 Mitigation Actions

The City of San Luis Obispo Local Planning Team identified and prioritized one new mitigation action based on the 2019 risk assessment. New and existing actions were prioritized using the process described in Section 7.2.1 of the Base Plan. The new mitigation action identifies implementation strategies, the responsible agency, potential funding, estimated cost, and implementation schedule.

Table G.21 City of San Luis Obispo's Mitigation Action Plan

ID	Hazard(s) Mitigated	Description/Background/Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
SL.1*	Adverse Weather, Biological, Earthquake, Flood, Wildfire, Hazardous Materials	Regularly review and continue to maintain consistency between the Safety Element, Municipal Code, zoning regulations, hazard area maps, and LHMP implementation strategies. Added 10/2016: Review the implementation and impacts of SB1069 Land use zoning	Community Development /Public Works /Fire	Little to no cost	Staff Time/ Dept. Budget	Medium	1-3 years	In progress. Safety Element to be updated in 2021
SL.2	Adverse Weather, Biological, Earthquake, Flood, Wildfire, Hazardous Materials	Train all City employees including fire fighters, police officers, building inspectors, and public works and utilities staff to levels appropriate for their hazard mitigation tasks and responsibilities.	Fire	Little to no cost	Staff Time/ Dept. Budget	Medium	1-3 years	In progress. Currently updating a City-wide training matrix to ensure employees have the valid training based on their position. Once the matrix is complete the City will hold training to ensure all City employees receive appropriate training and certifications. Utilize new Human Capital Management software to ensure new employees receive training during onboarding.
SL.3	Adverse Weather, Earthquake, Flood, Wildfire,	Provide training for City staff who apply its building regulations and planning standards, emphasizing the lessons learned in locations that have experienced disasters	Fire / Community Development /Public Works	Little to no cost	Staff Time/ Dept. Budget	Medium	1 yr.	In progress. Additional modeling has been completed. The results of this modeling indicated that a more expansive model should

ID	Hazard(s) Mitigated	Description/Background/Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
	Hazardous Materials							be created which is underway.
SL.4	Adverse Weather, Biological, Earthquake, Flood, Wildfire, Hazardous Materials	Conduct disaster-preparedness exercises for the types of hazards discussed in this LHMP.	Fire	Little to no cost	Staff Time/ Dept. Budget	Medium	1 yr.	In progress. Latest Public Point of Distribution drill held at the City of San Luis Obispo was on 10/18/2017. October 2018 Distribution took place on 10/21/18 in Arroyo Grande and Atascadero (the two locations exercised were intended to cover the whole county, including SLO). City plans to continue participating in exercises as allowed.
SL.5	Adverse Weather, Biological, Earthquake, Flood, Wildfire, Hazardous Materials	Establish ongoing Disaster Service Worker training program to include training for City staff to deal with emergencies as well as contribute to risk reduction measures.	Fire	Little to no cost	Staff Time/ Dept. Budget	Medium	1 yr.	In progress
SL.6	Adverse Weather, Biological, Earthquake, Flood, Wildfire,	Review funding opportunities and establish centralized internal procedures to coordinate efforts for securing funds that support risk reduction measures.	Admin. - Finance	Little to no cost	General Funds/ FEMA HMA	High	1 yr.	In progress. Spring of 2019. The City released an RFP to hire a grant writing firm to seek funding opportunities to leverage community

ID	Hazard(s) Mitigated	Description/Background/Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
	Hazardous Materials							improvement. This includes risk reduction measures.
SL.7	Adverse Weather, Biological, Earthquake, Flood, Wildfire, Hazardous Materials	Identify hazard mitigation projects eligible for grants as part of the Capital Improvement Program planning process.	Public Works/ Utilities	Little to no cost	Cal OES /FEMA: Up to $2 Million at WRRF	Medium	3-5 years	In progress. The Mid-Higuera Bypass project is currently being designed. Once design is complete, grant application work will begin. Utilities (new) - A $2 million grant application has been submitted with CalOES for flood proofing mission critical facilities related the Water Resource Recovery Facility.
SL.8	Adverse Weather, Earthquake, Flood, Hazardous Materials	Assess structural capacity of key assets (including bridges) and pursue infrastructure improvements as necessary.	Public Works/ Community Development	Less than $10,000	General Fund	Medium	3-5 years	In progress. As part of 2019-21 financial plan process the City has reviewed and prioritized assets maintenance and replacement. This prioritized asset list will be presented to the City Council for funding consideration.
SL.9	Adverse Weather, Biological, Earthquake, Flood,	Establish a funded program or mechanism to distribute public information regarding risk reduction activities and projects at City-sponsored events. Identify materials available for use at public education workshops.	Fire	Little to no cost	General Fund	Medium	1-2 years	In progress. Fire Prevention Open House occurred on and 10/14/17 and 10/13/18. Presentations at Cal

ID	Hazard(s) Mitigated	Description/Background/Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
	Wildfire, Hazardous Materials	Coordinate messaging with external agencies such as the American Red Cross and Volunteer Organizations Active in Disasters.						Poly orientations for students and their parents. Department is developing new disaster preparedness neighborhood presentation program and employee disaster worker preparedness beginning FY2020.
SL.10	Adverse Weather, Biological, Earthquake, Flood, Wildfire, Hazardous Materials	Support the efforts and education of people with access and functional needs to prepare for disasters.	Fire	Little to no cost	Staff Time/ Dept. Budget	Medium	1 yr.	In progress
SL.11	Adverse Weather, Biological, Earthquake, Flood, Wildfire, Hazardous Materials	Educate the community on individual preparedness and response to deal with emergencies at times when professional responders would be overwhelmed.	Fire	Little to no cost	General Fund	Medium	1-2 years	In progress. See SL.9 comments
SL.12	Adverse Weather, Biological, Earthquake, Flood, Wildfire,	Offer seminars and/or resources to assist local / small businesses in planning for continuity of operations and emergency preparedness.	Fire	Little to no cost	General Fund	Medium	1-2 years	In progress. Fire department staff attend the weekly meetings at the Downtown Association and has updated a fire safety checklist for festival

ID	Hazard(s) Mitigated	Description/Background/Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
	Hazardous Materials							vendors in the downtown, provided education to DTA staff.
SL.13*	Adverse Weather, Biological, Earthquake, Flood, Wildfire, Hazardous Materials	Continue to enforce local codes, ordinances, and standards pertaining to safe development and resiliency to natural and human-caused hazards.	Community Development /Fire	Little to no cost	General Funds/ FEMA HMA	High	1-2 years	In progress. As of April of 2019, permits have been issued on all URM structures. All have been finalized/closed out except for four properties, one of which is currently being retrofitted and remodeled (SLO Brew at 736 Higuera). Permits have been issued on two others (1029 and 1035 Chorro) but have not been finalized/closed out in permitting system. Current status on these is currently being researched. Records indicate the last of the four has completed Level A strengthening, but still has an outstanding permit - permit records and status is currently being researched.

ID	Hazard(s) Mitigated	Description/Background/Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
SL.14	Earthquake	Develop and provide managers of mobile home parks with information on how to improve the seismic performance of mobile homes and awareness of flood risk.	Community Development	Less than $10,000	Staff Time/ Dept. Budget	Medium	2-3 yrs.	In progress. Still in planning process; will be incorporated into Safety Element)
SL.15	Earthquake, Wildfire, Adverse Weather	The Secure and Resilient Electricity action would plan for energy independence and security at critical facilities throughout the City. By providing grid independent onsite renewable energy, storage, and energy management systems, and by providing a planning and financing framework for future investments, the City will be able maintain uninterrupted operations during times of electricity or natural gas grid instability.	Fire; police; public works; utilities; administration; parks and recreation	$200k to $500k;	California Energy Commission; Monterey Bay Community Power	High	3-5 yrs.	New Benefits: A resilient electricity system (solar and storage) at critical facilities ensure ongoing operations during significant disaster events and ensures viability of electric evacuation vehicles, City fleet, and transit vehicles.
SL.16	Earthquake	Continue to implement the Unreinforced Masonry Hazard Mitigation Plan and strengthen buildings identified in Levels A and B.	Community Development / Fire	$10,000 to $50,000	General Funds/FEMA HMA	Medium	2-3 yrs.	In progress. See SL.13 comments
SL.17	Flood	Develop and carry out environmentally sensitive flood reduction programs.	Administration - Natural Resources	$10,000 to $50,000	FEMA HMA	Medium	2-3 yrs.	In progress. The City continues to assess high priority erosion and sedimentation sites identified in the Waterway Management Plan and provide maintenance or restoration as appropriate; review City owned property and property with drainage easements covering

ID	Hazard(s) Mitigated	Description/Background/Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
								private properties and conduct vegetation management/removal as needed; and, complete silt removal projects at key drainage locations on a rotating basis. Assess and remove as necessary undesirable trees from creek system with tree/landscape contractors. Natural Resources Program staff manages vegetation trimming or removal to maintain the riparian corridors. The EIR for the Mid-Higuera Bypass project was adopted and the 95% plans are nearing completion.
SL.18	Haz Mat	Continue requiring businesses that use, store, or transport hazardous materials to ensure that adequate measures are taken to protect public health and safety.	Fire	Little to no cost	Certified Unified Program Agency (CUPA)	High	Annual impleme ntation	Fire Department CUPA Participating Agency completes 100% of permitted facility inspections annually to assure compliance with the fire code and state regulations. The fire department is subject to audit by the County

ID	Hazard(s) Mitigated	Description/Background/Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
								CUPA and has passed all recent audits.
SL.19	Haz Mat	Coordinate with allied agencies to prepare for hazardous materials incidents. Reference City EOP and Training and Exercise Plan; Maintain participation in County hazardous materials team	Fire	Less than $10,000	Certified Unified Program Agency (CUPA)	Medium	1 yr.	In progress. City Emergency Operations Plan is currently set to be updated. City issued RFP to hire consultant to update plan in Spring of 2019 and is expected to have a completed plan with associated training in Winter of 2020.
SL.20	Haz Mat	Maintain City's web site and other outlets with information regarding the safe handling and disposal of household chemicals.	Fire	Little to no cost	Staff Time/Dept. Budget	Medium	1 yr.	In progress/ongoing
SL.21	Wildfire	Enhance partnerships with CalFire and the local Fire Safe Council for fuel reduction efforts.	Fire	Little to no cost	Cal Fire / FireSafe Grants	Medium	1 yr.	In progress. As of March of 2019, The City of San Luis Obispo is now a recognized focus group and voting board member on the Fire Safe Council
SL.22	Wildfire, Drought	Support ongoing urban forest maintenance and tree trimming programs, to include planting drought-resistant trees and plants.	Public Works - Urban Forestry / Fire / Parks & Recreation / Natural Resources	Less than $10,000	General Fund	Medium	1-2 yrs.	In progress. Urban Forest Services continues regular maintenance which includes pruning and dead tree removal in City Streets, Parks and other City owned properties.

ID	Hazard(s) Mitigated	Description/Background/Benefits	Lead Agency and Partners	Cost Estimate	Potential Funding	Priority	Timeline	Status/ Implementation Notes
SL.23	Wildfire	Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques.	Fire/Natural Resources Director/Parks and Recreation	$10,000 to $50,000	FEMA and Fire Safe Council grants	High	1 yr.	In progress. The Natural Resource Manager has taken lead on all fuel management funds and projects in the City Open Space. Additional grant funding has been obtained to augment allocated fuel management budget.
SL.24	Wildfire	Require an enhanced fire protection plan in Local Very High Fire Severity Zones.	Fire	Less than $10,000	Staff Time/Dept. Budget	Medium	1 yr.	In progress.
SL.25	Biological	Continue offering free flu vaccines to City employees.	Human Resources	Less than $10,000	County Program	Medium	Annual impleme ntation	In progress. Continued participation in the County Public Health Point of Distribution program.
SL.26	Biological	Educate and encourage City employees to maintain a healthy work environment by utilizing sick and other leave benefits to avoid coming to work when sick or contagious and encouraging employees to develop plans for caring for sick family members taking care of ill family members.	Human Resources	Little to no cost	General Fund	Medium	Annual impleme ntation	In progress. Include in ongoing wellness, benefits, and leave of absence training, education, and general communications.

G.6 Implementation and Maintenance

Moving forward, the City will use the mitigation action table in the previous section to track progress on implementation of each project. As illustrated in the completed actions table (Table G.21) much progress has been made since the plan was originally developed. Implementation of the plan overall is discussed in Chapter 8 in the Base Plan.

G.6.1 Incorporation into Existing Planning Mechanisms

The information contained within this plan, including results from the Vulnerability Assessment and the Mitigation Strategy, will be used by the City to help inform updates and the development of local plans, programs and policies. The Engineering Division may utilize the hazard information when implementing the City's Community Investment Program and the Planning and Building Divisions may utilize the hazard information when reviewing a site plan or other type of development applications. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140. This enables the City of San Luis Obispo to qualify for additional funding through the California Disaster Assistance Act should the State determine there to be a need and/or additional funding to be available.

California State Assembly Bill 162 requires the General Plan Land Use Element to identify existing and proposed uses and flood mitigation strategies within the 100-year floodplain. The HMP should be referenced and used to inform the Land Use Element in order to meet this requirement. California State Senate Bill 1241 requires the Safety Element to incorporate wildfire hazard considerations for State Responsibility Areas (SRAs) and lands within very high fire severity zones. These areas are already depicted within the Safety Element and this Annex. They will be reviewed and updated as appropriate during the future updates to both of these documents. Whenever there are substantive changes to the County HMP or this Annex, those involved in other relevant planning mechanisms in the City will be included in the review process.

As stated in Chapter 8 of the Base Plan, the HMPC representatives from the City of San Luis Obispo will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

G.6.2 Monitoring, Evaluation and Updating the Plan

The City will follow the procedures to Monitor, review, and update this plan in accordance with San Luis Obispo County as outlined in Chapter 8 of the Base Plan. The City will continue to involve the public in mitigation, as described in Section 8.3 of the Base Plan. The Administrative Analyst in the City Fire Department will be responsible for representing the City in the County HMPC, and for coordination with the City LPT, including relevant staff and departments during plan updates. The City realizes it is important to review the plan regularly and update it every five years in accordance with the Disaster Mitigation Act Requirements as well as other State of California requirements. In order to ensure that regular review and update of the HMP occurs, the LPT will convene annually to review and discuss mitigation progress and any new concerns that may benefit from mitigation activities. During each annual review, the LPT will review each goal and objective to evaluate its:

- Relevance to the evolving setting and needs of the City of San Luis Obispo
- Consistency with changes in State and Federal policy
- Relevance to current and expected conditions

The LPT will review the Risk Assessment portion of the plan to determine if the information should be updated or modified. The parties responsible for various implementation should be updated or modified. The parties responsible for various implantation actions will report on:

- Status of their projects
- Implementation processes that have worked well
- Any difficulties encountered
- How coordination efforts are proceeding
- Which strategies should be revised

Appendix D Planning and Outreach Process

Outreach and Community Participation

A foundational first step in Resilient SLO's outreach and engagement strategy was to create a Community Outreach Plan (Exhibit A) that identified key stakeholders and population groups; established guiding principles, goals, and triggers; and outlined strategies and tactics that ensured the project was informed by community needs, priorities, and interests.

The Community Adaptation and Safety Element (CASE) reflects the community's vision for resilience to hazards and future disruptions. Community input shaped its development and was gathered through virtual community webinars, online surveys, "Stories of Resilience" submissions, a Resilience Roundtable, and working groups.

The Resilience Roundtable was an ad-hoc community advisory group of local experts that provided input on the City's approach to adapting to climate change. Community members were selected to serve on the Roundtable based on their traditional or non-traditional expertise in climate change resilience topics. The 14 Roundtable members represented a diversity of backgrounds and areas of expertise. The Roundtable met five times throughout the development of the CASE and provided critical input on key project deliverables to date.

The working groups were open to the public and led by Resilience Roundtable Members and project leads. Working groups provided additional community feedback on how climate change impacts to community resilience, the built environment, environmental justice, and the natural environment should be addressed.

Three community webinars were held to inform community members about the project, increase community knowledge of climate change adaptation and resilience topics, and gather feedback. Two separate surveys were also shared to gather community priorities, concerns, and feedback on actionable strategies for the city. Finally, community members were invited to share their experiences and lessons learned in overcoming disasters. These "Stories of Resilience" provide community perspectives on local resilience to historic disasters. Because of COVID-19 precautions, all community engagement occurred virtually.

- Online Survey – August through September 2020
- Stories of Resilience Submissions – December 2020 through December 2021
- Resilience Roundtable Meeting #1 – January 15, 2021
- Community Webinar – January 28, 2021
- Online Survey – February through March 2021
- Built Environment Working Group Meeting – March 2, 2021
- Natural Systems Working Group Meeting – March 4, 2021

- Community Resilience Working Group Meeting – March 4, 2021
- Resilience Roundtable Meeting #2 – March 11, 2021
- Community Webinar – May 13, 2021
- Community Resilience Working Group Meeting – July 12, 2021
- Natural Systems Working Group Meeting – July 13, 2021
- Built Environment Working Group Meeting – March 14, 2021
- Environmental Justice Working Group Meeting – July 19, 2021
- Community Strategy Workshop – July 22, 2021
- Resilience Roundtable Meeting #3 – August 13, 2021
- Community Education Event – January 24, 2021
- Resilient Roundtable Meeting #4 May 10, 2022
- Climate Party – August 13, 2022
- Resilient Roundtable Meeting #5 October 11, 2022

Stories of a Resilient SLO (community webinar) – January 28, 2021: This event introduced the Resilient SLO project and presented findings from the project's Baseline Conditions Report. Speakers included Mayor Heidi Harmon; Chris Read, City Sustainability Manager; Adrienne Greve, Cal Poly Professor; Beya Makekau, Director of Student Diversity and Belonging, Cal Poly; John Lindsey, Marine Meteorologist for PG&E; and Kai Lord-Farmer, Consultant at Ascent Environmental.

Re-energizing SLO – Building an Energy Resilient Future (community webinar) – May 13, 2021: This community education webinar explored energy resilience and its connection with public safety, economic resilience, and disaster preparedness. Featured speakers included Tanya Barham, CEO and Founder of Community Energy Labs; Craig Lewis, Executive Director of the Clean Coalition; and Kajsa Hendrickson, representing the Solar on Multi-Family Affordable Housing Program.

Adapting to a Changing Climate Workshop – Strategies for a Resilient SLO (virtual community workshop) – July 22nd, 2021: This community workshop centered around a community discussion of adaptation strategies to address climate change impacts. The event also featured a short presentation of anticipated climatic changes by project consultant Kai Lord-Farmer from Ascent Environmental.

City Staff and Partner Agency Engagement

City staff from key departments provided input on the project through the City's Green Team, an interdepartmental collaborative body of city staff. The Green Team focused on capacity building for the purposes of climate adaptation for three Green Team meetings which met on an ongoing basis to work on sustainability programs. Additionally, specific departments and outside agencies were consulted throughout the development of the CASE to support the development of the goals, policies, and programs that affect their areas of expertise and responsibility. Key departments and partner agencies consulted include:

- Community Development Department

- Office of Sustainability
- Public Works Department
- Fire Department
- Police Department
- Utilities Department
- Caltrans District 5
- San Luis Obispo County

Surveys

Six surveys were shared to gather community priorities, concerns, and feedback on actionable strategies for the city. In addition to more traditional surveys, community members were invited to submit “Stories of Resilience” to share their experiences and lessons learned in overcoming disasters. These “Stories of Resilience” provide community perspectives on local resilience to historic disasters.

Community Priorities Survey – August 2020 – September 2020: This survey sought to gather broad input on overall community priorities, concerns related to climate change impacts, experience with past hazards and response efforts, and priorities for local action. Survey results informed the development of the Vulnerability Assessment and community outreach activities throughout the project. The survey, consisting of 19 questions, and had 328 responses. The survey results were used to inform the development of goals, policies and programs (Exhibit B).

Stories of Resilience Submissions – December 2020 – Present: Community members were invited to submit stories about how they had overcome past challenges. Stories were shared on the project website and used to understand and celebrate how our community has demonstrated resilience. The Stories of Resilience are available on the City’s website Resilient SLO (https://www.slocity.org/government/department-directory/city-administration/office-of-sustainability-and-natural-resources/resilient-slo-2246).

Climate Strategies Survey – February 2021 – March 2021: This survey invited the community to share ideas for strategies to increase the city’s long-term resilience to climate change impacts (Exhibit C)

Climate Change Impacts on Community Organizations Survey – June 2021: This survey asked community organizations how their operations were being affected by climate hazards and how they were preparing for the impacts of climate change. The results of the survey helped inform the project Vulnerability Assessment (Exhibit D).

Community Asset Mapping Survey – August 2021: This survey allowed the public to map community strengths that support social cohesion, wellbeing, and disaster resilience. The data gathered can help the city understand existing assets, what should be strengthened and invested in, and what resources are missing (Exhibit E).

Environmental Justice Survey for Community Organizations – August 2021: The Environmental Justice Survey for Community Organizations was intended to gather input on environmental topics from organizations that serve vulnerable and/or disadvantaged communities in the City of San Luis Obispo. The survey findings were used to inform the integration of environmental justice into the CASE (Exhibit F).

Resilient SLO Community Engagement Plan

The primary objective of *Resilient SLO* is to update the City of San Luis Obispo's Safety Element of their General Plan, which will guide policies, programs, and investments for future development. The Safety Element will be updated to consider current and future climate change risks and hazards, as well as strategies to mitigate, adapt, and build resilience to the worsening impacts of climate change. As a long-range planning document and the necessity for all stakeholders to be involved in building climate resilience, inclusive community engagement is critical to the overall success of this project.

This Community Engagement Plan outlines key stakeholders and population groups, guiding principles, goals and triggers, and strategies and tactics to ensure that the project is informed by community needs, priorities, and interests while educating community members about climate risks and adaptation strategies. Community participation will be incorporated into all stages of the adaptation planning process and input will directly impact the direction and prioritization of project outcomes.

Community engagement will fulfill three key purposes:

1. **Inform:** To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions. Community members will receive critical information on current and future climate risks, hazards, and vulnerabilities, as well as best practices for building individual and community resilience.

2. **Consult:** To gather input and obtain feedback on the direction of the project, adaptation options and alternatives, and adaptation strategies to include in the City's updated Safety Element. Community members will be consulted through a variety of means to gain insight into their perspective on adaptation strategies and priorities.

3. **Collaborate:** To partner with the public in each aspect of the decision, including the development of alternatives and the identification of the preferred solution. Community members will engage in dialogue and discussion with project partners and local stakeholders to evaluate best practices and inform the updated Safety Element.

It should be noted that the timeline for community engagement activities will incorporate a diversity of approaches and that opportunities for the community to collaborate (and directly contribute to the community resiliency vision) will be a key priority.

Stakeholders

Understanding who key stakeholders are in the city of San Luis Obispo will help to ensure community engagement activities are designed and implemented with the intended audience in mind. It will also help to determine if public input gathered is representative of the city's population and inform targeted outreach that may be needed to engage underrepresented and marginalized populations.

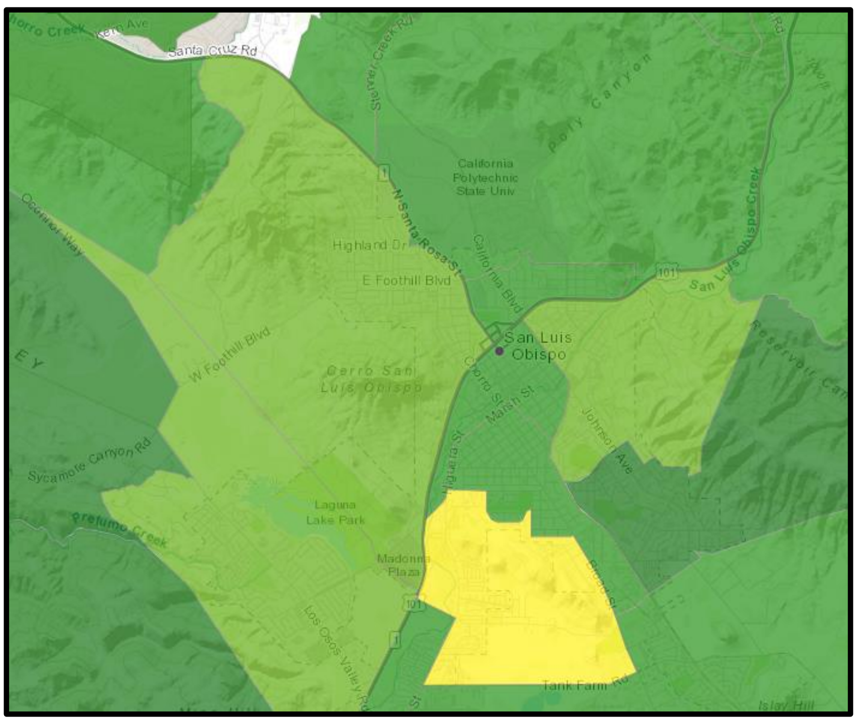
Community Profile

The City of San Luis Obispo has 46,548 inhabitants living on 13.2 square miles. Their three largest private employers are: PG&E, Tenet Healthcare, and Compass Health, Inc. Details on housing and household income are noted on their website:

Total Housing Units	Properties	Median Home Price	Median Household Income
20,578	68% Owned vs. 32% Rented	$669,200	$64,014

According to Census Data, the majority of the population (~71%) is between the ages of 18 and 64. 12.5% of the population is 65 or older. 17% of the population speak a language other than English at home and 18.3% of the population is Hispanic or Latino. 94.4% of the households have a computer; 90.1% have a broadband internet connection. Land Use details can be found here. Zoning details can be found here.

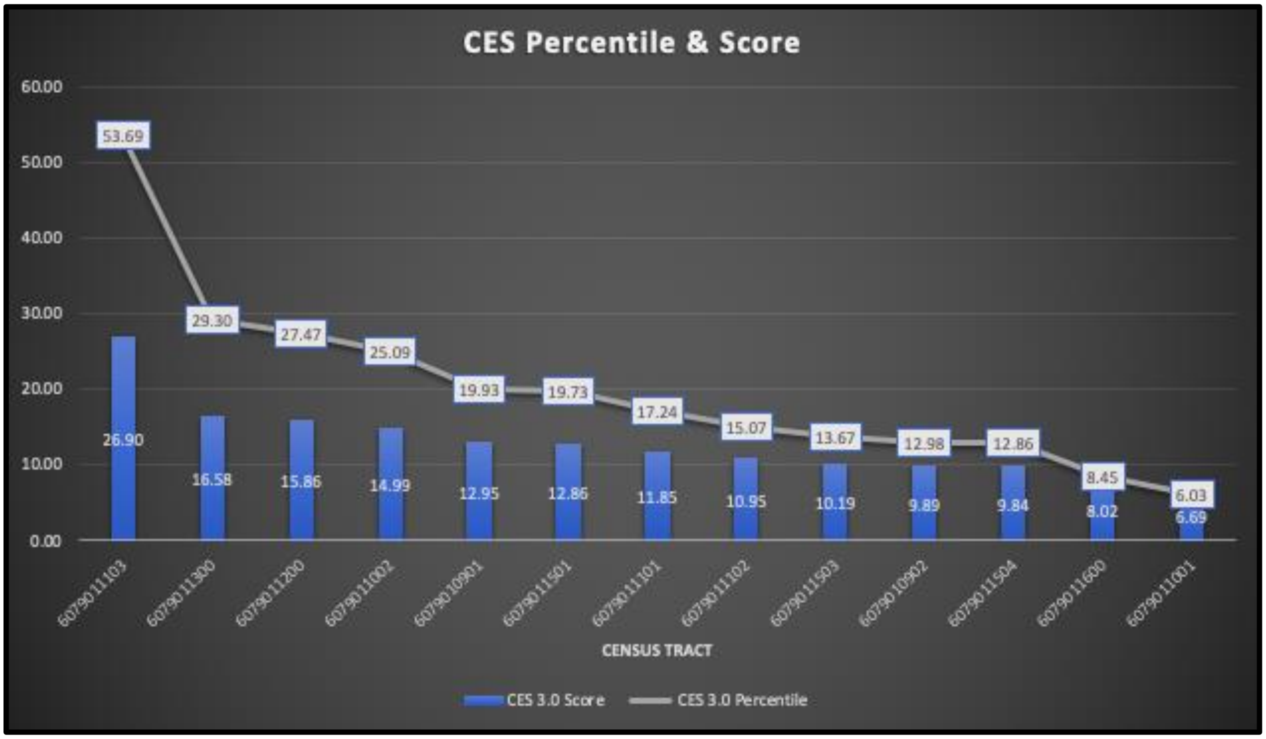
CalEnviroScreen Results



EnviroScreen Results for City of San Luis Obispo

When engaging stakeholders, the project team will prioritize residents and neighborhood leaders in geographic areas most vulnerable to climate change based on initial findings from the vulnerability assessment. Results from CalEnviroScreen (CES) will also inform priority communities to engage based on those who face the most significant environmental hazards. CES scores for the census tracts within the city's boundaries range from 6.69 to 26.9. The hardest hit census tract -

6079011103 with a score of 26.9 - has a CES percentile of 53.69%. This means that it scores below 46.3% of all census tracts within the State. The city does not have any disadvantaged communities as designated by SB-535. It should also be noted that census tracts do not align with city boundaries, so isolating the target neighborhoods within the tract may pose a challenge.



CES Percentiles & Scores by SLO Census Tracts

San Luis Obispo also serves as an economic hub for the region. A wildfire or natural disaster could disrupt transportation routes and prevent commuters from traveling into the city. As such, commuters should also be seen as key stakeholders, in addition to residents. The initial community engagement survey conducted for *Resilient SLO* allowed both residents and non-residents who work in the city to provide input.

Potential Partners

In order to successfully reach stakeholders, particularly underrepresented and marginalized populations, the project team will identify, engage, and partner with trusted local organizations. Promotional partners will be recruited for each engagement activity to help amplify the project team's outreach efforts. The project team intends to strengthen relationships with promotional partners throughout the course of the project to ideally sustain ongoing engagement in the City's climate adaptation initiatives and future community engagement efforts. Co-sponsors may also be able to support the procurement of additional materials to maximize participation.

The project team compiled a list of potential partners to engage, which includes:

- Local and regional nonprofit organizations including those focused on environmental issues, as well as housing, food, economic development, transportation, agriculture, civic engagement, arts and culture, and other social services
- Neighborhood associations
- Cultural centers
- Professional associations
- Business associations
- Media outlets
- Schools, colleges, and universities
- Organizations serving SLO's Latinx communities

This list also includes partners that can be engaged through different platforms, such as Twitter, Facebook, and Instagram. The project team will continue building this list throughout the course of the project.

Guiding Principles

All community outreach and engagement activities will be designed and implemented in a manner that upholds the following guiding principles, which are described in further detail in *Participation Tools for Community Planning*.

PRINCIPLE	DEFINITION	ACTION ITEM
Inclusiveness	Events are inclusive to all members of the community and include strategies to engage marginalized populations.	The unique needs of community populations will be considered in developing engagement strategies and the project will provide a diversity of opportunities to participate.
Respect	Community members are acknowledged for their unique perspectives and knowledge of local community issues	Community members are thanked for their contributions after every engagement activity.
Relevance	Issue areas align with community values and shared needs and aspirations	Partners will incorporate community values and needs into any community outreach or engagement activities.
Clear Purpose and Scope	A roadmap of the project is available from the beginning and all participants have a clear understanding of how their input will be utilized and what future deliverables they can expect to see.	Details of Resilient SLO are publicly available and contact information is provided for any individual with questions about the project.

Knowledge	Community members have access to the necessary tools and technical information to share useful insights.	Community members are provided with sufficient background information and resources to fully participate in the engagement activity.
Trust	Community members can trust project leads and community partners to utilize feedback and incorporate into project deliverables.	Community members are provided with the details on how their comments will be translated into project deliverables.
Sustained Engagement	Relationship-building with the community continues beyond the project timeline and provides an ongoing means to support concerns and aspirations	Project partners will provide an open line of communication for project participants and detail pathways to address ongoing issues.
Results	Community members are provided with public evidence that their input has been valued and incorporated into project outcomes.	When deliverables are drafted or finalized from engagement activities, respondents will receive a follow-up email outlining what has been accomplished.

Additionally, the project team will consider the following key questions when conducting community outreach and engagement, which are further described in the City's Public Engagement and Noticing Manual).

1. What is the action/program/project you need to communicate?
2. Who makes the final decision on the item, is this a staff decision? Subject to advisory body review? Will City Council ultimately receive the item for action?
3. What type of community interaction is desired?
4. Who needs to/wants to be informed?
5. When does the outreach need to happen?
6. What needs to be done?
7. What does success look like?

Cultural Considerations

It is also important to consider cultural factors when conducting community engagement activities to ensure that all communities are given equal access to opportunities to participate and that participants feel inspired to participate due to their unique contributions.

The Greenlining Institute's Making Equity Real: Community Benefits & Engagement Guide details key cultural considerations to prioritize when conducting community engagement, which will serve as guiding principles for the project team.

CULTURAL FACTORS	HOW TO ADDRESS CULTURAL CONSIDERATION FACTORS IN COMMUNITY ENGAGEMENT
Literacy Level	It may be more difficult to reach out to Limited English Proficient (LEP) individuals, immigrant communities, or people with lower educational attainment. Project leads should design materials and events for community engagement to accommodate different literacy levels and provide background information when referring to complex concepts. Avoid the use of acronyms where possible.
Socioeconomic Status	Groups with lower socioeconomic status are often disproportionately affected by environmental hazards while facing greater barriers to participation in engagement efforts to remediate them. These barriers may be addressed when considering factors such as the location and timing of activities, accessibility by public transportation, availability of childcare, and availability of food.
Language	All communication should be done in the major languages spoken in the community. This includes written background materials, live interpretation at key public events and captioned videos. Interpreters should be available at meetings when it is clear that non-English speaking members of the community will be present.
Local History	Certain communities may have participated in previous engagement efforts that did result in change. Over time, either not being included or participating and/or not feeling utilized may affect future participation. Understanding the local context is helpful prior to beginning engagement. Engaging with local CBOs that understand local history may help advance community participation in engagement activities. We strongly recommend ongoing information sharing to insure transparency, help maintain community relationships and build trust in the process.
Competing Interests and Limited Time	Community members may have many competing interests and limited time. Allowing different levels and types of involvements in the process can help foster participation. ● Going to places where people already gather to allow community members to give input without a large time commitment at a time that is convenient for them. ● Other more time-intensive activities, such as focus groups, charrettes, and workshops, can be made available for stakeholders who are interested in providing more in-depth input.

Goals and Triggers

Effective adaptation requires broad engagement. As such, participant demographics will be captured for each engagement activity and the project team will work to ensure representation from key demographic groups within the city. The following minimum response targets, informed by 2018 Census and American Community Survey results, will serve as response and participation goals. If these goals are not met, the project team will conduct targeted outreach efforts and engage with appropriate partners to engage underrepresented segments of the city's population. The timeline for targeted outreach, specifically when addressing the digital divide, may also need to be reviewed more in-depth to ensure that there is sufficient time for such populations to participate.

DEMOGRAPHIC	ACCEPTABLE RANGE (PERCENT)	MINIMUM RESPONSE		
		10%	15%	20%
Housing Situation				
Homeowner	63% - 73% (68%)	2971	4457	5942
Renter	27% - 37% (35%)	1273	1910	2547
Age				
Under 18	8.1% - 18.1% (13.1%)	382	573	764
18 - 24	29.9% - 39.9% (34.9%)	1410	2115	2820
25 - 34	8.6% - 18.6% (13.6%)	406	608	811
35 - 44	3.3% - 13.3% (8.3%)	156	233	311
45 - 54	3.7% - 13.7% (8.7%)	174	262	349
55 - 64	3.9% - 13.9% (8.9%)	184	276	368
Above 65	7.5% - 17.5% (12.5%)	354	531	708
Ethnicity				
American Indian or Alaskan Native	.3%	14	21	26
Asian	.6% - 10.6% (5.6%)	28	42	57
Black or African American	2.0%	94	141	189
Hispanic, Latino or Spanish origin	13.3% - 23.3% (18.3%)	627	941	1254
Native Hawaiian or Pacific Islander	.1%	5	7	9
White or Caucasian	65.7% - 75.7% (70.7%)	3098	4648	6197
Other	.2%	9	14	19
Household Income				

Less than $10,000	6.6% - 16.6% (11.6%)	311	467	632
$10,000 - $14,999	2.3% - 12.3% (7.3%)	108	163	217
$15,000 - $24,999	6.2% - 16.2% (11.2%)	292	439	585
$25,000 - $34,999	1.3% - 11.3% (6.3%)	61	92	123
$35,000 - $49,999	6.2% - 16.2% (11.2%)	292	439	585
$50,000 - $74,999	10.2% - 20.2% (15.2%)	481	722	962
$75,000 - $99,999	5.8% - 15.8% (10.8%)	274	410	547
$100,000 - $149,999	7.8% -17.8% (12.8%)	368	552	736
$150,000 - $199,999	.8% - 10.8% (5.8%)	38	57	75
$200,000 or more	2.8% - 12.8% (7.8%)	132	198	264

Strategies and Tactics

Due to public health concerns and public gathering restrictions due to COVID-19, community engagement events for Resilient SLO will be virtual. This does not preclude eventual in-person engagement at a later date; however this plan focuses on virtual activities.

Virtual engagement activities present unique opportunities and challenges. As a consequence of COVID-19, many individuals are working remotely and can more easily incorporate virtual engagement activities into their schedule. Community members are also likely to be more familiar with online platforms and tools. Virtual engagement can also attract individuals who would otherwise not attend an in-person event due to space constraints, transportation challenges, or child care needs.

At the same time, virtual activities can pose a technical barrier for certain community groups as participation can be hindered by a slow internet connection and/or limited knowledge about how to use the tools provided. Virtual engagement can also be impersonal and participants may not receive the full benefits of in-person events, particularly networking and relationship-building. The project team will identify and employ strategies to address challenges resulting from virtual engagement activities.

Outreach Strategy

To reach a broad audience, the project team will employ a variety of tactics to promote community engagement and education activities, including:

- Postcards to residents,
- E-notification,
- Website posting,
- Social Media,

- Utilities billing insert,
- Community Calendar,
- Signage,
- Paid media (newspaper, radio, outdoor/transit),
- Press Release,
- Neighborhood meetings, and
- Mailed Announcement.

Types of Activities

The following virtual engagement activities are divided based on their capability to inform, consult, or collaborate with the general public. All types of engagement activities will need to be considered in order to ensure this process is as equitable and accessible as possible.

INFORM

ACTIVITY	PURPOSE	CONSIDERATIONS
Website Hub	A central website where residents and stakeholders can visit to see updates from the project, view upcoming events, and provide input through a comment form or survey. The project's website has been created: https://www.lgc.org/resilient-slo	Ensure that the website is easy to navigate and is ADA-compliant.
Resource Library	Articles, podcasts, and other media linked as a resource to help residents learn more about climate change risks and adaptation strategies.	Example: City of Culver City General Plan Planning Library
Informational Webinar	A webinar can be organized to share information with a public audience. Including a Q&A opportunity can help to create a more engaging experience. Webinars can be easily recorded and added to the project website. Webinars can also be used to organize speaker series.	Provide participant guidance to help address potential technical issues in advance
Social Media Campaign	A coordinated social media campaign that includes local partners can help to inform the public of climate risks, hazards, vulnerabilities, adaptation solutions, and resources available in an engaging format that can help to build momentum. The campaign can be conducted through multiple platforms such as Facebook, Twitter, Instagram, LinkedIn, and more.	Early engagement with local partners

CONSULT

ACTIVITY	PURPOSE	CONSIDERATIONS

Online Survey	Surveys will be helpful to gather input from a broad audience, especially over time. Surveys can also be more accessible compared to scheduled events, but should be balanced with other activities that are more engaging.	• Keep survey brief • City uses OpenGov for public surveys
Mapping Survey	In addition to traditional surveys, different tools can be used to gather input on specific geographic locations within the city.	Tool: https://maptionnaire.com/
Mailed or Telephone Survey	Mailed or telephone surveys can be used to help address the digital divide.	
Video-guided Questionnaire	A set of short videos can be created to provide additional context for public members to complete targeted questionnaires. Residents can watch the videos at their own pace and then respond to a survey to give their thoughts and suggestions on each one.	• Example: City of Sacramento 2040- General Plan Workshop
App-based Engagement	Different app-based engagement tools can be used to solicit comments, ideas, and suggestions from community members that can then be upvoted by other participants.	• Tool: MindMixer.com • Example: Inspire Boulder
Interactive Webinar	Webinars can also be designed to be more interactive by utilizing polling and breakout room features.	If breakout rooms are used, need to identify a sufficient number of facilitators

COLLABORATE

ACTIVITY	PURPOSE	CONSIDERATIONS
Virtual Roundtable Discussions	Small group discussions can be organized to engage key stakeholders in a dialogue to gather input and/or reach consensus.	• Aim for max of x participants • Tools: Zoom • PollEverywhere can be used to create more interactive polling than the options already in Zoom
Virtual Public Workshop	A series of live webinars where project leads can give updates on the findings of: • Current and Future Hazards Assessment • Vulnerability Assessment • Hazards and Vulnerability Report	• Tools: Zoom, GoogleMeet • Considerations: Advertising the event to broad audiences • Digital Divide

	Community members can ask questions and give feedback in real time.	

IN-PERSON ACTIVITIES

If in-person activities are able to be conducted during the project term, different tactics will be employed, such as the following. In such an event, this plan will be updated to expand on in-person activities, opportunities, and best practices.

- Utilizing a train-the-trainer approach to equip community leaders and community-based organizations with the tools and resources to educate and/or engage their constituents.
- Organizing community design charrettes to engage community members in location-specific planning exercises.
- Organizing workshops and pop-up events to engage and educate the public.
- Leveraging existing meetings, such as neighborhood association meetings.
- Community bike parties, trivia nights, and other opportunities to reach the public in engaging and interactive ways.

Community Engagement Roadmap

Each component of the community engagement process will have its own roadmap. Staging the planning process will allow the project team to remain responsive and adaptive. Each roadmap will contain most, if not all, of the following categories:

- Purpose
- Timeline
- Guiding Principles
- Promotional Language
- Promotional Partners
- Addressing the Digital Divide
- Goals and Triggers

A draft list of community engagement and education activities is listed below.

ACTIVITY	PURPOSE & FORMAT	TIMING
A	**Community Priorities Survey** To gather broad input on overall community priorities, concerns related to climate change impacts, experience with past hazards and response efforts, and priorities for regional action. Results will inform the vulnerability assessment and future community engagement and education activities.	Completed in October 2020
B	**Climate Risks and Vulnerabilities Webinar** To increase public understanding of current and future climate change risks, hazards, and vulnerabilities. Video recordings will be produced to serve as ongoing educational resources.	January 2021
C	**Vulnerability Assessment Input Platform**	January - February 2021

	To solicit community input and feedback on the draft vulnerability assessment to identify and address gaps and inconsistencies. An online platform will be created, which may include video-guided and/or map-based questionnaires.	
D	**Adaptation Strategies Input Platform** To gather stories of resilience and ideas for adaptation strategies from San Luis Obispo stakeholders. An online platform will be used to allow community members to provide input over an extended period.	January - February 2021
E	**Vulnerability Assessment Webinar** To present the finalized vulnerability assessment as an educational opportunity for community members and stakeholders. Breakout discussions may be organized to further engage participants.	April - May 2021
F	**Adaptation Strategies Prioritization Platform** To consult the public on the prioritization of adaptation strategy options, which will also include strategies identified through Activity D. An online platform will be used to allow community members to provide input over an extended period.	June - July 2021
G	**Draft Safety Element Presentation** To provide the public with the opportunity to review and provide feedback on the draft Safety Element prior to finalization. Breakout discussions may be organized to further engage participants.	October 2021
H	**Community Capacity Building Discussions** To engage community members in adaptation solutions by providing trainings, connections, and guidance to increase and sustain their engagement. These may be organized in partnership with local organizations and segmented by population group to provide more targeted guidance.	January 2022

1 RESILIENT SLO COMMUNITY PRIORITY SURVEY: RESULTS SUMMARY

1.1 PURPOSE

Resilient SLO, an initiative of the City of San Luis Obispo, will result in an update to the City's General Plan to include strategies for building community resilience to the impacts of climate change. The project team consists of the Local Government Commission as the project managers and Ascent Environmental, Inc. as the lead technical consultant. Resilient SLO is designed to be a comprehensive, innovative, and inclusive planning process – one that elevates community voice in decision-making, utilizes best-available science and practices, and focuses on the real challenges that individuals face in the city of San Luis Obispo: climate change, the ongoing COVID-19 pandemic, and economic uncertainty. The Community Priority Survey is one means of the inclusive planning process. This survey sought to gather broad input on overall community priorities, concerns related to climate change impacts, experience with past hazards and response efforts, and priorities for local action. Results will be utilized in the short-term to inform the vulnerability assessment and future community engagement and education activities. Long- term outcomes from the larger Resilient SLO project include educational activities to ensure San Luis Obispo residents and businesses are equipped with the information and strategies to prepare and build resilience to climate change risks and hazards, a comprehensive vulnerability assessment of the city's physical assets, and infrastructure, an updated Safety Element of the General Plan with identified adaptation strategies across key sectors, an implementation guide that translates strategies into detailed work plans and model policies to catalyze action, trainings for City staff and supporting organizations to build collective capacity to respond to climate change hazards and disasters, and an Implementation Guide with work plans and model policies to catalyze action.

1.2 METHODOLOGY

This survey was the first opportunity for community members to give feedback on their concerns related to climate impacts, hazards, and vulnerabilities to be addressed in the larger Resilient SLO initiative. To inform the updates to the hazard mitigation plan and Safety Component of the General Plan, the project team was interested in hearing from community members on their climate impact experiences and their priorities, in order to incorporate effective planning measures. The climate impacts mentioned in the core questions came from impacts identified for the region in California's 4th Climate Change Assessment. Other priority areas were sourced from current events and stressors, such as COVID-19. The project team began drafting the survey in July 2020. Team leads on the project from the City, the Local Government Commission, and Ascent Environmental, Inc. met bi-weekly on project deliverables.

1.3 QUESTIONS

The survey consisted of 19 questions, including 13 multiple-choice and 6 open-ended. The survey included 4 demographic questions to evaluate whether respondents reflected the diversity of the local community. Respondents were also asked the zip code of both their residence and employment to gauge whether they lived or worked in the City. The remaining questions evaluated community priorities, concerns over climate hazards and impacts, experiences with hazards, evaluation of the City's response to past hazards, and interest in further information on resilience and adaptation topics. The survey opened on August 31st, 2020.

The scale and categories for each core multiple-choice question are noted below:

Question	Scale	Categories
Which of the following issues are you currently concerned about?	Level of Concern: ▶ Not at all ▶ Somewhat ▶ Very	▶ Access to Healthy Food ▶ Affordable Housing ▶ Air Pollution ▶ COVID-19 ▶ Earthquakes ▶ Job Security and Economic Vitality ▶ Social Equity and Justice ▶ Transportation affordability and accessibility ▶ Tree health and maintenance ▶ Water Pollution/ Stream health
Which of the following climate change impacts are you concerned about?	Level of Concern: ▶ Not at all ▶ Somewhat ▶ Very	▶ Drought and Decreased Water Supply ▶ Flooding and Storm Damage ▶ Hotter Temperatures and Heat Waves ▶ Sea Level Rise ▶ Wildfires ▶ Wildfire Smoke
How concerned are you that climate change will impact any of the following areas?	Level of Concern ▶ Not at all ▶ Somewhat ▶ Very	▶ Access to Beaches and Open Space ▶ Community Culture ▶ Employment and Job Security ▶ Evacuations ▶ Property Value ▶ Public Health and Safety ▶ Transportation Disruptions ▶ Utility Disruptions and Power Outages
Which of these hazards have you been personally affected by in the past 1-3 years in the City of San Luis Obispo?	Level of Impact ▶ Not at all ▶ Somewhat ▶ Significantly	▶ Air Pollution ▶ Drought and Water Supply ▶ Erosion ▶ Extreme Rainfall ▶ Flooding ▶ Hotter Temperatures and Heat Waves ▶ Tule Fog ▶ Wildfires ▶ Wildfire Smoke
For each hazard that you were affected by, please rank your level of satisfaction with the City's response.	Level of Satisfaction ▶ Not at all ▶ Somewhat ▶ Very	▶ Air Pollution ▶ Drought and Water Supply ▶ Erosion ▶ Extreme Rainfall ▶ Flooding ▶ Hotter Temperatures and Heat Waves ▶ Tule Fog ▶ Wildfires ▶ Wildfire Smoke
How would you prioritize the following actions in the city of San Luis Obispo?	Rank Order (1-7)	▶ Parks ▶ Public transportation ▶ Housing ▶ Trails

Question	Scale	Categories
		▶ Space for Businesses ▶ Land Preservation ▶ Agricultural Land Preservation

1.4 DEMOGRAPHIC QUESTIONS

The city sought to reach out to respondents that were representative of the diverse population of the City of San Luis Obispo. Respondents were given the option of providing key demographic details respondents or declining to answer. The questions included in this section are detailed below:

[Age] What is your age?

- Under 18
- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55 - 64
- Above 65
- Prefer not to say

[Race/Ethnicity] How would you describe yourself? Please select all that apply.

- American Indian or Alaska Native
- Asian
- Black or African American
- Hispanic, Latino, or Spanish origin
- Middle Eastern or North African
- Native Hawaiian or Other Pacific Islander
- White or Caucasian
- Other (please specify)
- Prefer not to say

[Household Income] What was your total household income before taxes in 2019?

- Less than $30,000
- $30,000- $39,999
- $40,000 - $59,999
- $60,000 - $79,999
- $80,000 - $99,999
- $100,000 or more
- Prefer not to say

1.5 OUTREACH

Original plans for survey outreach included in-person events and in-person survey opportunities to complement online and phone surveys. Due to COVID-19 and quarantine restrictions, these forms of outreach could not take place; outreach had to be fully remote. The primary form included an online survey on the city's OpenGov web portal which also regularly hosts surveys for other city initiatives outside this project and for regularly scheduled city meetings that are broadcast on the website. In an effort to bridge the digital divide, the project team worked with the city to establish a phone line for respondents to call in their responses. However, no respondents utilized the phone line to respond. In-person events would have reached more respondents who do not have internet access but the inability to hold in-person events affected the ability to fulfill that form of engagement.

To promote the phone-line and online survey, the project team reached out over e-mail or social media to organizations, businesses and agencies that serve populations who live, work, or go to school in San Luis Obispo. These promotional partners were asked to share the survey with their audiences and were given a promotional toolkit with sample email language and social media posts. A wide variety of organizations were contacted (approximately 126), in the hopes of reaching the diverse composition of the local community. Organizations contacted included local educational institutions, non-profits, coalitions, professional associations, cultural organizations, and businesses. Most outreach was conducted by email; 115 organizations were contacted via email. Highly trafficked social media accounts were also contacted. 11 organizations and/or individuals were contacted via social media. Promotional partners received a promotional kit, which included sample e-mail language, sample social media posts plus photo postcards, and a high level overview of key details, to share with their constituents. The survey deadline, originally the end of September, was extended to October 11th to give more time for responses. Once the deadline was extended, organizations were notified of the extension. In addition to outreach through promotional partners, the survey was also shared on 1-2 times per week on City's social media accounts.

On September 17th, a Spanish version of the survey was created on Survey Monkey. On September 29th, the entire promotional kit was translated to Spanish to conduct more outreach to the Spanish speaking community and shared with promotional contacts. Promotional asks to Latino, Hispanic, and Spanish-speaking cultural groups primarily went through Cal Poly students. Despite reaching out to organizations, the Spanish language survey posted on Survey Monkey did not receive any responses.

1.6 PROCESS OF ANALYSIS

1.6.1 Core Questions

Responses for each multiple-choice core question were analyzed to reveal the following:

a. Areas of Highest Concern/Impact/Satisfaction (for all Respondents)

b. Areas of Highest Concern/Impact/Satisfaction (for key Demographic Groups)

In evaluating the areas of highest concern/impact/satisfaction for all Respondents, we included all relevant measures for the specific category (ex. "Not at all", "Somewhat", "Very/ Significantly"). Responses are shown as absolute numbers (total counts) unless otherwise indicated.

In evaluating the Highest Concern/Impact/Satisfaction for select demographic groups, we chose to only focus on "Very" or "Significant" responses. Although a "somewhat" response indicates some level of concern/impact/satisfaction (as compared to a "not at all"), it was decided that a "Very" or "Significant" response was more indicative of a respondent's paramount concern. Thus, all responses for select Demographic Groups represent the percentage or total of respondents indicating "Very or "Significant" for the specific category.

Additionally, further grouping was performed on both Household Income and Race/Ethnicity for the ease of analysis and interpretability.

Household Income was re-structured into the following three groups:

- Less than $50,000
- $50,000 - $100,000
- $100,000 +

Race/Ethnicity was re-structured into the following two groups:

- White or Caucasian
- All other Races/Ethnicities

1.6.2 Open-Ended Questions

The survey contained six open-ended questions. Open-ended responses were categorized by topic area and analyzed for emerging themes. A word cloud has also been created to highlight key categories. The full text of responses will be available in the Appendix.

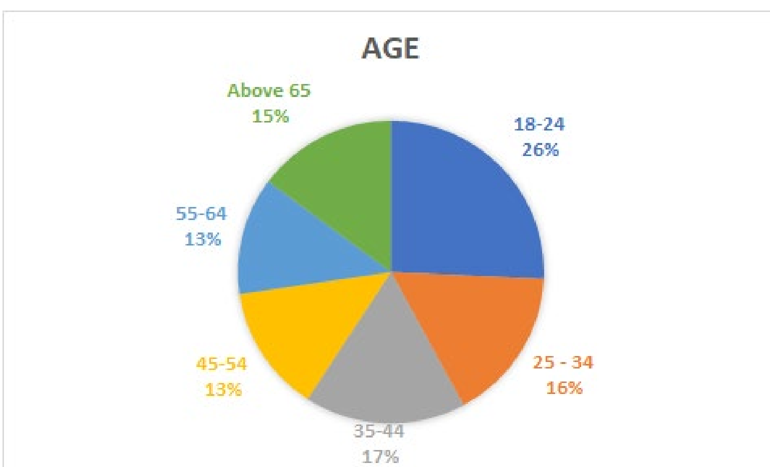
1.7 RESULTS

1.7.1 Overview

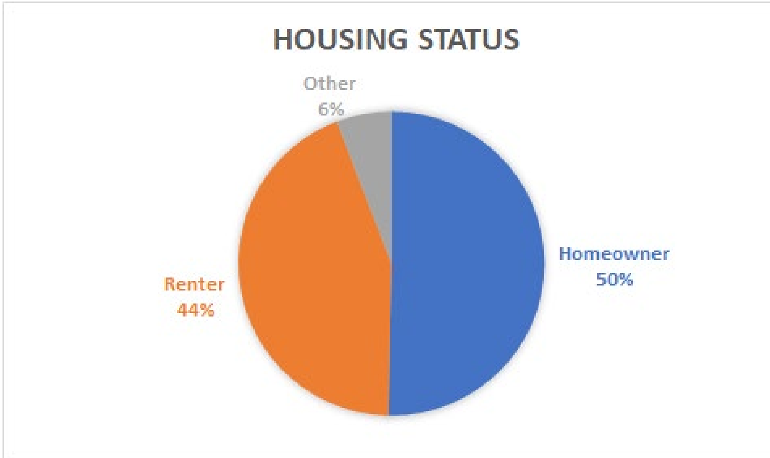
The English version of the survey was initiated on August 31st and closed on October 11th. The English version of the survey had 413 visitors and 331 responses. However, because of duplicate responses, only 328 responses were included in the analysis. Engagement with the survey generated over 16 hours of public comment. 290 of the respondents indicated that they lived or worked in a City zip code, while 41 responses came from a zip code outside of City limits. All responses, both in-City and out of City zip codes were analyzed. The Spanish Version of the survey, published two weeks after the English survey, had no respondents. The phone-in option was not utilized either.

1.7.2 Demographics

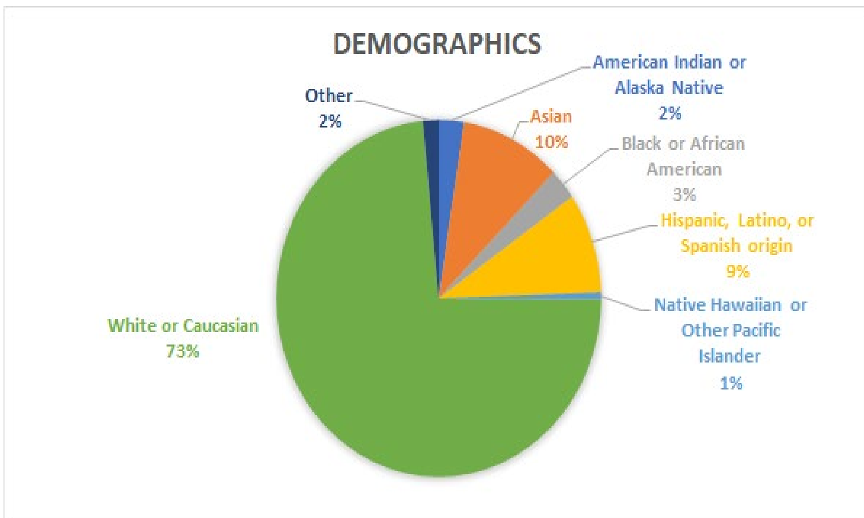
Respondents were asked to answer basic demographic information including age, housing status, income and ethnicity. These questions were asked to assess how well the survey respondents reflected the actual community make-up of San Luis Obispo. Respondents were asked to identify what 10-year age block they belonged to. The highest percentage of respondents were 18-24 (26%), followed by 25-34 (16%), 35-44 (17%), above 65 (15%), 45-54 (13%), and 55-64 (13%).



Half of respondents were homeowners (50%), 44% were renters, and 6% selected "other".



The most common household income selected by respondents was $100,000-149,000 (58), followed by 200,000 or more (33). In contrast, 30 respondents selected the lowest income bracket (less than 10,000), and 14 selected the second lowest income bracket: $10,000-14,999.



Respondents most commonly described themselves as White or Caucasian (234), followed by Asian (32), Hispanic, Latino or Spanish origin (29), Black or African American (9), American Indian or Alaskan Native (8), and Native Hawaiian or other Pacific Islander (2). It is worth noting that 42 respondents chose "prefer not to say" when describing their racial identity.

As a reference point, Demographic results from the survey were compared with the 2018 American Community Survey to determine if the survey respondents over or under represented the demographics of SLO residents. Details on representation are noted below.

Demographic	2018 American Community Survey (%)	Community Priority Survey Results (#, %)	Over or Under Represented?
Housing Situation			
Homeowner	68%	164, 49.5%	Under
Renter	35%	146, 44%	Over
Age			
Under 18	13.1%	0, 0%	Under

Demographic	2018 American Community Survey (%)	Community Priority Survey Results (#, %)	Over or Under Represented?
18 - 24	34.9%	80, 25%	Under
25 - 34	13.6%	51, 16%	Over
35 - 44	8.3%	53, 16%	Over
45 - 54	8.7%	42, 13%	Over
55 - 64	8.9%	40, 12%	Over
Above 65	12.5%	46, 14%	Over
Ethnicity/Race			
American Indian or Alaskan Native	.3%	8, 2%	Over
Asian	5.6%	31, 9%	Over
Black or African American	2.0%	5, 2%	Equal
Hispanic, Latino or Spanish origin	18.3%	23, 7%	Under
Native Hawaiian or Pacific Islander	.1%	2, 1%	Over
White or Caucasian	70.7%	237, 72%	Over
Other	.2%	3, 1%	Over
Household Income			
Less than $10,000	11.6%	30, 9%	Under
$10,000 - $14,999	7.3%	15, 5%	Under
$15,000 - $24,999	11.2%	9, 3%	Under
$25,000 - $34,999	6.3%	15, 5%	Under
$35,000 - $49,999	11.2%	17, 5%	Under
$50,000 - $74,999	15.2%	30, 9%	Under
$75,000 - $99,999	10.8%	29, 9%	Under
$100,000 - $149,999	12.8%	59, 18%	Over
$150,000 - $199,999	5.8%	32, 10%	Over
$200,000 or more	7.8%	33, 10%	Over

Hispanic, Latino or Spanish origin were the most underrepresented when compared to the 2018 American Community Survey. The survey respondents were also younger than the 2018 American Community Survey results. The two youngest age groups were underrepresented, especially those under 18 whom were not represented at all. All other age groups were slightly overrepresented. 12 respondents chose “prefer not to say” on this demographic question. Otherwise, all results were within 4 percentage points of the 2018 American Community Survey showing a successful sample of SLO demographics.

The demographic question that most respondents declined to answer was about total household income with 57 choosing “prefer not to say.” The highest three income brackets were overrepresented while lower income brackets were underrepresented compared to the 2018 American Community Survey results. This could be correlated with the higher percentage of survey respondents in younger age groups, who tend to make less money than older Americans later in their careers.

All respondents had to choose an answer when asked about their housing situations. The options included ”Homeowner, Renter, and Other.” Homeowners were under represented by respondents while renters were over represented. 19 chose “Other” to specify their housing situation. Some of them were students living at home or in student housing.

1.7.3 Open-Ended Questions

Details for each open-ended question are provided below:

- Of the open-ended questions, Question 5, "If there are other community issues not listed above that you are concerned about, please provide them here," had the most responses (153).
- Question 16, "What climate change adaptation and community resilience topics are you interested in learning more about?" had the 2nd highest number of responses (105).
- Question 14 garnered the third most responses (95), and asked "Do you have suggestions for how the City of San Luis Obispo can improve response efforts (to hazards)?"
- Question 13 had the 4th most respondents (83) and "Do you have any comments to share regarding how you were affected by past hazards and/or city response efforts?"
- Question 7, "If there are other climate change impacts not listed above that you are concerned about, please provide them here," had 77 responses.
- Questions 9 and 11 had the lowest number of respondents (54) and (37) respectively. Question 9 asked for additional areas impacted by climate change of concern. Finally, question 11 asked for additional hazards that respondents have been personally affected by over the past 1-3 years.
- Responses to key open-ended questions are discussed in detail in the results below.
- There were 604 total responses to open-ended questions.

Question	Number of Responses
5: "If there are other community issues not listed above that you are concerned about, please provide them here"	153
16: "What climate change adaptation and community resilience topics are you interested in learning more about?"	105
14: "Do you have suggestions for how the City of San Luis Obispo can improve response efforts (to hazards)?"	95
13: "Do you have any comments to share regarding how you were affected by past hazards and/or city response efforts?"	83
7: "If there are other climate change impacts not listed above that you are concerned about, please provide them here"	77
9: "If there are other areas impacted by climate change not listed above that you are concerned about, please provide them here."	54
11: "If there are other hazards that you have been personally affected by in the past 1-3 years in the City that are not listed above, please provide them here."	37

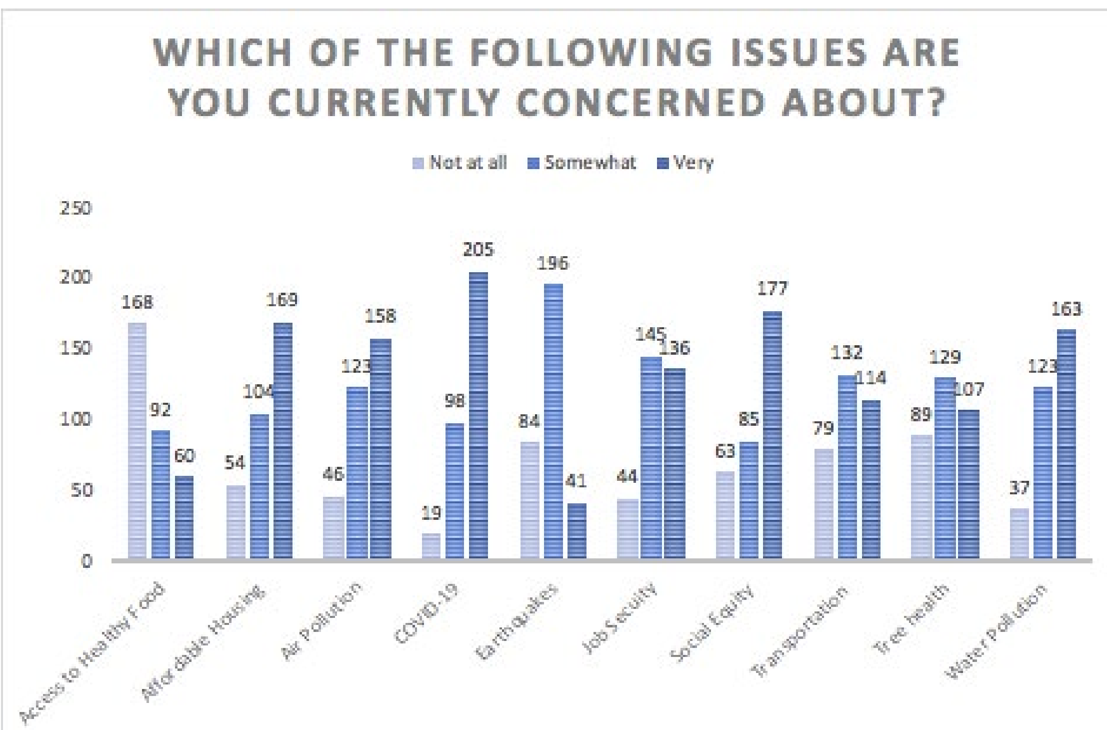
1.7.4 Core Questions

WHICH OF THE FOLLOWING ISSUES ARE YOU CURRENTLY CONCERNED ABOUT?

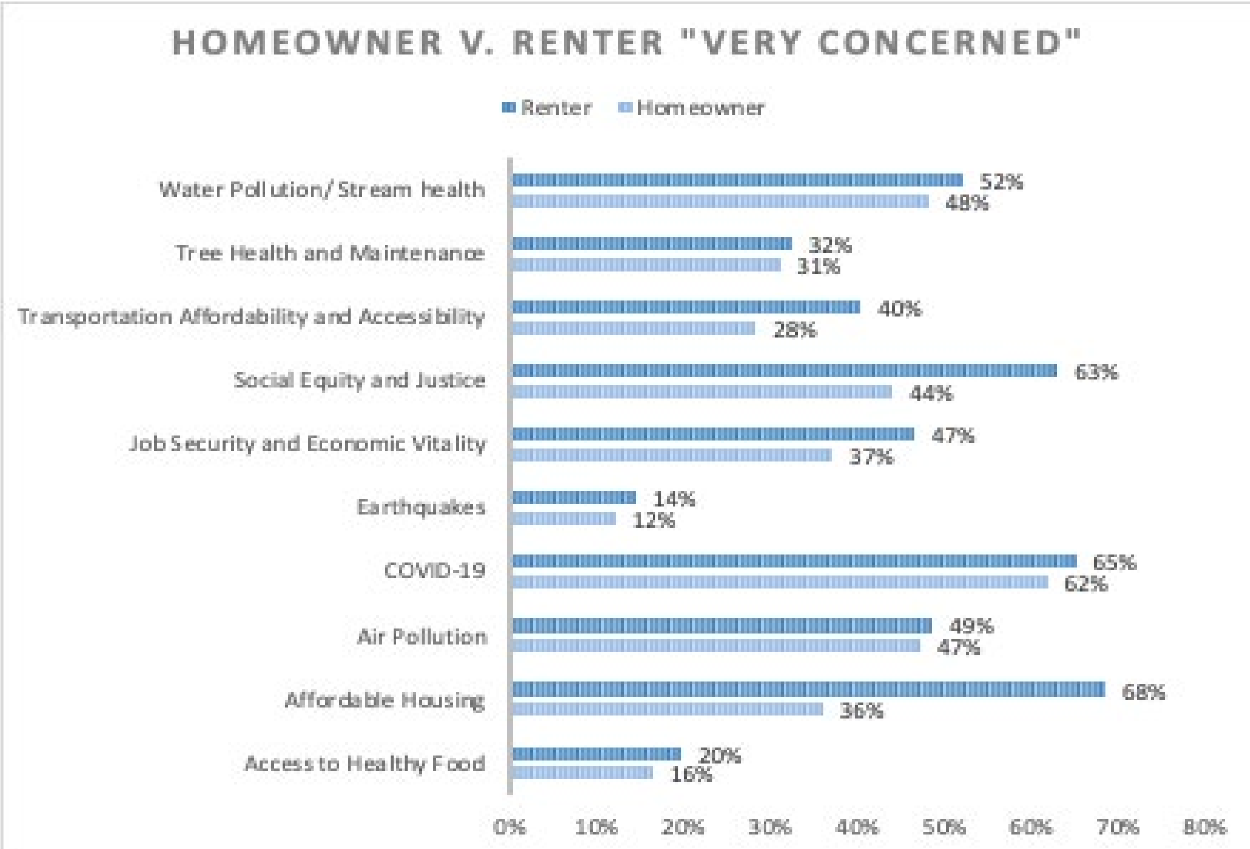
Overall Results

Level of Concern	Not at all	Somewhat	Very
Access to Healthy Food	168	92	60
Affordable Housing	54	104	169
Air Pollution	46	123	158
COVID-19	19	98	205
Earthquakes	84	196	41
Job Secuity	44	145	136
Social Equity	63	85	177
Transportation	79	132	114
Tree health	89	129	107
Water Pollution	37	123	163

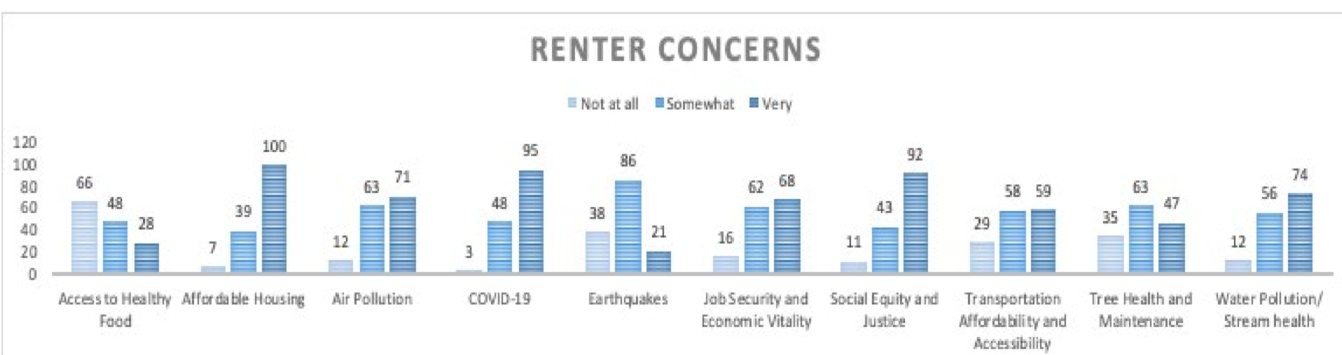
Respondents were most concerned about issues that are affecting their day-to-day life in 2020. As noted on the Figure above, this includes COVID-19, Air Pollution, Job Security, Social Equity and Affordable Housing. The strong concern for COVID-19 is not surprising; during the time period the survey was open, COVID-19 still had California counties in various stages of quarantine/lockdown. Additionally, the already competitive housing market in the state went through changes as some cities saw rents shift unpredictably. Furthermore, the summer saw high periods of social unrest as cases of police brutality and racial injustice were brought to the national spotlight. Beginning in August, wildfires broke out across the state following dry conditions, lighting, high-winds, and extreme heat. 2020 has also seen the largest wildfire in California's history, and the multiple fires occurring caused poor air quality for wide swaths of the state including the central coast.



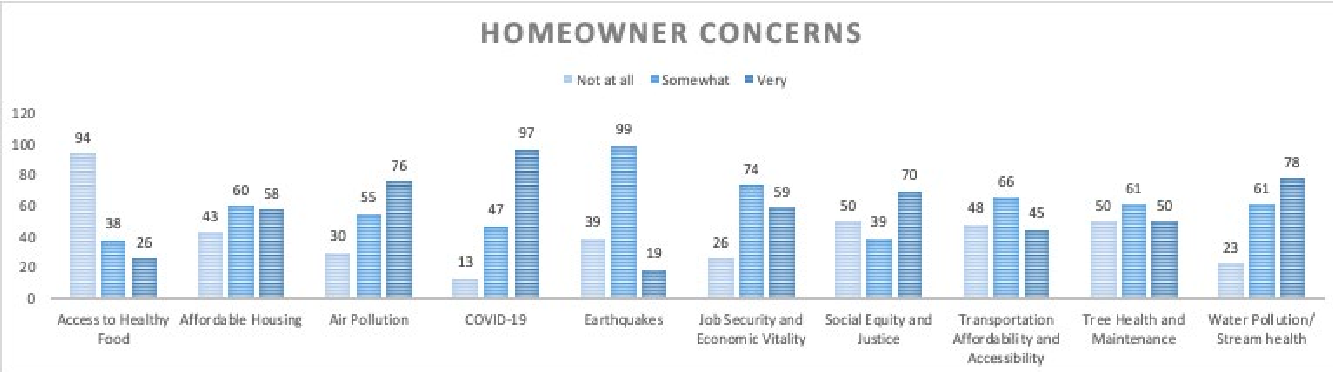
Variation by Housing Situation



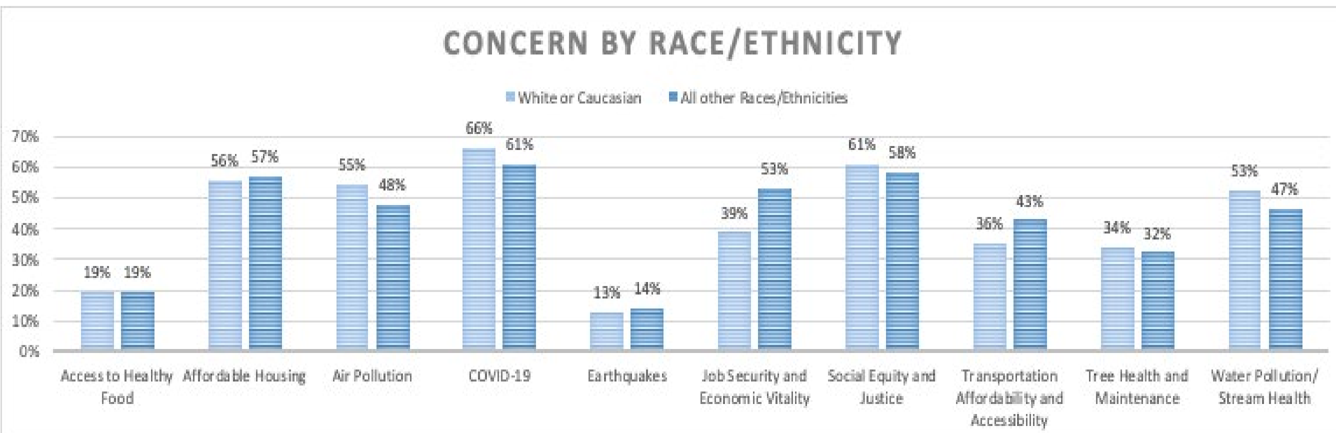
As noted in the graph above], renters and homeowners shared a similar amount (+/- 1 - 4%) of concern for a variety of key issues - Water Pollution, Tree Health, COVID-19, Healthy Food, Earthquakes, and Air Pollution. The three areas of greatest misalignment were Affordable Housing (68% v. 36%); Social Equity and Justice (63% v. 44%); and Transportation Affordability and Accessibility (40% v. 28%). The variation in Affordable Housing is understandable given the status of the respondents as "renters"'; homeowners are likely to be less concerned about housing affordability due to already owning a home. The variation in Social Equity and Justice is unclear, but could be connected to the age of the respondents (i.e. a correlation between age and homeowner status) or another unifying variable. The same could be said for Transportation Affordability and Accessibility with the added caveat for income.



Overall, the top three concerns for homeowners are COVID-19 (62%), Water Pollution/Stream Health (48%), and Air Pollution (47%). The top three concerns for renters are Affordable Housing (68%), COVID-19 (65%) and Social Equity and Justice (63%).

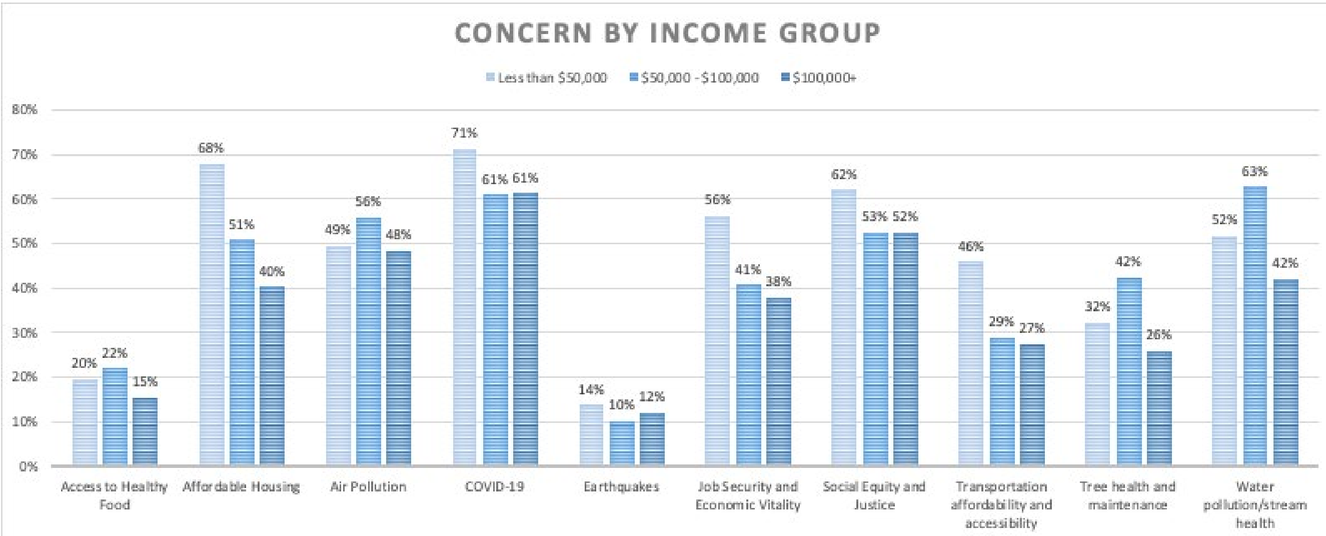


Variation by Race/Ethnicity



Level of climate concern between different racial and ethnic groups (in this case, Caucasian v. All other Races/Ethnicities) was fairly uniform on most key issues. The largest divergence occurred for Job Security and Economic Vitality (39% v. 53%); Air Pollution (55% v. 48%); and Transportation Affordability and Accessibility (36% v. 43%). Overall, the top three concerns for White or Caucasian respondents are COVID-19 (66%), Social Equity and Justice (61%) and Affordable Housing (56%). For participants identifying as one or more other races, their top three concerns are identical with some variation in level of concern (61%; 58%; 57% respectfully).

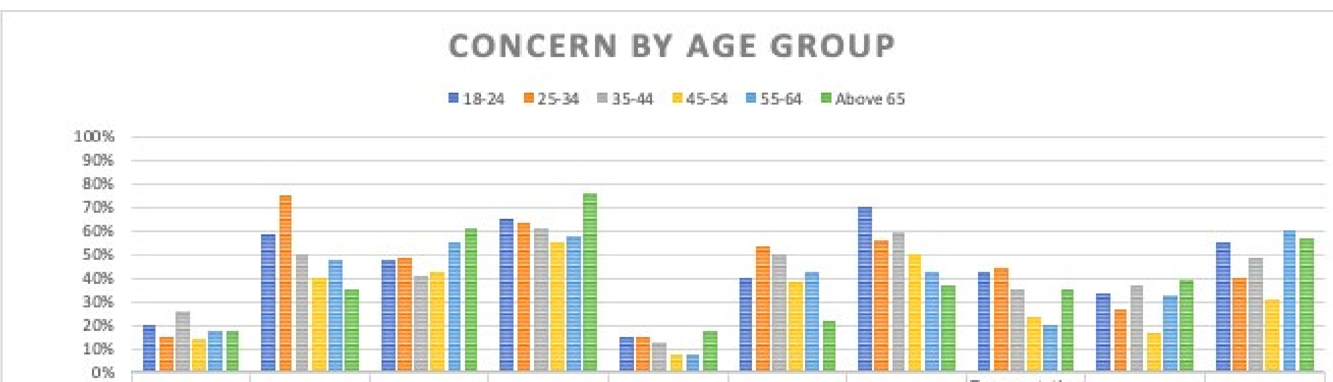
Variation by Income Group



Responses by income group are noted in the figure above. There is great variability in the level of concern Individuals have for key climate and adaptation subjects. The one exception to this observation is a clear concern for COVID-19 across all income groups. Unsurprisingly, individuals within the lowest household income group (“Less than $50,000), expressed a much higher level of concern for Affordable Housing (68% v. 51%, 40% respectfully); Job Security and Economic Vitality (56% v. 41%, 38%); and Transportation Affordability and Accessibility (46% v. 29%, 27% respectfully). Individuals within the other two income groups ($50,000 - $100,000 and $100,000 +) were more aligned in their levels of concern; the one main exception for this is concern for Water Pollution/ Stream Health (63% v. 42%).

Overall, individuals with a household income of less than $50,000 were most concerned about COVID-19 (71%); Affordable Housing (68%); and Social Equity and Justice (62%). Individuals with a household income between $50,000 - $100,000 were most concerned with Water Pollution/ Stream Health (63%); COVID-19 (61%); and Air Pollution (56%). Individuals with a household income of $100,000 or more were most concerned with COVID-19 (61%); Social Equity and Justice (52%); and Air Pollution (48%).

Variation by Age



	Access to Healthy Food	Affordable Housing	Air Pollution	COVID-19	Earthquakes	Job Security and Economic Vitality	Social Equity and Justice	Transportation affordability and accessibility	Tree health and maintenance	Water Pollution/ Stream Health
18-24	20%	59%	48%	65%	15%	40%	70%	43%	34%	55%
25-34	15%	75%	48%	63%	15%	54%	56%	44%	27%	40%
35-44	26%	50%	41%	61%	13%	50%	59%	35%	37%	48%
45-54	14%	40%	43%	55%	7%	38%	50%	24%	17%	31%
55-64	18%	48%	55%	58%	8%	43%	43%	20%	33%	60%
Above 65	17%	35%	61%	76%	17%	22%	37%	35%	39%	57%

When evaluated on the dimension of age, individuals expressed some similar concerns. COVID-19 continues to be a trend with the majority (50% +) of individuals expressing a high level of concern. More specifically, individuals above the age of 65 were most concerned with COVID-19 (76%); individuals between the ages of 45 and 54 were the least concerned with COVID-19 (55%).

Aside from COVID-19, other top concerns included Social Justice and Equity – a first or secondary concern for individuals within the following age groups: 18 - 24; 35 - 44; and 45 - 54. Individuals between the ages of 25 and 34 are also concerned about Social Justice and Equity (56%), but their paramount concern is Affordable Housing (75%). Individuals above the age of 65, on the other hand, are the least concerned about Social Equity and Justice (37%); after COVID-19, they are most concerned about Air Pollution (61%).

Open-Ended Responses

Question: If there are other community issues not listed above that you are concerned about, please provide them here.

Respondents were also able to write in other concerns that were not addressed above. 153 respondents wrote in a concern. The most repeated write-in concern involved homelessness. Selected responses include:

- "Homelessness and the lack of focus our city official have on dealing with the issue."
- "How is the community taking care of the House-less population?
- What are the options for those that do not have homes during the pandemic and unhealthy air conditions due to natural disasters (I.e. fires)"
- "The growing number of homeless in our downtown open spaces and doorways. Downtown is the heart of SLO and central to its vibrancy."
- "Homelessness is impacting the waterways & Spot fires. Hard facts to face but true."
- "providing services from homeless and mentally ill persons in the county"

Concerns that were repeated by multiple respondents include issues of police brutality and police funding. Select responses:

- "Systemic racism and our bloated county Sheriff's budget,"
- "Racism, police brutality, republican takeover using big money for our local candidates which will diminish the focus on environmental and justice concerns,"
- "Addressing and defunding workplaces and laws that uphold systemic racism. Defund the police in order to allocate funds towards issues like the ones listed above."
- "Overfunding on police--defunding is necessary."
- "I live by Santa Rosa Park and the homeless population is very disrespectful of our property. The creek that runs through our backyard is littered with their trash and they are constantly stealing things out of our yard. The police are not helpful with the issue whatsoever. The police are an entirely useless organization and are especially terrible here in SLO."
- "Police Department suppressing free speech rights by tear gassing people, over-charging protest organizer, failure to files charges against individuals who drove cars into pedestrians."

Other concerns that were repeated multiple times include cycling and transportation issues.

Selected responses:

- "Walkability"
- "Stop wasting money on changing roads to accommodate bike lanes. Instead *(sic)* focus on adding busses and repairing our streets. Do not take away our street parking to make a bike lane.
- "Infrastructure and road building"

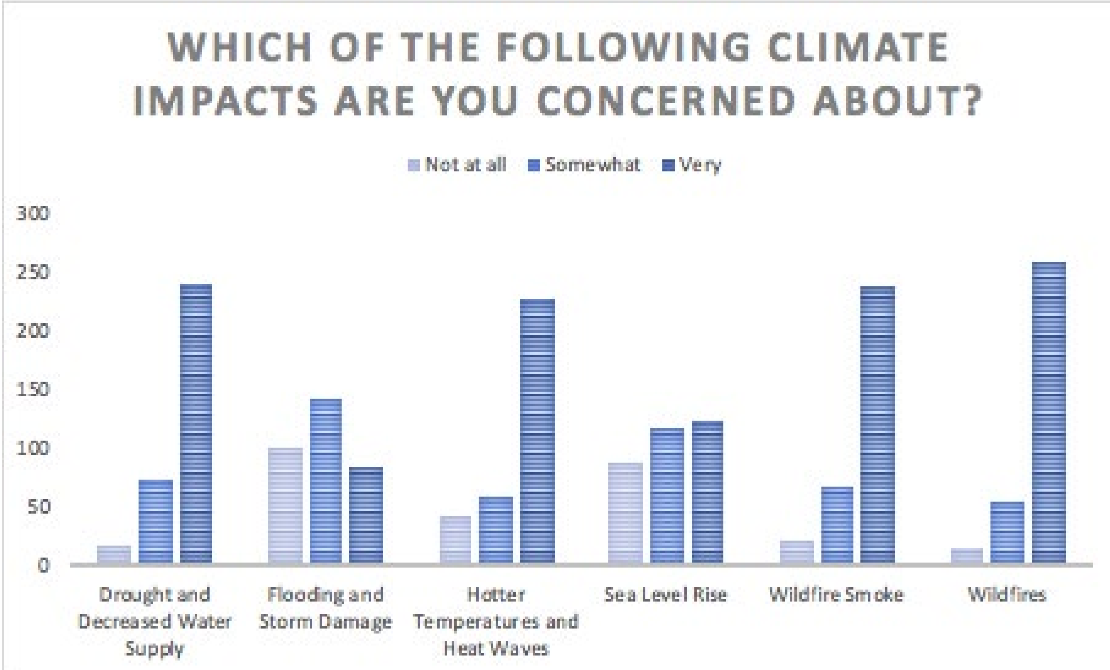
The graphic (shown below) is a word cloud generated from responses the open-end question. As the Word Cloud illustrates, housing and homelessness were two salient topics for respondents.

Which of the following climate change impacts are you concerned about?

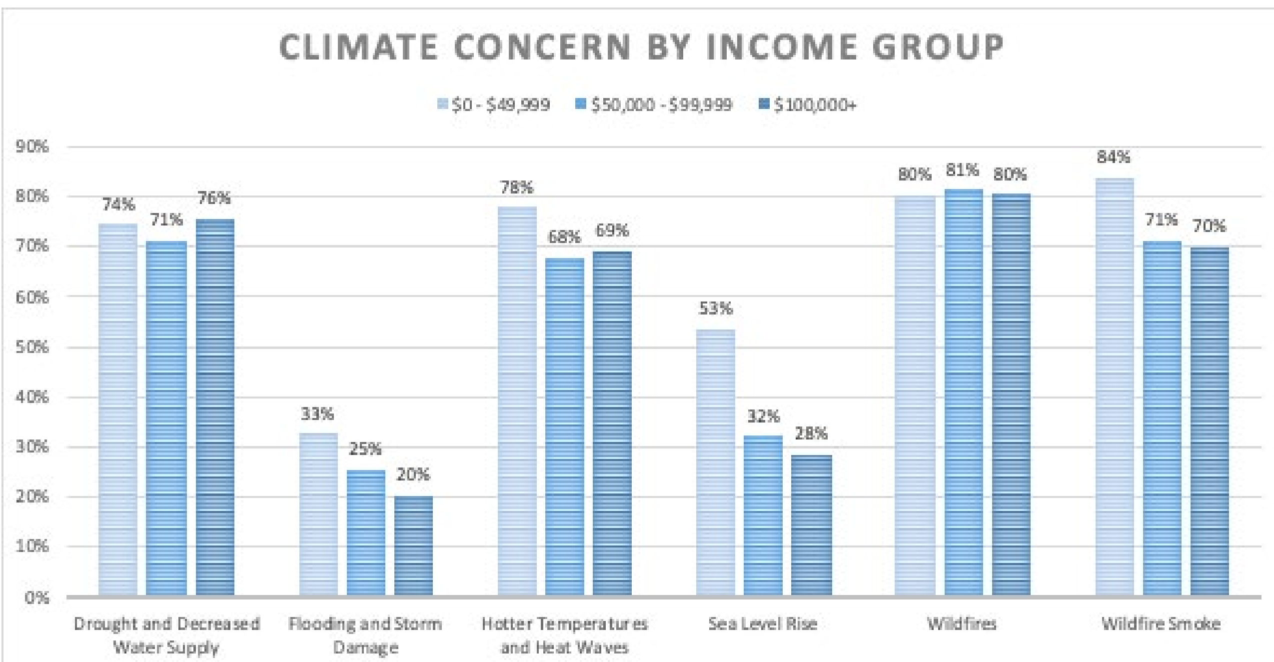
Overall Results

Level of Concern	Not at all	Somewhat	Very
Drought and Decreased Water Supply	16	72	240
Flooding and Storm Damage	100	141	84
Hotter Temperatures and Heat Waves	41	59	227
Sea Level Rise	87	117	122
Wildfire Smoke	20	66	238
Wildfires	15	53	259

Respondents were very concerned about most of these climate impacts. Only Flooding and Storm Damage saw more respondents choosing “Not at all” or “Somewhat”. Wildfires and Wildfire Smoke had the most concern, likely related to the volatile 2020 wildfire season in California that brought that state’s largest wildfire to date and many days of unhealthy air quality.

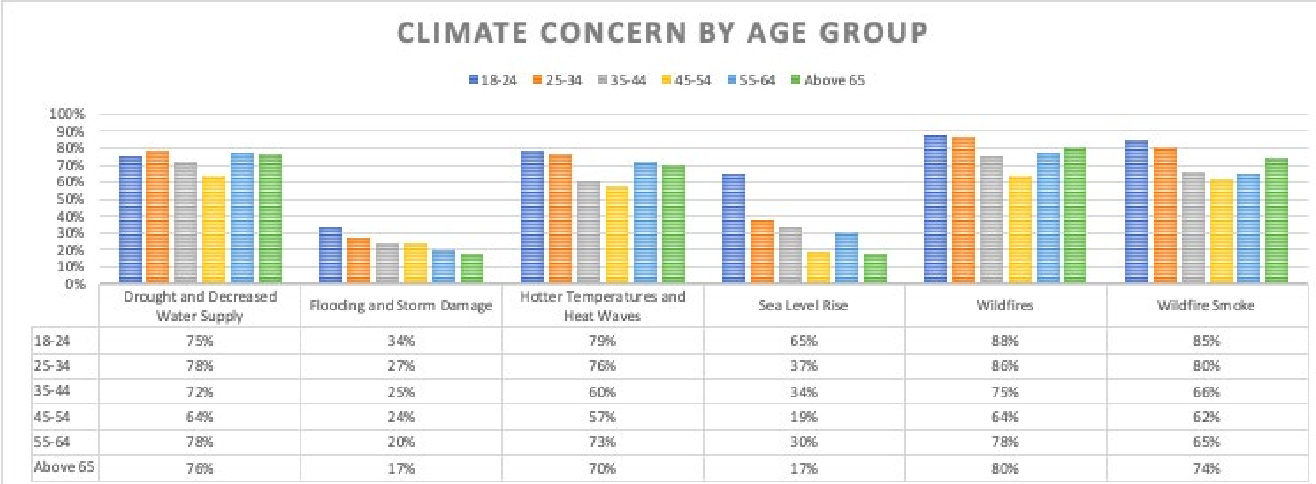


Variation by Income Group



When evaluated by income group, all groups, regardless of income, expressed strong concern about Wildfires (80%, 81%, 80% respectfully); however, it is interesting to note that individuals in the lowest income group are more concerned with Wildfire Smoke than Wildfires as a climate category (80% v. 84%). Individuals within the lowest income group are also most concerned about Hotter Temperatures and Heat Waves (78%) and are significantly more concerned about Sea Level Rise than individuals in other income categories. In comparison, individuals within the highest income group are most concerned about Drought and Decreased Water Supply (76%); their tertiary concern is Wildfire Smoke. Individuals within the middle-income group share similar concerns with some variation in percentage (71% for both).

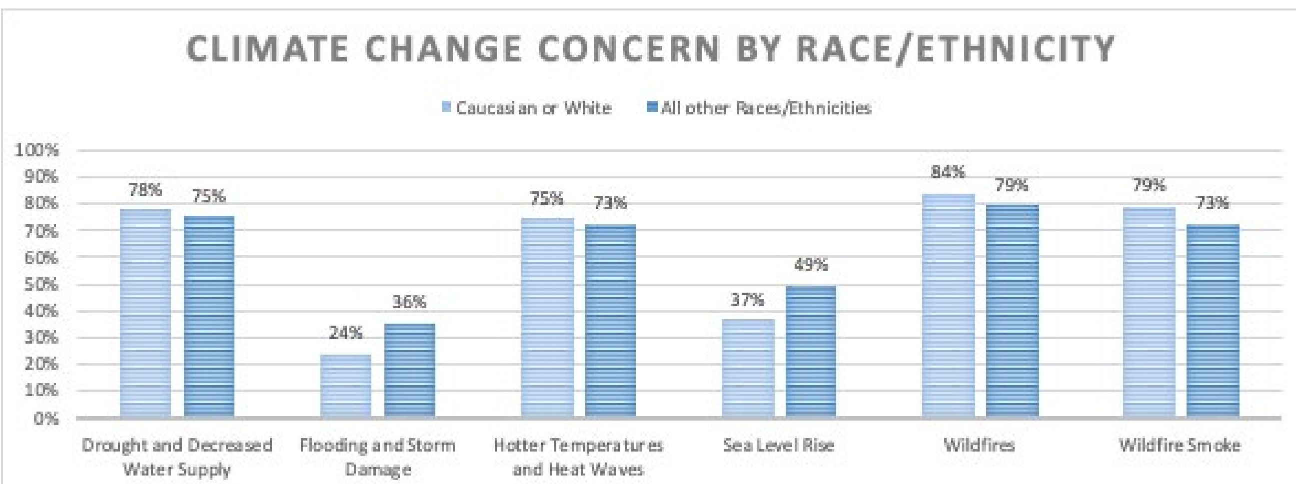
Variation by Age Group



	Drought and Decreased Water Supply	Flooding and Storm Damage	Hotter Temperatures and Heat Waves	Sea Level Rise	Wildfires	Wildfire Smoke
18-24	75%	34%	79%	65%	88%	85%
25-34	78%	27%	76%	37%	86%	80%
35-44	72%	25%	60%	34%	75%	66%
45-54	64%	24%	57%	19%	64%	62%
55-64	78%	20%	73%	30%	78%	65%
Above 65	76%	17%	70%	17%	80%	74%

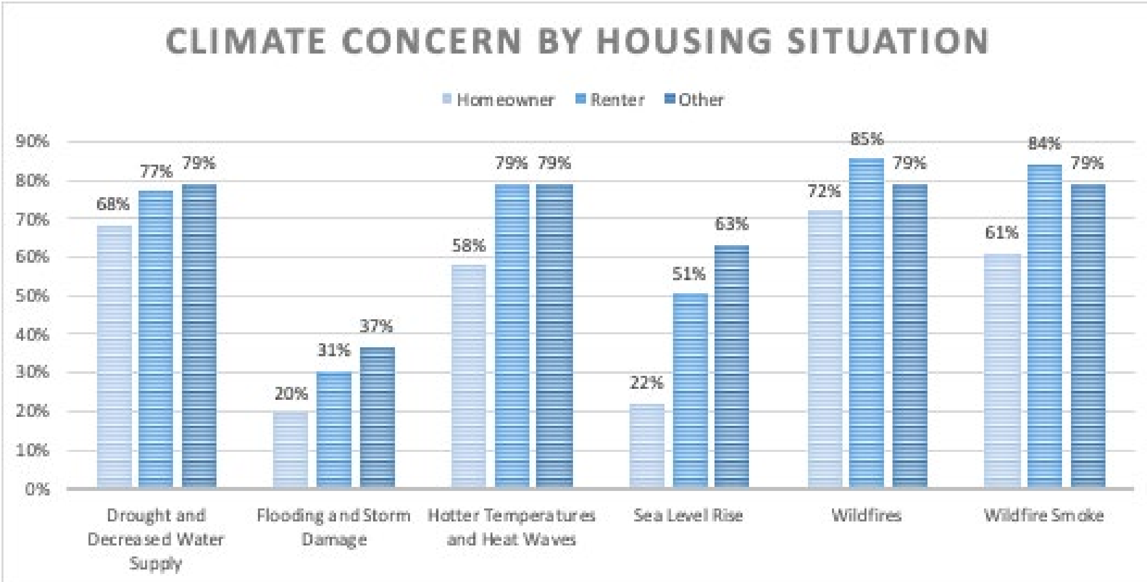
When evaluating climate concern by age, a few patterns emerge. Across the board, individuals are most concerned about Wildfires. Within that category, individuals between the ages of 18 and 24 are most concerned (88%), followed by individuals between the ages of 25 and 34 (86%). There is greater variation when evaluating individual's secondary concerns. Wildfire smoke is the second highest concern for individuals between the ages of 18 – 24 and 25 – 34. For all other age groups, their second highest concern is Drought and Decreased Water Supply. The greatest variance in concern among age groups is with Sea Level Rise. Individuals between the ages of 18 and 24 have the highest level of concern (65%), with individuals above the age of 65 expressing the least amount of concern (17%).

Variation by Race/Ethnicity



Climate concerns between different racial and ethnic groups (in this case, Caucasian v. All other Races/Ethnicities) was fairly uniform on a majority of issues (+/- 6%) – Drought and Decreased Water Supply (78% v. 75% respectfully); Hotter Temperatures and Heat Waves (75% v. 73%); Wildfires (84% v. 79%); and Wildfire Smoke (79% v. 73%). The largest divergences occurred for Flooding and Storm Damage (24% v. 36%) and Sea Level Rise (37% v. 49%). Regardless of racial or ethnic identify, all individuals noted the same top concern: Wildfires. Secondary and tertiary concern varied slightly – Wildfire Smoke (79%) and Drought and Decreased Water Supply (78%); vs. Drought and Decreased Water Supply (75%), Hotter Temperatures and Heat Waves (73%), and Wildfire Smoke (73%).

Variation by Housing Situation



Climate concerns among individuals in different housing situations varied slightly. The top concern for Homeowners and Renters is Wildfire (72% v. 85% respectfully). Secondary concern for these two groups deviated; renters are more concerned about Wildfire Smoke (84%); homeowners are more concerned about Drought and Decreased Water Supply (68%). Individuals identifying their housing situation as "Other" had four competing interests at 79% - Drought and Decreased Water Supply, Hotter Temperatures and Heat Waves, Wildfires, and Wildfire Smoke. The greatest divergence on level of concern occurred between Homeowners and Renters on the issue of Sea Level Rise: 51% of renters expressed concern versus only 22% of homeowners.

Open-Ended Responses

Question: If there are other climate change impacts not listed above that you are concerned about, please provide them here.

There were 77 responses to this question. Answers were categorized by topic area. The four most prevalent themes discussed by respondents were:

1) Biodiversity and Health of Inland and Marine Ecosystems

2) impacts to Agriculture & Food Systems

3) Water Supply

4) Social Inequality.

Biodiversity and impacts to wildlife and their habitats were key concerns for respondents. Concerns were raised about both inland and marine ecosystems. Key concerns for marine ecosystems included plastic pollution and ocean acidification. Respondents were also concerned with the impacts of climatic changes on agriculture and how agricultural changes might impact food supply and access. Water supply was also frequently mentioned. Over half of comments related to water discussed over-building and the impacts of new development on water supply. Comments also mentioned modified agricultural practices, water conservation, use of non-potable water and desalinization as potential solutions. Social inequality was another key issue. Comments in this category mentioned social justice, systemic and environmental racism, environmental justice, issues of representation, impacts to low income communities, and wealth inequality.

Subject Area	Issue	Frequency of Mentions
Environmental impacts	Biodiversity and Health of Inland and Marine Ecosystems	22
	Pests and Diseases	4
	Negative Environmental Impact of Development	2
Water	Water Supply	8
Agriculture	Agriculture & Food Systems	11
Human Systems	Social Inequality	7
	Economy	4
	Public Health	3
Energy & Infrastructure	Energy	4
	Transportation	4
Natural Disasters	Extreme Weather	5
	Mudslides/Mudflows	3
	Wildfire or forest management	3
	Temperature	2
Other	Climate Change is not occurring or should not be addressed by City	6

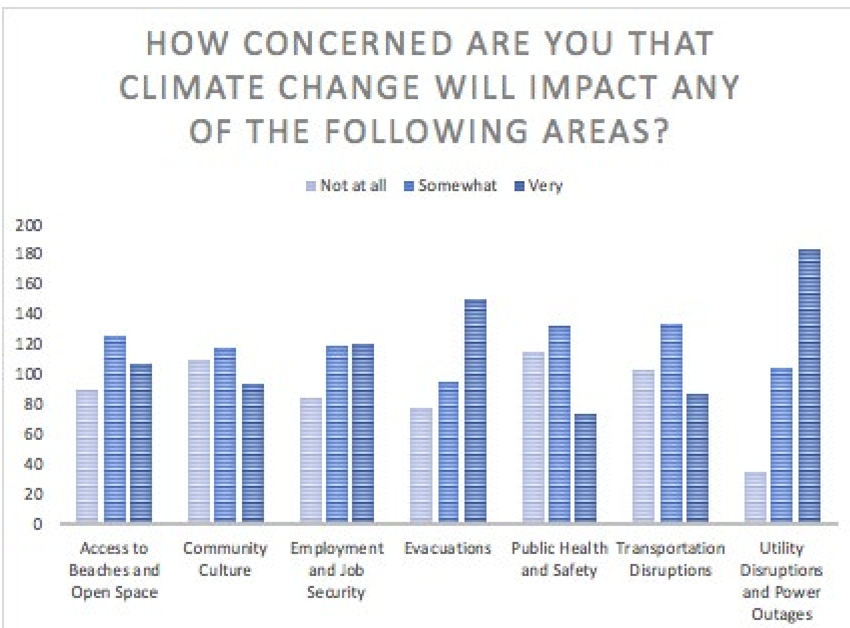
Responses to the open-ended question were also used to generate a Word Cloud (shown below). The Word Cloud illustrates the prevalence of words such as water, agriculture, environment, native, wildfire, food, etc. The frequency of these themes indicates that topics related to environment, water and agriculture are common concerns for respondents.

HOW CONCERNED ARE YOU THAT CLIMATE CHANGE WILL IMPACT ANY OF THE FOLLOWING AREAS?

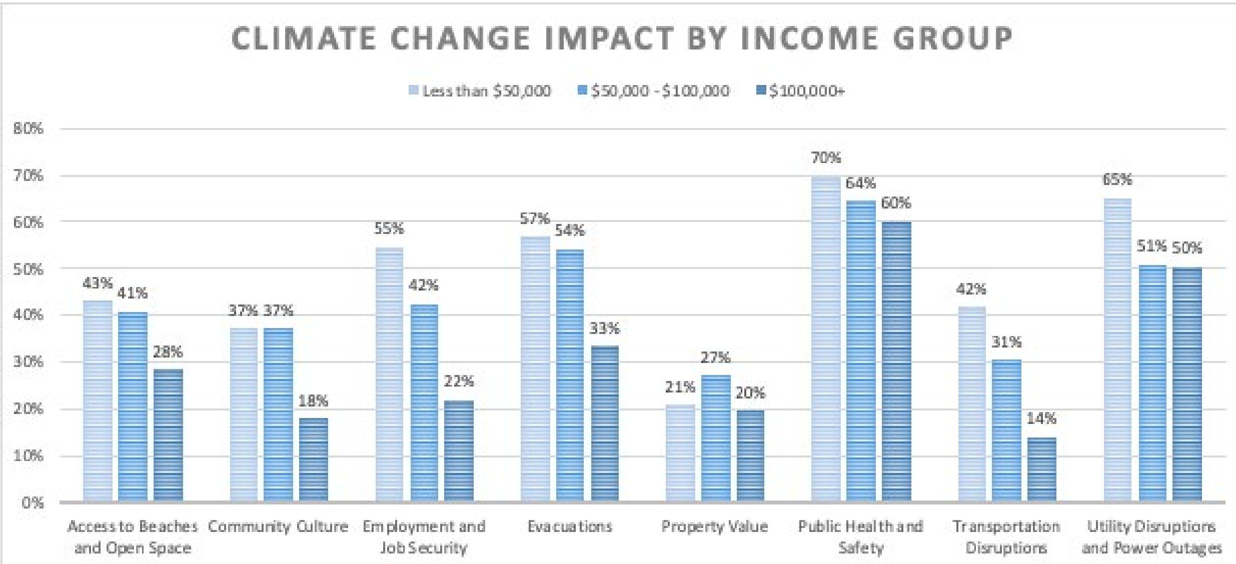
Overall Results

Row Labels	Not at all	Somewhat	Very
Access to Beaches and Open Space	90	126	107
Community Culture	110	118	94
Employment and Job Security	85	119	120
Evacuations	77	95	150
Public Health and Safety	115	133	74
Transportation Disruptions	103	134	87
Utility Disruptions and Power Outages	35	104	184

Respondents chose "Very Concerned" with less frequency for this question than previous questions. There is high concern about Utility Disruptions and Power Outages which aligns with the context of this survey's timing. Summer 2020 brought extreme heatwaves in the state and the California Independent System Operator issued multiple "flex warnings" statewide to conserve energy and blackouts occurred as demand for electricity to combat extreme heat increased. Customers in Northern San Luis Obispo county experienced outages in August 2020. Additionally, Pacific Gas & Electric has also participated in Public Safety Power Shutoffs as a wildfire prevention tool that also created utility disruptions. High concern around Employment and Job Security and Evacuations also fits trends seen in earlier questions and align with later concerns about Wildfires and Wildfire Smoke.

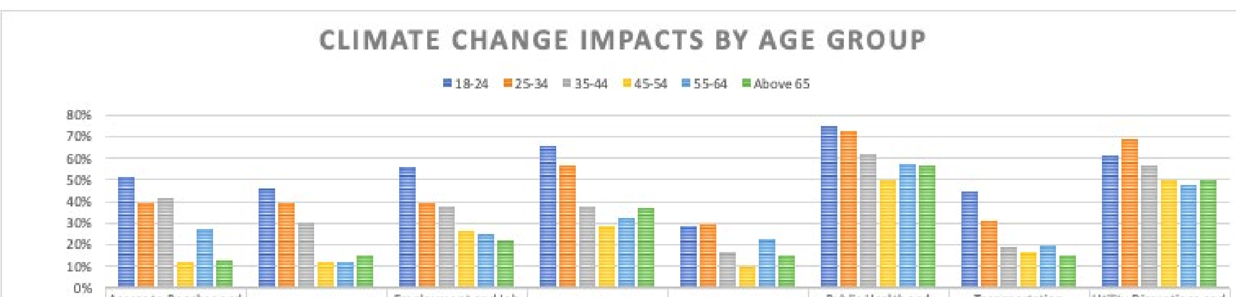


Variation by Income Group



As noted on the graph above, regardless of income, all individuals expressed the highest level of concern for Public Health and Safety (70%, 64%, 60% respectfully). Secondary concern varied slightly. After Public Health and Safety, individuals with household incomes of less than $50,000 or more than $100,000 were most concerned with Utility Disruptions and Power Outages. In comparison, individuals in the middle-income group ($50,000 - $100,000) had a secondary concern of Evacuations. The greatest divergence in level of concern occurred between individuals with a household income of less than $50,000 and more than $100,000 on the issue of Transportation Disruptions. Individuals within the lower income group had the highest level of concern among the three groups for this category - 42%. On the other end of the spectrum, the opposite was true: individuals within the highest income group had the lowest amount of concern – 14%.

Variation by Age Group

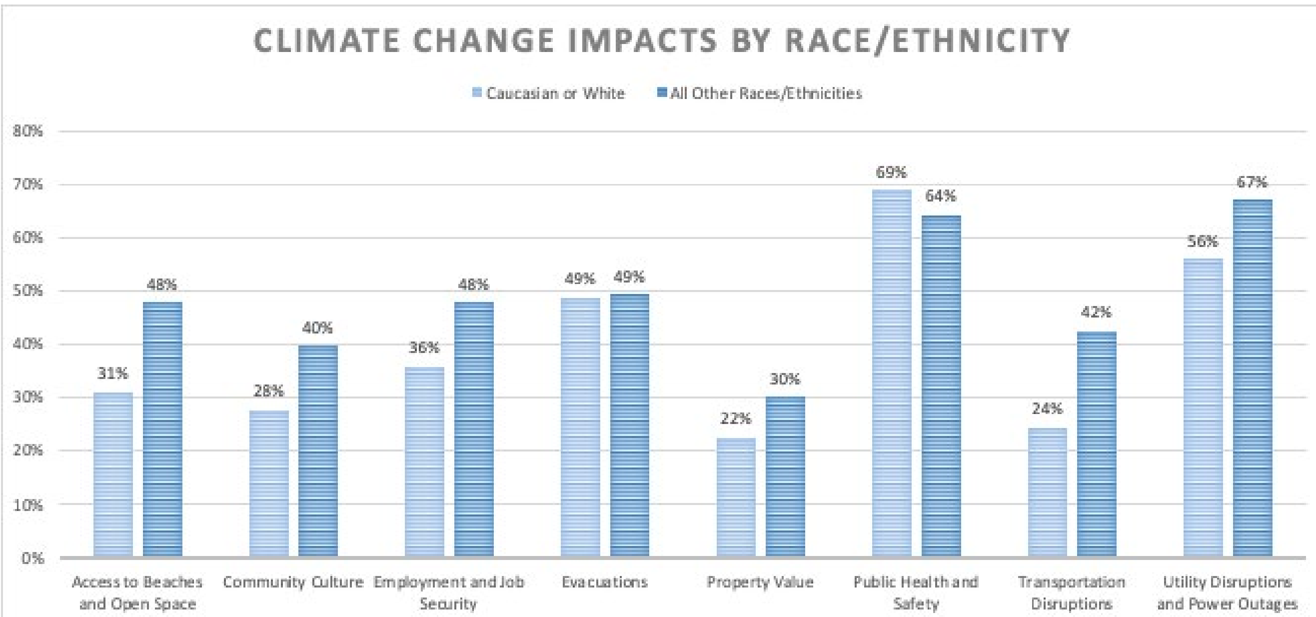


	Access to Beaches and Open Space	Community Culture	Employment and Job Security	Evacuations	Property Value	Public Health and Safety	Transportation Disruptions	Utility Disruptions and Power Outages
18-24	51%	46%	56%	66%	29%	75%	45%	61%
25-34	39%	39%	39%	57%	29%	73%	31%	69%
35-44	42%	30%	38%	38%	17%	62%	19%	57%
45-54	12%	12%	26%	29%	10%	50%	17%	50%
55-64	28%	13%	25%	33%	23%	58%	20%	48%
Above 65	13%	15%	22%	37%	15%	57%	15%	50%

When viewing concern for climate change impacts by age, a few patterns emerge. Across the board, individuals are most concerned about climate's potential impact on Public Health and Safety. Within that category, individuals between the ages of 18 and 24 are most concerned (75%), followed by individuals between the ages of 25 and 34 (73%). Utility Disruptions and Power Outages are also a common concern among the age groups, with at least 50% of individuals in five age groups (all except individuals between the ages of 55 and 64) expressing concern.

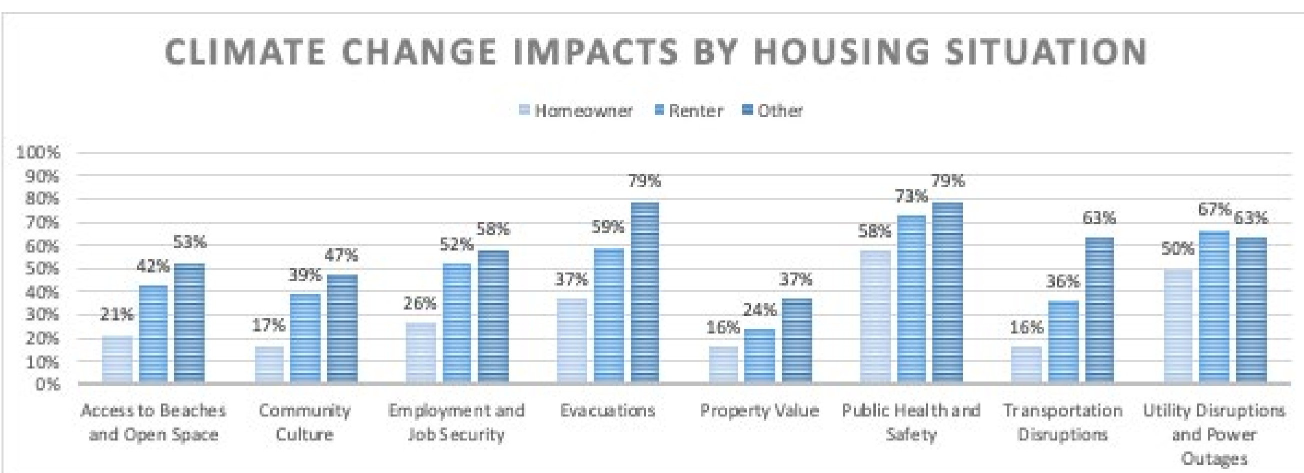
Omitting Public Health and Safety, individuals between the ages of 18 and 24 are most concerned about climate's potential impact on Evacuations (66%); and Utility Disruptions and Power Outages (61%). Individuals between the ages of 25 and 34 are also concerned about the same two categories with some variation in level of concern (57% and 69% respectfully). Individuals between the ages of 35 and 44 share a similar level of concern for Utility Disruptions and Power Outages (57%); they are also concerned about Access to Beaches and Open Space (42%). Individuals between the ages of 45 and 54 are concerned about Utility Disruptions and Power Outages (50%), followed by Evacuations (29%). Individuals between the ages of 55 and 64 are also concerned about Utility Disruptions and Power Outages (48%), in addition to Evacuations (33%). Finally, individuals above the age of 65 are concerned about Utility Disruptions and Power Outages (50%) and Evacuations (37%).

Variation in Race/Ethnicity



Regardless of racial or ethnic identify, individuals expressed similar levels of concern for two potential climate change impacts: Public Health and Safety (69% v. 64%, respectfully) and Utility Disruptions and Power Outages (56% v. 67% respectfully). Tertiary concerns were also the same – Evacuations (49% for both). The greatest divergence between groups occurred for Transportation Disruptions; only 24% of White or Caucasian respondents expressed concern compared with 42% of respondents of respondents identifying as all other races and ethnicities.

Variation by Housing Situation



When viewed through a housing situation lens, a few patterns emerge. Despite the variability, all respondents regardless of housing situation are concerned about Public Health and Safety, with individuals in the "Other" category reporting the highest level of concern at 79%. This same group expresses the same level of concern for Evacuations. Both renters and homeowners also list Utility Disruptions and Power Outages as a secondary concern (50% and 67% respectfully). This is a tertiary concern for individuals in "Other" alongside Transportation Disruptions. In terms of priority, homeowners and renters share a similar view on their concern for Evacuations (37% v. 59% respectfully). Of all the questions so far, this answer elicited the highest level of variability in level of concern; the smallest variation among levels of concern is for Utility Disruptions and Power Outages at 4%.

Open-Ended Responses

Question: If there are other areas impacted by climate change not listed above that you are concerned about, please provide them here

Respondents were also able to write in other concerns that were not addressed above. 54 respondents wrote in a concern.

6 of the respondents brought up concerns over how marginalized communities would feel climate impacts first. Selected responses:

- "I am concerned about how climate change will impact low income communities and communities of color first."
- "Health effects upon the poor and elderly, especially during the summer."
- "We need a community plan to support frail elders and people with chronic illness who are reliant on electricity, and cannot be without power. Example: people w/ lung disease, who use oxygen, electric beds, breathing assist machines. The rolling blackouts that are happening in CA (due to fire and maxing out of the power grid) are devastating for this portion of our community. We need an organized, local government plan to identify and support these folks."

8 Respondents brought up concerns about biodiversity, natural resources, and wildlife. Selected responses:

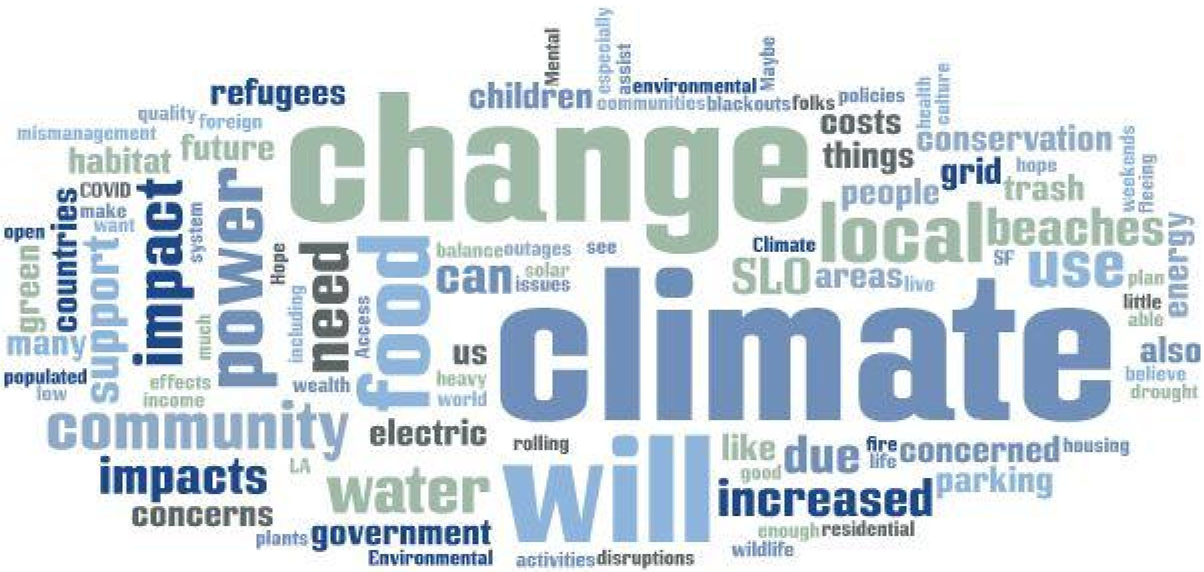
- "Access to food and use of agricultural resources, impacts to marine life and fisheries (including for food)"
- "Again, that we are not considering the impact on local wildlife" or preparing to create safe zones for animals (inland & marine)
- "Natural resource conservation is being impacted by the lack of regional consensus about conservation and habitat restoration goals as the climate changes. SLO has an opportunity to build on leadership and successes from within City government to emphasize natural resource conservation measures in a changing climate."
- "Loss of biodiversity, climate refugees, natural resources"

8 Respondents brought up concerns about agriculture and/or local food access:

- "Weather patterns, heat waves, and quality of air and water affecting the ability to grow food."
- "crop yield and tourism"

Remaining responses ranged from denying the city's role in responding to climate change, concerns over utilities or utility shut offs, concerns over evacuations, from where evacuees can go to how to handle refugees coming to the SLO region. A few respondents brought up concern for "hope" in the future.

Open-ended responses were used to generate a Word Cloud (shown below). The words shown were frequently used by respondents.

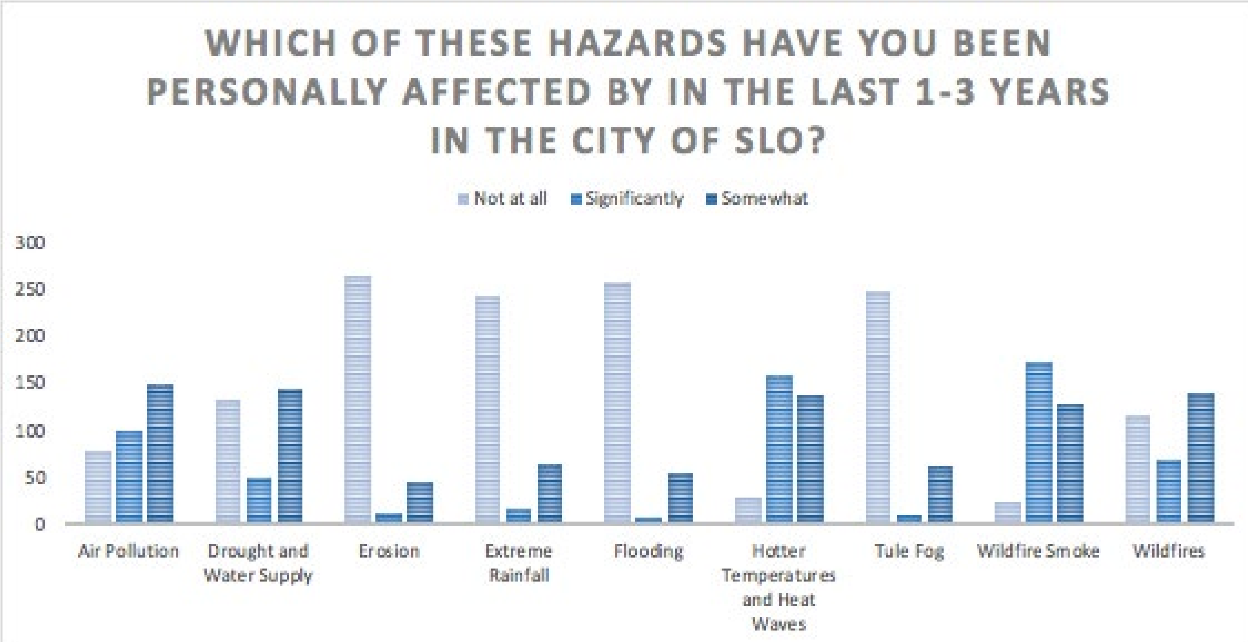


WHICH OF THESE HAZARDS HAVE YOU BEEN PERSONALLY AFFECTED BY IN THE LAST 1-3 YEARS IN THE CITY OF SLO?

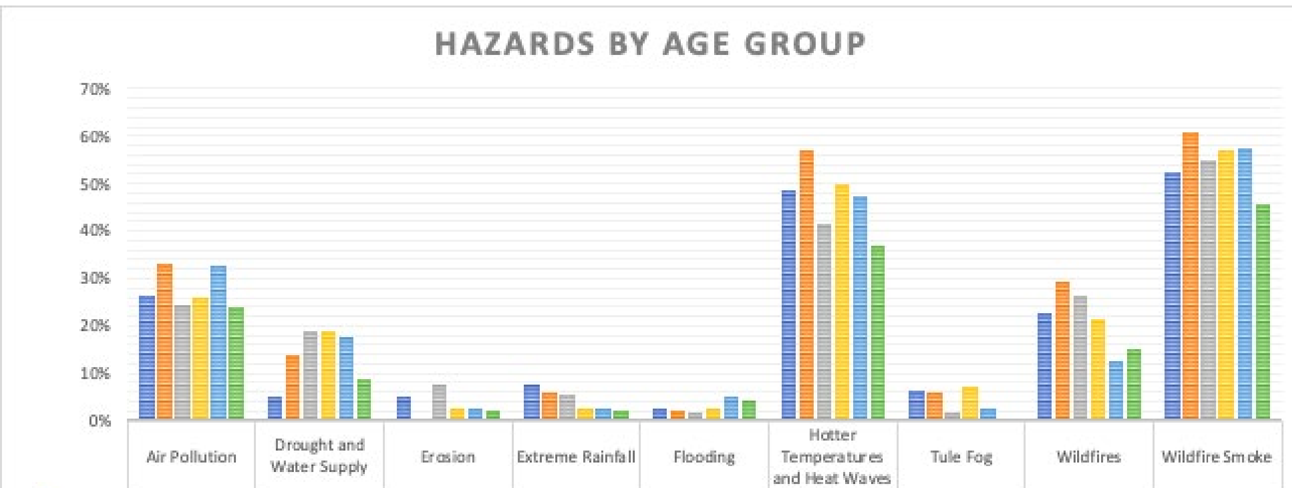
Overall Results

Impact in Last 1-3 Years	Not at all	Significantly	Somewhat
Air Pollution	79	100	148
Drought and Water Supply	133	50	144
Erosion	265	13	45
Extreme Rainfall	244	17	64
Flooding	257	9	54
Hotter Temperatures and Heat Waves	30	158	138
Tule Fog	247	11	62
Wildfire Smoke	24	173	127
Wildfires	117	68	140

This question has more respondents reporting they have not been personally affected by about half of these impacts in the last 1-3 years. The most significantly reported impacts were of Wildfire Smoke, Hotter Temperatures and Heat Waves, and Air Pollution which matches the trends in other questions and references the context of events in 2020 (i.e. wildfire and extreme events). Even when wildfires do not occur in the city boundaries, impacts of wildfire smoke and air pollution affect many residents somewhat or significantly which explains why "Wildfire" has less significant direct impact for respondents than "Air Pollution" and "Wildfire Smoke.'



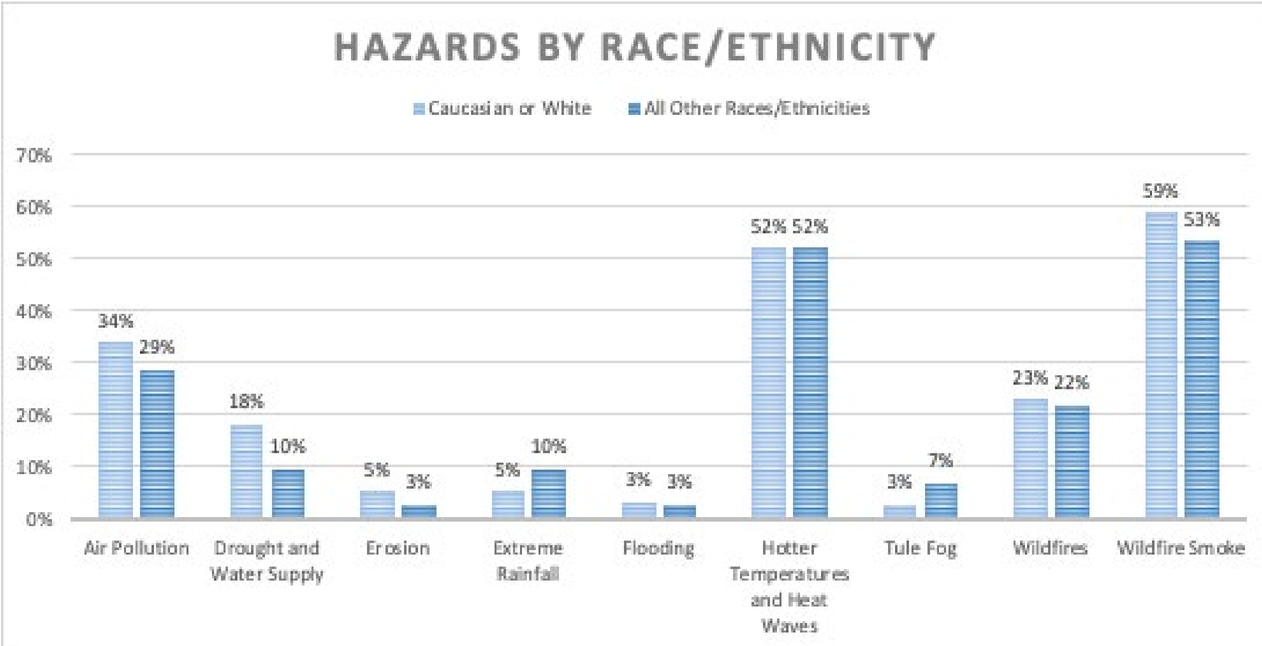
Variation by Age Group



	Air Pollution	Drought and Water Supply	Erosion	Extreme Rainfall	Flooding	Hotter Temperatures and Heat Waves	Tule Fog	Wildfires	Wildfire Smoke
18-24	26%	5%	5%	8%	3%	49%	6%	23%	53%
25-34	33%	14%	0%	6%	2%	57%	6%	29%	61%
35-44	25%	19%	8%	6%	2%	42%	2%	26%	55%
45-54	26%	19%	2%	2%	2%	50%	7%	21%	57%
55-64	33%	18%	3%	3%	5%	48%	3%	13%	58%
Above 65	24%	9%	2%	2%	4%	37%	0%	15%	46%

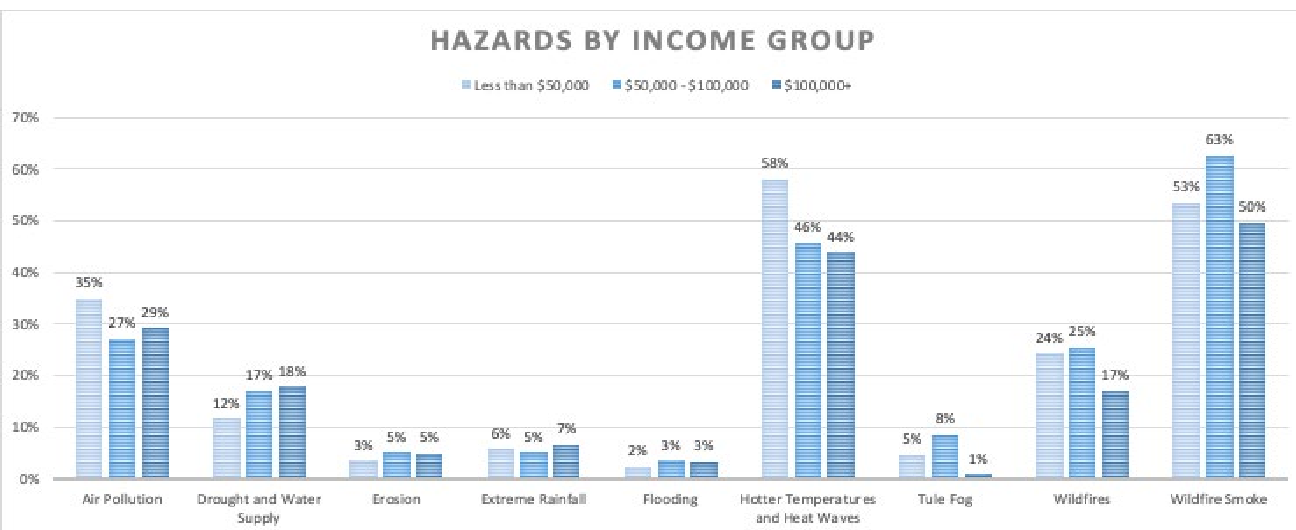
In terms of Hazards, all age groups have been quite impacted by Wildfire Smoke and Hotter Temperatures and Heat Waves. Within these two categories, individuals between the ages of 25 and 34 were most impacted (61% and 57%, respectfully). Individuals above the age of 65 indicate the lowest level of impact for these two categories (46% and 37%, respectfully). Other impactful hazards include Wildfires - with individuals between the ages of 25 and 34 reporting the highest level of impact at 29%, followed by individuals between that ages of 35 and 44 at 26% - and Air Pollution – with individuals between 25-34 and 55-64 each expressing the highest impact – at 33%. Erosion, Extreme Rainfall, Flooding, and Tule Fog were very rarely listed as a high impact for individuals across the age groups.

Variation by Race/Ethnicity



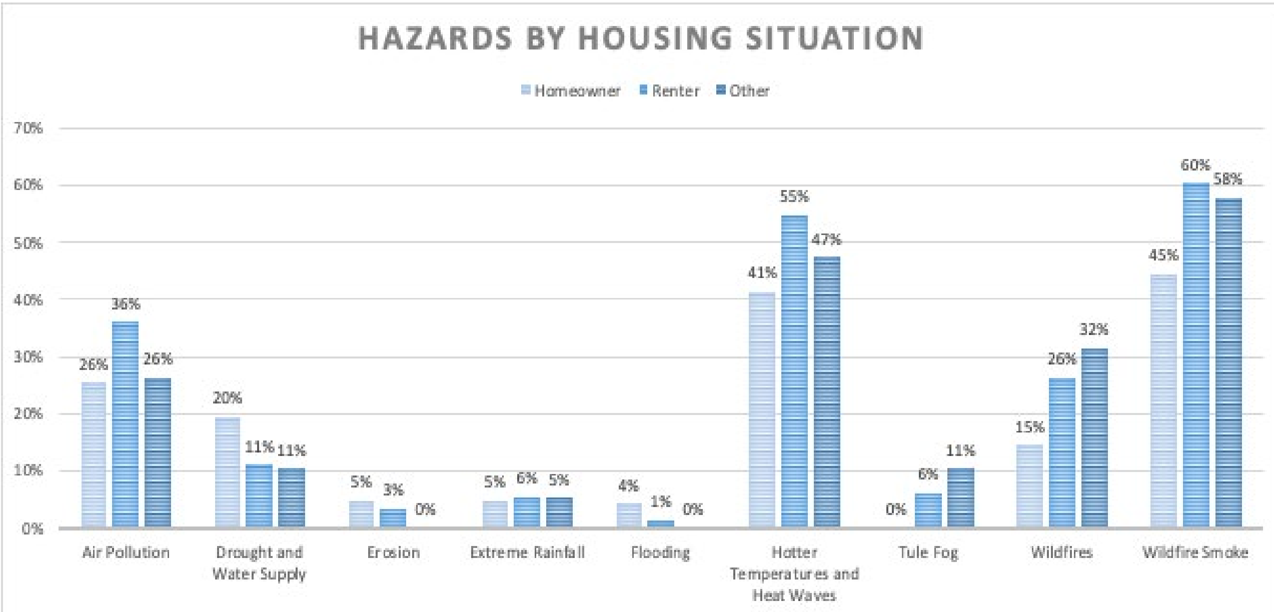
In terms of racial and/or ethnic identity, all groups expressed a high level of impact for Wildfire Smoke (59% and 53% respectfully) and for Hotter Temperatures and Heat Waves (52% for both). A tertiary concern was Air Pollution (34% and 29%). Similar to the other analyses for this question, respondents did not express high levels of impact for Erosion, Flooding, Extreme Rainfall or Tule Fog. The greatest divergence between groups occurred for Drought and Water Supply; Caucasian or White respondents reported a higher level of impact – at 18% - than individuals of other races/ethnicities – at 10%.

Variation by Income Group



From an income perspective, individuals within the lower income bracket were most impacted by Hotter Temperatures and Heat Waves (58%), followed by Wildfire Smoke (53%). Individuals in the other two categories expressed a similar level of impact for Hotter Temperatures and Heat Waves (46% and 44% respectfully), with a higher level of impact for Wildfire Smoke (63% and 50%). In fact, individuals in the middle-income group express the highest level of impact for Wildfire Smoke. Other shared impacts include Air Pollution (35%, 27%, and 29% respectfully) and Wildfires (24%, 25% and 17%).

Variation by Housing Situation



Homeowners, renters, and individuals indicating "Other" report being most impacted by Wildfire Smoke (45%, 60%, and 58%, respectfully), followed by Hotter Temperatures and Heat Waves (41%, 55%, and 47%, respectfully). Aside from these two categories, renter and homeowners report being more impacted by Air Pollution than Wildfires (26% v. 36%; 15% v. 26%); individuals indicating "Other" report the opposite (26% v. 32%).

Open-Ended Responses

Question: If there are other hazards that you have been personally affected by in the past 1-3 years in the City that are not listed above, please provide them here.

There were 37 responses to this question. Of those responses, 10 discussed climate related hazards. The remaining 27 discussed other community issues not directly applicable to climate change. Related responses discussed the following:

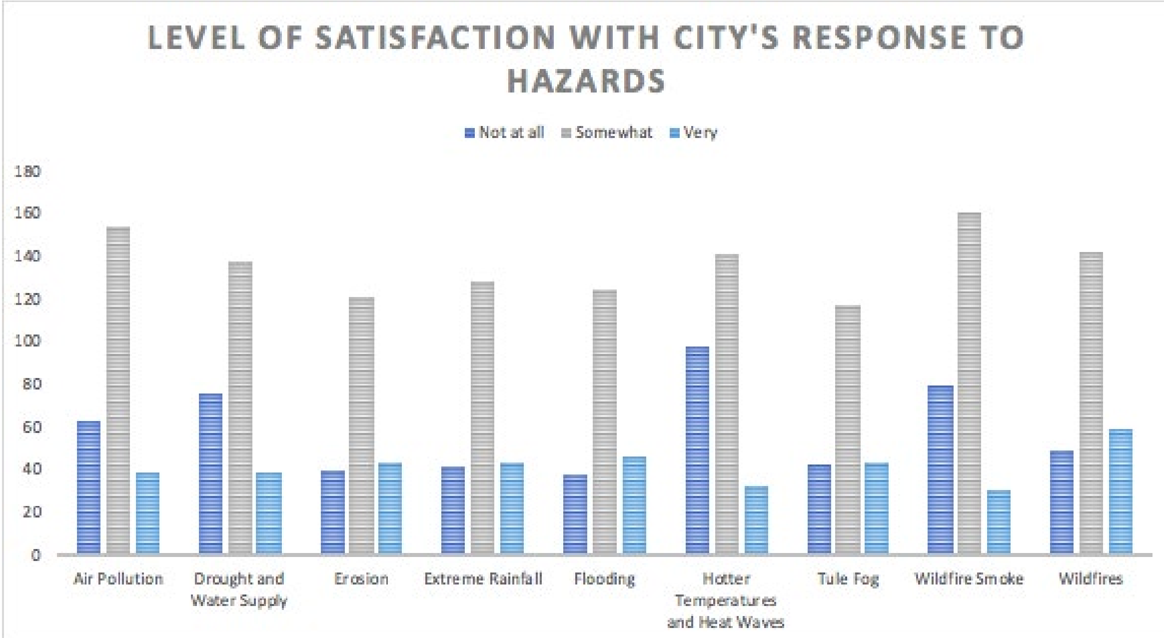
- Mortality of trees that were weakened by drought. Tree caused damage to the home and increased cost of air conditioning due to loss of canopy.
- Extreme 116 degree heat
- Nearby wildfires and the impacts of smoke on an asthmatic
- Experience with Lyme Disease
- Landslide from extreme rainfall
- Air pollution that lead to the development of asthma
- Dust
- Power outages
- Invasive species
- Loss of biodiversity affecting people psychologically and economically.

Responses to question 11 were used to generate a Word Cloud (see below).

FOR EACH HAZARD THAT YOU WERE AFFECTED BY, PLEASE RANK YOUR LEVEL OF SATISFACTION WITH THE CITY'S RESPONSE.

Overall Results

Satisfaction of City Response to Impact Area	Not at all	Somewhat	Very
Air Pollution	63	154	39
Drought and Water Supply	76	137	39
Erosion	40	121	43
Extreme Rainfall	41	128	43
Flooding	38	124	46
Hotter Temperatures and Heat Waves	98	141	32
Tule Fog	42	117	43
Wildfire Smoke	79	160	30
Wildfires	49	142	59



Open-Ended Responses

Question: Do you have any comments to share regarding how you were affected by past hazards and/or city response efforts? Please describe specific hazard, location, and response

Write-in answers to this question demonstrate that respondents are either not clear on how much the city can do in responding to climate impacts, don’t believe the city can respond to impacts that they few as “natural” or at the state/federal scale or they do not know how the city responded and wish for more publicity about city response efforts. Because of these frequently cited opinions, multiple respondents indicated they used “Not at all satisfied” to indicate “not applicable” or they skipped responding at all. For these reasons, write-in responses are a more useful analysis than the absolute numbers. 83 respondents wrote in a short answer.

Select responses that express doubt or confusion about the city’s ability to respond:

- “Several of the above items are caused by nature and the city can’t do anything about them so they should not even have been included.”
- “I cannot see how the city could do anything about fires, floods, fog and rain. The city can and should focus on eliminating trash and waste in our local parks and waterways. That will have a huge impact on its citizens' outlook on our government taking care of the city.”
- “Let's act now to reduce the burnable debris around out (*sic*) homes and stream beds.”
- “I don’t think the city can do anything to control or improve these items except for provide infrastructure that allows emergency responders to quickly and safely access the entire population. In that regard the city has actively made response times and access to core populations worse by converting roadways to bicycle paths and failing to add lanes to major thoroughfares. I think the city really needs to reassess its willingness to sacrifice human lives in the name of environmentalist ideals. When someone has a stroke every minute of delay in transport to the hospital costs that person brain function and treatment options. Additionally these alternative modes of transportation have no ability to help facilitate business growth or commerce, and as such provide no return on the funds the city invests in them.”
- “I really don't see how the City can "respond" to some of these. Air pollution from what? If wildfires, not much the City can do apart from abatement and building codes already in place. Auto pollution is minimal. And City Hall cannot dictate the weather.”

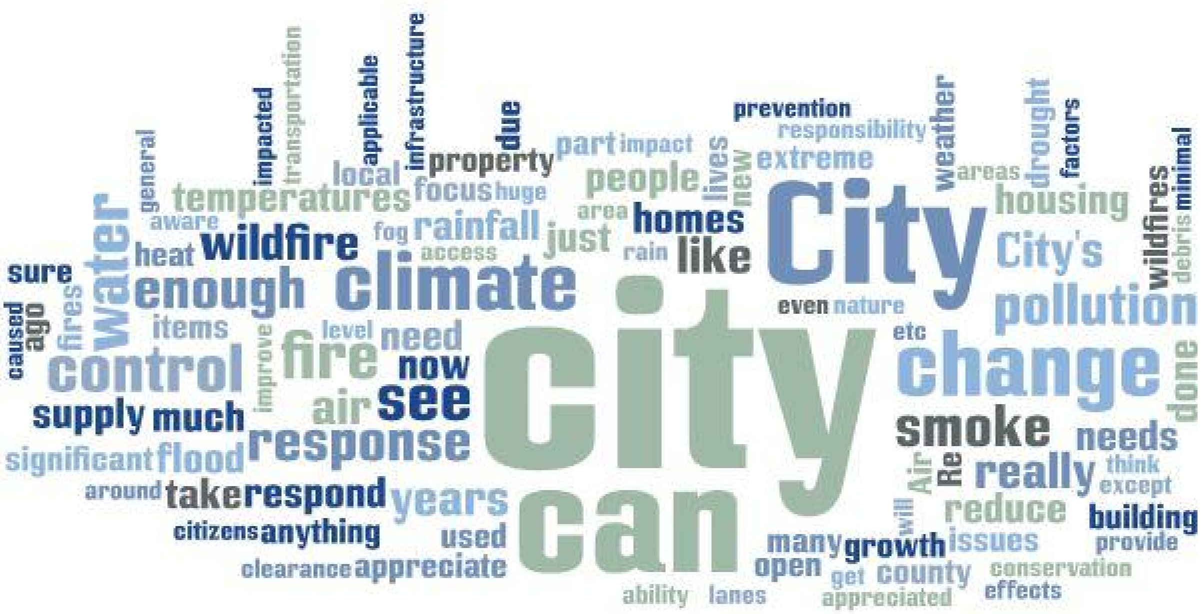
- “I'm not aware of the City's response to any of the above listed items except to say the more growth, housing, etc. that occurs the more air pollution and lack of water supply will be factors in everyday life. As well as infrastructure that cannot support the housing growth all around the city.”
- “I used "Not at all satisfied" to indicate more of "not applicable" Air pollution is being worked upon by the City, and awareness of the need for conservation of water was an ad campaign and a hotline, both appreciated. The effects of the others I cannot see the City's responsibility to. In my case only.”
- “I only rated a few factors because many of these issues are not truly under local influence/control. The City has done a good job addressing our flood control system. More needs to be done about wildfire prevention but a significant challenge is the amount of overgrown vegetation on private property or land just outside the City's footprint.”
- “In general, I feel the city hasn't really acknowledged it's general resident experiences with climate change. Too much focus on bike lanes and ignoring the less glamorous/ youth-focused, and middle/upper class side of being impacted by climate change.”
- “I'm not sure how to respond to some of these questions where I do not have a direct experience, and as a result don't have a level of satisfaction to report. I believe the City leadership's push for climate action, sustainable transportation, affordable housing, and protection of open space are all in the right direction.”
- “You should have had a "not applicable" column. There is little the City can do about hot temperatures or wildfire smoke drifting into the area. Drought and water supply is something the City can control. Constantly raising water rates while allowing hundreds of new homes it NOT the way to respond.”
- “What is the city doing for any of these? If they are doing something, they sure aren't doing a good job publicizing what they are doing.”

Select responses that offer more concrete feedback:

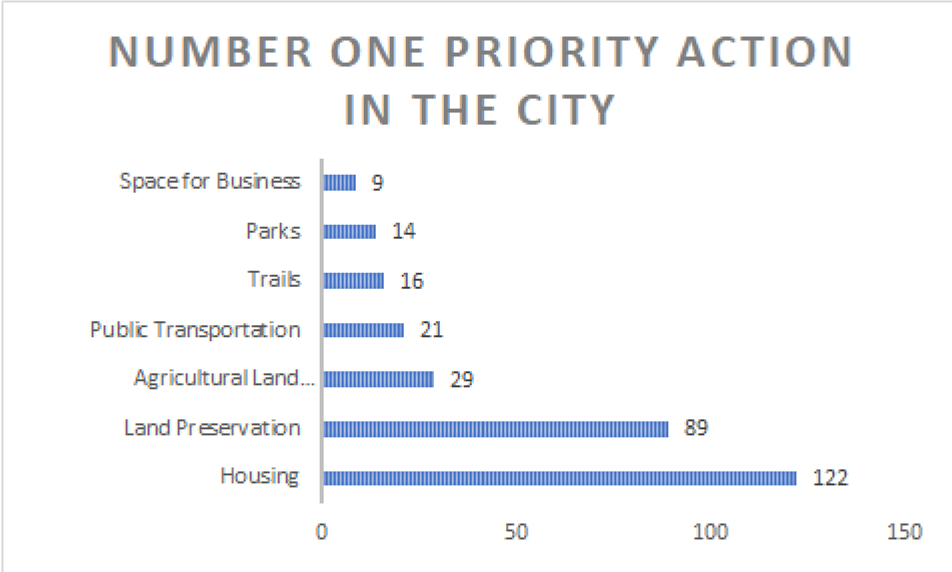
- “Storm drain clearance especially on the north end of the city near Loomis Street is sometimes lacking and more frequent patrols by city personnel to this area would be appreciated.”
- “Appreciate the notifications we get through Twitter and other platforms.”
- “Address fire prevention like the Native Americans and how we used to. Prevent forest fires.”
- “City could do more to reduce water use - encourage lawn reduction, including on City properties.”
- “The city has used a wide brush to paint very high fire hazard and should be more specific/precise in classifying fire hazard. A city perimeter approach would be more effective and appropriate. Over-classifying can have dire effects on residents ability to obtain fire insurance. Just like keeping areas in flood zones that have been mitigated is a problem.”
- “The potential for water shortage is ignored when the city approved extensive new housing. Otherwise these developments would have been disapproved. The city says one thing but does another with respect to this topic.”
- “While the firefighters have indeed been heroes in this scenario, the city need to undertake extreme conservation measures, plant more trees to increase air quality, install solar throughout the town, enforce xeriscaping and the like. I do appreciate the city/county air report.”
- “Stonewalling on the Lake Dredging project is unacceptable.”
- “Keep beaches open for locals during heat waves.”
- ‘I actually was not aware of the City's response at all to any of these issues.”
- “Last winter when highway 5 was closed due to snow. The freeways and highways were blocked for HOURS and HOURS because we only have one or two routes to use in Southern California and the Central Coast.”

- "What is the city doing to capture and utilize the very little rain we get each year? How much of it are we losing to runoff in our ocean? What is the city doing to implement a carbon free grid by 2030? How can we take wisdom and advice from our local indigenous people to better understand working with the environment?"
- "My property is located within a flood zone. Mitigations, such as creek debris clearance, have been successful (so far!). Though many residential neighborhoods back up to steep, somewhat denuded hills, there have not been any significant mudflows (so far!). There is an inadequate supply of N95 masks which are necessary when doing errands during periods of hazardous air quality."
- "Allowing 75 foot buildings downtown adds to the heat zone of the downtown corridor"
- "I'm glad a notice has been put out about the air pollution hazards. We need strong messaging from our leadership to help us through challenges."
- "heat mitigation in low income housing is not being taken seriously."
- "I do not think, in a town where the majority do not have AC, we (the city) are ready for extreme heat."
- "It wasn't apparent to me that the homeless had options to shelter in a cool/clear air space"
- "Hotter temperatures, but the city does not have shade structures in many areas."
- "Flooding. If we and our neighbors didn't go out and clean the storm drains when it rains hard, multiple yards would be underwater."
- "Wildfires: Reverse 911 works really well but most of my friends didn't know about it so trying to get the word out better. The Reverse 911 message also needs to be more clear including identifying the threat."

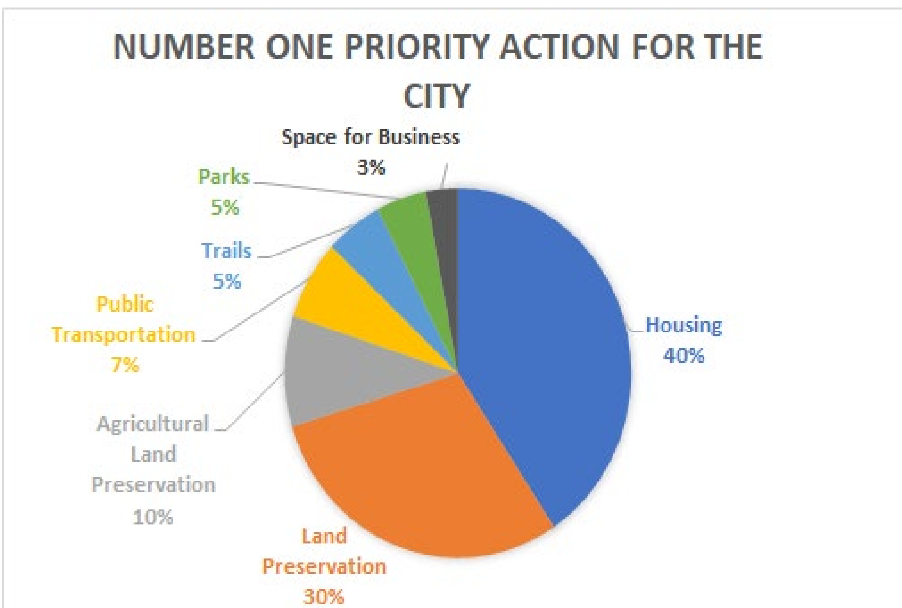
Responses to this question were used to generate a word cloud (see below).



HOW WOULD YOU PRIORITIZE THE FOLLOWING ACTIONS IN THE CITY OF SLO?



Respondents were asked to prioritize actions in the City of San Luis Obispo. Housing was most frequently listed as a number one priority; housing was chosen as the top priority 122 times or by 40% of respondents. Land Preservation, another priority topic, was selected as the number one priority 89 times or by 30% of respondents. Selected as the number one priority less frequently were Agricultural Land Preservation (selected 29 times or by 10% or respondents), Public Transportation (21 times or 7%), Trails (16 times or 5%), Parks (14 times or 5%), and Space for Business (9 times or 3%).



WHAT CLIMATE CHANGE ADAPTATION AND COMMUNITY RESILIENCE TOPICS ARE YOU INTERESTED IN LEARNING MORE ABOUT?

There were 104 responses to this question. The most common topical areas mentioned by respondents were transportation, energy, and the environment. Water, wildfire, housing and social issues were also prevalent topics, in addition to agriculture, temperature changes, development, and emergency management. Issues related to climate change mitigation, waste and pollution and the economy were also mentioned. Multiple comments indicated interest in any topic related to climate adaptation and resilience. There were also several comments that the City should not be pursuing this topic. The table below summarized the approximate number of mentions for each topical area and topics suggested by respondents.

Topical Area	Topics	Mentions
Transportation	▸ Electric vehicles and charging ▸ Public transportation ▸ EV charging for apartment renters ▸ Active Transportation/bikeability/walkability ▸ Reducing emissions from transportation ▸ Traffic reduction ▸ Walkable neighborhoods with access to services ▸ Pro Con approach to transportation decisions	19
Energy	▸ Solar, wind and renewable energy sources ▸ Solar for residential & existing homes ▸ Require rooftop solar ▸ Microgrids, batteries, & energy reliability ▸ Affordable energy ▸ Alternate technology such as trash to energy ▸ Preventing early close of Diablo Canyon ▸ Eradication of gas burning engines	15
Environmental Protection	▸ Open Space/land preservation ▸ Wildlife conservation ▸ Air pollution ▸ Urban forestry and trees to for urban cooling and societal benefits ▸ Ecosystem-based adaptation ▸ Saving beaches ▸ Natural landscaping	15
Water	▸ Water conservation ▸ "Integrated water resource management (intersections of flood management, water supply, watershed/habitat/GW protection, and water quality protection)." ▸ Drought and water supply ▸ Increasing infiltration ▸ Community outreach on water conservation	11
Wildfire	▸ City wildfire mitigation efforts ▸ Fire prevention & planning ▸ Outreach to property owners at the wildland urban interface ▸ Native land management practices and knowledge	10

Topical Area	Topics	Mentions
	▸ Fire safe building ▸ Wildfire smoke ▸ Prescribed burns ▸ Fire response	
Housing	▸ Balancing housing needs with land preservation ▸ Affordable housing ▸ Tiny homes ▸ Housing for Cal Poly students ▸ Repurposing existing developed land for housing ▸ Off-grid housing ▸ How climate change will impact housing prices	9
Social Issues	▸ How can the City encourage residents to contribute more? ▸ Homelessness ▸ Mass migration into City ▸ How can the City avoid an increase in the wealth gap and unequal burden of climate change on marginalized communities? ▸ Social equity and justice ▸ Community outreach regarding personal actions such as water conservation, wildfire mitigation, carbon footprint reduction, etc. ▸ How can the government better understand community wants and needs? ▸ Covid-19	9
Agriculture	▸ Community gardens ▸ Healthy food access ▸ Local food ▸ Soil health ▸ Regenerative agriculture and permaculture	7
Temperature Changes	▸ Extreme heat leading to AC installation and impacts on grid ▸ AC for schools and senior centers ▸ Alternatives to AC	7
Development	▸ How can we accommodate growth in a less dense format? ▸ Environmentally friendly development/ how can growth contribute to resilience? ▸ Encouraging businesses and government to be environmentally conscious ▸ Analysis of environmentally damaging industries and promoting more sustainable industrial practices ▸ Resilient construction materials and landscaping	5
Emergency Management	▸ Faster warning systems for natural disasters ▸ Planning for compound hazards ▸ Pandemic and epidemic planning ▸ Disaster preparedness and planning ▸ Neighborhood resilience ▸ Resilience	5
Climate Change Action	▸ City efforts to plan for and combat climate change	4

Topical Area	Topics	Mentions
	▸ Transitioning to a fossil fuel free society	
Waste & Pollution	▸ Waste in parks and open spaces ▸ Recycling and composting programs ▸ Compost use in community gardens ▸ Noise and light pollution	3
Economy	▸ Job security ▸ Diversifying employment from tourism	2

Responses to this were also used to generate a Word Cloud. As the Word Cloud highlights, water, transportation, energy, housing and land were among the frequently used words.

Survey Strategies for Resilience

August 26, 2021, 11:41 AM

Contents

Survey Strategies for Resilience

Suggest strategies for long-term community resilience in the face of climate change

Summary Of Registered Responses

As of August 26, 2021, 11:41 AM, this forum had:		**Topic Start**
Attendees:	51	January 29, 2021, 2:31 PM
Registered Responses:	2	
Minutes of Public Comment:	12	

QUESTION 1

What qualities of the SLO community most support long-term resilience? For example, social networks, maintained infrastructure, local farms and food, creeks and flood control, adequate water supplies, air quality, fire protection, etc.

Answered	2
Skipped	0

better community improved infrastructure more

QUESTION 2

We have heard community stories about what is needed to make our community strong. For example, neighborhood food pantries, climate education, preparedness training, social cohesion, and air conditioning during extreme heat. What ideas or strategies do you have for making our city more resilient?

Answered	2
Skipped	0

- energy implemented more other show

QUESTION 3

How can we protect the community members that are most vulnerable to climate change impacts? How do we ensure that our process is equitable?

Answered	2

Survey Strategies for Resilience

Suggest strategies for long-term community resilience in the face of climate change

Skipped	0

may **more** **need** people

Survey Strategies for Resilience

Suggest strategies for long-term community resilience in the face of climate change

Survey Questions

QUESTION 1

What qualities of the SLO community most support long-term resilience? For example, social networks, maintained infrastructure, local farms and food, creeks and flood control, adequate water supplies, air quality, fire protection, etc.

QUESTION 2

We have heard community stories about what is needed to make our community strong. For example, neighborhood food pantries, climate education, preparedness training, social cohesion, and air conditioning during extreme heat. What ideas or strategies do you have for making our city more resilient?

QUESTION 3

How can we protect the community members that are most vulnerable to climate change impacts? How do we ensure that our process is equitable?

Individual Registered Responses

Name not shown
inside Neighborhood 1
January 30, 2021, 12:46 PM

Question 1

Since I moved to SLO in the mid-60's, I've observed that our City has generally done an excellent job of governance. Infrastructure is constantly being evaluated and improved as needed. City programs are varied and serve the broad needs of the community. With community input, Standards and Guidelines (although seemingly more and more unwieldy), have been improved over time to protect our unique resources and guide our physical development.

Question 2

Most of the above mentioned ideas sound very worthwhile. During this Covid adventure, the efforts shown by the City, DowntownSLO, other local community organizations and individuals, have greatly impressed me as to the actual RESILIENCE of our amazing City. Continuing education surrounding important issues is one of the key elements of continued future success. Energy policies that have been implemented show bold leadership that may show the way to other communities. We can certainly look to other countries who have implemented forward-thinking strategies for Resiliency. There are many great examples.

Question 3

Continue and expand educational information and outreach programs. Maintain a budget item for emergency services for those that may be most vulnerable as a result of climate change impacts. There may be the need for a citizen advisory body to help determine priorities and thresholds for support.

Name not available
inside Neighborhood 11
February 24, 2021, 12:13 PM

Question 1

existing infrastructure must be improved, better electricity, more natural gas, sweep and clean the streets/gutters/sidewalks and bike paths, more parking, better lighting, more police, trim trees

Question 2

More energy - keep the electricity on - back-up power when PSPS happen, more natural gas for cooking/heating. Homeless are too aggressive.

Question 3

keep people healthy with better diets and more exercise, promote "rugged individualism", people need to more self-sufficient.

Climate Change Impacts on Community Organizations Survey Summary

Relation to the Safety & Community Resilience Element Update:

Traditionally, the General Plan had a Safety Element, with this update we are re-envisioning the document as the Safety and Community Resilience element. The intention is to take a more holistic approach by integrating community wellbeing and resilience in addition to the traditional lens of public safety.

To integrate community resilience and wellbeing, we are reaching beyond a narrow focus on physical infrastructure to consider ***social infrastructure*** – organizations and places that support the networks of relationships in a community, social cohesion, and connectedness. There is growing recognition that social capital – connectedness and trust within a community - is important for building resilience to disasters and disruptions.[1] As the city prepares for an increasingly unpredictable future, with greater incidence of disasters due to climate change, social capital and the infrastructure that supports it becomes increasingly important.

The Climate Change Impacts on Community Organizations Survey will be used to include a discussion of social infrastructure and community assets in the Safety and Community Resilience Element, and a map of community assets.

Survey Purpose:

The survey is designed to help the city understand what parts of the community support social cohesion, wellbeing, and disaster resilience. This information will inform the Safety and Community Resilience Element update.

The survey can be used to understand:

- Well-trusted community spaces and organizations that the city can consider partnering with in the future
- Resources that are missing that would support social cohesion and disaster resilience
- Resources/Assets that should be strengthened and invested in to improve social cohesion, wellbeing, and disaster resilience

Survey Promotion

The survey was advertised through a press release, social media posts, flyers, and email outreach. Flyers were posted on city transit and in city hall and were distributed at the downtown Farmers' Market.

Survey Participation

The survey was open from June16th through June 17th. There were 7 responses to the survey.

The 7 organizations to respond to the survey were the SLO FoodBank, CAPSLO, The Salvation Army, Jewish Community Center-Federation of San Luis Obispo, SLO Food Co-op, SLO Chamber of Commerce, and Transitions-Mental Health Association.

<u>Questions</u>

The survey consisted of 6 questions, 4 of which were written response and 2 multiple choice.

<u>Written Response/Open Ended</u>

Question 1: What is the name of your organization?

Question 4: If your organization was impacted by one of the hazards listed above, how have these impacts affected your operations and/or the population you serve?

Question 5: Does your organization have any emergency planning practices or protocols in place to mitigate impacts on your operations during these events?

Question 6: Do you have any recommendations on how the City can help community organizations become resilient to impacts to climate change?

<u>Multiple Choice</u>

Question 2: Which of the following climate change impacts are you concerned about affecting your organization and/or the populations you serve?

Question 3: Which of the above-mentioned climate-related hazards has your organization been personally affected by in the past 1-3 years?

<u>Results</u>

<u>Overview</u>

The objective of the questions asked was to gather information from core community organizations in SLO City about the risk climate change poses to their organization and operation.

<u>Common Themes:</u>

1. Community organizations are most concerned about the effects of:

- Wildfire and associate impacts
- Increased Temperatures and extreme heat
- Large Storm Events and Flooding
- Long Term Drought

2. All 7 organizations have personally been affected in the last 1-3 years by wildfire and associate impacts.

Responses to question 3: If your organization was impacted by one of the hazards listed above, how have these impacts affected your operations and/or the populations you serve?

- "Many of our direct distributions, and distributions hosted by our agency partners are held outdoors. This means our clients, volunteers, and staff have little to no protection against extreme heat and poor air quality. We are also very concerned about PSPS events and both our vulnerability as a food storage facility and the community's vulnerability. We luckily received a grant to fund the addition of a generator to our main warehouse, which will help us greatly in the event of a PSPS. But, we are still concerned about how we will prepare ourselves to serve the community if/when it is hit with one."
- Other impacts on operations that were cited were:
    - Closure of children's centers
    - Aging adults needs support
    - Homeless shelters
    - Long term drought causing stress on water supply on property
    - Work with local farmers to source fresh produce
    - Increased housing costs

3. Many of the community organizations have an emergency planning practice or protocols in place to help mitigate impacts on operations.

- These range from high level organization protocols to placing disaster and emergency supplies in buildings and program sites.

4. In terms of recommendations for how the City can help community organizations become resilient to impacts of climate change, organizations listed

- Education
- Creation of a general safety guide for natural disasters that businesses, non-profits, and other organizations can utilize
- Supporting local sourcing and organic practices
- Communication

The survey was open from August 12th through August 30th. There were 266 responses to the survey.

Common Themes:

Community Strengths - Across all four scenarios, these assets were frequently mentioned:

1. Public Information (Disaster Information, Social Media, News)
   a. 47 mentions accounting for 20% of responses.
2. Medical/Emergency Services (Public Safety)
   a. 41 mentions accounting for 17% of responses.
3. Open Space/Trails
   a. 31 mentions accounting for 13% of responses.

- Asset 1: Public Information (Disaster Information, Social Media, News) On average this asset was rated as Very Important respondents listed receiving support from this asset in the following types:
  - Access to accurate and understandable information
  - Informs about the current state of situation
  - Enhances ability to prepare and mobilize
  - Provides direction and recommendation
  - Connects community members to resources
- Asset 2 Medical/Emergency Services on average this asset was rated as Very Important respondents listed receiving support from this asset in the following types:
  - Vaccines, injuries, aid
  - Provides reassurance and "peace of mind" when services are well staffed, present, and equipped.
  -
- Asset 3 Open Space/Trails on average this asset was rated as Very Important/ Important. Respondents listed receiving support from this asset in the following types:
  - Improves Mental and Physical Health
  - Outlet for activity or Relaxation
  - Overall Fitness and Well being are supported

In addition to these specific assets, respondents frequently listed these assets:

- Community Service Centers (i.e.: Library, Cal Poly Campus, Churches, Pride and Diversity Center etc.)
  - 30 mentions, about 12%
- Multimodal Transit (bike lanes/ parking, pedestrian access, traffic control etc.)
  - 25 mentions, about 10%
- Recreational Facilities (i.e.: Parks, Athletic Facilities, etc.)

    - 16 mentions, about 7%
- Local Economy/Business: 13 mentions, 5%
- Local Government: 10 mentions 4%

Types of Support Received - Across scenarios the types of support most frequently listed were:

- Emotional and physical security
- Opportunity to coordinate, prepare, and appropriately react
- Direction and recommendation on how to respond before, during, and after.

Gaps and Key Needs - Across scenarios these assets were frequently listed as missing:

<u>In general</u>

- Clear and effective communication
- Dynamic Facilities/Open Spaces
- Proactive attitude

<u>Scenario 1</u>

- Improve recreational amenities
- Increase of accessible transportation (more parking, more bus stops, bike/walk friendly)
- Resource security and Protection

<u>Scenario 2</u>

- Disaster Preparedness Manager
- Accurate information

<u>Scenario 3</u>

- Citywide plan
- Outreach and training

<u>Scenario 4</u>

- Resource Access (food, shelter, medical, recreational)

<u>Scenario One: Normal Life</u>

The following assets were listed for scenario one:

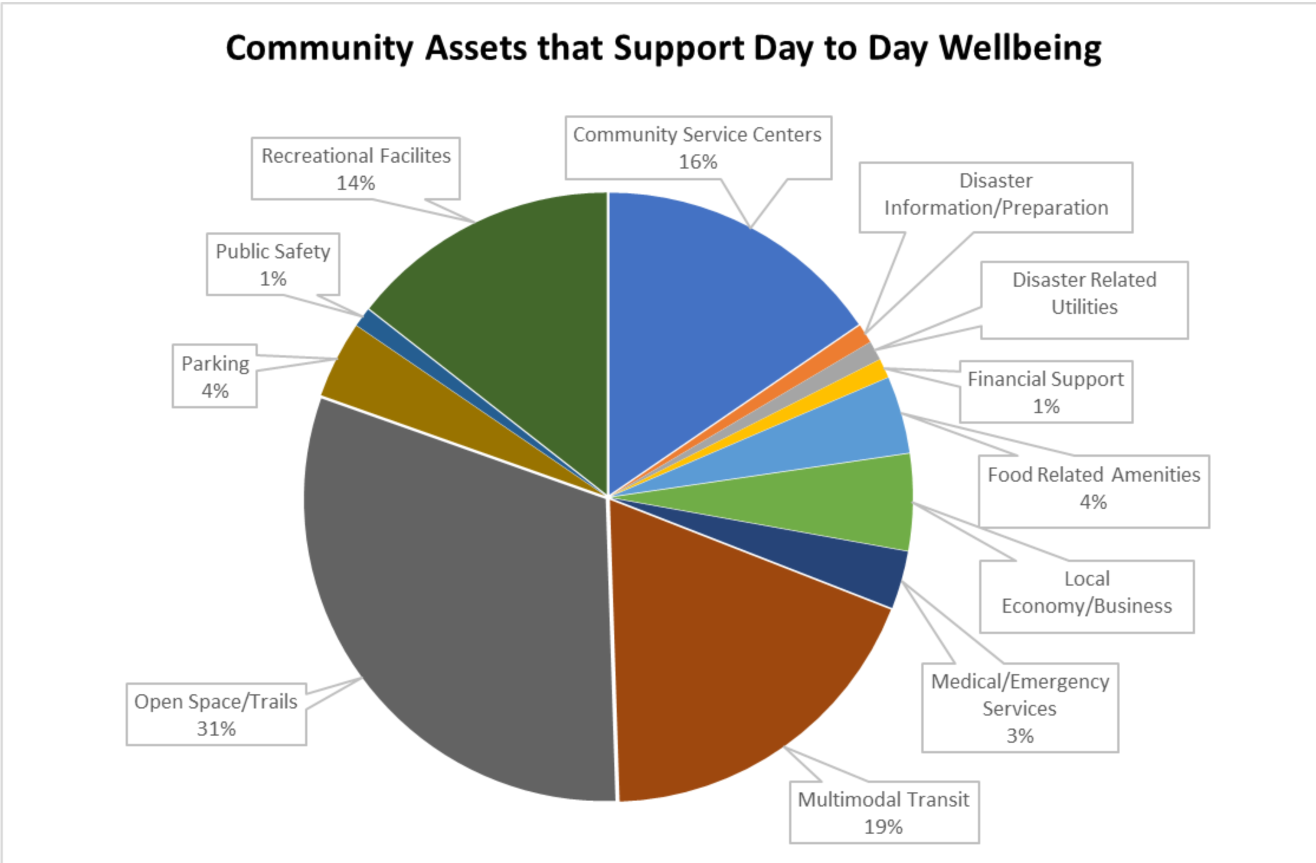
1. Community Service Centers
    a. SLO County Library
    b. The Mission
    c. SLO Newcomers Group
    d. Bishop Peak Elementary
    e. SLO Village
    f. Gala Pride and Diversity Center

2. Disaster Information/Preparation
    a. SLO Adult Education
3. Disaster Related Utilities
    a. City Utilities/Infrastructure
4. Financial Support
    a. SESLOC Federal Credit Union
5. Food Related Amenities
    a. Farmers Market
    b. Marigold Shopping Center
    c. Trader Joes/Food 4 Less Shopping Center
6. Local Economy/business
    a. Headstrong Fit
    b. Equilibrium Fitness
    c. Phoenix Books
    d. Bang the Drum Brewery
    e. Small Family-Owned Businesses
    f. Bike Kitchen
7. Medical/Emergency Services
    a. General Medical Care
    b. Sierra Vista Medical Center
    c. Up-to-date Hospitals
8. Multimodal Transit
    a. Bike Paths
    b. SLO Transit
    c. Protected Bike Lanes
    d. Pedestrian Hybrid Beacons
    e. Pedestrian Oriented Sidewalks/Paths
    f. Railroad Safety Trail
9. Open Space/Trails
    a. Terrace Hill
    b. Bowden Ranch
    c. Cerro San Luis
    d. West Cuesta Ridge
    e. Laguna Lake
    f. Bishop Peak
    g. Feldsman Loop
    h. Cuesta Park
    i. South Hills Open Space
    j. Edna Valley
10. Parking
    a. Parking Garages

    b. Street Parking
    c. Downtown Parking
    d. Parking Accessibility throughout the City
11. Public Safety
    a. Streetlights/Well Lit Areas
12. Recreational Facilities
    a. SLO Swim Centers
    b. Parks and Rec Kids Camp
    c. City Parks
    d. Damon Garcia Sports Fields

Results:

Scenario 1	
Asset Category	**Count**
Community Service Centers	15
Disaster Information/Preparation	1
Disaster Related Utilities	1
Financial Support	1
Food Related Amenities	4
Local Economy/Business	5
Medical/Emergency Services	3
Multimodal Transit	18
Open Space/Trails	30
Parking	4
Public Safety	1
Recreational Facilites	14
Total	97



Scenario Two: Disaster Preparation

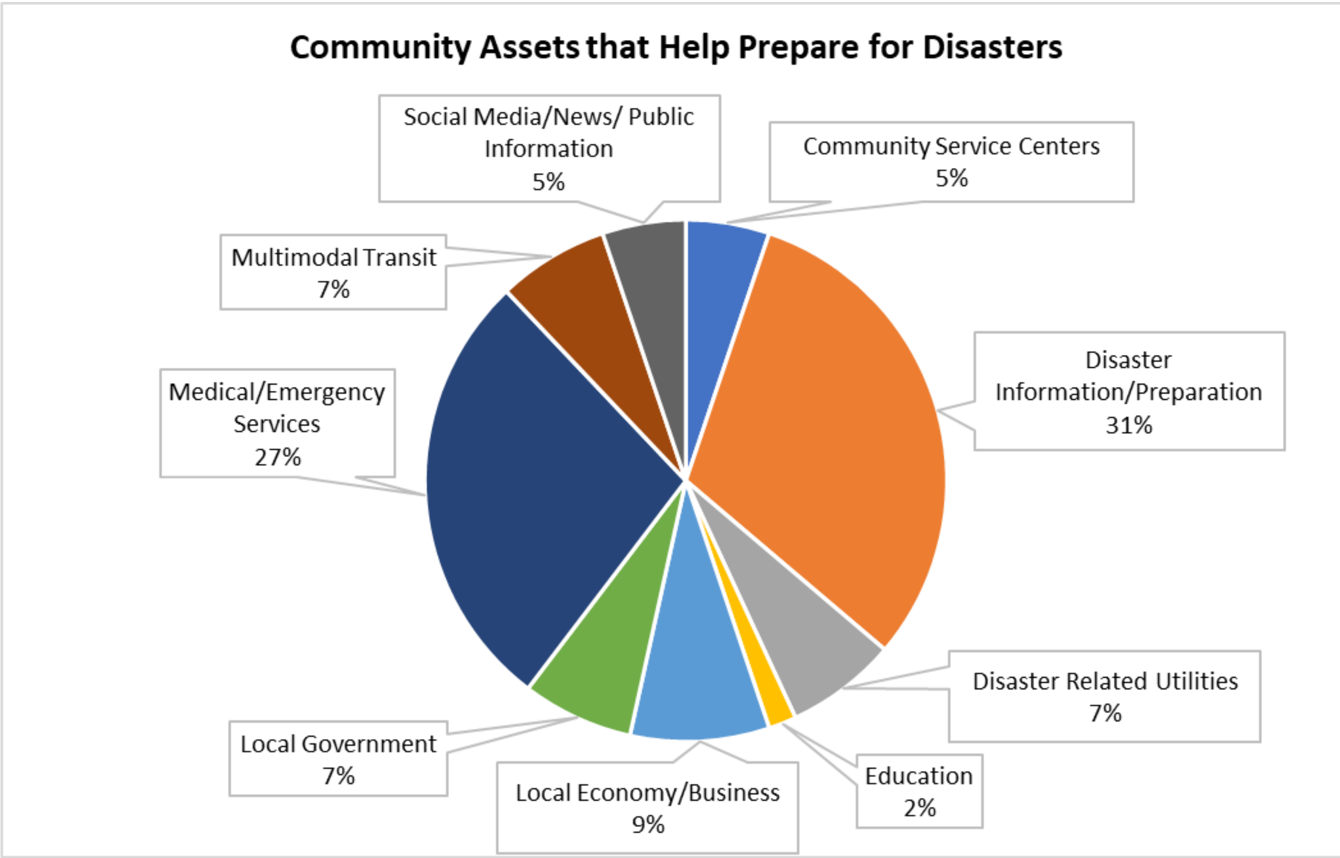
The following assets were listed for scenario one:

1. Community Service Centers
    a. Community Centers
    b. SLO County Library
    c. Cal Poly University Campus
2. Disaster information/preparation
    a. News
    b. City Website, ReadySLO, EmergencySLO.org
    c. Early Warning Systems (Sirens, Alerts)
    d. Radio AM/FM Alerts
3. Disaster Related Utilities
    a. Water Stations
    b. Utilities
    c. SLO Public Works
    d. Mutual Aid
4. Education

    a. Soil and Regenerative AG Classes
5. Local economy/businesses
    a. Target
    b. The Mountain Air
    c. Costco
    d. Trader Joes
    e. Miner's Ace Hardware
6. Local government
    a. SLO City and County Officials
    b. SLO City
    c. SLO County
7. Medical/Emergency Services
    a. Fire Departments
    b. American Red Cross
    c. Health Department
    d. EMS
    e. Hospitals
    f. Cal Poly Health Center
8. Multimodal Transit
    a. SLO Airport
    b. Personal Vehicles
    c. Emphasis on Public Transportation
9. Social Media/News
    a. KCBX Radio
    b. Online Presence of SLO Community Members

Results:

Scenario 2	
Asset Category	**Count**
Community Service Centers	3
Disaster Information/Preparation	18
Disaster Related Utilities	4
Education	1
Local Economy/Business	5
Local Government	4
Medical/Emergency Services	16
Multimodal Transit	4
Social Media/News/ Public Information	3
Grand Total	**48**



Scenario Three: During Disaster

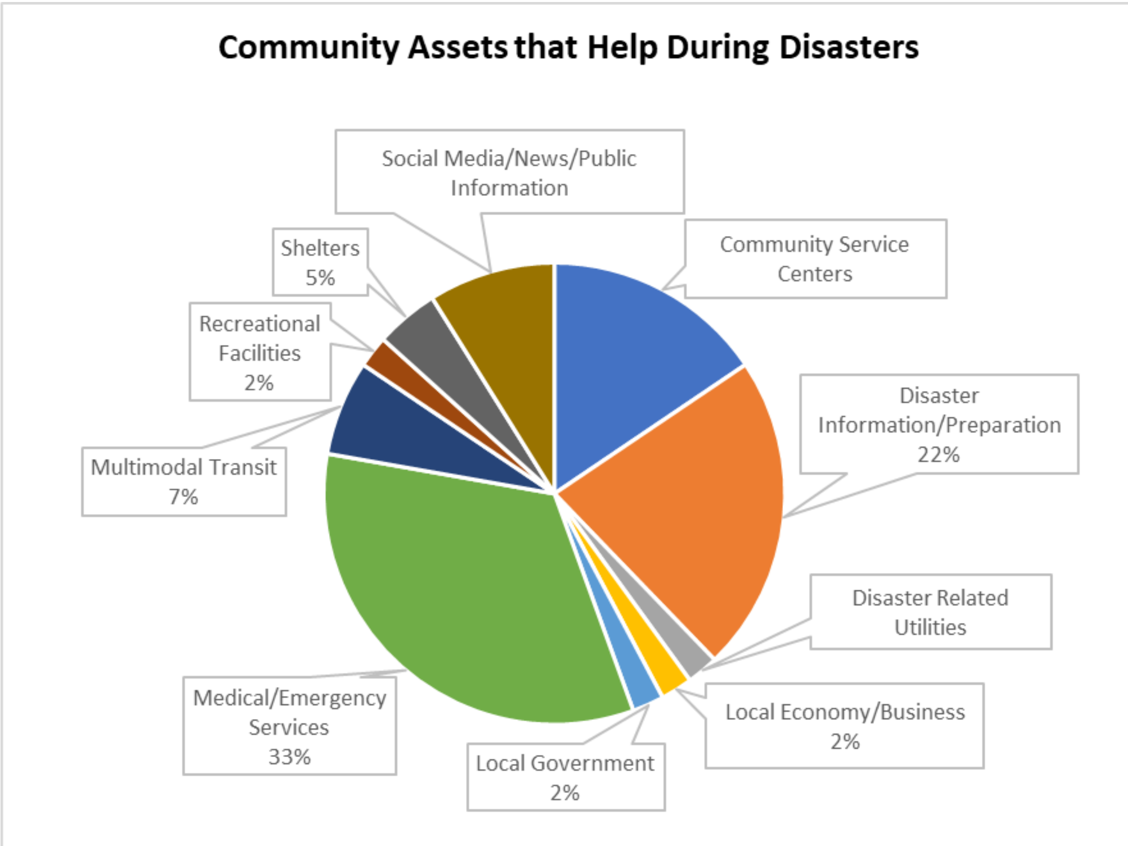
The following assets were listed for scenario one:

1. Community Service Centers
    a. City Hall
    b. Church
    c. SLO Library
    d. Veteran's Memorial Building
    e. Schools
    f. Ludwick Community Center
2. Medical/Emergency Services
    a. SLO County and City Fire
    b. SLO County and City Police
    c. Search and Rescue
    d. American Red Cross
    e. Medical Reserve Corps
    f. City Government
3. Social Media/news

   a. Social Media Groups
   b. KSBY
4. Disaster Information/Preparation
   a. Early Warning System
   b. Pulse Point
   c. EmergencySLO.org
   d. Public Communication
   e. ReadySLO.org
   f. City Emails
   g. KSBY
5. Shelters
6. Multimodal Transit
   a. Airport
   b. US 101 and Roadway Accessibility
7. Local economy/business
   a. Costco
8. Local Government
   a. SLO County and SLO City

Results:

Scenario 3	
Community Asset	**Count**
Community Service Centers	7
Disaster Information/Preparation	10
Disaster Related Utilities	1
Local Economy/Business	1
Local Government	1
Medical/Emergency Services	15
Multimodal Transit	3
Recreational Facilities	1
Shelters	2
Social Media/News/Public Information	4
Grand Total	**45**



Scenario Four: Post Disaster

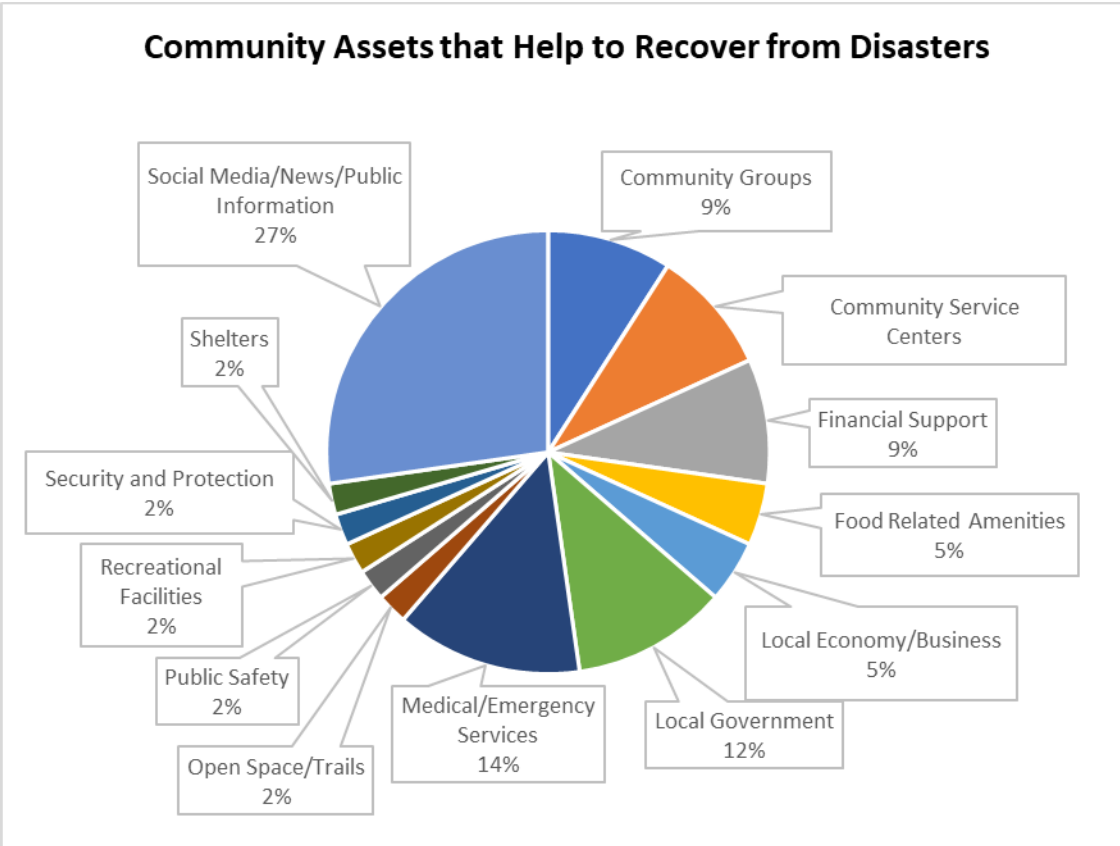
The following assets were listed for scenario one:

1. Local Economy/Business
    a. Target
    b. Small Business Development Center
2. Food Related Amenities
    a. Grocery Stores
    b. Pharmacy
    c. Water and Food Supply
3. Recreational Facilities
    a. The Pad Climbing
4. Local Government
    a. SLO County Administration
    b. City Government
    c. County OES, City Manager, and Mayor
    d. City of SLO
5. Social Media/News/Public Information

    a. City Agency Responsible for Disseminating Information
    b. Timely Access to Service Providers
    c. Newspapers
    d. ReadySLO.org
    e. SLO City Hall
    f. Instagram, Twitter, Facebook
    g. City Website
6. Community Groups
    a. Local Non-Profit Organizations
    b. Mutual Aid
    c. Food Banks
7. Open Space/Trails
    a. General Open Space
8. Financial Support
    a. Workforce Recovery Grants
    b. EDD
    c. Insurance Companies
    d. FEMA
9. Security and Protection
    a. National Guard
10. Community Service Centers
    a. Salvation Army
    b. Churches/Religious Centers
    c. The Center
    d. SLO County Veteran's Hall

Results:

Scenario 4	
Community Asset	**Count**
Community Groups	4
Community Service Centers	4
Financial Support	4
Food Related Amenities	2
Local Economy/Business	2
Local Government	5
Medical/Emergency Services	6
Open Space/Trails	1
Public Safety	1
Recreational Facilities	1
Security and Protection	1
Shelters	1
Social Media/News/Public Information	12
Grand Total	**44**


Community Assets that Help to Recover from Disasters
Social Media/News/Public Information 27%
Community Groups 9%
Community Service Centers
Shelters 2%
Financial Support 9%
Security and Protection 2%
Food Related Amenities 5%
Recreational Facilities 2%
Local Economy/Business 5%
Public Safety 2%
Medical/Emergency Services 14%
Local Government 12%
Open Space/Trails 2%

Overview:

The Environmental Justice Survey for Community Organizations was intended to gather input on environmental topics from organizations that serve vulnerable and/or disadvantaged communities in the City of San Luis Obispo. More specifically, the survey gathered input on how the city can better support disadvantaged communities by reducing environmental pollution, identifying key community needs, and increasing the voice of marginalized groups in the City's decision-making process. The survey findings will support the integration of environmental justice into the City's General Plan Safety and Community Resilience Element.

The survey was open for two weeks from August 12th, 2021 to August 26th 2021. The survey was sent via email to 59 staff members at local organizations or agencies that work with disadvantaged communities or focus on diversity, equity, and inclusion. The survey was also shared with participants of the Environmental Justice Working Group.

Participation:

The survey received 7 responses from the following organizations:

- Diversity Coalition San Luis Obispo County
- SLO Food Bank
- HASLO
- United Way of San Luis Obispo County
- Lumina Alliance
- CAPSLO
- Habitat for Humanity SLO County

Populations Served:

All respondents indicated that they serve populations that live, work, and/or go to school in the City of San Luis Obispo. All organizations reported that they serve low-income, non/limited English speakers. Also, all organizations serve young children and youth within SLO. The majority (6/7) of responses showed to support those who are unhoused, unemployed, and uninsured. People without vehicle access, undocumented individuals and families, people with disabilities, and outdoor workers are also served by a majority of organizations. About half of respondents show support for people with chronic health conditions and people with severe mental illness.

Only one organization (Diversity Coalition SLO County) indicated that they aid racial and ethnic people of color and faith-based communities, this same organization specifically supports BIPOC populations. One individual organization described that they serve “low income residents of SLO County who lack the resources to purchase or obtain enough food for themselves or their families” while another organization noted they assist those with affordable housing ownership. One other organization serves victims of violence particularly.

Environmental Pollutants Adversely Impacting Vulnerable Populations

Types of environmental pollutants (all listed frequently among the respondents)

- Exhaust and traffic pollution from living in proximity to major roadways
- Contaminated drinking water
- Lead paint or pipes in housing
- Pesticide pollution from agriculture
- Living/working near environmental clean-up sites
- Smoke from wildfires

Populations are affected mostly by living and working near the environmental pollutants listed.

Farmworkers are at risk to greater pesticide exposure and are also impacted more by wildfire smoke as they are working outdoors.

Low income housing are often based in areas that are more impacted by pollutants such as noise and exhaust from higher traffic volumes.

Due to insufficient resources and low level priorities from local governments, vulnerable populations are subject to substandard living conditions, lack of proper education/recognition, and are of a low priority for remediation.

Recommendations for how the City can Help Protect Vulnerable Populations from Environmental Pollutants, Hazards and Climate Change Impacts

- Host listening sessions inside of affected communities.
- Devote new human and material resources to investigate and remedy environmental injustices.
- Identify and appoint leadership from within the affected communities
- Provide monetary or other basic needs support to farmworkers when their work is disrupted by unusual or dramatic climate events
- Incorporate greater city plans to clean up pollutants and test for pollutants in soil and other locations
- Provide access to resources, education, funding, and create platforms/events where community members may share their experiences and be intentionally listened to

Community Improvements to Protect the Wellbeing and Safety of Vulnerable Populations

1. Better transit services (more routes, more stops, shorter wait times).
2. Low income housing.
3.
    - Cooling Centers.
    - Broadband access.
    - Cooling/heating for homes and apartments (air conditioning/heat pumps).
4.
    - Park access.
    - Address food deserts by providing farmers markets and such in low income areas.
    - Street Trees.
    - Translation Services.

- Safe parking/ camping areas for the unhoused population that includes services and resources.
- Community gathering places.

"Real, tangible short and long-term, result driven solutions that are not based in politically motivated rhetoric and empty promises"

A general consensus shows these needs are anticipated to change beside one organization which does not think community needs will change as impacts increase. It was noted that better public transportation and cooling centers will rise in importance. Additionally, heightened rates of demographic change will increase need for affordable housing, educational resources, and access to broadband.

<u>Important Public Services and Amenities</u>

- Access to safe living conditions, legal services, and affordable child care.
- Libraries, bus transit, bicycling paths, safe overnight parking, public bathrooms, programs specifically targeted towards low-income housing.
- Living wage jobs and access to affordable housing.
- Access to public parks and recreation
- Transit improvements for senior and disabled populations.

Specifically for disaster situations

- Cooling centers, clean and safe shelters
- Access to food, clean water, electricity, and transportation
- Translation services and assistance for those with mobility issues
- Temporary housing for displaced individuals

<u>Healthy Food Access</u>

- Increase support for food banks
  - Partner with SLO Food Bank to determine regional gaps in service.
  - Create opportunities for food distributions, pantries, free farmer's markets in underserved communities.
- Improve public transportation to super markets and farmers markets
- Support food banks, farms, and gardens for low income neighbors

<u>Participation in the Public Decision-Making Process</u>

<u>Barriers</u>

- Language barriers seem to be most prevalent.
- Lack of trust also drives participation downward.
- Don't hear about opportunities (e.g not well connected to the City communication channels)
- Seems to be inaccessible to many people:
  - Too little time to engage (when struggling to put food on table, dealing with violence, engagement in public government not on radar.

    - Inaccessible meeting times
- Disconnection between members of the public and government body
    - Topics of city meeting not relevant
    - Lack of interest
    - Lack of knowledge on government processes.

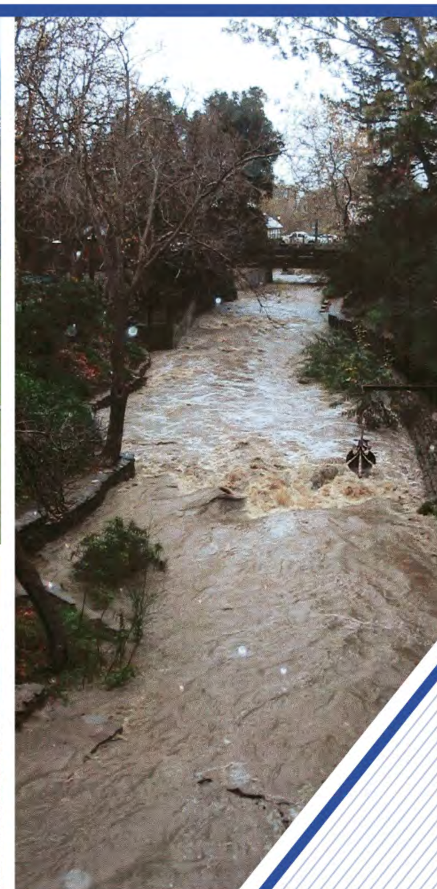
<u>Recommendations for improved involvement and communications</u>

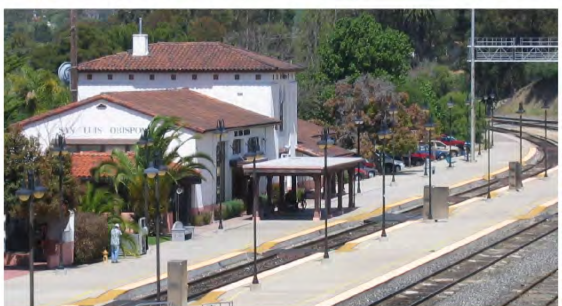
- Ensure affected communities have opportunities to create agendas, not simply respond to agendas.
- Incentivize participation
- Consider alternative meeting times outside of work week/hours
- Collaborate with trusted partners/agencies within different communities to spread information (specific recommendation to use CAPSLO to disseminate info of interest to civilians.
- "Prioritize and focus on real life, basic needs that enhance and sustain"

<u>Additional Comments</u>

- "Further reduce jobs/housing imbalance in order to reduce job commute times and all things associated with them (reduced air quality, decreased quality of life etc.)
- Please sustain our work making environmental justice a core priority in the city's service to all its citizens, don't allow to fall between the cracks... Thank you.

January 2021





Resilient SLO:
Baseline Conditions Report

City of San Luis Obispo
990 Palm Street
San Luis Obispo, CA 93401

Resilient SLO: Baseline Conditions Report

Prepared for:

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San Luis Obispo, CA 93401

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January 2021

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LIST OF ABBREVIATIONS

°F	Fahrenheit
CALFIRE	Department of Forestry and Fire Protection
Cal Poly	California Polytechnic State University at San Luis Obispo
CDC	Center for Disease Control and Prevention
COVID-19	2019 coronavirus disease
County	County of San Luis Obispo
City	City of San Luis Obispo
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
GIS	geographic information system
HASLO	Housing Authority of San Luis Obispo
HMP	San Luis Obispo County Multi-Jurisdictional Hazard Mitigation Plan
HPI	California Healthy Places Index
IPCC	Intergovernmental Panel on Climate Change
Report	Baseline Conditions Report
RTA	San Luis Obispo Regional Transit Authority
SR	State Route
USACE	US Army Corps of Engineers
UWMP	Urban Water Management Plan
WUI	wildland-urban interface
WRRF	Water Resource Recovery Facility

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1 INTRODUCTION

This Baseline Conditions Report (Report) has been developed as part of Resilient SLO, a planning process undertaken by the City of San Luis Obispo (City) to better understand the local impacts of climate change and incorporate climate adaptation and resilience strategies into the City's General Plan Safety Element, consistent with requirements in Senate Bill 379. Senate Bill 379 requires communities in California to incorporate strategies to mitigate the impacts of climate change in their general plan safety element and plays an important role in helping the City become more resilient to the current and future effects of climate change. Resilience refers to the capacity of individuals, communities, institutions, businesses, and systems to survive, adapt, and thrive in the face of chronic stresses and acute shocks (APA 2017). The Report has been developed to understand the City's current climate-related hazards and provide a baseline for key characteristics of the community that are likely to be affected by climate change. The Report serves as the first step in the development of the City's comprehensive climate change vulnerability assessment and provides a historical frame of reference to understand how climate change will affect the City. Figure 1-1 illustrates the four main steps of the Resilient SLO planning process. This report serves as the culmination of work complete in Step 1 of the process.

Figure 1-2 Resilient SLO Planning Process

The City has adopted its *Climate Action Plan for Community Recovery*, which focuses on reducing greenhouse gas (GHG) emissions produced from community activities. The plan sets an ambitious target of carbon neutrality by 2035, adopts sector-specific goals, and identifies concrete actions to chart a path toward achieving those goals. The City's efforts are consistent with other jurisdictions that are demonstrating leadership in reducing GHG emissions and sharing successes and lessons learned with other communities in support of widespread climate action at the speed and scale required to stabilize the increase in global temperature caused by climate change at or below 2 Celsius (C)2C.

While the City continues to reduce local emissions, it is important to recognize that warming due to anthropogenic activities from the pre-industrial period to the present will persist for centuries to millennia and continue to cause further long-term changes in the climate system. As stated by the Intergovernmental Panel on Climate Change (IPCC), human activities that generate GHG emissions are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels with increases likely reaching 1.5°C (2.7 between 2030 and 2052) if emissions continue to increase at the current rate (IPCC 2018). Trends, beginning in the 1950s, in the intensity and frequency of climate and weather extremes have been detected when only 0.5°C of global warming occurred. These weather extremes including long-term drought, extreme heat events, increased wildfire risk, and extreme storm events are anticipated to increase in intensity and frequency as the average global temperature increases to between 1.5 and 2°C. Due to past and ongoing emissions at their current rate, estimated anthropogenic global warming is projected to increase at a rate of 0.2°C (likely between 0.1°C and 0.3°C) per decade due to past and ongoing emissions (IPCC 2018). As a result, the City must begin to prepare for the impacts of climate change, despite future trends in local and global GHG emissions.

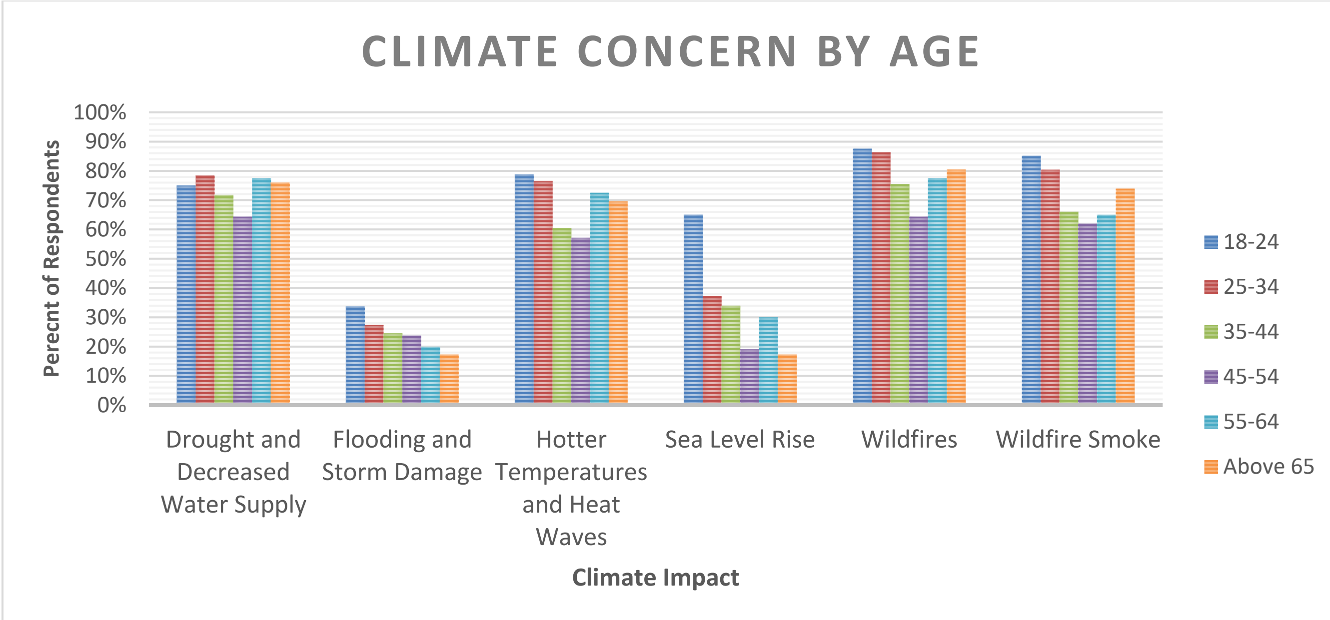
Because climate impacts and their severity will vary throughout the state, local resilience and adaptation planning focuses on understanding the anticipated regional and local climate impacts. The first step in this process is to assess existing hazards and sensitivities that may be affected by climate change. This Report focuses on identifying the City's historic and current exposure to climate-related hazards, as well as determining community assets (i.e., infrastructure, functions, and populations) that are likely to be affected. The document is organized into two sections:

- Existing Hazards Assessment—This section summarizes local and regional plans and resources and evaluates existing hazards that may be exacerbated by climate change. In the City, these climate hazards include flooding, extreme heat, and wildfire, as well as their secondary effects. This section also includes a brief discussion of the current COVID-19 pandemic. The existing climate hazards described in this section serve as a baseline against which to assess future climate conditions and the magnitude of changes that are projected to occur through the 21st century.
- Sensitive Infrastructure, Populations, and Community Functions—This section discusses the City's transportation system, critical facilities and infrastructure, socioeconomic trends and vulnerable populations, and community and economic functions that could be affected by climate change. To help explain how climate change may affect the City in the future, this section also describes how the City's community assets have been affected by climate-related hazards in the past. In addition, this section identifies specific populations in the City that are disproportionately affected by existing hazards and may be disproportionately affected by future climate hazards.

1.1 RESILIENT SLO COMMUNITY PRIORITIES SURVEY

As part of the development of this report, a community priorities survey was developed to gather input on overall community priorities regarding climate-related hazards, concerns related to climate change impacts, experience with past hazard events and response efforts, and priorities for local action. The survey, consisting of 19 questions, was open from August 31, 2020 – October 11, 2020 and had 328 responses. The survey results will be used to inform the vulnerability assessment and hazards report, as the next step in the Resilient SLO planning process, as well as the future community engagement and education activities. Highlights from the survey results have been included in this Report to help better understand the community's priorities regarding climate-related hazards.

As part of the survey, participants were asked what climate-related impact they were most concerned about. Figure 1-2 illustrates the responses to this question by age group. As shown in Figure 1-2, respondents were most concerned about wildfires and associated poor air quality events. Leading up to and during the survey response period, the City experienced poor air quality from several wildfires in the surrounding region, which may have influenced survey results. The large majority of respondents were also concerned about drought, increasing temperatures, and heat wave events and much less concerned about flooding and sea level rise. Survey results for this question also highlight that respondents in the 18-24 year old age cohort were the most concerned about almost all climate issues. To explore the full results of the community priorities survey, please refer to Appendix A of this report.



Sources: Resilient SLO Community Priorities Survey

Figure 1-2 City Resident's Climate Concern by Age

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2 EXISTING HAZARDS ASSESSMENT

This section provides an overview of local and regional plans, as well as a summary of existing hazards in the City that are anticipated to be affected by climate change. Plans and resources reviewed are the City's annex to the San Luis Obispo County Multi-Jurisdictional Hazard Mitigation Plan (HMP) (San Luis Obispo County 2019a), the current General Plan Safety Element (City of San Luis Obispo 2014), the California Governor's Office of Emergency Services' MyHazards mapping tool, Cal-Adapt, the California Heat Assessment Tool, the California Healthy Places Index (HPI), and geographic information system (GIS) data from the California Department of Transportation GIS Open Data and the City and County of San Luis Obispo Open Data Repository.

This section also includes background information on the overall climate and topography in the region and includes a detailed discussion of three existing hazards that may be exacerbated by climate change: flooding, extreme heat, long-term drought, and wildfire. Statistics and figures are provided to illustrate the extent of past impacts and geographic areas at risk for each hazard.

2.1 LOCAL AND REGIONAL PLANS

This section provides a general summary of local and regional plans related to existing hazards and describes how they can support increasing the City's resilience to the current and future impacts of climate change. The plans discussed in this section were used to develop this Report and help establish a planning framework to be used during various stages of the Resilient SLO development process.

2.1.1 San Luis Obispo County Multi-Jurisdictional Hazard Mitigation Plan

The HMP assesses all current human-made and natural hazards in San Luis Obispo County (County) and the incorporated cities in the County, including the City of San Luis Obispo. It also provides practical and cost-effective mitigation solutions to reduce the County's vulnerability to hazards and reduce both human and financial losses from hazardous events (San Luis Obispo County 2019a). The HMP, which was last updated in October 2019, includes community profiles for the incorporated cities, community services districts, and special districts in the County. The HMP and City specific Annex G acknowledges the role climate change will play in exacerbating future hazards and recognizes the importance of preparing climate-specific hazard mitigation strategies. Climate change considerations are discussed for each hazard. The following hazards discussed in the HMP specifically relate to climate change:

- adverse weather (e.g., thunderstorms, high winds, extreme heat);
- agricultural pest infestation, plant disease (e.g., tree mortality), and invasive species;
- naturally occurring biological agents (e.g., vector borne diseases);
- coastal storms, erosion, and sea level rise;
- dam failure;
- drought and water shortage;
- flooding;
- landslides and debris flow;
- soil hazards and land subsidence; and
- wildfires.

Annex G of the HMP (San Luis Obispo County 2019b),a community profile specific to the City, supersedes the City's previous Local Hazard Mitigation Plan (LHMP), which was first published in 2006 with an update in 2014. Annex G provides an in-depth discussion of the City's climate, economy, and demographics and presents an assessment of the City's vulnerability to natural and human-made hazards. Annex G also includes a capability assessment that provides an inventory of existing regulatory tools (e.g., ordinances, plans), personnel resources, financial resources (e.g., grants, fees), and partnerships that are currently used or could be used in the future to implement hazard mitigation activities. A mitigation action plan was developed, based on the capability assessment, and identifies mitigation strategies for each of the hazards discussed in the HMP.

Annex G of the HMP includes a detailed description of the planning process used to produce the plan, background information about the City, a hazard risk assessment, a capability assessment, mitigation strategies, and an implementation and monitoring plan. Annex G of the HMP also includes the following goal specific to preparing for climate impacts in the City. The Resilient SLO planning process supports objectives 3.A and 3.B.

GOAL 3: Prepare for and adapt to the impacts of climate change.

- **Objective 3.A:** Use, and update as needed, the best available science to estimate exposure, vulnerability, and risk of hazards as the result of climate change.
- **Objective 3.B:** Use the climate change exposure, vulnerability, and risk assessments to ensure mitigation investments, capital projects, and programs actively mitigate climate impacts.

2.1.2 City of San Luis Obispo General Plan Safety Element

The City's current General Plan Safety Element (City of San Luis Obispo 2014), which was adopted in 2000 and last revised in 2014, identifies goals and policies to avoid or minimize the loss of life, property, and prosperity that can result from disasters and to help the City and its residents recover quickly from unavoidable disaster events. The Safety Element identifies the level of risk for various hazards by evaluating the probability of loss, the City's capacity to reduce risks, the potential severity of loss, and the adequacy of knowledge about the hazard.

Hazards discussed in the Safety Element include flooding, fire, earthquakes and geologic hazards, hazardous materials, electromagnetic fields, airport hazards, and hazardous trees. The Safety Element also identifies programs and policies to aid the City in avoiding and preparing for emergencies, such as investing in City staff training, implementing the Standardized Emergency Management System, engaging citizens in preparedness education, and maintaining an Emergency Operations Center Plan. Although the City's current Safety Element does discuss climate-related hazards (e.g., wildfire, flooding), it does not include a discussion of climate change or assess how various hazards will be affected or exacerbated by climate change.

2.1.3 Urban Water Management Plan

In 2015, the City adopted the Urban Water Management Plan (UWMP) which evaluates the City's current and projected water supplies through the year 2035. The UWMP was prepared in accordance with the Urban Water Management Planning Act (Act), and; accordingly, will be updated every 5 years and submitted to the California Department of Water Resources. Goals in the UWMP related to this this Report include the following:

- assess current and future water use trends in the community;
- summarize the water supply and the water system;
- assess water supply reliability;
- document the water demand;
- manage measures in place to balance supply and demand; and
- demonstrate compliance with SB X7-7 which requires the City to develop urban water use targets to help meet the goal of a 20 percent reduction goal by 2020.

2.1.4 Waterway Management Plan

In 2003, the City developed and adopted its current Waterway Management Plan in coordination with the San Luis Obispo County Flood Control and Water Conservation District Zone 9 Advisory Committee. The purpose of this plan is to adopt an approach and schematic plans to address flooding, erosion, water quality, and ecological issues in the San Luis Obispo Creek Watershed that can be implemented with approval from various regulatory agencies.
The plan includes five key components to achieve the plan's objective. These include the following:

- Stream Maintenance and Management Program and guidance document for routine stream maintenance;
- new Drainage Design Manual for storm water, flood control, and bank repair design;
- Flood Management Plan that outlines the conceptual flood control alternatives;
- Bank Stabilization Program that provides a management framework and conceptual plans for addressing current and future bank instability problem areas; and
- Habitat Enhancement and Restoration Program that provides a conceptual plan and framework for stream resource enhancement, restoration, and protection.

2.1.5 Community Wildfire Protection Plan

The City of San Luis Obispo adopted the Community Wildfire Protection Plan (CWPP) in 2019. The purpose of the CWPP is to collaboratively address fire protection planning efforts occurring in the City, minimizing wildfire risk to watershed lands, assets, firefighters, and the public. The CWPP includes the following:

- the City's physical and social characteristics,
- wildfire history and landscape-scale fire hazard variables in the City,
- an evaluation of wildfire risk in priority areas, and
- strategies for reducing structural ignitability, conducting public education and outreach; and, reducing fuel loads, and minimizing wildfire risk in the community.

2.2 PLANNING RESOURCES

This section includes a brief summary of resources available to the public that will be used in the vulnerability assessment, some of which were used in this Report to identify baseline conditions for the assessment of future climate-related risk.

2.2.1 California Governor's Office of Emergency Services MyHazards Mapping Tool

The California Governor's Office of Emergency Services MyHazards mapping tool is an interactive map that displays information about earthquake, liquefaction, tsunami, flood, and fire hazards throughout the state. MyHazards also provides general information about each hazard and links to other resources for more detail about specific hazards and preparedness measures.

2.2.2 California Adaptation Planning Guide

In August 2020, the Governor's Office of Emergency Services completed an update to the *California Adaptation Planning Guide* (APG) (Cal OES, 2020). The California Adaptation Planning Guide (APG) is designed to support local government, regional organizations, and climate collaborative groups to integrate best practices and current science into their adaptation planning efforts. Guidance from the APG was used to develop this report and will be used as one of the primary guidance documents during the Resilient SLO planning process.

2.2.3 Federal Highway Administration's Vulnerability Assessment and Adaptation Framework

The Federal Highway Administration's (FHWA's) Vulnerability Assessment and Adaptation Framework is a guidance document developed to support transportation agencies and their partners assess the vulnerability of their transportation systems to extreme weather and the impacts of climate change. The document also helps agencies integrate climate adaptation considerations into transportation decision-making and provides an in-depth process for conducting a vulnerability assessment. Relevant sections of this document were used to develop this report and will be used as one of the primary guidance documents during the Resilient SLO planning process.

2.2.4 Cal-Adapt

Cal-Adapt is a tool developed by the University of California, Berkeley's Geospatial Innovation Facility, California Energy Commission, and California Strategic Growth Council that uses global climate simulation model data to provide a view of how climate change might affect California. Climate datasets on Cal-Adapt include historical observations, as well as downscaled climate projections, which are used to create charts and maps that display climate variables through time. Cal-Adapt includes climate variables, such as temperature, precipitation, sea level rise, snowpack, wildfire, streamflow, and drought.

2.2.5 California Heat Assessment Tool

The California Heat Assessment Tool is a tool developed by the California Natural Resources Agency as part of the state's Fourth Climate Change Assessment. The tool provides information for local and state health practitioners to better understand dimensions of heat vulnerability driven by climate changes and where action can be taken to mitigate the public health effects of extreme heat in the future.

2.2.6 CalEnviroScreen

CalEnviroScreen, a web-based tool developed by the California Office of Environmental Health Hazard Assessment (OEHHA), uses a science-based method for evaluating multiple pollution sources in a community while accounting for local vulnerabilities. The purpose of the tool is to identify which communities are most burdened by pollution from multiple sources and which are most vulnerable to its effects, taking into account the socioeconomic and health status of people living in those communities. The tool provides a set of indicator data that will help to identify portions of the City particularly vulnerable to climate-related hazards.

2.2.7 California Healthy Places Index

The California HPI, developed by the Public Health Alliance of Southern California, provides an interactive map, graphs, data tables, and a policy guide to examine local health factors and compare local conditions to those across the state. Climate health vulnerability indicators are built into the HPI by incorporating climate-related hazards data layers into the mapping (e.g., air conditioning access, public transit access); incorporating select climate-resiliency metrics into the HPI score, which combines 25 community characteristics into a single indexed score to describe a community's overall health; and addressing climate challenges in the policy guide.

2.3 EXISTING HAZARDS ASSESSMENT

This section provides an overview of existing climate-related hazards in the community and serves as a comparative baseline for assessing future climate conditions and the magnitude of changes that are projected to occur through the 21st century.

2.3.1 Geography and Climate

The City is located west of the Santa Lucia Mountains and 8 miles east of the Pacific Ocean in the Central Coast region of California. It occupies approximately 10.7 square miles and is surrounded primarily by protected open space and agriculture. Although the City itself is on average 300 feet above sea level, much of the terrain surrounding the City is mountainous, with prominent peaks such as Cerro San Luis and Bishop Peak at 1,292 and 1,559-feet above sea level, respectively (San Luis Obispo County 2019b).

San Luis Obispo experiences a Mediterranean climate, which is characterized by dry summers and mild, wet winters. Although this is the general trend, the region has historically experienced both unseasonably warm and cold periods. The City has an annual average temperature of 70.2 degrees Fahrenheit (°F) and average precipitation of 19 inches per year, occurring primarily in the winter and spring months. The City's climate is influenced by the proximity of the ocean, resulting in weather events including dense fog, offshore wind, and coastal storms (San Luis Obispo County 2019b).

2.3.2 Flooding

This section provides a summary of the San Luis Obispo Creek watershed and describes existing flooding issues in the City and the surrounding region. Two interchangeable, technical terms that characterize flood frequency are used throughout the section and are defined as follows:

- **Recurrence Intervals**: A common way to describe floods is by stating their recurrence intervals, which refer to how often, on average, a given flood may occur. A 100-year event, for example, is described as an event that may occur about once in every 100 years, on average. However, this terminology can be misleading because flood events are statistical occurrences, and events may occur more frequently than their recurrence interval suggests.
- **Exceedance Probability:** The exceedance probability of a given flood event is the percent chance that a larger flood will occur in any given year, and it is calculated by dividing the number 1 by the recurrence interval. Thus, the "100-year event" becomes the "1-percent exceedance event," or a flow rate that has a 1-percent chance in any given year of being equaled or surpassed by a larger flow rate. This representation, although interchangeable with the recurrence interval, provides a more helpful way to think about flood risk.

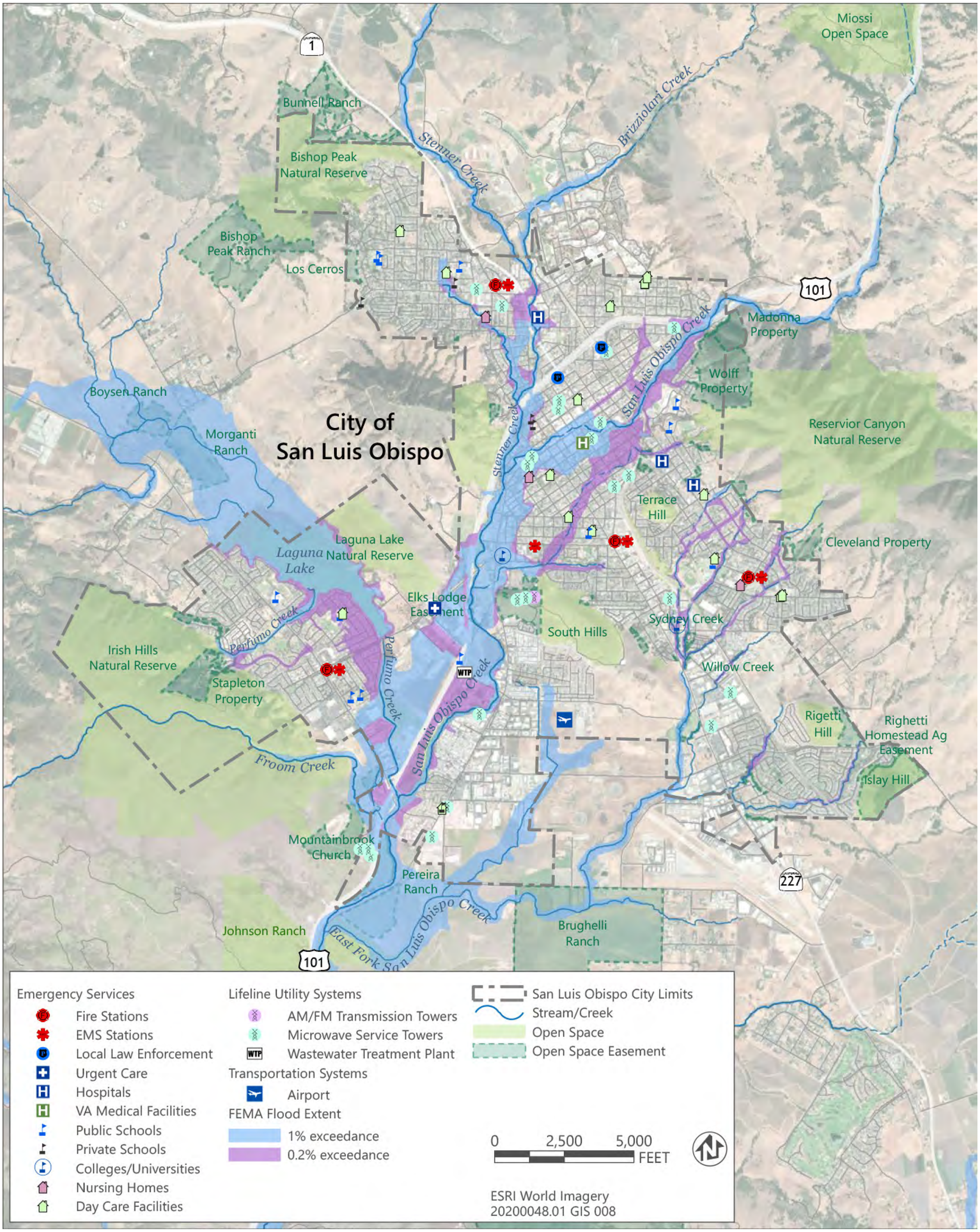
There are several overall mechanisms by which flooding can occur:

- dam inundation flooding, in which impounded water is released because of dam breaching;
- localized flooding, which occurs when intense rainfall overwhelms the capacity of local drainage infrastructure, causing the ponding of water; and
- riverine flooding, which occurs when channels (i.e., the relatively deep, narrow sections of creeks and rivers) cannot contain the flow volume moving through them, causing water to spill out into the overbank areas (i.e., the relatively wide, flat regions on one or both sides of the channel, also called "floodplains").

According to the HMP, the City is not at risk of dam inundation flooding, and localized flooding is considered a minimal risk. The highest flooding concern for the City is riverine flooding, which may include "flash" flood risks (San Luis Obispo County 2019b).

SAN LUIS OBISPO CREEK WATERSHED

As shown in Figure 2-1, San Luis Obispo Creek flows through the City in a northeast to southwest direction, passing through the downtown area and generally following U.S. Highway (U.S.) 101 on its way to the Pacific Ocean at Avila Beach. The watershed for San Luis Obispo Creek, the land area that captures rainfall and contributes water directly to the creek system, covers an area of approximately 84 square miles, ranging in elevation from approximately 2,460 feet in the upper watershed near the Cuesta Grade to its outlet into the Pacific Ocean. Along its main flow path, it transitions from steep canyons to the gently sloping alluvial plain underlying the City, descending more than 2,230 feet to downtown. In the City's downtown, San Luis Obispo Creek flows through the "under-city culvert," consisting of a system of covered, constructed channels between Osos Street and Chorro Street that is more than 1,000 feet long and 18–23 feet wide (Questa Engineering Corporation 2003, 2015), before emerging into Mission Plaza.



Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020 and processed by cbec eco engineering in 2020.

Figure 2-1 Waterways and Floodplain Areas in the City of San Luis Obispo with Critical Facilities

Further downstream, near the intersection of Marsh Street and Higuera Street, San Luis Obispo Creek is joined by a major tributary, Stenner Creek, which in turn receives flow from Brizzolara and Old Garden Creeks. San Luis Obispo Creek then continues south along the alluvial plain, intercepting Prefumo Creek as it exits Laguna Lake and joining East Fork San Luis Obispo Creek near the Higuera Street/U.S. 101 interchange by the Johnson Ranch Open Space. Near the confluence of San Luis Obispo Creek with Davenport Creek, the channel enters “the Narrows” (Questa Engineering Corporation 2003), passing through a steep, confined canyon before being joined by See Canyon Creek and discharging to the Pacific Ocean. Flows in the watershed are “flashy,” meaning that water moves quickly through the system and that stream levels rise and recede rapidly in response to rainfall events. This is a result of the steep topography of the upper watershed and the relatively shallow soils, land cover, and rainfall characteristics for the region (Questa Engineering Corporation 2003).

HISTORICAL FLOODING

The San Luis Obispo Creek watershed has a long history of flooding, with a series of storms over the last 50 years that have caused millions of dollars’ worth of damage.[1] Damaging flood events have occurred in 1868–1872, 1884, 1897, 1911, 1948, 1952, 1962, 1969, 1973, 1995, 1998, and 2001 (Questa Engineering Corporation 2003; City of San Luis Obispo 2014). The flooding events in January and March 1995 occurred during one of the wettest periods on record, causing the watershed to be relatively saturated for long periods, which prevented soils from absorbing incoming precipitation. The 1995 flooding events followed the 1994 Highway 41 fire, which burned major areas of the Stenner Creek and upper San Luis Obispo Creek watersheds and caused increased runoff and sediment delivery to channels. Flow spilled out of the San Luis Obispo Creek channel in the region around Marsh and Higuera Streets, causing extensive damage, and remained out of the creek banks for nearly 3 miles downstream. The events, for which the peak flow was estimated to be the 17-year flood event[2] (6-percent exceedance probability), caused $2.3 million in damage (Questa Engineering Corporation 2003). Prior events were even more damaging: The 1969 flood caused $6.92 million in damage, and the 1973 flood caused $13.6 million in damage. During the 1973 flood, depths of inundation over U.S. 101 exceeded 4 feet near the Madonna Inn and were up to 3 feet near the Prefumo Creek confluence (Questa Engineering Corporation 2003).

FLOOD RISK

Following the 1973 flood, watershed studies and plans were developed and updated, including the 1974 U.S. Army Corps of Engineers floodplain study of San Luis Obispo Creek (USACE 1974), 1977 Nolte & Associates study (George S. Nolte & Associates 1977), and 1978 Federal Emergency Management Agency (FEMA) flood insurance study. The extent of 100-yr and 500-yr flood zones, based on these studies, is shown in Figure 2-1.

In 2003, the City’s WMP was completed, which relied on updated analyses for flow frequency. In general, the flow estimates provided by the WMP for a given recurrence interval are higher than those reported in the prior studies, leading to the recommendation that the WMP be used for design considerations for projects in the City, as a conservative assumption, as well as the adoption of the updated flow frequency estimates by the City. However, the FEMA inundation extents, shown in Figure 2-1, were generally validated by the 2003 WMP for the 100-year event despite the slightly higher depths reported by the WMP (Questa Engineering Corporation 2003). The FEMA inundation extents further indicate the 500-year flood hazard area, which was not assessed as part of the WMP, and they are still provided on the City’s website and serve as an important reference. According to the WMP, nearly all streams in the San Luis Obispo Creek watershed have less than a 25-year (4-percent exceedance probability) flood capacity, with some experiencing flooding in the 10- to 15-year range (Questa Engineering Corporation 2003).

[1] Storm damages were normalized to reflect costs in the year 2000.

[2] According to the flood frequency analysis conducted for the 2003 Waterway Management Plan (Questa Engineering Corporation 2003), which represent updated flood frequency information compared to the Federal Emergency Management Agency study (1978).

Flood Risk Factors

For the San Luis Obispo Creek watershed, factors that may directly contribute to flooding are infrastructure-induced flow constrictions, wildfire, and degraded riparian corridors (Questa Engineering Corporation 2003). In terms of flooding from infrastructure, bridges often serve as flow constrictions because the abutments, or structures connecting the bridge deck to the ground, may occupy part of the floodplain for a channel in order to reduce the span width of the deck. In addition, bridge piers can intercept transported debris, particularly woody vegetation, and reduce conveyance through the structure. The U.S. 101 and Santa Rosa Street bridges over Stenner Creek were upgraded following the highly damaging 1973 flood to prevent these occurrences and reduce future flood risk (Questa Engineering Corporation 2003). The Marsh Street Bridge in the City's downtown, first built in 1909, is currently being replaced and is scheduled to be completed in January 2021. One of the greatest flow constrictions in the watershed is the undercity culvert. The capacity of the culvert was estimated in the 1977 publication *Flood Control and Drainage Master Plan for the San Luis Obispo Creek Watershed* (George S. Nolte & Associates 1977) at 4,500 cubic feet per second. This flow rate is below the 25-year event (4-percent exceedance probability) according to FEMA flood insurance studies (FEMA 1978), indicating that the culvert is unable to manage water flow during the 25-year flood event. The 2003 WMP, which provided updated estimates for flood frequency, estimated the capacity of the culvert to be close to the 15-year event (7-percent exceedance probability), Questa Engineering Corporation 2003). Flows exceeding the undercity culvert capacity may exit the channel at Osos Street or further upstream at the Santa Rosa or Marsh Street bridges and cause overland flooding within downtown, particularly along the Marsh Street corridor and areas surrounding the creek channel.

Post-wildfire runoff represents another risk for flooding because burned areas in the watershed will contribute more runoff and higher sediment loads than vegetated areas. As previously mentioned, the 1995 floods, which caused approximately $2.3 million in damages, followed the 1994 Highway 41 fire and the loss of vegetation on hillslopes contributed to high runoff volumes. Overall, about one third of the San Luis Obispo Creek watershed is considered by the California Department of Forestry and Fire Protection (CAL FIRE) to be in Very High Fire Hazard Severity Zones, based on an analysis of publicly available GIS data (CAL FIRE 2020). Wildfire impacts are further discussed in Section 2.2.4.

Finally, degradation of riparian corridors, the thin strips of trees and other vegetation lining the creeks, may contribute to flooding within the San Luis Obispo Creek watershed. Historically, riparian zones would have been composed of tall, single-trunk sycamores, cottonwoods, and willows, but these areas are now characterized by shrubby willow growth (Questa Engineering Corporation 2003). This results in more low-hanging branches coming into contact with flowing water, which increases the roughness of the creek channels and consequently reduces flow velocities. When the water is slowed, water levels in the channel are increased and overflow into surrounding lands becomes more likely.

Urbanization, the conversion of land to impervious surfaces as a result of urban development, has indirectly affected flood risk by altering the shape and function of the creek channels within the watershed. Overall, the San Luis Obispo Creek watershed is about 10 percent urbanized, meaning that 10 percent of the land area within the basin[3] that drains to the outlet of San Luis Obispo Creek at Avila Beach is covered by urban development. However, when considering only the portion of the watershed upstream of Los Osos Valley Road, the drainage basin is 15 percent urbanized (Questa Engineering Corporation 2003). Conversion to impervious surfaces accompanying urban development results in higher runoff rates because rainfall cannot be absorbed by the underlying soil from these surfaces. This causes water to enter the creek channels more quickly and leads to higher flow volumes and faster channel velocities on a more frequent basis. However, this effect may be reduced for increasingly large flood events. For periods of sustained, heavy rainfall, the watershed soils may be highly saturated at the time of peak rainfall and the watershed may; therefore, have a limited ability to absorb the incoming precipitation, even if the impervious surfaces had not been in place. The WMP concluded that while urban development since the 1960s has not had a large effect on increasing runoff volumes for large events (increases of less than 2 percent for the 100-yr/1-percent exceedance probability flood), notable increases in runoff for more frequent events were determined. Specifically, flows associated with the 2-yr (50 percent exceedance probability) event were shown to increase by up to 10-12 percent in the Mid-Higuera area as a result of urbanization trends from the 1960's to the early 2000's. Impacts from additional urbanization of the San Luis Obispo Creek

[3] Basin, or drainage basin, is another term for watershed.

watershed will need to be determined, as a result of build-out according to the general plans for the City, County, and the California Polytechnic State University at San Luis Obispo (Cal Poly). The County is currently progressing an update to the hydrologic study of East Fork San Luis Obispo Creek to further understand flood risk in key locations and impacts of urbanization on that region of the San Luis Obispo Creek watershed.

Although urban development from the 1960s to early 2000's has not had a large effect on directly increasing runoff volumes from large events (e.g., 100-year/1-percent exceedance probability) in the San Luis Obispo Creek watershed, it has greatly affected incision, or the deepening of channels through erosion (Questa Engineering Corporation 2003). The San Luis Obispo Creek watershed is vulnerable to erosion because the underlying Franciscan Complex is extensively fractured through tectonic forces and includes highly erodible layers (Questa Engineering Corporation 2003). Over time, incision can lead to a suite of flooding problems by altering the form and function of channels. Incision often results in the disconnection of creeks and rivers from their natural floodplains, as the channel cuts deeper and more narrowly into the land surface. This tends to increase flood risk downstream as the pulse of water moving through the basin following a rainfall event is concentrated in channels and accelerated, instead of flowing more slowly and shallowly over larger areas of land. As a result, the storage capacity of the watershed is minimized. Further, incision can lead to bank failure, in which the sloped sides of the channel become undercut by erosion related to frequent, fast-moving water and collapse inward, introducing large quantities of sediment and vegetation into the channel. This can in turn reduce flow capacity as the debris blocks portions of the channel, thereby causing localized flooding as water spills out of the channel and into surrounding areas. In some areas of the watershed, incision has been on the order of 6–10 feet, meaning that the channel bottoms are 6–10 feet lower than they have been historically (Questa Engineering Corporation 2003). So, while urbanization since the 1960s had not been shown by the WMP to greatly increase runoff volumes for large events, the effects of channel incision over long periods of time can still result in complex flood behavior that may ultimately worsen flooding from large storm events regardless of whether or not the runoff, and therefore the flow within the channel, is increasing markedly.

In addition to urbanization, there are several other causes of this widespread incision problem. The historic presence of small dams in the upper watershed (near Stagecoach Road, which has been removed, and the larger Reservoir Canyon facility) prevented large sediments (cobble and large gravels) from being transported downstream. Naturally, these eroded sediments would have continuously filled in the channels, but instead they became trapped behind the dams and filled in the small reservoirs. The creek channels continued to erode the underlying material, and with reduced incoming sediment to offset this erosion, the channels cut deeper into the landscape. While no longer occurring at historical levels, intensive livestock grazing in the late 1800's and early 1900's is a legacy factor that continues to affect incision (Questa Engineering Corporation 2003). As sheep, cattle, and other hooved animals walk across a landscape, their hooves can compress the soil and reduce its ability to absorb incoming precipitation, especially if grazing in high densities. Reduction in vegetation associated with grazing can also increase runoff rates as incoming precipitation encounters the land surface more quickly and directly. In the upper San Luis Obispo Creek watershed, intensive turn-of-20th century grazing has permanently increased runoff rates, which can subsequently drive channel incision by increasing flow rates for frequent (e.g., 2-yr) events. Further, changes to the creek channels themselves, from reducing the amount of mature vegetation along the creeks to straightening and relocating the channels for road construction, have caused water to move more quickly into and through the channel, increasing the erosive strength of the creeks and contributing to incision (Questa Engineering Corporation 2003).

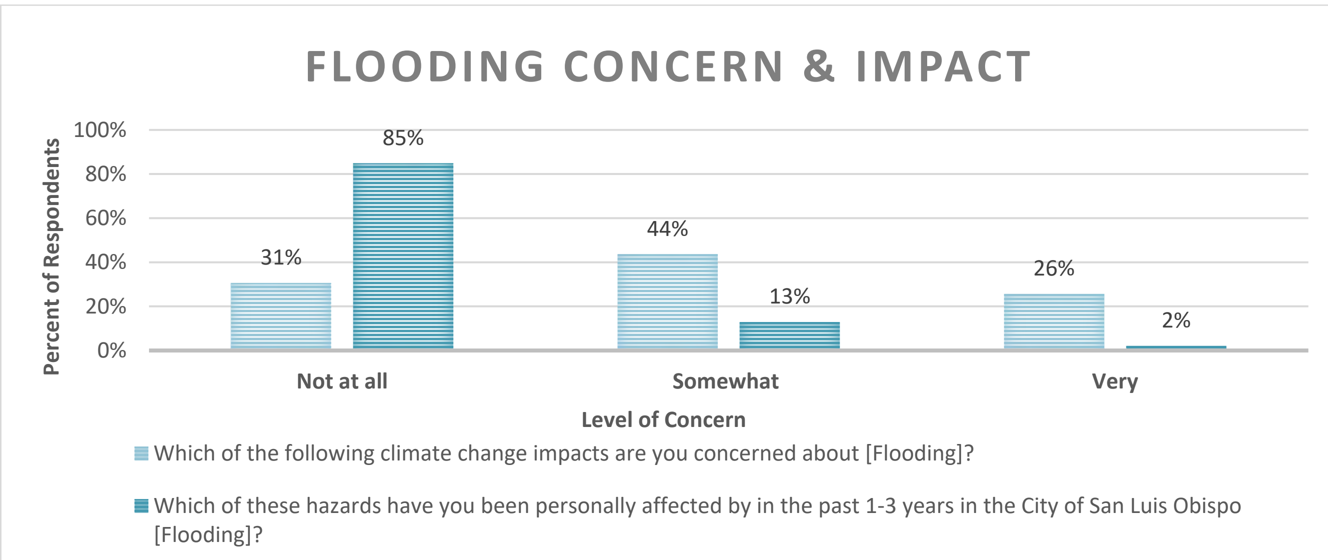
FLOOD MANAGEMENT

Flood management continues to be a high priority for the City, but there are several important barriers that can make management more difficult. First, much of the creek corridor that runs through the City along San Luis Obispo Creek and its tributaries is not owned by the City. Although the City has some authority under the City's Municipal Code for emergency removal of vegetation and other debris, general maintenance of the creeks falls upon the owners of property adjacent to the creek (City of San Luis Obispo 2015). Additionally, the creek corridor is highly confined in areas, particularly through downtown, making projects such as channel widening infeasible. Following the 1973 flood, the George S. Nolte & Associates study, completed in 1977, identified proposed flood control projects, but few were adopted because of the environmental effects associated with channel widening and other alternatives (Questa

Engineering Corporation 2003). Several areas of the City, including downtown areas along San Luis Obispo Creek, the intersection of U.S. 101 and Los Osos Valley Road, the Johnson Avenue railroad underpass, and areas surrounding Laguna Lake, have been at a high risk for frequent flooding (City of San Luis Obispo 2011). To address these issues, large projects have been proposed to manage flood risk in the increasingly urbanized City. One such proposed project is the Mid-Higuera Bypass Project, which would increase conveyance capacity of San Luis Obispo Creek between Marsh Street and Madonna Road. This area, downstream of the confluence of Stenner and San Luis Obispo Creeks, has flooded and received extensive damage in some of the historical floods previously mentioned. The planned removal of sediment and Arundo stands from San Luis Obispo Creek south of Los Osos Valley Road will also serve to reduce local flood risk.

COMMUNITY FLOODING CONCERNS

As part of the community priorities survey, when participants were asked to report on their level of concern for flooding, as shown in Figure 2-2, 70 percent of respondents indicated that they were “Somewhat” or “Very Concerned” about the issue. When asked about whether they had been impacted by flooding in the last 1-3 years, only 15 percent of respondents indicated “Somewhat” or “Very”. Additionally, individuals with a household income of less than $50,000 and individuals aged 18 to 24 reported the highest level of concern for flooding. Individuals who identify as all other races and ethnicities, compared to individuals who identify as white or caucasian, also expressed a higher level of concern for flooding (i.e., 36 percent v. 24 percent, respectively).

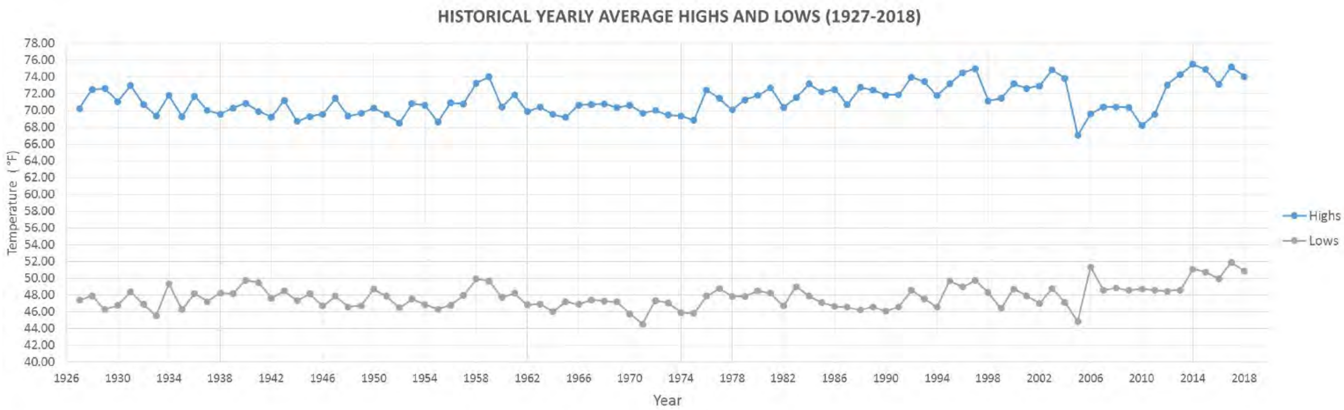


Sources: Resilient SLO Community Priorities Survey

Figure 2-2 City Resident’s Flooding Concern and Impact

2.3.3 Average Temperatures, Extreme Heat, and Drought

The City is characterized by a Mediterranean climate. While the City is generally considered to have a mild climate, weather patterns and events have historically observed both unseasonably warm periods and cold spells. According to Cal-Adapt, during the historic period (1961–1990), the annual average maximum temperature in the City was 71.1°F and the annual average minimum temperature was 43.7°F (CEC 2019a). Although the City has not historically experienced many extreme heat conditions, the City could be experience increased sensitivity to extreme temperatures because residents are not acclimatized to or prepared for extreme heat conditions. Extreme heat events are described in this section in terms of their intensity (i.e., average maximum temperature), frequency (i.e., how often they occur), time of year in which they occur, and duration (total number of consecutive extreme heat days). Figure 2-3 includes the average annual maximum and minimum temperatures for the City from 1926 through 2018.



Sources: Cal Poly 2020

Figure 2-3 City Average Annual Temperature from 1928 to 2018 (Cal Poly Weather Station)

EXTREME HEAT DAYS AND WARM NIGHTS

Cal-Adapt defines an extreme heat day as a day in a year when the daily maximum temperature exceeds the 98th historical percentile of daily maximum/minimum temperatures based on observed historical data from 1961–1990 between April and October. Based on the parameters set in Cal-Adapt, an extreme heat day for the City is defined as a day with a maximum temperature of 89.6°F or above. An average of 4 extreme heat days per year occurred in the City during the historic period (1961–1990). Heat days have historically occurred between April and late October (CEC 2019b).

Cal-Adapt defines a warm night as a night when the daily minimum temperature is above the extreme heat threshold of 57.1°F, which is the 98th historical percentile of daily minimum temperatures in the historic period (1961–1990) between April and October. In the historic period (1961–1990), an average of four warm nights per year occurred in the City (CEC 2019b). Notably, in the summer of 2020, the City experienced several prolonged extreme heat periods. In August 2020, the daily maximum temperature, recorded at San Luis Obispo Airport, was above 90°F for seven consecutive days between August 14 and August 20, 2020, breaking several maximum daily temperature records during this period (NOAA 2020).

HEAT WAVE EVENTS

Cal-Adapt defines a heat wave as four or more consecutive extreme heat days. During the historic period (1961–1990), the maximum number of consecutive extreme heat days in the City was 2.6 days, which does not qualify as a heat wave event according to the Cal-Adapt definition. These partial heat wave events (2.6 days) have been infrequent in the City, with an average of 0.2 event per year during the historic period (1961–1990). Because prolonged heat events have been rare in the City, both the City's 2006 LHMP and the more recent Annex G of the County's HMP do not discuss or evaluate extreme heat events in depth. However, maximum daily temperature records continue to be exceeded with several heat waves events occurring in the City in recent years. Because extreme heat events have not been an issue historically for the City, this may make the City particularly vulnerable and unprepared when these events do occur.

URBAN HEAT ISLAND

Although the City's Mediterranean climate includes high temperatures during summer and fall months, the City's urban land use patterns can intensify periods of extreme heat through the "urban heat island" (UHI) effect. The UHI effect is generally understood as the phenomenon of urban areas being significantly warmer than surrounding rural areas because of human activity and land use patterns in the built environment. Several factors contribute to the effect, with the primary cause being changes in land surfaces (EPA 2008). The albedo of a surface is the measure of the ability to reflect or absorb solar radiation, with darker surfaces having a lower albedo and absorbing more solar radiation. As urban areas develop over time, resulting in the development of more land surfaces with low albedos (e.g., asphalt pavement, dark building surfaces), more solar radiation is absorbed in these materials causing increased ambient temperatures and warmer nighttime temperatures. Another factor contributing to the UHI effect is the loss of evapotranspiration in urban areas. Evapotranspiration, the movement of water to the air from sources such as the soil, plants, and bodies of water, reduces ambient air temperatures (EPA 2008). As cities grow and often reduce the extent of available vegetation that contributes to evapotranspiration, UHI effects are exacerbated. Additionally, waste heat from human activities involving machinery (e.g., vehicle traffic, using air conditioning, industrial activity) can also contribute to the UHI effect, with excess heat absorbed by surrounding surfaces (Sailor 2011; Zhu et al. 2017).

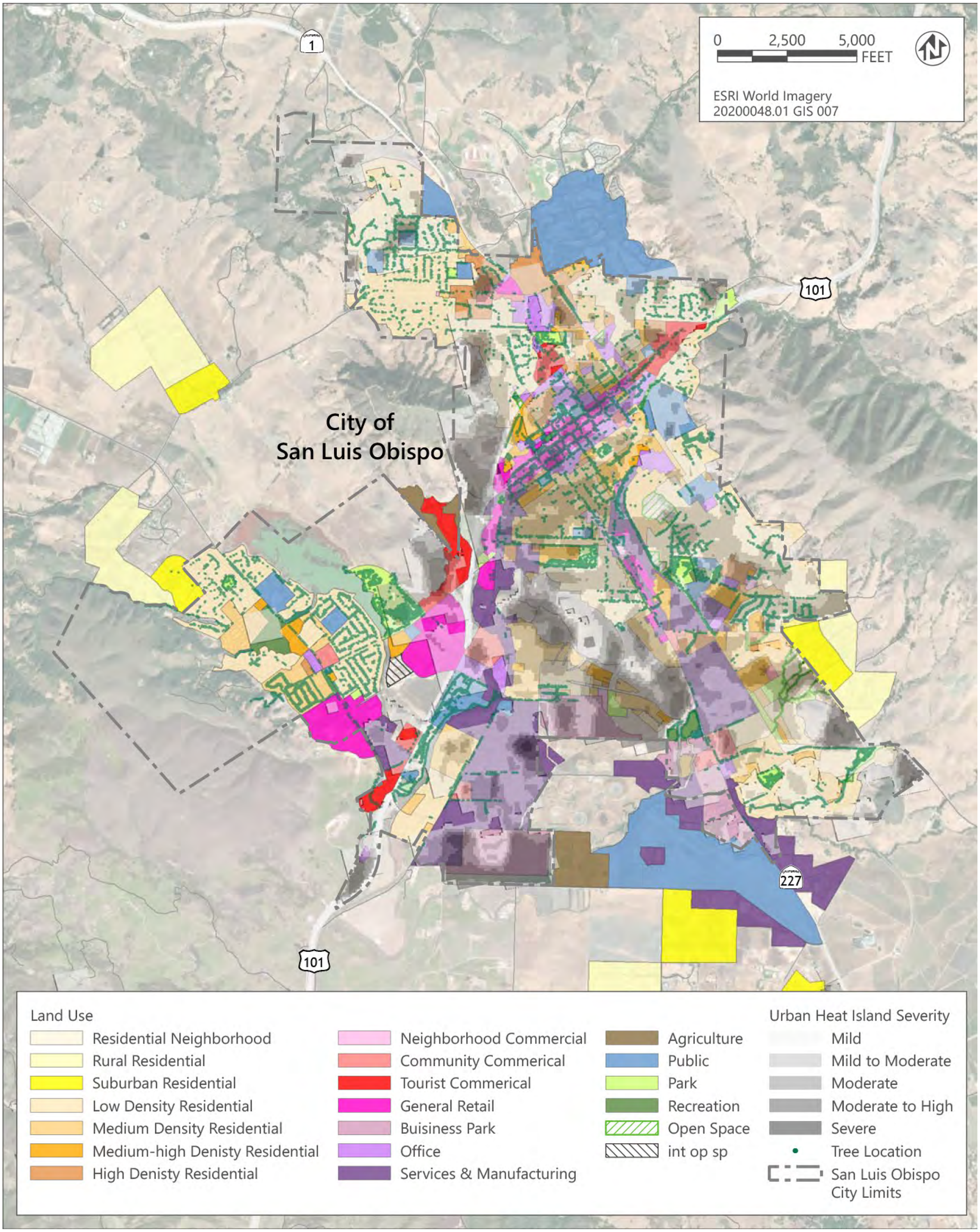
Several factors contribute to the UHI effect, including land use patterns; the presence of large, paved areas (e.g., roads and parking lots); traffic from high-volume roadways (Zhu et al. 2017), impervious surfaces (e.g., roofs); and the presence of vegetation and trees, which contribute to evapotranspiration. All these factors affect surface temperatures in urban areas. To show how the UHI effect is affecting various parts of the City, Figure 2-4 identifies land uses in the City, street trees owned and maintained by the City data from The Trust for Public Land, which has developed maps to identify hot spots in cities with above-average temperatures compared to the City as a whole.

LONG-TERM DROUGHT

Long-term drought can have significant environmental, agricultural, health, economic, and social consequences. San Luis Obispo County, along with larger areas of California, experiences periods of long-term drought that stress the ecosystem and water supplies; and subsequently, impact agriculture, public health, and the economy. Notable multi-year droughts that have affected the County and the City include:

- **1929 – 1934** – This statewide drought established the criteria commonly used in designing storage capacity and yield for large Northern California reservoirs; and hence, is one of the first major historic droughts noted in California.
- **1975-1977** — From November 1975 through November 1977, California experienced one of its most severe droughts. In 1976 and 1977, the winters brought only one-half and one-third of normal precipitation, respectively.
- **1987-1992** — San Luis Obispo County suffered adverse effects resulting from this statewide drought, when low precipitation and runoff levels greatly affected the Central Coast, adversely affecting about 30 percent of the state's population, much of the dry-farmed agriculture, and over 40 percent of the irrigated agriculture.
- **2007 – 2009 –** California proclaimed a statewide drought in 2009. The greatest impacts of this multi-year drought were suffered on the western side of the San Joaquin Valley, on agricultural communities where drought effects were coupled with the economic recession. Emergency response actions were necessary with regard to social services.
- **2012 – 2017** – Drought produced severe impacts to water wells throughout the San Luis Obispo planning area, with a high number of wells running dry. Water allotments were drastically reduced in many towns and to water agencies, with extremely high costs for procuring water. In addition, job loss occurred with many families requiring food supply and water supply assistance to homeowners experiencing dry wells. For the County of San Luis Obispo, there were 13 disaster declarations from 2012–2017, though total associated financial losses across the various economic sectors is not available for all these recent drought-related declarations.

The City relies on regional water supplies, the four primary sources including Whale Rock Reservoir, Salinas Reservoir, Nacimiento Reservoir, and recycled water (City of San Luis Obispo 2019a). As discussed in Section 2.1.3, the UWMP, which evaluates the City's current and projected water supplies through the year 2035, includes strategies to reduce water demand and prepare for long-term drought scenarios. Water demand modeling estimates that these sources provide a 7.5-year combined water supply, assuming an extended worst-case historical drought (San Luis Obispo County 2019a).

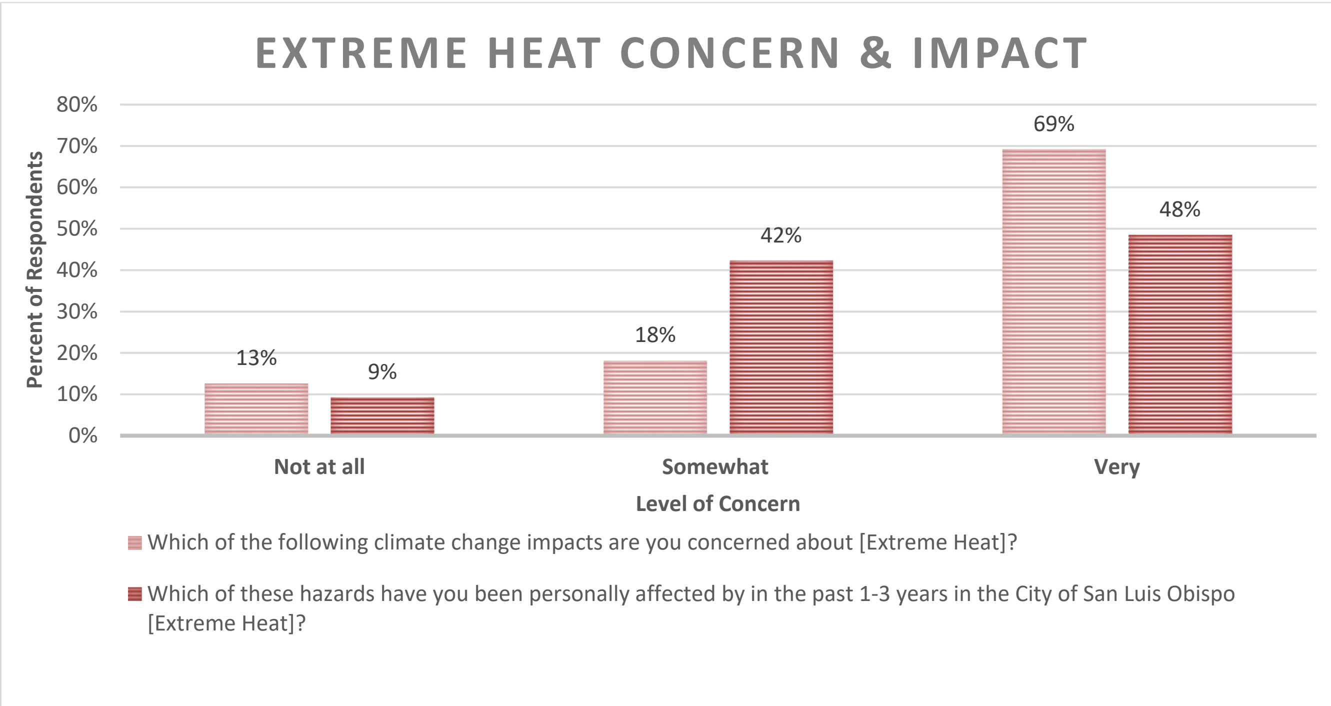


Source: Data received and downloaded from City of San Luis Obispo and the Trust for Public Land.

Figure 2-4 Urban Heat Island Effect and Tree Cover in the City

COMMUNITY EXTREME HEAT CONCERNS

As part of the community priority survey, when participants were asked to report on their level of concern for extreme heat, as shown in Figure 2-5, 87 percent of respondents indicated that they were "Somewhat" or "Very" concerned about the issue. Ninety percent of individuals indicated they had been "Somewhat" or "Very" impacted by extreme heat in the past 1-3 years. Additionally, individuals with a household income of less than $50,000 and individuals between the ages of 18 and 24 had the highest level of concern for extreme heat. Individuals who note their housing situation as "Renter" or "Other" indicate the highest level of concern for extreme heat (i.e., 79 percent versus 58 percent for homeowners).



Sources: Resilient SLO Community Priorities Survey

Figure 2-5 City Resident's Extreme Heat Concern and Impact

2.3.4 Wildfire

A wildfire is defined as an uncontrolled fire spreading through vegetative fuels that poses a threat to life and/or property (San Luis Obispo County 2019b). Wildfires can be ignited by natural events, such as lightning strikes, or can be caused by damaged infrastructure (e.g., downed power lines) or human activities (e.g., campfires, arson). Wildfires can move quickly, casting embers into downwind areas, and spread to developed areas, putting human live and properties at risk.

Three factors that contribute significantly to wildfire behavior are topography, fuel, and weather:

- Topography—An area's terrain and slope affect its susceptibility to wildfire spread. Both fire intensity and the rate of spread increase as slope increases because heat from a fire tends to rise through convection. For this reason, wildfires tend to spread more slowly downhill. The arrangement of vegetation on a hillside can also contribute to increased or decreased fire activity on slopes.
- Fuel—The type, condition, and volume of fuel material are key factors that influence wildfire behavior. Fuel sources are diverse and can include dead vegetative matter, live trees, brush, and cured grasses. Buildings and other structures, such as homes, can also be sources of fuel. Certain types of plants are more susceptible to burning or will burn with greater intensity, and dead, dry plant matter tends to burn more easily than living plant

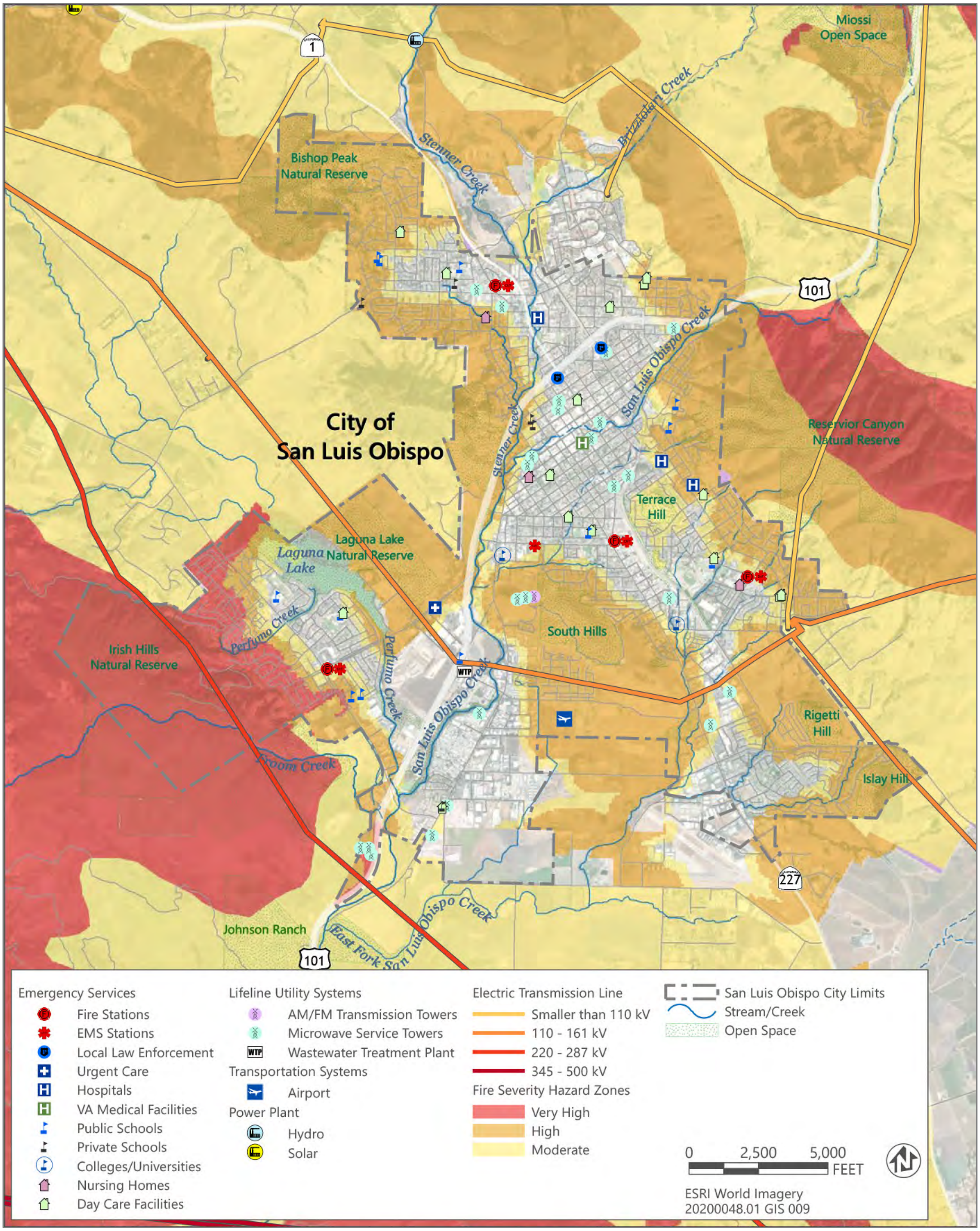
matter. Thus, fire risk is increased significantly during periods of prolonged drought. The density of vegetation increases the amount of combustible material available, also called the fuel load.

- Weather—Factors such as temperature, humidity, wind, and the occurrence of lightning affect the potential for wildfire and its spread. High temperatures and low humidity can dry out wildfire fuels, creating a situation in which fuel will ignite more readily and burn more intensely. Thus, wildfire risk increases during periods of drought. Wind is one of the most significant weather factors in the spread of wildfires. Higher wind speeds lead to faster wildfire spread and, oftentimes, greater fire intensity.

Environmental and climatic conditions in and around the City influence the frequency and magnitude of wildfires. The City often experiences high-wind events, such as the Santa Lucia winds, which originate inland and flow westward during the late summer and early fall, counter to the prevailing westerly winds that occur throughout much of the year. Santa Lucia winds contain little humidity, and summers in the City are hot and dry, with precipitation primarily occurring in the winter months. Thus, the combination of the relatively hot, dry Santa Lucia winds occurring at a time when vegetation in the County and the City is particularly dry following the summer months can contribute to the ignition and spread of large wildfires. Periods of low relative humidity, when dead trees and vegetation cannot absorb moisture from the air, can also increase the risk of wildfires (City of San Luis Obispo 2011).

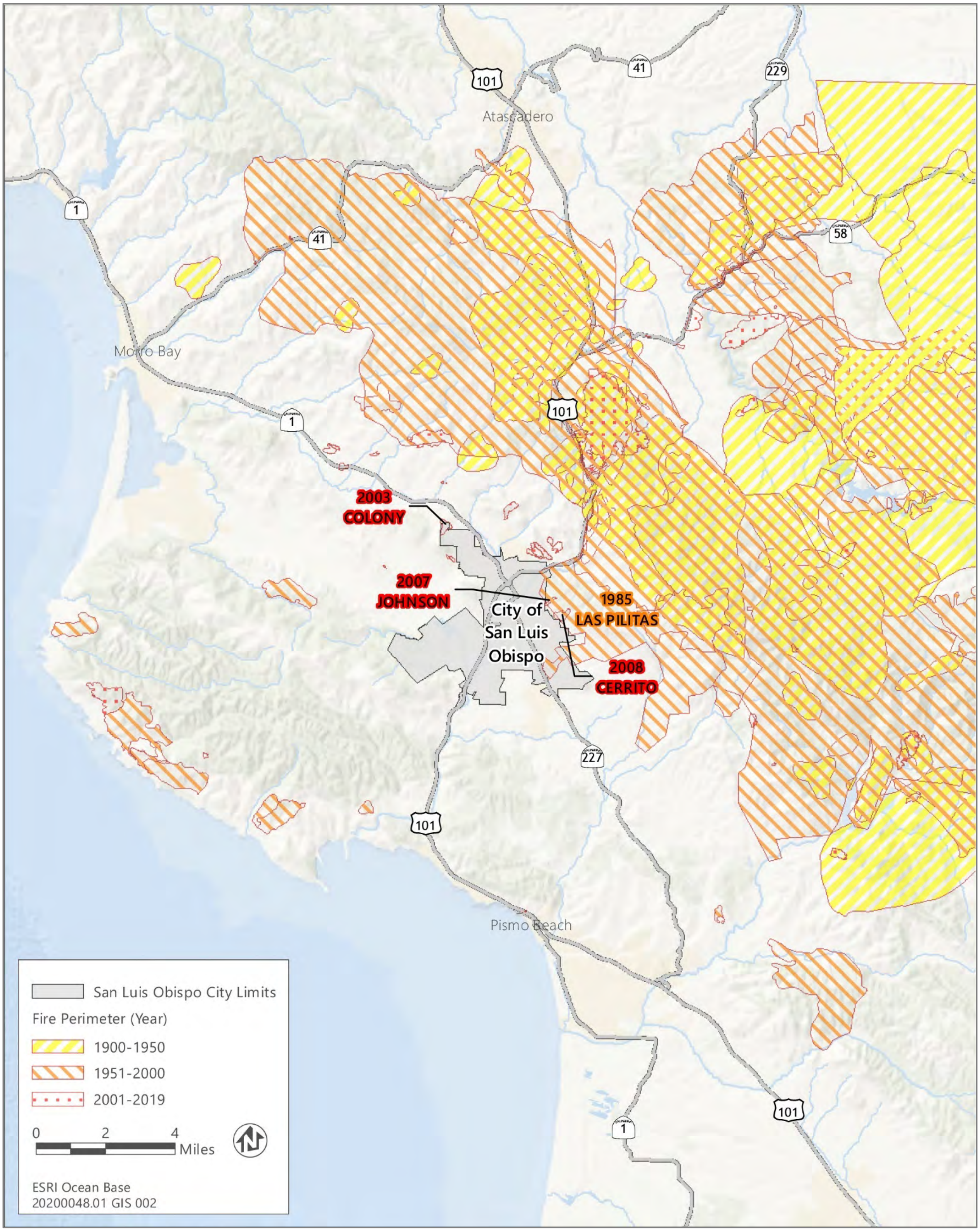
The risk of wildfires and subsequent impacts to property and life is greatest at the wildland-urban interface (WUI), which is where urban development borders wildland fuels. Wildfire risk is compounded in areas of the WUI that are also located in or near High or Very High Fire Hazard Severity Zones. Figure 2-6 includes CAL FIRE designated Fire Hazard Severity Zones in and surrounding the City. Portions of southwestern and northeastern parts of the City are located in or near a Very High Fire Hazard Severity Zones, and many of these portions of the City overlap with the WUI. Locations identified by CAL FIRE as Hazard Severity Zones for the City and County are identified in Appendix A. Beyond these areas of the City, the risk of urban fires decreases, with most of the areas surrounding the City located in a Moderate Fire Hazard Severity Zone.

Figure 2-7 shows the locations of fires that have occurred within 10 miles of the City between 1900 and 2020. Four fires (labelled in Figure 2-7) have occurred within City boundaries. Between 1900 and 2018, 490 wildfires have been recorded in the County (San Luis Obispo County 2019a). Notable fires that have occurred in the County include the Weferling fire (1960), the Las Pilitas fire (1985), the Chispa fire (1989), the Highway 41 fire (1994), the Highway 58 fire (1996), the Logan fire (1997), and the Chimney fire (2016). In total, these fires burned approximately 400,000 acres, destroyed numerous structures, and cost millions of dollars to suppress (City of San Luis Obispo 2019b). The Las Pilitas fire burned 75,000 acres and burned within City limits, damaging a number of structures (City of San Luis Obispo 2011). The 1994 Highway 41 fire burned more than 50,000 acres close to the City’s northern boundary and destroyed 42 homes, 61 other structures, and 91 vehicles (San Luis Obispo County 2019a).



Source: San Luis Obispo County 2019a

Figure 2-6 Wildfire Hazard Severity Zones In and Surrounding the City of San Luis Obispo with Critical Facilities



Sources: Data downloaded from CalFire in 2020

Figure 2-7 Wildfire Perimeters for Wildfires within 10 Miles of the City of San Luis Obispo (1900–2020)

WILDFIRE MANAGEMENT

The City's Fire Department is the main agency responsible for wildfire response, management, and mitigation in the City, with many fires being addressed through mutual aid by both the City's Fire Department and CAL FIRE. Several agencies, including the County, provide support to incorporated areas, including the City, during wildfire events. Supporting agencies, such as CAL FIRE, are also available to mobilize during fire response if needed. In addition to having the authority to declare local emergencies, the County can provide support for evacuations, shelter, and other forms of assistance for municipalities, including the City (San Luis Obispo County 2016). The City can also declare a disaster declaration through the City's Disaster Council, absent the County. Because fire risk is highest for regions of the City within the WUI, the City has produced detailed maps of these regions, indicating evacuation routes and other critical information for responders. Locations identified by CAL FIRE as Hazard Severity Zones for the City and County are identified in Appendix A. The City's Community Wildfire Protection Plan serves as the primary document for assessing wildfire risk in different areas in the City and helping to implement a series of policies and strategies to reduce this risk. These policies, along with corresponding strategies, include:

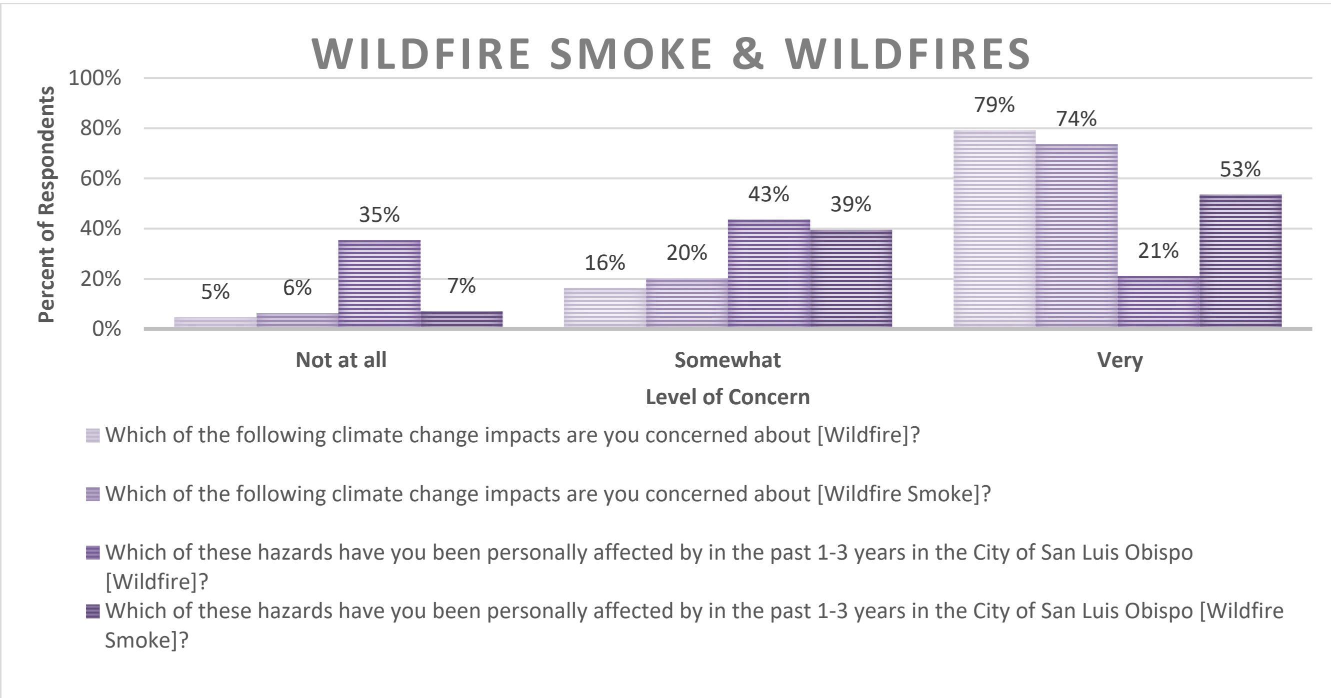
- Education - The goal of the Education policies and strategies are to prepare response organizations, communities, the public, and policy makers regarding appropriate community actions and interactions to reduce the unwanted impacts of fires in the WUI.
- Fuel - The goal of the fuel policies and strategies are to mitigate the unwanted impacts of wildfires on communities through proper vegetation management techniques that reduce hazardous fuels and the resulting wildfire intensity.
- Planning - The goal of the planning policies and strategies are to mitigate the unwanted impacts of wildfires on communities through community planning (including new resilient community design, retrofitting existing communities, and community recovery from the impact of fire), response planning, evacuation planning, and preparedness planning for responders, communities, and individuals and animals and livestock.
- Response - The goal of the response policies and strategies are to mitigate the unwanted impacts of wildfires on life, property and resources by having an efficient and effective response that includes properly trained personnel, appropriate equipment, and a community prepared to take appropriate action or evacuation.
- Ignition Resistance - The goal of the ignition resistance policies and strategies are to eliminate or mitigate structural ignitions from radiant heat, flame contact, or embers from WUI fires.

WILDFIRE SMOKE

While the City is at risk from the impacts of wildfires, the City and its residents are also susceptible to impacts of smoke from wildfires in the coastal mountain ranges of central California and the Los Padres National Forest to the east of the City. Wildfire smoke in the surrounding region and, due to wind patterns, wildfires along the central coast in general, can greatly reduce air quality in the City and cause public health impacts as well as impacts to tourism and normal community functions. Community public health factors that can increase the impacts of wildfire smoke include the prevalence of asthma in children and adults; chronic obstructive pulmonary disease; hypertension; diabetes; obesity; percent of population 65 years of age and older; and indicators of socioeconomic status, including poverty, income, and unemployment. Exposure to wildfire smoke, particularly exposure to vulnerable populations, can result in worsening of respiratory symptoms, increased rates of cardiorespiratory emergency visits, hospitalizations, and even death (Rappold et al. 2017). In the summer of 2020, wildfire smoke alerts were issued for San Luis Obispo County due to poor air quality caused by the Dolan Fire near Big Sur (The Tribune 2020a). Wildfire smoke can also have impacts on the labor market and the economy in general, with air quality affecting the ability of outdoor workers to perform their work and impact industries that operate in the open air (e.g., wineries, recreation activities, sporting events) (Borgschulte et al. 2019).

COMMUNITY WILDFIRE AND WILDFIRE SMOKE CONCERNS

As part of the community priorities survey, when asked about their concern for wildfires and wildfire smoke, as shown in Figure 2-8, 94 percent of participants indicated “Somewhat” or “Very”. When asked about whether they have been personally affected by either event, 64 percent of respondents indicated “Somewhat” or “Very” for wildfires and 92 percent of respondents indicated “Somewhat” or “Very” for wildfire smoke. Additionally, wildfire smoke was of paramount concern for individuals within the lowest income group (i.e., 84 percent). Renters and individuals between the ages of 18 and 24 expressed the highest level of concern for wildfire and wildfire smoke. Individuals who identify as White or Caucasian express a slightly higher level of concern both wildfire and wildfire smoke than individuals who identify as all other Races/Ethnicities.



Sources: Resilient SLO Community Priorities Survey

Figure 2-8 City Resident’s Wildfire and Wildfire Smoke Concern and Impact

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3 SENSITIVE INFRASTRUCTURE, POPULATIONS, AND FUNCTIONS

This section discusses the City's transportation and built environment; critical facilities and infrastructure, socioeconomic trends and vulnerable populations, and community and economic functions that could be affected by climate change. It helps develop a comprehensive understanding of the City's infrastructure and facilities, populations, and functions that are vulnerable to the impacts of climate change in order to understand how and why potential impacts may occur in the future and determine how these effects compare to baseline conditions. The specific topics discussed in this section were based on guidance in the APG and he FHWA's *Vulnerability Assessment and Adaptation Framework*, which provides guidance on assessing the climate vulnerabilities of the transportation system (FHWA 2017).

3.1 TRANSPORTATION SYSTEM AND BUILT ENVIRONMENT

This section provides an overview of the City's built environment, which includes the transportation network; utilities infrastructure; and critical facilities, such as police and fire stations, hospitals, community centers, and libraries. It also describes the City's existing transportation system, as well as the regional transportation network, focusing on physical infrastructure and facilities (e.g., bridges, roadways) and transportation behavior and trends (e.g., commute behavior, mode share, traffic on high-volume roadways) that are anticipated to be affected by climate change. It includes an analysis of all modes of transportation (e.g., driving, cycling, walking). This section also catalogs critical facilities and infrastructure in or near the City that may be affected by existing or future climate-related hazards. Critical facilities, for the purposes of this Report, are consistent with the critical facilities that provide essential public health and safety functions and included in the City's HMP.

3.1.1 Transportation System

The City includes facilities to accommodate various modes of transportation, including automobiles, local and regional transit, and walking and biking. Understanding the location and condition of transportation resources responsible for the movement of people and resources throughout the City is a key component when preparing for an emergency response during hazard events.

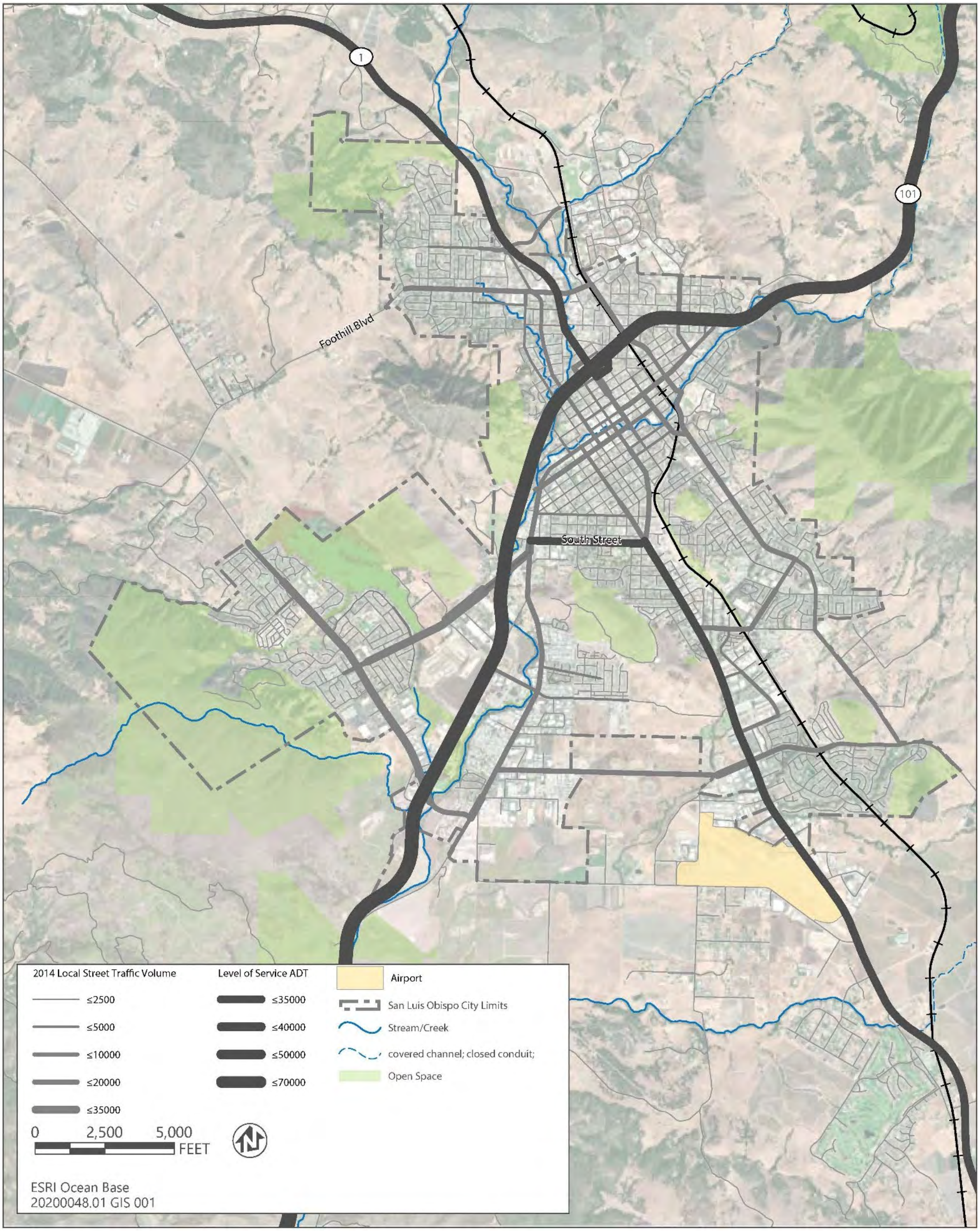
STREET NETWORK

The City contains several major transportation corridors, including U.S. 101, State Route (SR) 1, and SR 227. Most local streets have transportation infrastructure to support travel by multiple modes, including driving, walking, bicycling, and transit. There are 76 traffic signals throughout the City to assist in traffic management. Table 3-1 provides the level of service and annual average daily traffic figures for major highway segments in the City. Figure 3-1 shows traffic volume for U.S. 101, SR 1, SR 227, and local streets. The major regional arterials and highways that have the greatest volumes are Santa Rosa Street, Madonna Road, Broad Street, and Los Osos Valley Road.

Table 3-1 Annual Average Daily Traffic and Level of Service of Highway Segments in San Luis Obispo

Highway or State Route	Segment	Number of Lanes	Level of Service	Annual Average Daily Traffic
U.S. 101	S. Higuera to Monterey Road	4	D	70,000
SR 227	Los Ranchos Road to Tank Farm Road	2/3/4	F	20,000
SR 227	Tank Farm Road to Higuera Street	4	D	18,000-30,000
SR 1	U.S. 101 to Highland Drive	4	F	33,000-37,000

Source: City of San Luis Obispo & San Luis Obispo Council of Governments 2019



Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 3-1 Major Roadways in San Luis Obispo by Traffic Volume

BICYCLE NETWORK

The City has a well-established bicycle network that offers both separated and shared street space. There are also ample bicycle parking racks throughout the City, primarily in the downtown area. The different types of bicycle facilities are described below and shown in Figure 3-2:

- **Class I Bikeways (Shared-Use Paths):** Class I bikeways provide a separate right-of-way and are designated for bicycle and pedestrian use only. These paths serve corridors where there is enough right-of-way, or space, to allow them to be constructed or where on-street facilities are uncomfortable because of vehicular volumes, speeds, or other roadway characteristics.
- **Class II Bikeways (Bicycle Lanes):** Class II bikeways are dedicated lanes for bicyclists generally adjacent to the outer vehicle travel lanes. These lanes have special lane markings, pavement legends, and signage.
- **Class III Bikeways (Bicycle Routes and Neighborhood Greenways):** Class III bikeways are designated by signs or pavement markings for shared use with motor vehicles but have no separated bike right-of-way or lane striping. Class III bikeways provide a connection to other portions of the bike network but are located in places where dedicated facilities are infeasible or designate preferred routes for bicyclists through high-demand corridors. The City's Bicycle Transportation Plan also includes neighborhood greenways, a type of Class III bikeway that is further prioritized for bicycle and pedestrian travel, often including traffic volume and speed management elements, branded signs and pavement markings.
- **Class IV Bikeways (Protected Bike Lanes or "Cycle Tracks"):** Class IV bikeways provide a right-of-way designated exclusively for bicycle travel in a roadway and are protected from other vehicle traffic by physical barriers, including, but not limited to, flexible posts, raised curbs, or parked cars.

As shown in Figure 3-2, there are several Class I through III bikeways proposed throughout the City as identified in the City's current Bicycle Transportation Plan (2013). The City is currently in the process of updating the Bicycle Transportation Plan and incorporating a pedestrian component, creating the City's First Active Transportation Plan (ATP). The ATP is anticipated to include further focus on planning physically-separated bikeways and pedestrian pathways and is planned for City Council consideration, and potential adoption in early 2021.

PEDESTRIAN NETWORK

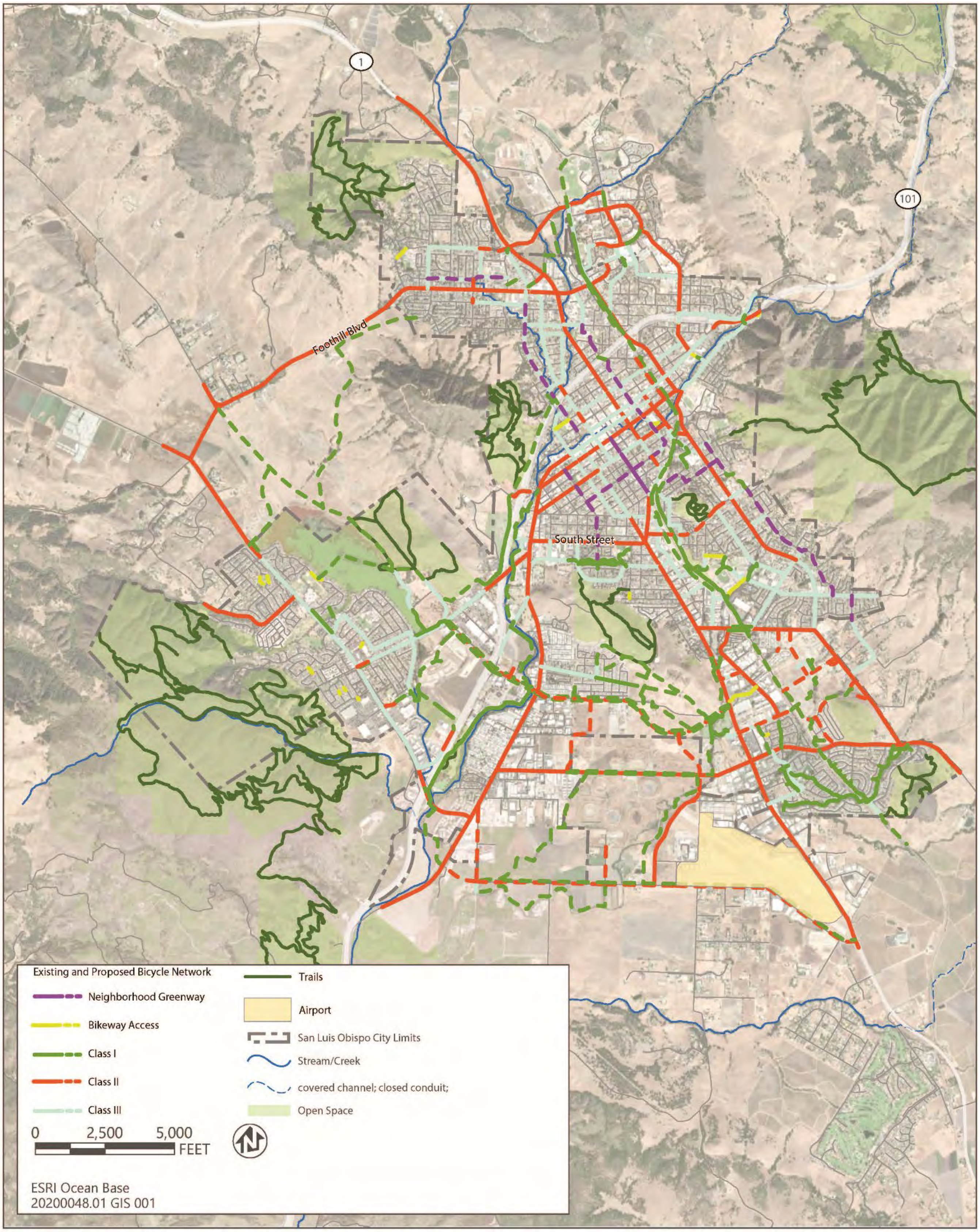
The pedestrian network in San Luis Obispo is well established with numerous sidewalks, multiuse trails, and hiking trails located throughout the City. Areas lacking pedestrian infrastructure are generally located in the northeastern part of the City. Figure 3-3 shows the pedestrian network, highlighting areas without sidewalks and showing existing Class I multiuse trails.

TRANSIT AND AIRPORT SERVICES

The City operates the SLO Transit bus service, which provides daily fixed-route transit services in the City and to the adjacent Cal Poly campus. According to the 2017–2020 Short Range Transit Plan (City of San Luis Obispo 2017), SLO Transit operates with varying service levels 7 days a week, with a fleet of 17 vehicles. SLO Transit completes more than 1 million passenger trips annually, defined as the total number of passenger boardings. The San Luis Obispo Regional Transit Authority (RTA) provides bus services in the County and provides connections between SLO Transit and RTA routes in the City's Downtown Transit Center. Figure 3-4 highlights transit service in the City and includes RTA regional routes that serve the City.

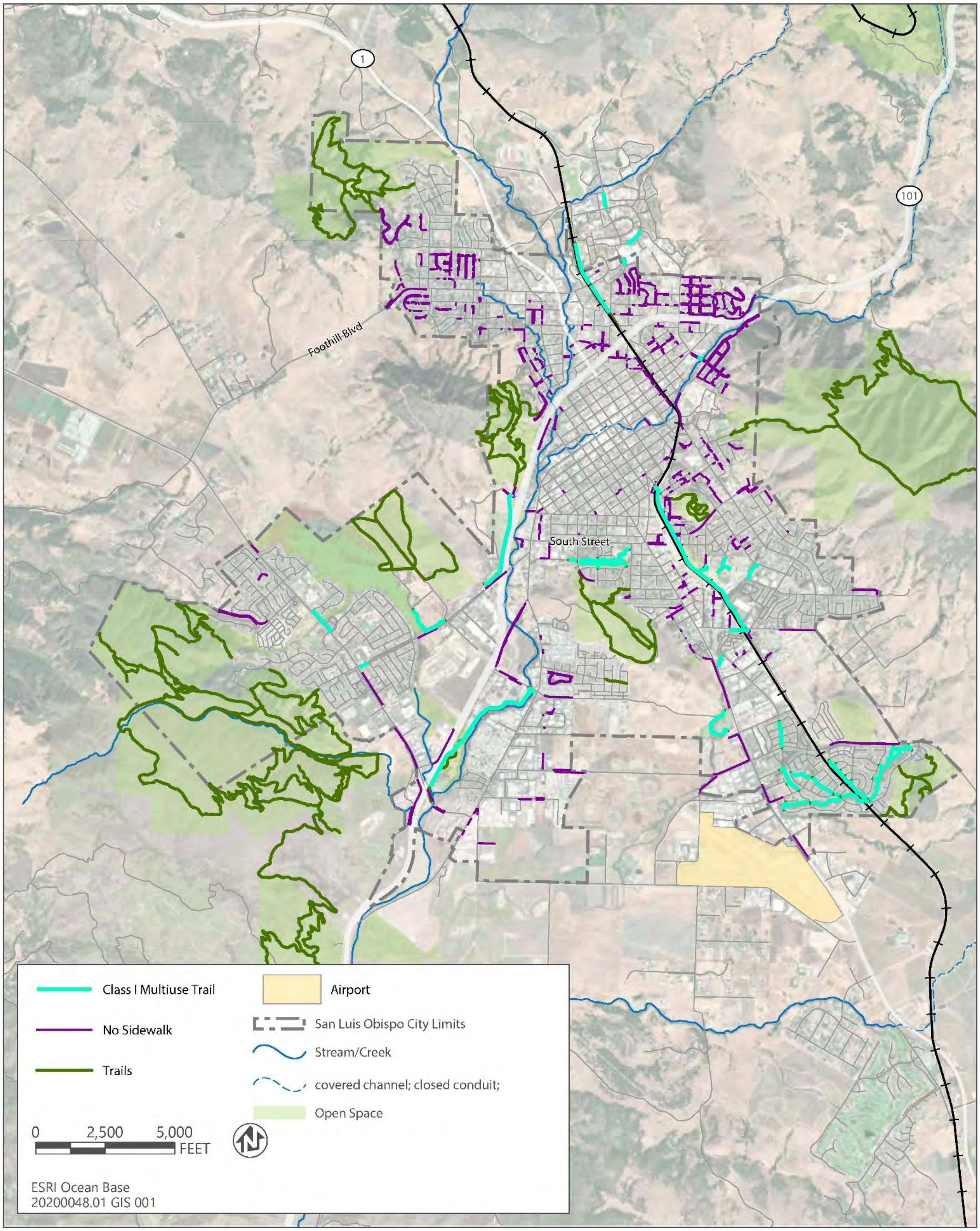
In addition to SLO Transit and RTA, Greyhound provides regional and long-distance bus routes via a stop in the City. The City also includes an Amtrak train station, which provides regional and interstate rail service to residents and visitors along railroad tracks owned and operated by the Union Pacific Railroad. The City's train station is located just a few blocks away to the southeast of downtown.

The City and County are served by the County-owned Regional Airport. The airport allows people to fly private aircrafts and to use commercial carriers to connect with national and global commercial carriers.



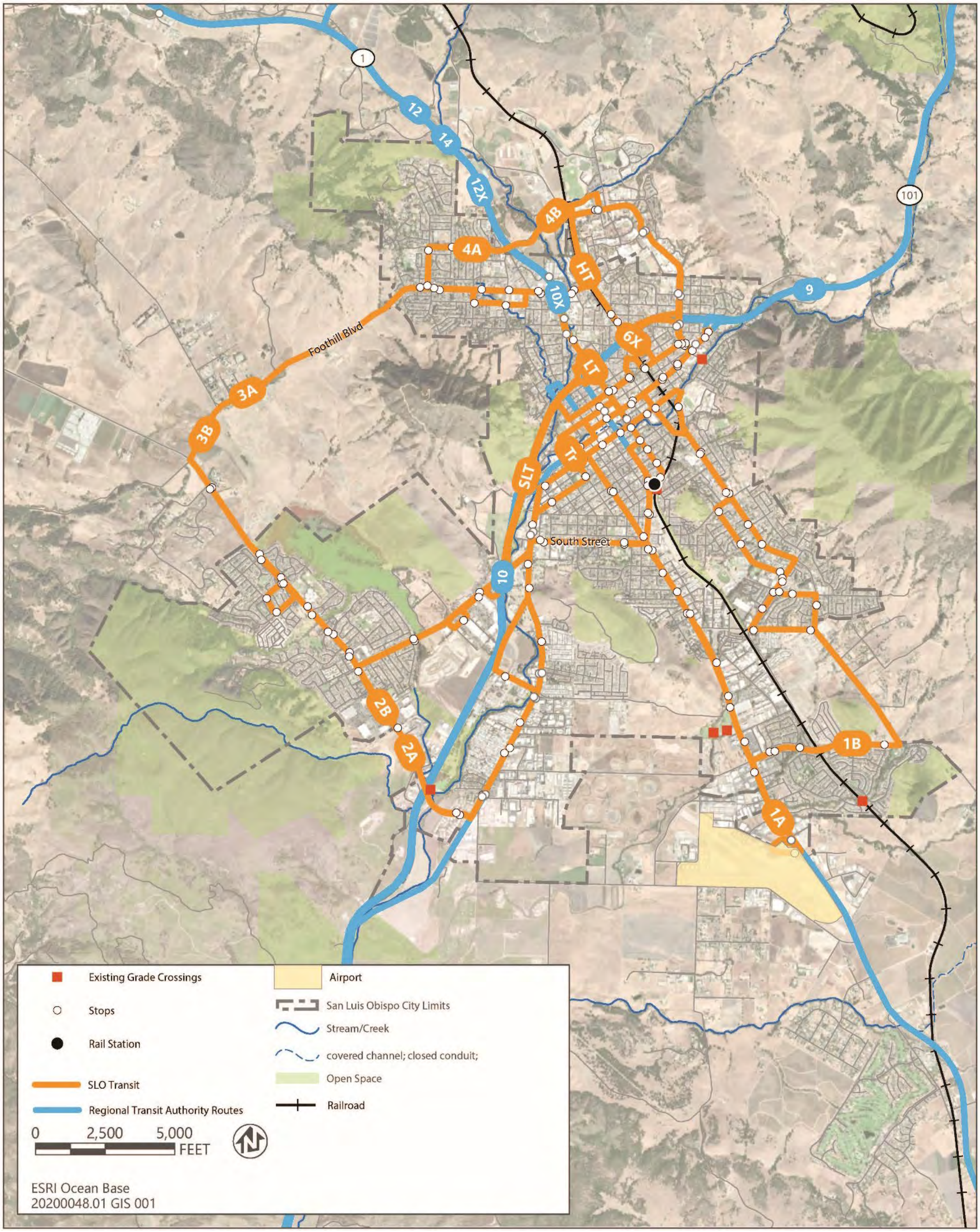
Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 3-2 Existing and Proposed Bikeways



Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 3-3 Pedestrian Infrastructure within San Luis Obispo

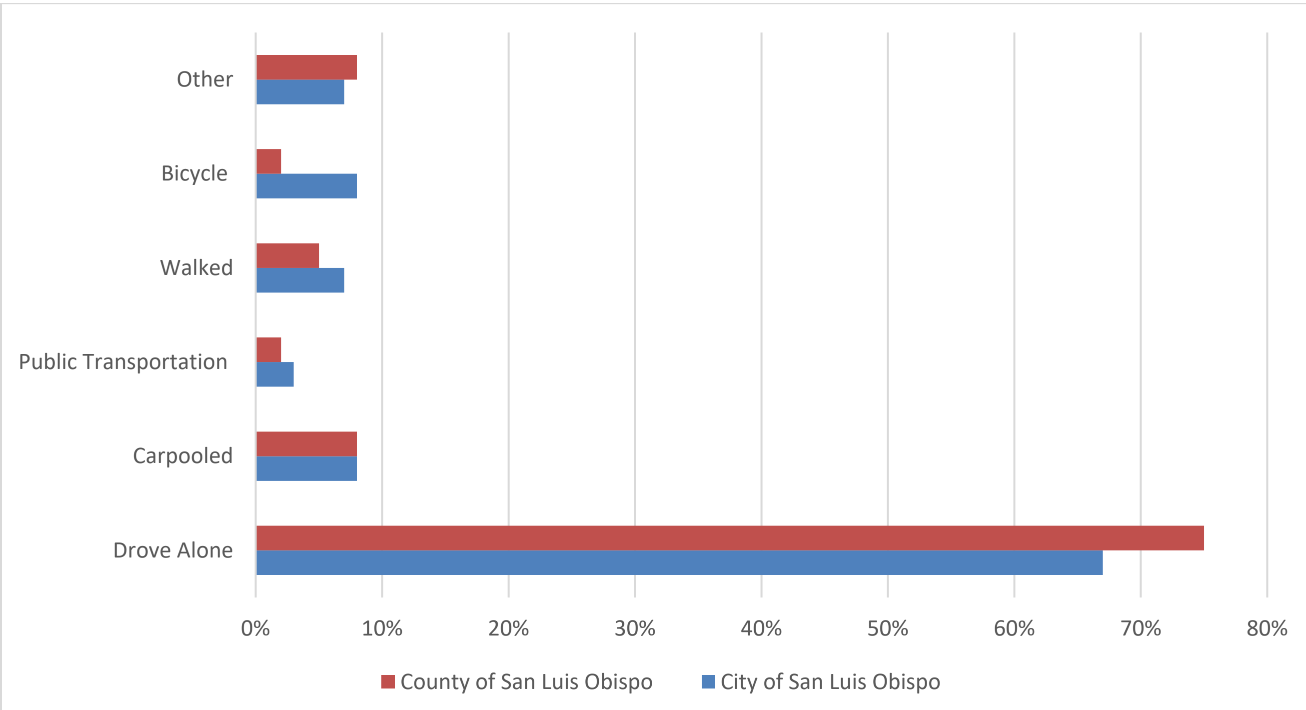


Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 3-4 Public Transit Routes within San Luis Obispo

MODE SHARE

As shown in Figure 3-5, the percentage of residents in the City who commute using a non-automobile mode, such as bicycling, transit, or walking, is approximately 18 percent. In comparison, approximately 8 percent of County residents commute using a non-automobile mode. The share of City residents using transit is 3 percent, the share of residents walking to work is 7 percent, and the share of residents biking to work is 8 percent. Approximately 67 percent of residents drive alone to work, while 8 percent carpool. Figure 3-5 shows the commute characteristics by mode in the City, compared to the County data.



Source: U.S. Census Bureau 2018

Figure 3-5 Commuting Characteristics by Mode in the City and County

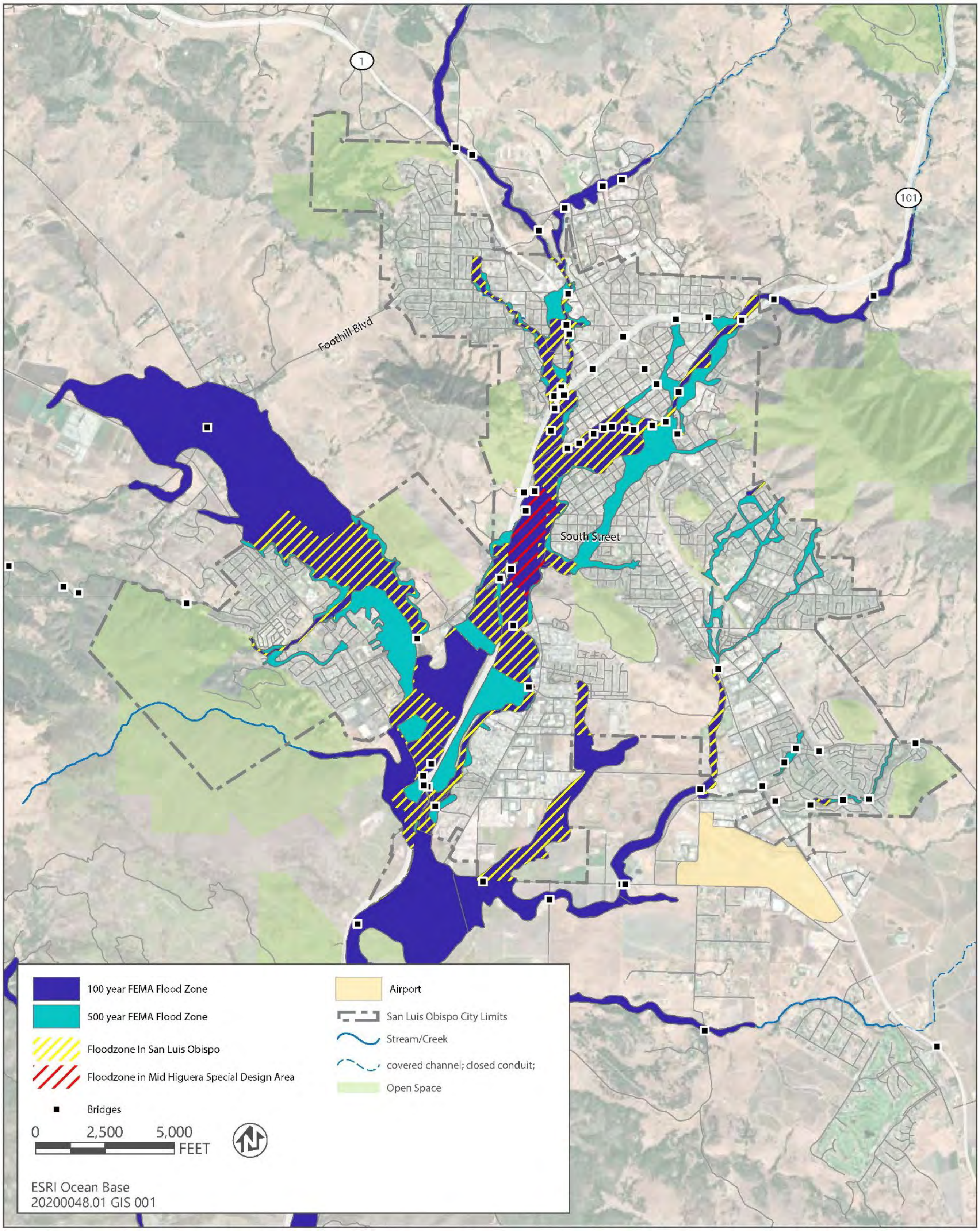
HAZARD IMPACTS ON THE TRANSPORTATION SYSTEM

The transportation system facilitates movement of people and resources throughout the City and is both susceptible to existing hazards and a key component of effective emergency response during hazard events. Extreme heat events, wildfires and floods pose a direct physical threat to transportation facilities and infrastructure, damaging or destroying transit facilities, bridges, and roadways. Additionally, hazard events outside of the region may affect electricity infrastructure which could consequently affect electric ground transportation and transit absent strategic energy resilience efforts.

Transportation systems are designed and constructed to withstand certain variabilities in weather and temperature based on observations of historical weather trends for specific climate regions (Li et al. 2011). The performance of transportation assets may begin to decline when the severity of extreme heat periods exceeds historical ranges, for example, risk of damage to bridges due to thermal expansion increases significantly at temperatures above 100°F (Cambridge Systematics 2015). The characteristics of extreme heat events will affect different transportation assets differently.

The City's vulnerability to flooding impacts on the transportation system is largely dependent on the capacity of the City's flood management system to handle large storm events. Impacts on the transportation system from flooding events are generally caused by failures in a City's stormwater management or flood management system. For a full discussion of the City's flood management system, see Section 2.3.2. When flooding does occur on roadways, impacts can include increased risk of roadway collisions, increased congestion due to road closures, and erosion of roadway materials (i.e., roadway subbase materials) that can cause increased roadway degradation overtime (Caltrans 2013). Figure 3-6 overlays the FEMA 100- and 500-year flood zones over the state and local bridges within the City boundary and the City's sphere of influence. As described in greater detail in Section 2.2.2, "Flooding," flood zones are located primarily along the San Luis Obispo Creek and Brizzolara Creek.

Extreme heat caused by wildfires can cause damage to roadway assets such as guard rails and signage. Route closures during or after major wildfire events can cause increased traffic congestion or travel time delays. Additionally, post-wildfire runoff, in which fire-scarred slopes produce mudslides and debris flows during storm events can also cause road closures and transportation system delays (Caltrans 2013).



Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

Figure 3-6 Transportation Infrastructure and Facilities and Flood Zones

3.1.2 Critical Facilities and Infrastructure

Critical facilities and infrastructure provide essential services to the public, such as preserving the quality of life and providing essential public safety, emergency response, and disaster recovery functions. Different types of critical facilities include medical facilities, evacuation and community centers, potable water and wastewater facilities, fire stations, and local law enforcement stations. The County's HMP organizes critical facilities the following four categories:

- **Emergency Services** – Facilities or centers aimed at providing for the health and welfare of the whole population (e.g., hospitals, police, fire stations, emergency operations centers, evacuation shelters, schools).
- **Lifeline Utility Systems** – Facilities and structures such as potable water treatment plants, wastewater, oil, natural gas, electric power and communications systems.
- **Transportation Systems** – These include railways, highways, waterways, airways, and city streets to enable effective movement of services, goods and people.
- **High Potential Loss Facilities** – These include nuclear power plants, dams, and levees.

Transportation infrastructure is discussed in greater detail in Section 3.1.1, "Transportation System." Table 3-2 includes the City's critical facilities and infrastructure are that have been evaluated for their replacement value and are included in Appendix G of the HMP.

Table 3-2 Critical Facilities and Infrastructure in the City of San Luis Obispo

Category	Facility/Infrastructure Asset	Replacement Value
Community and Recreational Facilities	City Hall	$9,287,080
	Library	$1,604,146
	Ludwick Community Center	$2,559,501
	Meadow Park Recreational Center	$1,448,126
	Mitchell Park Senior Center	$1,068,158
	Sinsheimer Pool and Park	$2,623,419
Medical Facilities	Sierra Vista Regional Medical Center	N/A
	French Hospital Medical Center	N/A
Schools	California Polytechnic State University	N/A
	Cuesta College	N/A
	Laguna Middle School	N/A
	San Luis Obispo High School	N/A
Infrastructure	Critical Bridges	Varies
	Essential Bridges	Varies
	Higuera Box Culvert	$4,500,000
	Evacuation Route Roads	$50,000,000
	Other Essential City-Owned Roads	$120,000,000
	Communication Towers	N/A
Other City-Owned Facilities	City Corporation Yard	$4,884,929
	Community Development and Public Works Administration	$23,081,375
	Parking Garages	$31,674,135
	Parks and Recreation Building	$1,282,662
	Prado Day Center	$669,393
	Utilities Administration	$1,060,252

Category	Facility/Infrastructure Asset	Replacement Value
Police and Fire Stations	Dispatch Center	$6,701,098
	Fire Station #1	$5,483,205
	Fire Station #2	$511,872
	Fire Station #3	$594,009
	Fire Station #4	$507,087
	Police Main Building, Garage, Annex	$4,854,341
Potable Water and Wastewater Facilities	Fire Station #4 Well	N/A
	Pacific Beach Well	N/A
	Reservoirs	N/A
	Eight Sewer Lift Stations	N/A
	Sewer System Infrastructure (pipes) – Approx. 140 miles	N/A
	Water Resource Recovery Facility	$77,296,765
	Seven Water Pump Stations	N/A
	Water System Infrastructure (pipes) – Approx. 180 miles	N/A
	Eleven Treated Water Storage Tanks	N/A
	Water Treatment Plant	$51,486,423

Note: N/A = not available.

Source: Modified from Table G.9 in San Luis Obispo County 2019b

The San Luis Obispo Water Resource Recovery Facility (WRRF) is the City's only facility that is classified as a high potential loss facility, which is defined as a critical facility that presents a significant risk to the surrounding area if damaged (e.g., dams, nuclear power plants). Keeping wastewater contained is vital because wastewater contains contents such as human and animal waste, food scraps, oil, pesticides, fertilizers, heavy metals, and chemicals. Additionally, pathogenic bacteria, fungi, parasites, and viruses can live in wastewater before it is treated. In the event of a spill, untreated wastewater can contaminate surface water and groundwater resources and cause environmental and public health impacts, including contaminate drinking water, spread disease, cause algae blooms in waterways, and release toxic gases and odors. Flooding risk is relatively high for the WRRF because the facility is located within a 100-year floodplain with moderate liquefaction risk (San Luis Obispo County 2019b). Therefore, it is especially critical that mitigating the risks of flooding and liquefaction is prioritized for this facility.

HAZARD IMPACTS ON CRITICAL FACILITIES

Critical facilities and infrastructure are instrumental in the City's ability to respond to hazards that are affected by climate change. For this reason, they are given special consideration when planning and preparing for hazards so that these critical assets are not damaged and remain operational, especially during emergency events. Large flooding can cause significant issues for some critical facilities, specifically those involved in emergency services such as fire departments or police stations. Table 3-3 includes the name and type of facilities within the City that are within the 100-year and 500-year flood zones. Table 3-4 includes the name and type of facilities that are within the High and Very High Hazard Severity Zone designations which have been developed by CAL FIRE and discussed in detail in Section 2.3.4.

The risk of specific critical facilities to hazards is largely dependent on the type of critical facility and hazard affecting that facility. Both wildfires and floods can pose a direct physical threat to critical facilities and critical infrastructure, causing damage to or destroying buildings and structures and, subsequently causing disruptions to operation of those facilities during emergency events as well as day-to-day operations. Precipitation events, preceded by wildfires, can cause post-wildfire runoff events, placing increased stress on City infrastructure by causing increased erosion, increased siltation in waterways, increased risk of flooding from debris flow, and decreased water quality in rivers and streams. Extreme heat events can cause increased demand on utility infrastructure (e.g., increased electricity demand for cooling) as well as cause increased demand on emergency services (e.g., increased hospital room visits). Impacts on the City's critical facilities can cause compounding effects on other community functions in the City. For example, impacts and disruptions to City's electricity grid will in turn affect businesses resulting in a potential loss of economic activity. These cascading effects will be explored further in later stages of the Resilient SLO project.

Table 3-3 Critical Facilities Located in 100-Year and 500-Year Flood Zones

Facility/Infrastructure Asset Name	Asset Type	Asset Category	Located in 100-Year Flood Zone	Located in 500-Year Flood Zone
San Luis Obispo WRRF	Waste Water Treatment Plant	Lifeline Utility Systems	Yes	Yes
N/A	Microwave Service Towers	Lifeline Utility Systems	Yes	Yes
N/A	Microwave Service Towers	Lifeline Utility Systems	Yes	Yes
N/A	Microwave Service Towers	Lifeline Utility Systems	Yes	Yes
Laurus College	Colleges / Universities	Emergency Services	Yes	Yes
Pacheo Elementary School	Day Care Facilities	Emergency Services	Yes	Yes
The Manse on Marsh	Nursing Homes	Emergency Services	Yes	Yes
San Luis Veterans Clinic	VA Medical Facilities	Emergency Services	Yes	Yes
N/A	Microwave Service Towers	Lifeline Utility Systems	No	Yes
Central California School	Colleges / Universities	Emergency Services	No	Yes
CL Smith Elementary School	Day Care Facilities	Emergency Services	No	Yes
Old Mission School	Private Schools	Emergency Services	No	Yes

Note: N/A = not available, WRRF = Water Resource Recovery Facility.

Source: Data retrieved from San Luis Obispo County 2019b

Table 3-4 Critical Facilities Located in Very High or High Fire Hazard Severity Zones

Facility/Infrastructure Asset Name	Asset Type	Asset Category	Fire Hazard Severity Zone	
			Very High	High
7 Microwave Service Towers	Microwave Service Towers	Lifeline Utility Systems	Yes	Yes
9 Microwave Service Towers	Microwave Service Towers	Lifeline Utility Systems	No	Yes
Garden Creek	Nursing Homes	Emergency Services	No	Yes
San Luis Obispo High School	Public School	Emergency Services	No	Yes
Pacific Beach High School	Public School	Emergency Services	No	Yes
Love to Learn	Day Care Facilities	Emergency Services	No	Yes
Old Mission Preschool	Day Care Facilities	Emergency Services	No	Yes
San Luis Obispo Classical Academy	Day Care Facilities	Emergency Services	No	Yes
Blue Sky Preschool	Day Care Facilities	Emergency Services	No	Yes
Cal Poly Preschool Lab	Day Care Facilities	Emergency Services	No	Yes
Love to Learn	Day Care Facilities	Lifeline Utility Systems	No	Yes
SLO Christian Academy	Private Schools	Emergency Services	No	Yes
SLO County Psychiatric Health Facility	Hospitals	Emergency Services	No	Yes
Medical Stop Urgent Care Service	Urgent Care	Emergency Services	No	Yes
Teach Elementary	Public Schools	Emergency Services	No	Yes
Peep – De'Groot Prepare School	Public Schools	Emergency Services	No	Yes
Clark Field (Historical)	Airport	Transportation Systems	No	Yes

Note: N/A = not available, WRRF = Water Resource Recovery Facility.

Source: Data retrieved from San Luis Obispo County 2019b

3.2 SOCIOECONOMIC TRENDS AND VULNERABLE POPULATIONS

Certain populations in urban areas are particularly vulnerable to a variety of hazards that are likely to be exacerbated by climate change. Vulnerabilities can include being disproportionately exposed to hazards and environmental pollution; being more sensitive to impacts because of preexisting health conditions; or having less resources or opportunities to prepare for and recover from hazard impacts. Vulnerable populations often include persons over the age of 65, infants and children, individuals with chronic health conditions (e.g., cardiovascular disease, asthma), low-income populations, athletes, and outdoor workers (CDC 2019). More broadly, any trait that would limit or prevent people from avoiding a hazard, seeking medical attention, or obtaining essential food, supplies, and/or care in an emergency would make them vulnerable to hazards.

The HPI score for the City combines 25 community characteristics across eight areas (i.e., economic, social, education, transportation, neighborhood, housing, clean environment, and health care) into a single indexed score correlated to life expectancy at birth. The HPI score ranking for the combined census tracts in the City places it in the 61st percentile, meaning it has healthier community conditions than 61 percent of other California census tracts. Although certain geographic areas and populations may be more vulnerable than others, by identifying these specific populations or geographic areas, the City can work to address these vulnerabilities and, in turn, make the whole community more resilient.

Compared to the City's overall HPI score, the City is doing particularly well in terms of education, performing better than 78 percent of other California census tracts in terms preschool enrollment and residents with a bachelor's degree or higher. However, the City ranks lower in terms of the economic factors score (39th percentile overall), which includes factors such as median household income, unemployment rate, and population with an income exceeding 200 percent of federal poverty level. The City also ranks low in terms of the housing factors score (17th percentile overall), which includes indicators such as housing habitability and low-income homeowners with a severe housing burden (HPI 2020). This summary provides highlights of the City overall HPI score. To see all information on individual indicators, visit the California HPI website (https://map.healthyplacesindex.org/).

3.2.1 Population Overview

The U.S. Census bureau estimates the City's population to be 47,459 persons as of July 2019 (U.S. Census Bureau 2019). Table 3-3 illustrates the City's demographics by sex, race, and age according to the U.S. Census. As shown, the large majority of residents identify as white with those identifying as Hispanic being the second largest demographic group. In terms of youth and elderly populations, 29 percent of City residents are either under 18 years or over 65 years old. The City is highly educated: 93 percent of the population over 25 years old has at least a high school degree, and 50 percent of the population over 25 years old has a bachelor's degree or higher (U.S. Census Bureau 2018). More specific information regarding the City's demographics will be explored further in the forthcoming Resilient SLO Hazards and Vulnerabilities Report.

Table 3-3 City Demographics by Sex, Race, and Age

Demographic Characteristics	City of San Luis Obispo	San Luis Obispo County	California
Population	47,459	283,111	39,512,223
Male	51%	51%	50%
Female	49%	49%	50%
White alone	84%	89%	72%
Hispanic or Latino	18%	23%	39%
Asian alone	6%	4%	16%
Two or more races	4%	4%	4%
Black or African American alone	2%	2%	7%
American Indian and Alaska Native alone	0.4%	1.4%	1.6%

Demographic Characteristics	City of San Luis Obispo	San Luis Obispo County	California
Persons under 5 years	3%	5%	6%
Persons under 18 years	13%	18%	23%
Persons 65 years and older	13%	21%	15%

Source: U.S. Census Bureau 2019

HOME OWNERSHIP

In 2019, the City had a total of 21,416 housing units (City of San Luis Obispo 2018). According to the 2018 American Community Survey, 91 percent are occupied and 9 percent are vacant. Homeownership versus renting provides a number of benefits including greater housing security, the ability to implement home improvement projects (e.g., energy efficiency improvements), and the ability to use a home to access financial resources (Brookings Institute 2018). The majority of housing units are rented (62 percent), while 38 percent are owned. Around 8 percent of occupied households do not have access to at least one automobile, and around 2 percent of occupied housing units have no telephone service available (U.S. Census Bureau 2018). Those who own homes, in general, have easier access to equity in their homes which provides more flexibility in emergency situations and are, therefore, less likely to become homeless from life events (Brookings Institute 2018).

HOUSING COSTS

Overall, the cost of living in San Luis Obispo is high relative to household income. Table 3-4 provides key information about housing costs in the City. As shown in Table 3-5, around 57 percent of renters spend 35 percent or more of their income on rent (U.S. Census Bureau 2018). Around 6 percent of all families and 14 percent of families with a female single parent had an income that fell below the poverty level in the span of a year (U.S. Census Bureau 2018).

Table 3-4 Housing Cost Characteristics

Housing Characteristic	Housing Cost
Median monthly cost for owners with a mortgage	$2,340
Median monthly cost for renters	$1,461 per unit
Median household income	$52,740

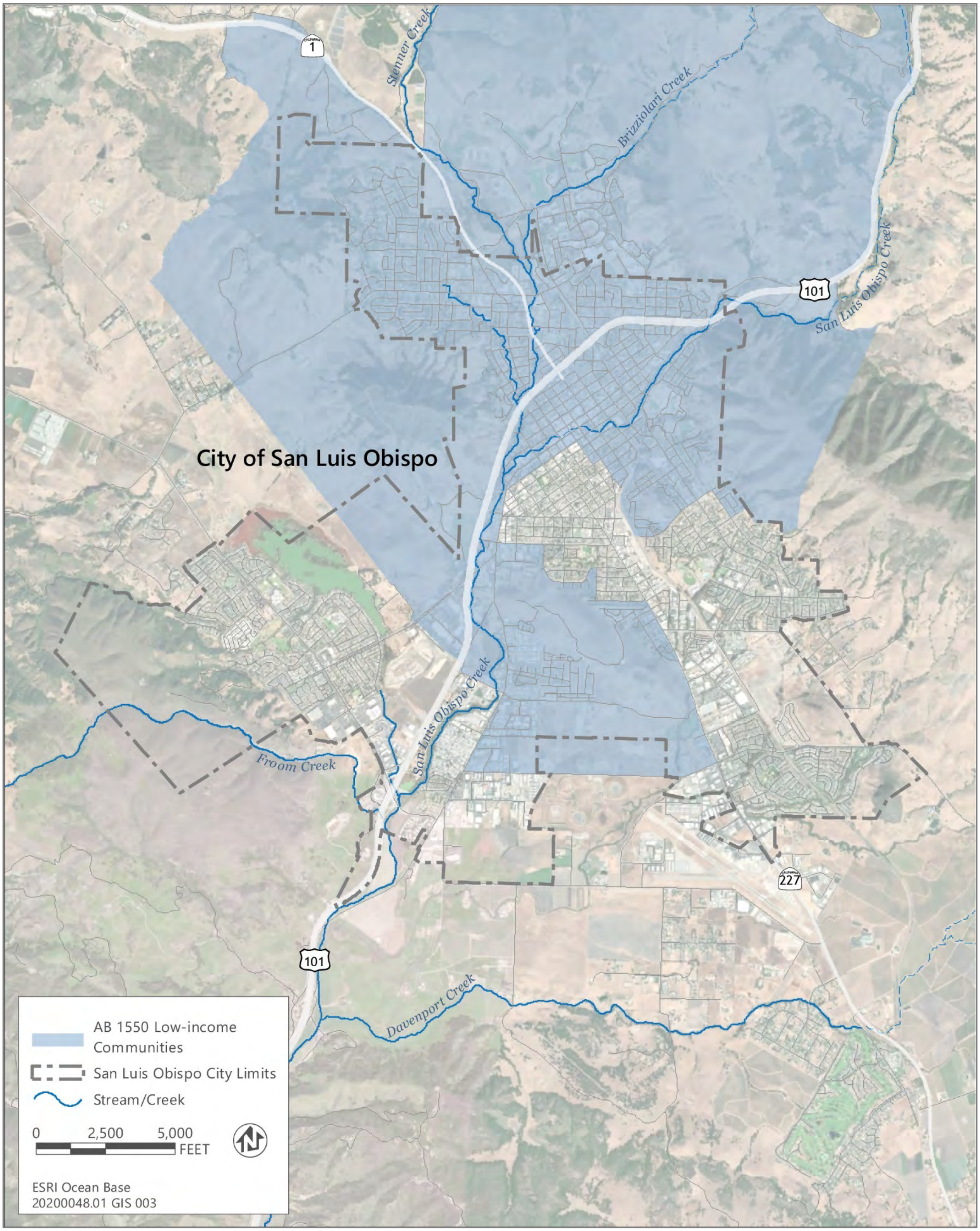
Source: U.S. Census Bureau 2018

As illustrated in Figure 3-7, the City has a substantial low-income population, as mapped consistently with definitions provided in Assembly Bill 1550, which defines low-income communities as census tracts with median household incomes at or below 80 percent of the statewide median income or with median household incomes at or below the threshold designated as low income by the California Department of Housing and Community Development's list of state income limits adopted pursuant to California Code Section 50093. As demonstrated in Figure 3-7, this population is located primarily in the northern and central parts of the City.

Table 3-5 Gross Rent as a Percentage of Monthly Household Income

Housing Characteristic	Percent of Occupied Units
Less than 15 percent	7%
15 to 20 percent	8%
20 to 25 percent	9%
25 to 30 percent	13%
30 to 35 percent	6%
35 percent or more	57%

Source: U.S. Census Bureau 2018



Source: CalEPA 2020

Figure 3-7 Low-Income Communities as Defined under Assembly Bill 1550

Research has found that housing affordability is one of the strongest predictors of rates of homelessness in a community, with higher median rents leading to higher rates of homelessness and higher rates of sheltered homeless populations. To better understand the issue of homelessness, the U.S. Interagency Council on Homelessness categorizes homeless individuals in three basic groups: chronically homeless (i.e., people who have experienced long-term homelessness), episodic homeless (i.e., people who alternate between permanent housing and supportive housing or shelters), and transitional homeless (i.e., people who become temporarily homeless because of an event, such as loss of employment) (U.S. Interagency Council on Homelessness 2009). There are approximately 482 homeless individuals in the City (City of San Luis Obispo 2020a).

EMPLOYMENT

Employment characteristics of City residents can highlight key vulnerabilities to climate impacts. Below are some examples of key employment characteristics for City residents as well as jobs located in the City.

Resident Employment Characteristics

- Of the City's population over 16 years of age, approximately 60 percent are employed, 2 percent are unemployed, and 38 percent are not in the labor force (e.g., students) (U.S. Census Bureau 2018).
- Typically, without considering the impact of COVID-19, around 3 percent of workers use public transportation to commute to work, 76 percent drive (combined alone and carpooled), 7 percent walk, 9 percent commute via other means, and around 5 percent work from home (U.S. Census Bureau 2018).
- Approximately 2 percent of the employed population works in the agriculture, forestry, fishing, hunting, and mining industries, and around 4 percent work in the construction industry (U.S. Census Bureau 2018). These workers generally work outdoors more often and for longer periods than other professions and are therefore, often have higher exposure to hazards, including extreme heat and wildfire smoke.

City Employment Industries

- The City serves a regional employment center for the County with a jobs-to-housing ratio of 2.7 jobs (including Cal Poly and the Men's Colony) for every one housing unit (City of San Luis Obispo 2018), illustrating the influx of workers from other areas in the County and elsewhere into the City for employment opportunities.
- In 2018, the largest employment industries in the City were the educational services industry (15 percent), accommodations and services (15 percent), retail trade (12 percent), and health care and social services (12 percent) (U.S. Census Bureau 2018).

DISABILITY STATUS

Individuals with disabilities, especially those who are also unemployed or underemployed, are especially vulnerable to climate hazards largely because they, along with youth and senior populations, often rely heavily on family or caretakers for transportation and other basic needs (e.g., taking medications, cooking food). Around 9 percent of the City's total civilian noninstitutionalized population has a disability, with the majority of these people 65 years and over. Around 35 percent of people 65 years and over in the City have reported having a disability (U.S. Census Bureau 2018).

HEALTH INSURANCE COVERAGE

People who do not have health insurance coverage are disproportionately at risk during emergencies because they may not be able to receive the care they need or be able to pay for treatment. Table 3-6 includes various sectors of the workforce without health insurance and insurance the vulnerability of unemployed residents to emergency hazard events.

Table 3-6 Health Insurance Coverage

Population Sector	No Health Insurance Coverage (public or private)
Total Population	5%
Unemployed Residents	17%
Employed Residents	5%
Not in the labor force	7%

Source: U.S. Census Bureau 2018

HOUSEHOLD SIZE AND CHARACTERISTICS

Single parents are often the sole providers for their households, making the household increasingly susceptible if any major life event were to occur (e.g., an illness, job loss). Single parents also have an increased burden regarding childcare, as they must be able to pay for childcare during work hours or be able to bring their children to work. Single-parent households also are likely to rely on only one source of income and are therefore, more likely to qualify as low income. Around 10 percent of households have a single parent (4 percent male householder, 6 percent female householder) (U.S. Census Bureau 2018).

Elderly populations, especially those who live alone, have a preexisting health condition, or are not able to drive, are vulnerable to climate hazards because they may be more sensitive to extreme heat and may not have the ability to move or adapt as quickly during hazardous situations compared to others. Eleven percent of householders who live alone are 65 years and over (U.S. Census Bureau 2018).

LANGUAGE

Cultural and linguistic isolation can make it difficult for people to access or understand important information regarding preparing for and responding to emergency situations. Approximately 6 percent of the City's population primarily speaks a language other than English and reports that they are able to speak English less than "very well" (U.S. Census Bureau 2018). Table 3-7 includes information about languages spoken in the City as well as what percentage of residents that speak another language do not speak English "very well" and may experience linguistic isolation.

Table 3-7 Languages Spoken by City Residents

Language Spoken	Percentage of Population	Percentage of population that speak English less than "very well"
Speak only English	83%	n/a
Speak Spanish	11%	33%
Other Indo-European Language	2.5%	26%
Asian-Pacific Island Language	3%	45%
Other Languages	0.5%	21%

Notes: n/a = not applicable

Source: U.S. Census Bureau 2018

STUDENTS

Young adults from the ages of 20–34 represent a large portion of the City's population (42 percent of the total population) largely because of enrollment at two colleges, Cal Poly and Cuesta College, the City's junior college (U.S. Census Bureau 2018). University students often have less access to vehicles on campus. For example, students at Cal Poly are not allowed to keep cars on campus during their freshman year (Cal Poly n.d.). As part of Cal Poly's emergency management planning, the university has contracted with multiple bus and shuttle companies in San Luis Obispo County to provide emergency transportation services, if needed, and worked with the San Luis Obispo

County Office of Emergency Services to ensure transportation resources would be available during large scale disaster events (Cal Poly 2018).

Generally, university students rely on on-campus housing or renting housing off campus. Because these students often have less control over their housing conditions, they could potentially have a reduced ability to deal with extreme heat or other hazards. In 2017, a brush fire broke out adjacent to the Cal Poly campus, requiring an evacuation event for many of students living in on-campus housing, further highlighting the impacts of hazard events on student populations. The two main universities located near the City are:

- Cal Poly, whose campus is located adjacent to the City boundary to the northeast, hosts the most students of the two schools with 20,503 total undergraduate students enrolled in fall 2019 (NCES 2020).
- Cuesta College, whose total undergraduate enrollment for fall 2019 was 11,281 students, with the majority being in state (96 percent) (NCES 2020).

As highlighted in the discussion above, there are several sectors of the City's population to consider when identifying vulnerable populations in the City, as suggested by the APG. Potentially vulnerable populations in the City include:

- low-income populations identified as part of Assembly Bill 1550,
- populations experiencing linguistic isolation,
- youth and senior populations,
- populations without access to a vehicle or limited mobility,
- people with disabilities or existing health conditions (e.g., asthma),
- housing insecure or homeless populations,
- populations living in coastal and inland floodplains or along the WUI,
- unemployed or underemployed populations,
- people without access to affordable health care or food, and
- outdoor and migrant workers.

3.2.2 Hazard Sensitivities for Vulnerable Populations

This sections provides a general discussion of how certain vulnerable populations may be at increased risk from climate-related hazards. The section is not intended to be an extensive analysis of all hazard sensitives for all vulnerable populations in the City. A more in-depth analysis of specific risks for vulnerable populations in the City will be included in forthcoming steps of the Resilient SLO project.

EXTREME HEAT IMPACTS

Extreme heat most severely affects populations that are more prone to heat-related illness, populations who are more exposed to weather because of the nature of their work or living situation, and populations that are less able to adapt to extreme heat. For example, youth (i.e., infants and children up to 4 years of age), elderly populations (i.e., those over 65 years old), people who are overweight, and people who are ill or on certain medications are at high risk of experiencing heat-related illness and, therefore, have greater vulnerability compared to other groups (CDC 2012). Increased temperatures have been reported to cause heat stroke, heat exhaustion, heat syncope, and heat cramps, with certain vulnerable populations at increased probability of experiencing these effects (Kovats and Hajat 2008). Extreme heat can also worsen air quality, quickening the production of ozone in areas with increased concentrations of ozone precursors (i.e., oxides of nitrogen and reactive organic gases) (Knowlton et al. 2004). Additionally, people who work outdoors (e.g., agricultural workers, construction, and utility workers) and homeless individuals are more likely to be exposed to the sun during extreme heat days, giving them exposure vulnerability.

Research has found that low-income residents spend a larger proportion of their income on utilities, including electricity used for cooling, with these residents being disproportionally affected during extreme heat events (Voelkel et al. 2018). Additionally, research has found that low-income neighborhoods can often have less tree coverage and park space, further contributing to the disproportionate impact on low-income residents (Zhu and Zhang 2008). Unhoused individuals are also at increased risk from extreme heat events with, generally, less access to places to cool off and health care resources during these events. Additionally, decreased access to transportation services can further increase exposure and health risks from extreme heat events for the unhoused community (Ramin and Svoboda 2009).

FLOOD IMPACTS

Flooding events can occur very suddenly and unexpectedly. People who live in or near flood zones, especially those who have limited mobility, are most at risk of injury or death. Homeless populations living along waterway embankments or in flood zones are also at high risk during flooding events. These populations, along with people whose businesses are located in or near flood zones, are vulnerable to having their home or livelihood damaged or destroyed by flooding. Destructive floods can also affect the local economy when businesses or services must close for repairs or be rebuilt, in turn affecting low-income populations. When essential City infrastructure is affected by floods (e.g., transportation infrastructure, utilities, water infrastructure), people can have a more difficult time obtaining food, water, or medications, and this difficulty can disproportionately affect those with disabilities and elderly people who rely more heavily on others for assistance and supplies.

WILDFIRES

Wildfires can have serious short- and long-term effects. Immediate effects of wildfires include decreased air quality, resulting in negative health impacts on local populations, especially those who have preexisting health conditions, such as asthma. People who live within a High or Very High Fire Hazard Severity Zone and/or within the WUI are disproportionately vulnerable to wildfires. Impacts from wildfire events in and near urban centers can include loss of life, property damage, and damages to critical facilities and infrastructure. Regional and localized wildfires can also result in secondary impacts, including road closures and subsequent disruptions to the transportation system, interruptions to typical economic and community functions, short and long-term housing shortages, and public health impacts from wildfire smoke. While the City is not at very high risk from the direct impacts of wildfires, the City's location makes it susceptible to impacts of wildfire smoke from wildfires in the coastal mountain ranges of central California.

Community public health factors that can increase the impacts of wildfire smoke include the prevalence of asthma in children and adults; chronic obstructive pulmonary disease; hypertension; diabetes; obesity; percent of population 65 years of age and older; and indicators of socioeconomic status, including poverty, income, and unemployment. Exposure to wildfire smoke, particularly exposure by vulnerable populations, can result in worsening of respiratory symptoms, increased rates of cardiorespiratory emergency visits, hospitalizations, and even death (Rappold et al. 2017). Similar to flooding, wildfires can affect the local economy and damage infrastructure, in turn affecting low-income populations and making it especially difficult for some people to obtain food, water, or medications.

3.3 COMMUNITY AND ECONOMIC FUNCTIONS

This section discusses important community functions (e.g., utility operations, emergency services) and economic functions (e.g., major employment sectors) that may be affected by existing hazards. Hazard planning is especially important for the City, as it is the civic, economic, and cultural hub of the Central Coast (San Luis Obispo County 2019b).

3.3.1 Community Functions

The City provides many essential services and employment opportunities to the broader County community and serves as the governmental and cultural hub of the Central Coast region. The City has multiple regionally significant medical facilities, including two major private hospitals, as well as urgent care facilities, assisted living communities, and community health care centers. Notably, the Sierra Vista Regional Medical Center provides high-level medical and urgent care services for the County, including the County's only neurosurgery program, high-risk pregnancy program, dedicated pediatric unit, and neonatal intensive care unit (San Luis Obispo Chamber of Commerce 2020).

The City also remains an important educational resource for the region. As discussed in Section 3.2, "Socioeconomic Trends and Vulnerable Populations," the City is home to Cal Poly and Cuesta College. Cal Poly consistently ranks among the top public universities in the nation with renowned engineering, architecture, business, and agriculture programs.

The City's Fire, Parks and Recreation, Police, Public Works, and Utilities Departments, among others, provide essential public services that make the City safe and enjoyable for residents and visitors of both the City and County. The City relies on regional water supplies, the four primary sources being Whale Rock Reservoir, Salinas Reservoir, Nacimiento Reservoir, and recycled water (City of San Luis Obispo 2019a). Electric and gas utilities are provided by Pacific Gas and Electric Company.

The City not only provides high-quality services and a high quality of life to its residents, but also offers a unique travel destination for visitors from the United States and internationally. The City is located in a region that offers a variety of outdoor attractions including beaches, state parks, wineries, and outdoor recreational spaces for surfing, hiking, and mountain biking. The City is also known as a tourist destination for its charming downtown, events such as the Thursday Night Farmers' Market, historic Spanish mission, recreational trails, and a thriving wine industry, including the following major attractions and community landmarks:

- **Mission San Luis Obispo de Tolosa:** Founded in 1772, this historic mission was the fifth Spanish mission constructed in California.
- **San Luis Obispo Wine Country:** There are over 250 wineries throughout Paso Robles, Edna Valley, and San Luis Obispo County that are national and international tourist destinations.
- **Recreation and Open Space:** Recreational opportunities and natural open space is abundant in and around the City, with trails for hiking, cycling, and horseback riding, as well as City parks, hot springs, and golf courses. Additionally, the City is located close to the coast, where residents and visitors can enjoy activities such as surfing, kayaking, or whale watching (City of San Luis Obispo 2020b).

COMMUNITY SERVICES

The City as well as community partners offer a number of community services which support the City's overall community function. These services often focus on providing support to underserved community members who may not have equitable access to opportunities or service accessible to the general population. Included below is a list of organizations and services offered to the community which helps support overall community function.

- **40 Prado Homeless Services Center** - The Community Action Partnership of San Luis Obispo, in partnership with Community Health Centers, operates the 40 Prado Homeless Services Center which helps individuals and families improve their health and stability and move them towards self-sufficiency. Services provided at the shelter include overnight accommodations (up to 100 beds), meals, showers, laundry, mail/phone services, access to case management, primary medical care, and animal kennels
- **Housing Authority of San Luis Obispo** - The Housing Authority of San Luis Obispo (HASLO) works to build and maintain affordable housing for citizens in the County. HASLO works with individuals and organizations to provide housing, education, and employment opportunities for families of modest means to become self-sufficient and improve their quality of life.
- **SLO Food Bank -** The SLO food bank provides food, supplies, and resources to over 80 different nonprofit organizations throughout the County. The organization also provides assistance to households applying for food assistance as well as other services.
- **San Luis Obispo Chamber of Commerce** - The San Luis Obispo Chamber of Commerce works to enhance the economic prosperity and community well-being of San Luis Obispo County by supporting and advocating for local businesses. Members of the Chamber of Commerce are provided with business support services, networking opportunities, classes and trainings, and promotional services, all in support of helping local businesses thrive.

3.3.2 Economic Functions

The City is the economic center of the County with many County residents commuting to the City for employment opportunities. Fourteen of the top 25 employers in the County are located in the City (San Luis Obispo County 2019a). Cal Poly and Cuesta College provide the City and the surrounding region with a young and highly educated workforce. The City acquires the majority of its yearly revenue from sales and use taxes ($26 million), property taxes ($18 million), and fees and service ($14.5 million) (City of San Luis Obispo 2020c). Major economic industries in the City include education, health care, tourism, and retail. Table 3-8 shows percentage of jobs by industry sector located in the City.

Table 3-8 Employment by Economic Sector in the City of San Luis Obispo for 2018

Industry	Employment (% of total)
Education services, health care, and social assistance	26.40%
Arts, entertainment, recreation, and accommodation and food services	17.20%
Retail trade	12.80%
Professional, scientific, management, and administrative and waste management services	11.90%
Manufacturing	6.10%
Construction	4.40%
Other services, except public administration	4.40%
Finance, insurance, and real estate	3.80%
Public administration	3.80%
Transportation, warehousing, and utilities	2.90%
Wholesale trade	2.10%
Information	2.10%
Agriculture, forestry, fishing and hunting, and mining	1.90%

Source: U.S. Census Bureau 2018

EDUCATION

As the top employer in both the City and the County, Cal Poly is of significant local and regional economic importance. Student, faculty, staff, and visitor spending off campus generates substantial revenue for local businesses and landowners. Approximately $160.8 million was spent by students at off-campus businesses and for housing during the 2012-2013 academic year, generating millions of dollars of tax revenue for the City, most notably from property and sales taxes (Cal Poly 2014). Cal Poly is also inextricably linked with the tourism industry, as many people come to tour the school or visit friends and family attending the university.

TOURISM

Tourism is one of the most dominant economic strengths of the City, as demonstrated by the City's high employment in retail, arts, entertainment, recreation, and accommodation and food service industries, shown in Table 3-4. The City's tourism sector largely relies on transportation infrastructure, weather, public spaces, the health and abundance of natural resources, and local attractions and services to maintain this vital industry. In the City's 2018-19 budget, 25 percent of the City's revenue came from sale tax while 10 percent came from the transient occupancy tax, generated from visitors staying at the various hotels in the City. As a result, the City relies heavily on tourism and regional visitors to provide important services to residents including public safety, street paving, bicycle, and pedestrian improvement, and other City services. In November 2020, residents in the City voted to extend a voter-approved sales tax at a new 1.5 cent rate, previously set at 0.5 cents (The Tribune 2020b). Given the City's heavy reliance on the tourism industry, the City is particularly vulnerable to climate impacts (e.g., wildfire) that would affect this industry.

AGRICULTURE

Although agriculture is not a major employment sector within the City itself, agriculture is the predominant land use surrounding the City and generates significant economic value for the County. The top five crops and livestock produced in the region by total crop value include grapes (for wine), broccoli, strawberries, avocados, and cattle. The grape and wine industry have large influence on agricultural production in the County with grapes alone accounting for approximately 27 percent of all crop value in 2018, San Luis Obispo County produced one billion dollars in crop value, demonstrating the significance of agriculture in supporting the County's economy (County of San Luis Obispo 2018).

HAZARD SENSITIVITIES ON COMMUNITY AND ECONOMIC FUNCTIONS

Flooding, extreme heat, drought, and wildfire can disrupt community and economic functions by damaging or destroying structures and infrastructure that are essential for providing those functions. In addition to the direct and immediate destruction of the structures and infrastructure that support community and economic functions, climate-related hazards may have long-term indirect effects on the community. For instance, climate-related hazards could alter the visual aesthetic associated with the City (e.g., type/density of vegetation, scarring of the landscape from wildfire/brushfire events), causing a perceived change in attractiveness to prospective visitors and students, affecting tourist- and education-related services, such as hotels, restaurants, retail, and universities.

Agriculture is a sector that is susceptible to climate-related hazards and even small changes in annual average temperatures and precipitation. Extreme heat results in higher evaporation rates, leading to decreased reservoir storage and soil saturation; can negatively affect plant growth and cattle health; and can increase the risk of certain pest infestations. Flooding can oversaturate soils, cause erosion of soils, and pose a threat to livestock in floodplains. Wildfire and wildfire smoke can destroy or damage crops, injure or kill livestock, and destroy ranching and agriculture infrastructure (CEC 2012). Impacts on the agriculture industry would, in turn, affect the tourism industry because many people visit the region for its wineries and other agricultural businesses.

The City's economy has generally been stable in recent history, with the unemployment rate ranging from 4 percent to 5 percent from 2000 to 2007. The national economic recession in 2008 caused unemployment to increase to 9 percent in 2009 (City of San Luis Obispo 2010). The current economic impacts of COVID-19 are especially pronounced in the tourism industry because of travel restrictions, closures, and social-distancing requirements. Given potential similarities in economic impacts between COVID-19 and certain hazards (e.g., wildfires and associated smoke), which place restrictions on businesses and households, it is important to understand and learn from how the City is being affected by the COVID-19 pandemic. Approximately 40 percent of the excess unemployment attributable to COVID-19 in the United States is in the leisure and hospitality sector, compared to prepandemic conditions of 11 percent. This is notable based on the large portion of jobs in the City concentrated in the tourism and service industries. Future climate impacts, particularly those involving natural resources or affecting the ability of tourists to visit the City and surrounding areas (e.g., wildfire, wildfire smoke, extreme heat), may have similar economic effects on the City. Through the end of 2020, it is estimated that the travel industry on a national level will experience $505 billion in losses, resulting in substantial decreases in federal, state, and local taxes (U.S. Travel Association 2020). Additionally, because the City relies on sales tax revenue to fund maintenance and services, these impacts could, in turn, lead to changes in the City's capacity to respond to or mitigate future hazard scenarios. However, it is possible that the current recession is temporary, especially regarding the tourism industry and that the travel economy will continue to lag only until COVID-19 cases decrease, a vaccine is developed and distributed, and travel-related businesses can open at increased capacity (Visit SLO CAL 2020).

4 REPORT FINDINGS AND NEXT STEPS

This Report sets the stage for the next steps in the Resilient SLO planning process as well as the update to the City's Safety Element by establishing an understanding of existing hazards, populations, and community assets, and how hazards have historically affected these community assets. Included below are important findings from the summary report.

Flooding

- The San Luis Obispo Creek watershed has a long history of flooding, with a series of storms over the last 50 years that have caused millions of dollars' worth of damage. Damaging flood events have occurred in 1868–1872, 1884, 1897, 1911, 1948, 1952, 1962, 1969, 1973, 1995, 1998, and 2001 (Questa Engineering Corporation 2003; City of San Luis Obispo 2014).
- For the San Luis Obispo Creek watershed, factors that may directly contribute to flooding are infrastructure-induced flow constrictions, wildfire, and degraded riparian corridors (Questa Engineering Corporation 2003). Post-wildfire runoff represents another risk for flooding because burned areas in the watershed will contribute more runoff and higher sediment loads than vegetated areas.

Extreme Heat and Drought

- For this report (see Section 2.3.3 for details), an extreme heat day for the City is defined as a day with a maximum temperature of 89.6°F or above. On average, 4 extreme heat days per year occurred in the City during the historic period (1961–1990). Although the City has not historically experienced many extreme heat conditions, the City could be experience increased sensitivity to extreme temperatures because residents are not acclimatized to or prepared for extreme heat conditions.
- San Luis Obispo County, along with larger areas of California, experience periods of long-term drought that stress the ecosystem and water supplies and, subsequently, impact agriculture, public health, and the economy. The City relies on regional water supplies, the four primary sources including Whale Rock Reservoir, Salinas Reservoir, Nacimiento Reservoir, and recycled water (City of San Luis Obispo 2019a) and has developed and regularly updates the Urban Water Management Plan to help manage the City's water supply.

Wildfire and Associated Impacts

- The City often experiences high-wind events, such as the Santa Lucia winds, which originate inland and flow westward during the late summer and early fall, counter to the prevailing westerly winds that occur throughout much of the year. The combination of the relatively hot, dry Santa Lucia winds occurring at a time when vegetation in the County and the City is particularly dry following the summer months can contribute to the ignition and spread of large wildfires.
- The risk of wildfires and subsequent impacts to property and life is greatest at the wildland-urban interface (WUI), which is where urban development borders wildland fuels. Wildfire risk is compounded in areas of the WUI that are also located in or near High or Very High Fire Hazard Severity Zones which can be seen in Figure 2-7 in the Report.
- While the City is not at very high risk from the direct impacts of wildfires, the City's location makes it susceptible to impacts of wildfire smoke from wildfires in the coastal mountain ranges of central California. Community public health factors that can increase the impacts of wildfire smoke include the prevalence of asthma in children and adults; chronic obstructive pulmonary disease; hypertension; diabetes; obesity; percent of population 65 years of age and older; and indicators of socioeconomic status, including poverty, income, and unemployment.

Sensitive Infrastructure

- Critical facilities and infrastructure are instrumental in the City's ability to respond to hazards that are affected by climate change. For this reason, they are given special consideration when planning and preparing for hazards so that these critical assets are not damaged and remain operational, especially during emergency events.

- Transportation systems are designed and constructed to withstand certain variabilities in weather and temperature based on observations of historical weather trends for specific climate regions (Li et al. 2011). The performance of transportation assets may begin to decline when the severity of extreme heat periods exceeds historical ranges, for example, risk of damage to bridges due to thermal expansion increases significantly at temperatures above 100°F (Cambridge Systematics 2015).
- The City's vulnerability to flooding impacts on the transportation system is largely dependent on the capacity of the City's flood management system to handle large storm events. Impacts on the transportation system from flooding events are generally caused by failures in a City's stormwater management or flood management system.

Vulnerable Populations and Community Functions

- Around 8 percent of occupied households in the City do not have access to at least one automobile, and around 2 percent of occupied housing units have no telephone service available (U.S. Census Bureau 2018), which can both result in increased risk during evacuation scenarios.
- Overall, the cost of living in San Luis Obispo is high relative to household income. Approximately 57 percent of renters spend 35 percent or more of their income on rent (U.S. Census Bureau 2018). Those who own homes, in general, have easier access to equity and provide more flexibility in emergency situations and are, therefore, less likely to become homeless from life events (Brookings Institute 2018).
- Approximately 6 percent of the City's population primarily speaks a language other than English and reports that they are able to speak English less than "very well" (U.S. Census Bureau 2018), which may cause issues with communication during emergency events.
- In 2018, the largest employment industries in the City were the educational services industry (15 percent), accommodations and services (15 percent), retail trade (12 percent), and health care and social services (12 percent) (U.S. Census Bureau 2018).
- The City is the economic center of the County with many County residents commuting to the City for employment opportunities. Fourteen of the top 25 employers in the County are located in the City (San Luis Obispo County 2019a).
- Tourism is one of the most dominant economic strengths of the City, as demonstrated by the City's high employment in retail, arts, entertainment, recreation, and accommodation and food service industries. The City's tourism sector largely relies on transportation infrastructure, weather, public spaces, the health and abundance of natural resources, and local attractions and services to maintain this vital industry.
- In the City's 2018-19 budget, 25 percent of the City's revenue came from sale tax while 10 percent came from the transient occupancy tax, generated from visitors staying at the various hotels in the City. As a result, the City relies heavily on tourism and regional visitors to provide important services to residents including public safety, street paving, bicycle, and pedestrian improvement, and other City services. Given the City's heavy reliance on the tourism industry, the City is particularly vulnerable to climate impacts (e.g., wildfire) that would affect this industry.

4.1 NEXT STEPS

The next step in the planning process is to use downscaled global climate projections to evaluate how climate change will affect the City in the near-term, by midcentury, and by late century. A detailed analysis will be conducted to assess how existing hazards may be exacerbated by the effects of climate change and how these exacerbated hazards may affect the City and its population. Additionally, a Resilience Roundtable will be developed, composed of experts and community stakeholders to inform the planning. These steps will result in the preparation of a full hazards report, which will describe the project activities to date and help inform what resilience strategies should be included in the City's Safety Element update to mitigate the current and future impacts of climate change.

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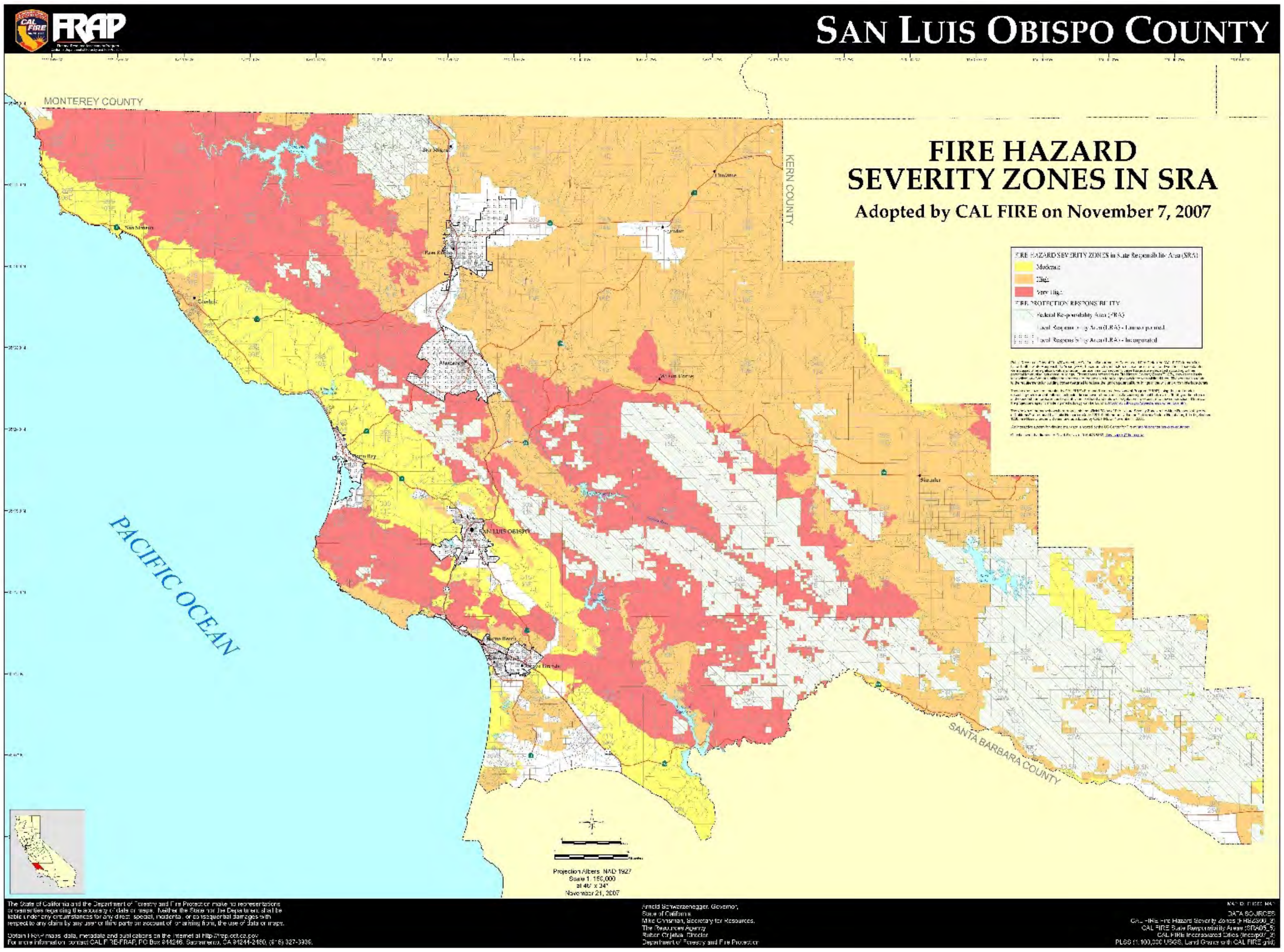
Appendix A

CAL FIRE San Luis Obispo County Hazard Severity Zone Map


FRAP
SAN LUIS OBISPO COUNTY
FIRE HAZARD SEVERITY ZONES IN SRA
Adopted by CAL FIRE on November 7, 2007
Moderate
High
Very High
Federal Responsibility Area (FRA)
Local Responsibility Area (LRA) - Unincorporated
Local Responsibility Area (LRA) - Incorporated
MONTEREY COUNTY
KERN COUNTY
SANTA BARBARA COUNTY
PACIFIC OCEAN
SAN LUIS OBISPO
Projection Albers NAD 1927
Scale 1:150,000
November 21, 2007
DATA SOURCES

Appendix B

Resilient SLO Community Priorities Survey

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1 RESILIENT SLO COMMUNITY PRIORITY SURVEY: RESULTS SUMMARY

1.1 PURPOSE

Resilient SLO, an initiative of the City of San Luis Obispo, will result in an update to the City's General Plan to include strategies for building community resilience to the impacts of climate change. The project team consists of the Local Government Commission as the project managers and Ascent Environmental, Inc. as the lead technical consultant. Resilient SLO is designed to be a comprehensive, innovative, and inclusive planning process – one that elevates community voice in decision-making, utilizes best-available science and practices, and focuses on the real challenges that individuals face in the city of San Luis Obispo: climate change, the ongoing COVID-19 pandemic, and economic uncertainty. The Community Priority Survey is one means of the inclusive planning process. This survey sought to gather broad input on overall community priorities, concerns related to climate change impacts, experience with past hazards and response efforts, and priorities for local action. Results will be utilized in the short-term to inform the vulnerability assessment and future community engagement and education activities. Long- term outcomes from the larger Resilient SLO project include educational activities to ensure San Luis Obispo residents and businesses are equipped with the information and strategies to prepare and build resilience to climate change risks and hazards, a comprehensive vulnerability assessment of the city's physical assets, and infrastructure, an updated Safety Element of the General Plan with identified adaptation strategies across key sectors, an implementation guide that translates strategies into detailed work plans and model policies to catalyze action, trainings for City staff and supporting organizations to build collective capacity to respond to climate change hazards and disasters, and an Implementation Guide with work plans and model policies to catalyze action.

1.2 METHODOLOGY

This survey was the first opportunity for community members to give feedback on their concerns related to climate impacts, hazards, and vulnerabilities to be addressed in the larger Resilient SLO initiative. To inform the updates to the hazard mitigation plan and Safety Component of the General Plan, the project team was interested in hearing from community members on their climate impact experiences and their priorities, in order to incorporate effective planning measures. The climate impacts mentioned in the core questions came from impacts identified for the region in California's 4th Climate Change Assessment. Other priority areas were sourced from current events and stressors, such as COVID-19. The project team began drafting the survey in July 2020. Team leads on the project from the City, the Local Government Commission, and Ascent Environmental, Inc. met bi-weekly on project deliverables.

1.3 QUESTIONS

The survey consisted of 19 questions, including 13 multiple-choice and 6 open-ended. The survey included 4 demographic questions to evaluate whether respondents reflected the diversity of the local community. Respondents were also asked the zip code of both their residence and employment to gauge whether they lived or worked in the City. The remaining questions evaluated community priorities, concerns over climate hazards and impacts, experiences with hazards, evaluation of the City's response to past hazards, and interest in further information on resilience and adaptation topics. The survey opened on August 31st, 2020.

The scale and categories for each core multiple-choice question are noted below:

Question	Scale	Categories
Which of the following issues are you currently concerned about?	Level of Concern: ▶ Not at all ▶ Somewhat ▶ Very	▶ Access to Healthy Food ▶ Affordable Housing ▶ Air Pollution ▶ COVID-19 ▶ Earthquakes ▶ Job Security and Economic Vitality ▶ Social Equity and Justice ▶ Transportation affordability and accessibility ▶ Tree health and maintenance ▶ Water Pollution/ Stream health
Which of the following climate change impacts are you concerned about?	Level of Concern: ▶ Not at all ▶ Somewhat ▶ Very	▶ Drought and Decreased Water Supply ▶ Flooding and Storm Damage ▶ Hotter Temperatures and Heat Waves ▶ Sea Level Rise ▶ Wildfires ▶ Wildfire Smoke
How concerned are you that climate change will impact any of the following areas?	Level of Concern ▶ Not at all ▶ Somewhat ▶ Very	▶ Access to Beaches and Open Space ▶ Community Culture ▶ Employment and Job Security ▶ Evacuations ▶ Property Value ▶ Public Health and Safety ▶ Transportation Disruptions ▶ Utility Disruptions and Power Outages
Which of these hazards have you been personally affected by in the past 1-3 years in the City of San Luis Obispo?	Level of Impact ▶ Not at all ▶ Somewhat ▶ Significantly	▶ Air Pollution ▶ Drought and Water Supply ▶ Erosion ▶ Extreme Rainfall ▶ Flooding ▶ Hotter Temperatures and Heat Waves ▶ Tule Fog ▶ Wildfires ▶ Wildfire Smoke
For each hazard that you were affected by, please rank your level of satisfaction with the City's response.	Level of Satisfaction ▶ Not at all ▶ Somewhat ▶ Very	▶ Air Pollution ▶ Drought and Water Supply ▶ Erosion ▶ Extreme Rainfall ▶ Flooding ▶ Hotter Temperatures and Heat Waves ▶ Tule Fog ▶ Wildfires ▶ Wildfire Smoke
How would you prioritize the following actions in the city of San Luis Obispo?	Rank Order (1-7)	▶ Parks ▶ Public transportation ▶ Housing ▶ Trails

Question	Scale	Categories
		▶ Space for Businesses ▶ Land Preservation ▶ Agricultural Land Preservation

1.4 DEMOGRAPHIC QUESTIONS

The city sought to reach out to respondents that were representative of the diverse population of the City of San Luis Obispo. Respondents were given the option of providing key demographic details respondents or declining to answer. The questions included in this section are detailed below:

[Age] What is your age?

- Under 18
- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55 - 64
- Above 65
- Prefer not to say

[Race/Ethnicity] How would you describe yourself? Please select all that apply.

- American Indian or Alaska Native
- Asian
- Black or African American
- Hispanic, Latino, or Spanish origin
- Middle Eastern or North African
- Native Hawaiian or Other Pacific Islander
- White or Caucasian
- Other (please specify)
- Prefer not to say

[Household Income] What was your total household income before taxes in 2019?

- Less than $30,000
- $30,000- $39,999
- $40,000 - $59,999
- $60,000 - $79,999
- $80,000 - $99,999
- $100,000 or more
- Prefer not to say

1.5 OUTREACH

Original plans for survey outreach included in-person events and in-person survey opportunities to complement online and phone surveys. Due to COVID-19 and quarantine restrictions, these forms of outreach could not take place; outreach had to be fully remote. The primary form included an online survey on the city's OpenGov web portal which also regularly hosts surveys for other city initiatives outside this project and for regularly scheduled city meetings that are broadcast on the website. In an effort to bridge the digital divide, the project team worked with the city to establish a phone line for respondents to call in their responses. However, no respondents utilized the phone line to respond. In-person events would have reached more respondents who do not have internet access but the inability to hold in-person events affected the ability to fulfill that form of engagement.

To promote the phone-line and online survey, the project team reached out over e-mail or social media to organizations, businesses and agencies that serve populations who live, work, or go to school in San Luis Obispo. These promotional partners were asked to share the survey with their audiences and were given a promotional toolkit with sample email language and social media posts. A wide variety of organizations were contacted (approximately 126), in the hopes of reaching the diverse composition of the local community. Organizations contacted included local educational institutions, non-profits, coalitions, professional associations, cultural organizations, and businesses. Most outreach was conducted by email; 115 organizations were contacted via email. Highly trafficked social media accounts were also contacted. 11 organizations and/or individuals were contacted via social media. Promotional partners received a promotional kit, which included sample e-mail language, sample social media posts plus photo postcards, and a high level overview of key details, to share with their constituents. The survey deadline, originally the end of September, was extended to October 11th to give more time for responses. Once the deadline was extended, organizations were notified of the extension. In addition to outreach through promotional partners, the survey was also shared on 1-2 times per week on City's social media accounts.

On September 17th, a Spanish version of the survey was created on Survey Monkey. On September 29th, the entire promotional kit was translated to Spanish to conduct more outreach to the Spanish speaking community and shared with promotional contacts. Promotional asks to Latino, Hispanic, and Spanish-speaking cultural groups primarily went through Cal Poly students. Despite reaching out to organizations, the Spanish language survey posted on Survey Monkey did not receive any responses.

1.6 PROCESS OF ANALYSIS

1.6.1 Core Questions

Responses for each multiple-choice core question were analyzed to reveal the following:

a. Areas of Highest Concern/Impact/Satisfaction (for all Respondents)

b. Areas of Highest Concern/Impact/Satisfaction (for key Demographic Groups)

In evaluating the areas of highest concern/impact/satisfaction for all Respondents, we included all relevant measures for the specific category (ex. "Not at all", "Somewhat", "Very/ Significantly"). Responses are shown as absolute numbers (total counts) unless otherwise indicated.

In evaluating the Highest Concern/Impact/Satisfaction for select demographic groups, we chose to only focus on "Very" or "Significant" responses. Although a "somewhat" response indicates some level of concern/impact/satisfaction (as compared to a "not at all"), it was decided that a "Very" or "Significant" response was more indicative of a respondent's paramount concern. Thus, all responses for select Demographic Groups represent the percentage or total of respondents indicating "Very or "Significant" for the specific category.

Additionally, further grouping was performed on both Household Income and Race/Ethnicity for the ease of analysis and interpretability.

Household Income was re-structured into the following three groups:

- Less than $50,000
- $50,000 - $100,000
- $100,000 +

Race/Ethnicity was re-structured into the following two groups:

- White or Caucasian
- All other Races/Ethnicities

1.6.2 Open-Ended Questions

The survey contained six open-ended questions. Open-ended responses were categorized by topic area and analyzed for emerging themes. A word cloud has also been created to highlight key categories. The full text of responses will be available in the Appendix.

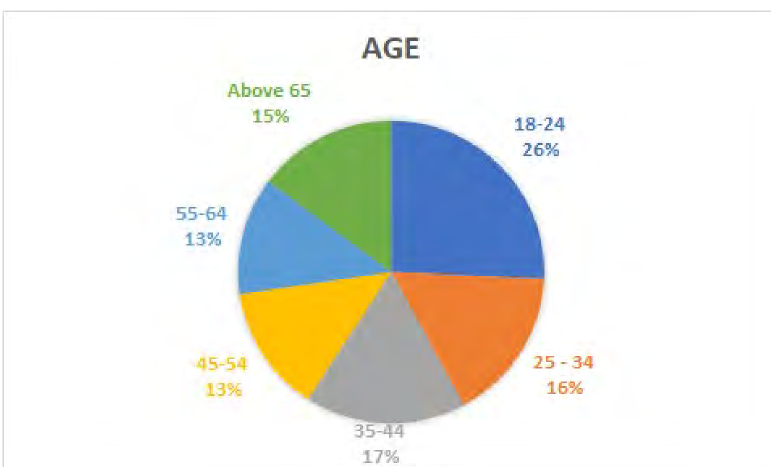
1.7 RESULTS

1.7.1 Overview

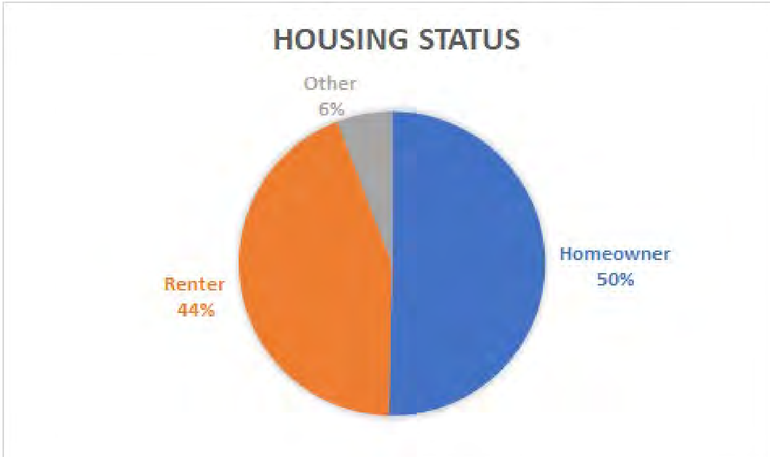
The English version of the survey was initiated on August 31st and closed on October 11th. The English version of the survey had 413 visitors and 331 responses. However, because of duplicate responses, only 328 responses were included in the analysis. Engagement with the survey generated over 16 hours of public comment. 290 of the respondents indicated that they lived or worked in a City zip code, while 41 responses came from a zip code outside of City limits. All responses, both in-City and out of City zip codes were analyzed. The Spanish Version of the survey, published two weeks after the English survey, had no respondents. The phone-in option was not utilized either.

1.7.2 Demographics

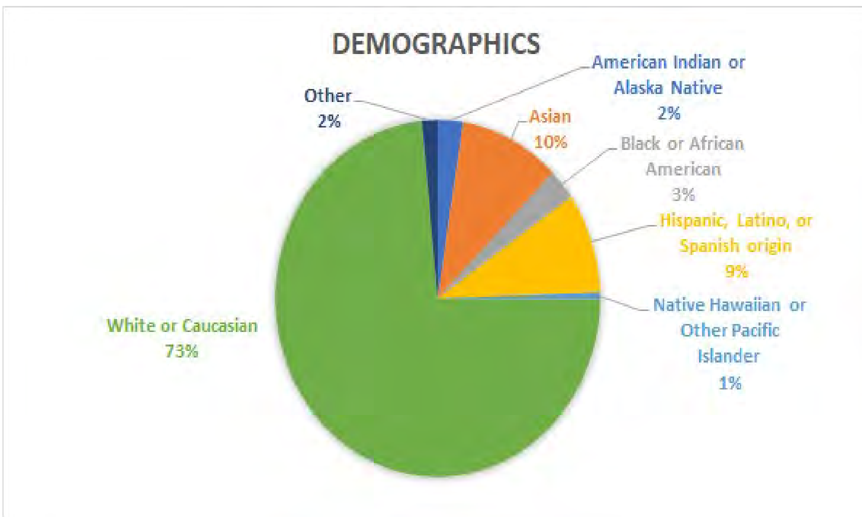
Respondents were asked to answer basic demographic information including age, housing status, income and ethnicity. These questions were asked to assess how well the survey respondents reflected the actual community make-up of San Luis Obispo. Respondents were asked to identify what 10-year age block they belonged to. The highest percentage of respondents were 18-24 (26%), followed by 25-34 (16%), 35-44 (17%), above 65 (15%), 45-54 (13%), and 55-64 (13%).



Half of respondents were homeowners (50%), 44% were renters, and 6% selected “other”.



The most common household income selected by respondents was $100,000-149,000 (58), followed by 200,000 or more (33). In contrast, 30 respondents selected the lowest income bracket (less than 10,000), and 14 selected the second lowest income bracket: $10,000-14,999.



Respondents most commonly described themselves as White or Caucasian (234), followed by Asian (32), Hispanic, Latino or Spanish origin (29), Black or African American (9), American Indian or Alaskan Native (8), and Native Hawaiian or other Pacific Islander (2). It is worth noting that 42 respondents chose “prefer not to say” when describing their racial identity.

As a reference point, Demographic results from the survey were compared with the 2018 American Community Survey to determine if the survey respondents over or under represented the demographics of SLO residents. Details on representation are noted below.

Demographic	2018 American Community Survey (%)	Community Priority Survey Results (#, %)	Over or Under Represented?
Housing Situation			
Homeowner	68%	164, 49.5%	Under
Renter	35%	146, 44%	Over
Age			
Under 18	13.1%	0, 0%	Under

Demographic	2018 American Community Survey (%)	Community Priority Survey Results (#, %)	Over or Under Represented?
18 - 24	34.9%	80, 25%	Under
25 - 34	13.6%	51, 16%	Over
35 - 44	8.3%	53, 16%	Over
45 - 54	8.7%	42, 13%	Over
55 - 64	8.9%	40, 12%	Over
Above 65	12.5%	46, 14%	Over
Ethnicity/Race			
American Indian or Alaskan Native	.3%	8, 2%	Over
Asian	5.6%	31, 9%	Over
Black or African American	2.0%	5, 2%	Equal
Hispanic, Latino or Spanish origin	18.3%	23, 7%	Under
Native Hawaiian or Pacific Islander	.1%	2, 1%	Over
White or Caucasian	70.7%	237, 72%	Over
Other	.2%	3, 1%	Over
Household Income			
Less than $10,000	11.6%	30, 9%	Under
$10,000 - $14,999	7.3%	15, 5%	Under
$15,000 - $24,999	11.2%	9, 3%	Under
$25,000 - $34,999	6.3%	15, 5%	Under
$35,000 - $49,999	11.2%	17, 5%	Under
$50,000 - $74,999	15.2%	30, 9%	Under
$75,000 - $99,999	10.8%	29, 9%	Under
$100,000 - $149,999	12.8%	59, 18%	Over
$150,000 - $199,999	5.8%	32, 10%	Over
$200,000 or more	7.8%	33, 10%	Over

Hispanic, Latino or Spanish origin were the most underrepresented when compared to the 2018 American Community Survey. The survey respondents were also younger than the 2018 American Community Survey results. The two youngest age groups were underrepresented, especially those under 18 whom were not represented at all. All other age groups were slightly overrepresented. 12 respondents chose “prefer not to say” on this demographic question. Otherwise, all results were within 4 percentage points of the 2018 American Community Survey showing a successful sample of SLO demographics.

The demographic question that most respondents declined to answer was about total household income with 57 choosing “prefer not to say.” The highest three income brackets were overrepresented while lower income brackets were underrepresented compared to the 2018 American Community Survey results. This could be correlated with the higher percentage of survey respondents in younger age groups, who tend to make less money than older Americans later in their careers.

All respondents had to choose an answer when asked about their housing situations. The options included ”Homeowner, Renter, and Other.” Homeowners were under represented by respondents while renters were over represented. 19 chose “Other” to specify their housing situation. Some of them were students living at home or in student housing.

1.7.3 Open-Ended Questions

Details for each open-ended question are provided below:

- Of the open-ended questions, Question 5, "If there are other community issues not listed above that you are concerned about, please provide them here," had the most responses (153).
- Question 16, "What climate change adaptation and community resilience topics are you interested in learning more about?" had the 2nd highest number of responses (105).
- Question 14 garnered the third most responses (95), and asked "Do you have suggestions for how the City of San Luis Obispo can improve response efforts (to hazards)?"
- Question 13 had the 4th most respondents (83) and "Do you have any comments to share regarding how you were affected by past hazards and/or city response efforts?"
- Question 7, "If there are other climate change impacts not listed above that you are concerned about, please provide them here," had 77 responses.
- Questions 9 and 11 had the lowest number of respondents (54) and (37) respectively. Question 9 asked for additional areas impacted by climate change of concern. Finally, question 11 asked for additional hazards that respondents have been personally affected by over the past 1-3 years.
- Responses to key open-ended questions are discussed in detail in the results below.
- There were 604 total responses to open-ended questions.

Question	Number of Responses
5: "If there are other community issues not listed above that you are concerned about, please provide them here"	153
16: "What climate change adaptation and community resilience topics are you interested in learning more about?"	105
14: "Do you have suggestions for how the City of San Luis Obispo can improve response efforts (to hazards)?"	95
13: "Do you have any comments to share regarding how you were affected by past hazards and/or city response efforts?"	83
7: "If there are other climate change impacts not listed above that you are concerned about, please provide them here"	77
9: "If there are other areas impacted by climate change not listed above that you are concerned about, please provide them here."	54
11: "If there are other hazards that you have been personally affected by in the past 1-3 years in the City that are not listed above, please provide them here."	37

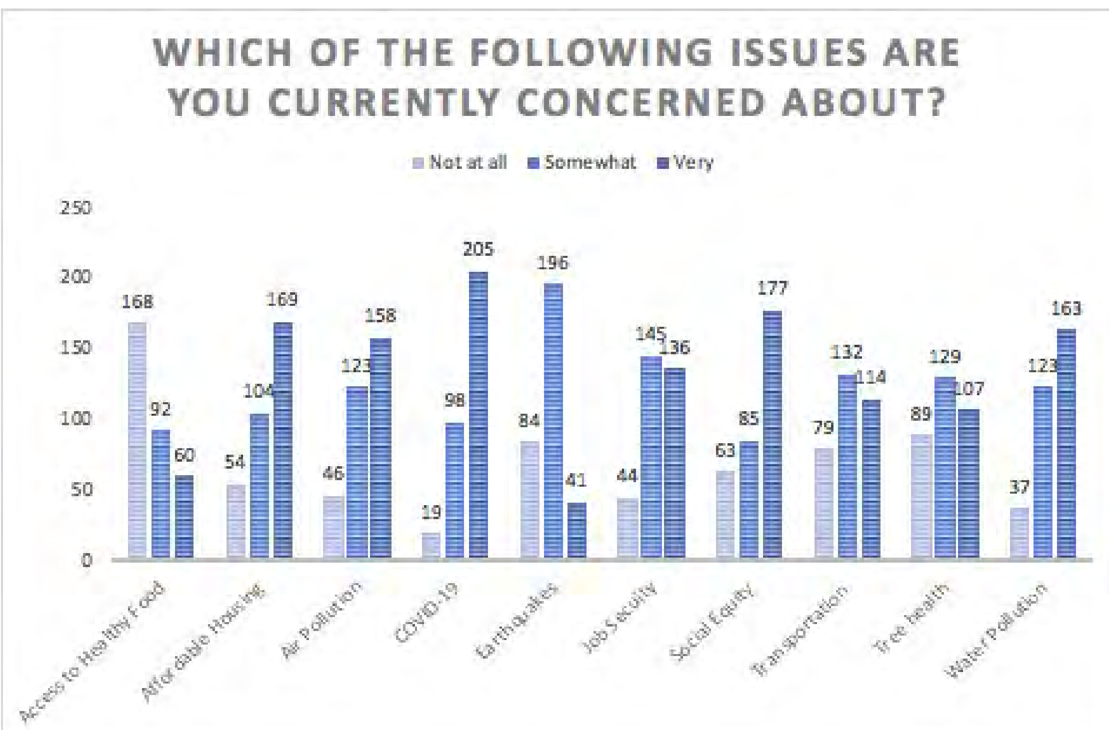
1.7.4 Core Questions

WHICH OF THE FOLLOWING ISSUES ARE YOU CURRENTLY CONCERNED ABOUT?

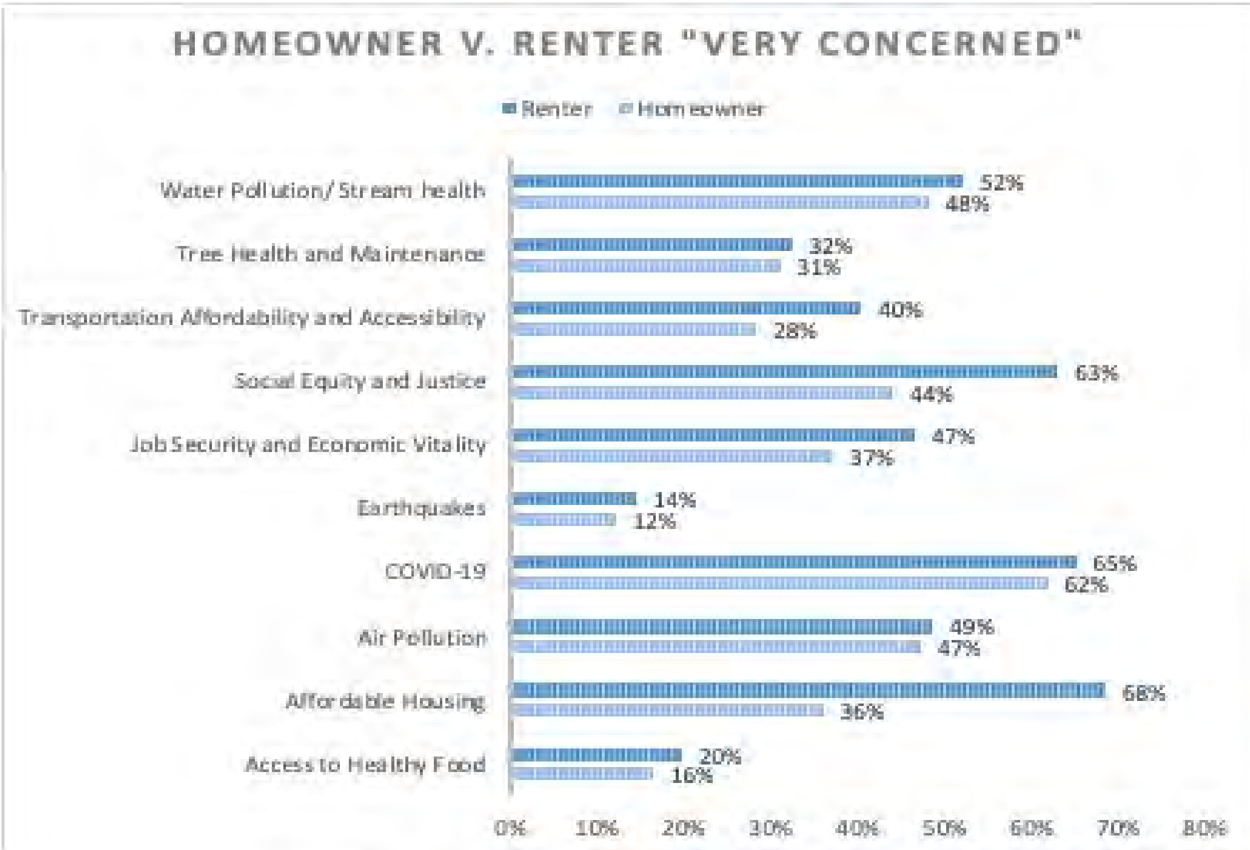
Overall Results

Level of Concern	Not at all	Somewhat	Very
Access to Healthy Food	168	92	60
Affordable Housing	54	104	169
Air Pollution	46	123	158
COVID-19	19	98	205
Earthquakes	84	196	41
Job Secuity	44	145	136
Social Equity	63	85	177
Transportation	79	132	114
Tree health	89	129	107
Water Pollution	37	123	163

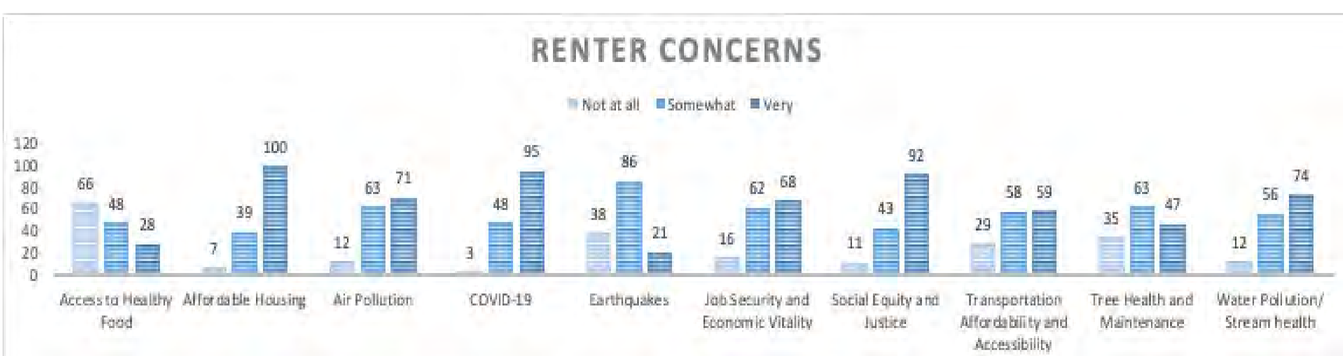
Respondents were most concerned about issues that are affecting their day-to-day life in 2020. As noted on the Figure above, this includes COVID-19, Air Pollution, Job Security, Social Equity and Affordable Housing. The strong concern for COVID-19 is not surprising; during the time period the survey was open, COVID-19 still had California counties in various stages of quarantine/lockdown. Additionally, the already competitive housing market in the state went through changes as some cities saw rents shift unpredictably. Furthermore, the summer saw high periods of social unrest as cases of police brutality and racial injustice were brought to the national spotlight. Beginning in August, wildfires broke out across the state following dry conditions, lighting, high-winds, and extreme heat. 2020 has also seen the largest wildfire in California's history, and the multiple fires occurring caused poor air quality for wide swaths of the state including the central coast.



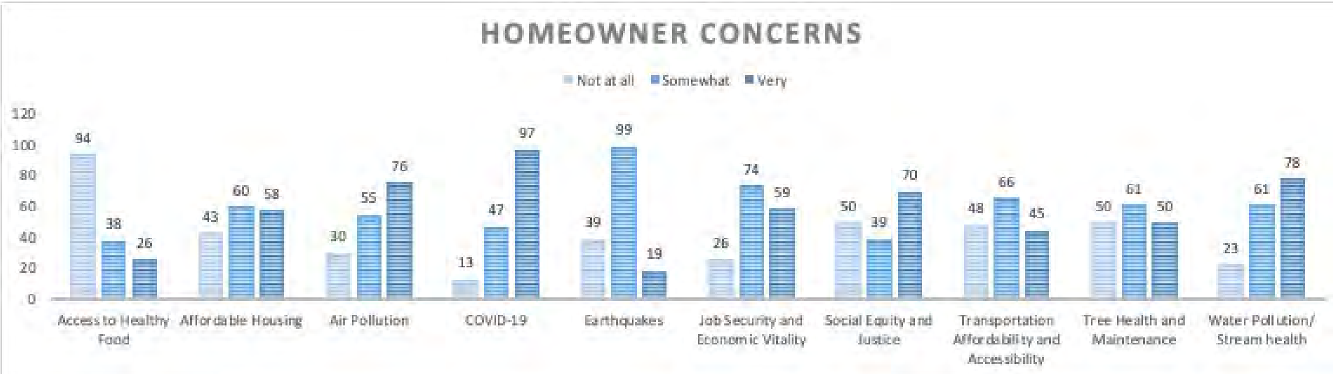
Variation by Housing Situation



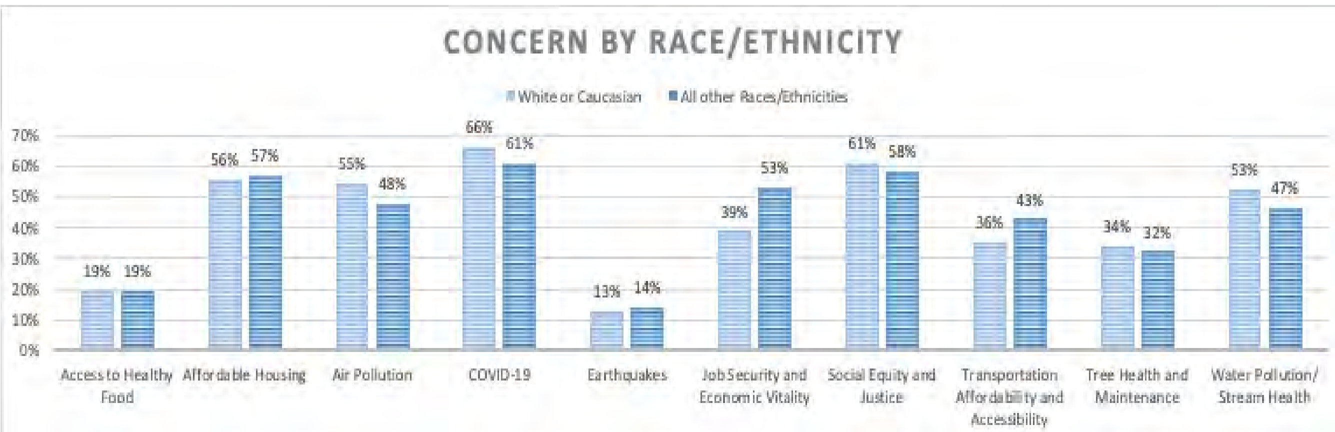
As noted in the graph above], renters and homeowners shared a similar amount (+/- 1 - 4%) of concern for a variety of key issues - Water Pollution, Tree Health, COVID-19, Healthy Food, Earthquakes, and Air Pollution. The three areas of greatest misalignment were Affordable Housing (68% v. 36%); Social Equity and Justice (63% v. 44%); and Transportation Affordability and Accessibility (40% v. 28%). The variation in Affordable Housing is understandable given the status of the respondents as "renters"'; homeowners are likely to be less concerned about housing affordability due to already owning a home. The variation in Social Equity and Justice is unclear, but could be connected to the age of the respondents (i.e. a correlation between age and homeowner status) or another unifying variable. The same could be said for Transportation Affordability and Accessibility with the added caveat for income.



Overall, the top three concerns for homeowners are COVID-19 (62%), Water Pollution/Stream Health (48%), and Air Pollution (47%). The top three concerns for renters are Affordable Housing (68%), COVID-19 (65%) and Social Equity and Justice (63%).

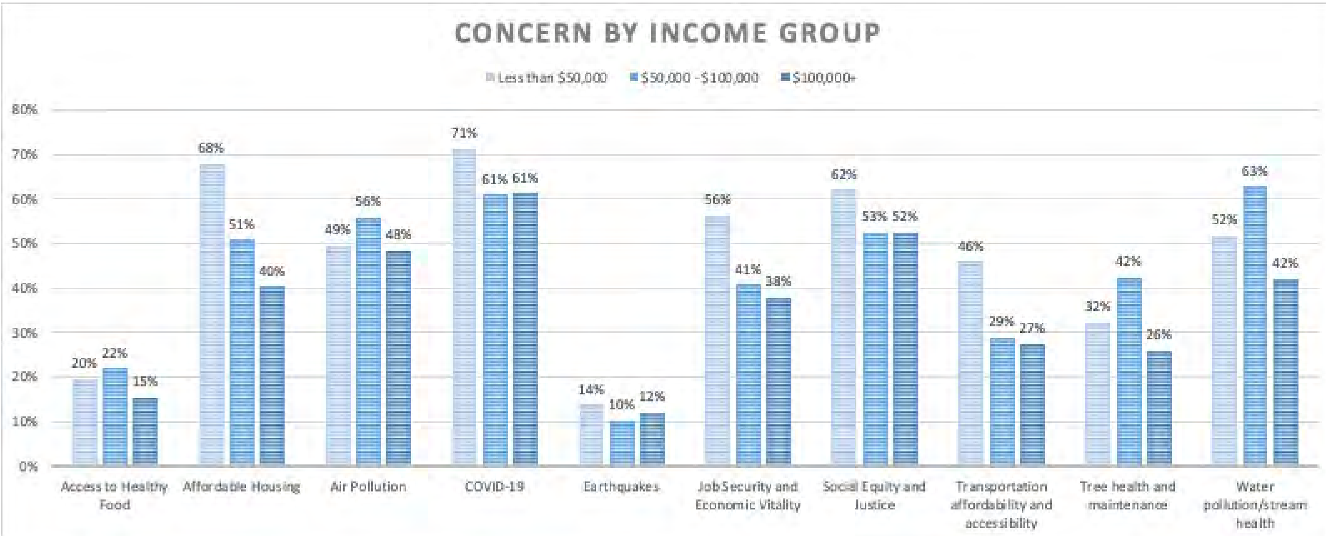


Variation by Race/Ethnicity



Level of climate concern between different racial and ethnic groups (in this case, Caucasian v. All other Races/Ethnicities) was fairly uniform on most key issues. The largest divergence occurred for Job Security and Economic Vitality (39% v. 53%); Air Pollution (55% v. 48%); and Transportation Affordability and Accessibility (36% v. 43%). Overall, the top three concerns for White or Caucasian respondents are COVID-19 (66%), Social Equity and Justice (61%) and Affordable Housing (56%). For participants identifying as one or more other races, their top three concerns are identical with some variation in level of concern (61%; 58%; 57% respectfully).

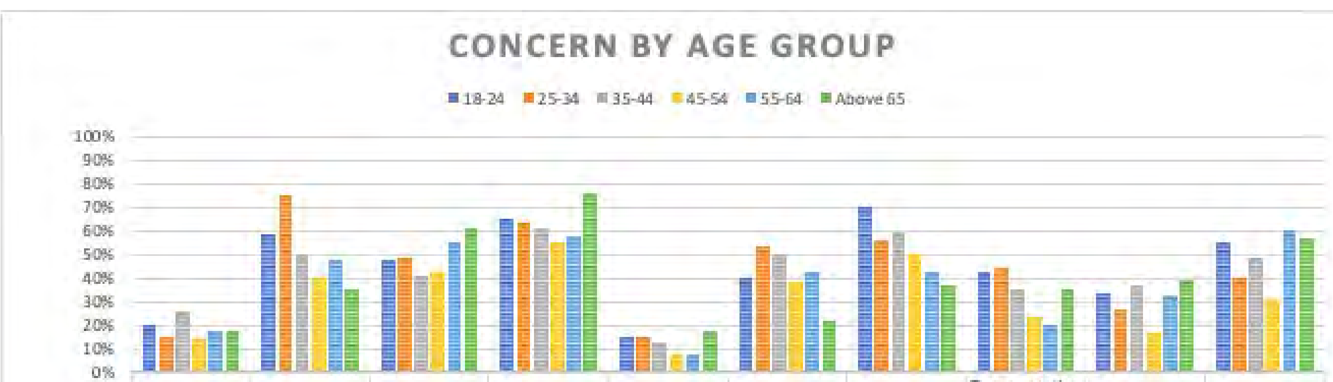
Variation by Income Group



Responses by income group are noted in the figure above. There is great variability in the level of concern Individuals have for key climate and adaptation subjects. The one exception to this observation is a clear concern for COVID-19 across all income groups. Unsurprisingly, individuals within the lowest household income group ("Less than $50,000), expressed a much higher level of concern for Affordable Housing (68% v. 51%, 40% respectfully); Job Security and Economic Vitality (56% v. 41%, 38%); and Transportation Affordability and Accessibility (46% v. 29%, 27% respectfully). Individuals within the other two income groups ($50,000 - $100,000 and $100,000 +) were more aligned in their levels of concern; the one main exception for this is concern for Water Pollution/ Stream Health (63% v. 42%).

Overall, individuals with a household income of less than $50,000 were most concerned about COVID-19 (71%); Affordable Housing (68%); and Social Equity and Justice (62%). Individuals with a household income between $50,000 - $100,000 were most concerned with Water Pollution/ Stream Health (63%); COVID-19 (61%); and Air Pollution (56%). Individuals with a household income of $100,000 or more were most concerned with COVID-19 (61%); Social Equity and Justice (52%); and Air Pollution (48%).

Variation by Age



	Access to Healthy Food	Affordable Housing	Air Pollution	COVID-19	Earthquakes	Job Security and Economic Vitality	Social Equity and Justice	Transportation affordability and accessibility	Tree health and maintenance	Water Pollution/ Stream Health
18-24	20%	59%	48%	65%	15%	40%	70%	43%	34%	55%
25-34	15%	75%	48%	63%	15%	54%	56%	44%	27%	40%
35-44	26%	50%	41%	61%	13%	50%	59%	35%	37%	48%
45-54	14%	40%	43%	55%	7%	38%	50%	24%	17%	31%
55-64	18%	48%	55%	58%	8%	43%	43%	20%	33%	60%
Above 65	17%	35%	61%	76%	17%	22%	37%	35%	39%	57%

When evaluated on the dimension of age, individuals expressed some similar concerns. COVID-19 continues to be a trend with the majority (50% +) of individuals expressing a high level of concern. More specifically, individuals above the age of 65 were most concerned with COVID-19 (76%); individuals between the ages of 45 and 54 were the least concerned with COVID-19 (55%).

Aside from COVID-19, other top concerns included Social Justice and Equity – a first or secondary concern for individuals within the following age groups: 18 - 24; 35 - 44; and 45 - 54. Individuals between the ages of 25 and 34 are also concerned about Social Justice and Equity (56%), but their paramount concern is Affordable Housing (75%). Individuals above the age of 65, on the other hand, are the least concerned about Social Equity and Justice (37%); after COVID-19, they are most concerned about Air Pollution (61%).

Open-Ended Responses

Question: If there are other community issues not listed above that you are concerned about, please provide them here.

Respondents were also able to write in other concerns that were not addressed above. 153 respondents wrote in a concern. The most repeated write-in concern involved homelessness. Selected responses include:

- "Homelessness and the lack of focus our city official have on dealing with the issue."
- "How is the community taking care of the House-less population?
- What are the options for those that do not have homes during the pandemic and unhealthy air conditions due to natural disasters (I.e. fires)"
- "The growing number of homeless in our downtown open spaces and doorways. Downtown is the heart of SLO and central to its vibrancy."
- "Homelessness is impacting the waterways & Spot fires. Hard facts to face but true."
- "providing services from homeless and mentally ill persons in the county"

Concerns that were repeated by multiple respondents include issues of police brutality and police funding. Select responses:

- "Systemic racism and our bloated county Sheriff's budget,"
- "Racism, police brutality, republican takeover using big money for our local candidates which will diminish the focus on environmental and justice concerns,"
- "Addressing and defunding workplaces and laws that uphold systemic racism. Defund the police in order to allocate funds towards issues like the ones listed above."
- "Overfunding on police--defunding is necessary."
- "I live by Santa Rosa Park and the homeless population is very disrespectful of our property. The creek that runs through our backyard is littered with their trash and they are constantly stealing things out of our yard. The police are not helpful with the issue whatsoever. The police are an entirely useless organization and are especially terrible here in SLO."
- "Police Department suppressing free speech rights by tear gassing people, over-charging protest organizer, failure to files charges against individuals who drove cars into pedestrians."

Other concerns that were repeated multiple times include cycling and transportation issues.

Selected responses:

- "Walkability"
- "Stop wasting money on changing roads to accommodate bike lanes. Instead *(sic)* focus on adding busses and repairing our streets. Do not take away our street parking to make a bike lane.
- "Infrastructure and road building"

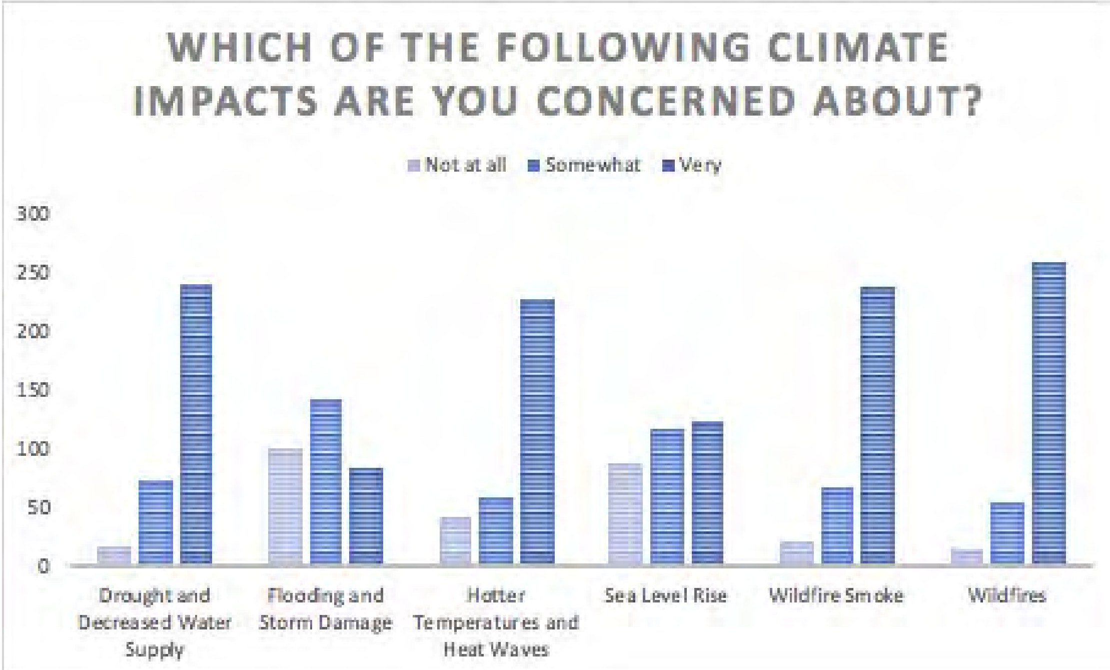
The graphic (shown below) is a word cloud generated from responses the open-end question. As the Word Cloud illustrates, housing and homelessness were two salient topics for respondents.

Which of the following climate change impacts are you concerned about?

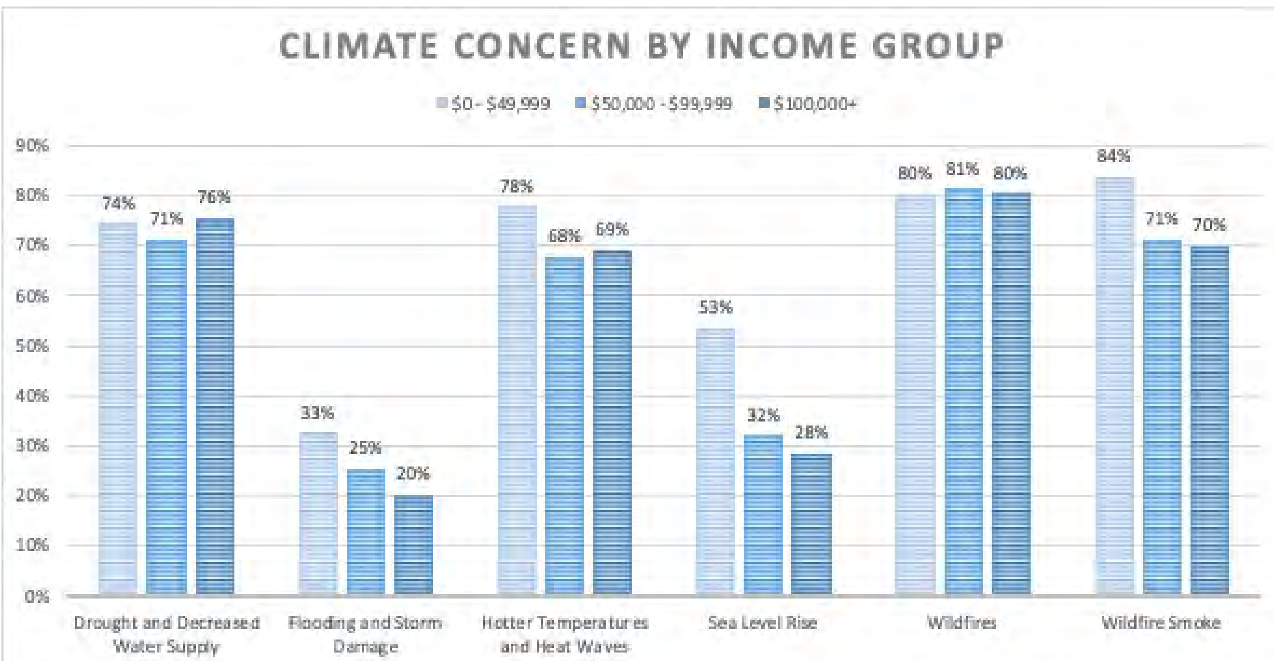
Overall Results

Level of Concern	Not at all	Somewhat	Very
Drought and Decreased Water Supply	16	72	240
Flooding and Storm Damage	100	141	84
Hotter Temperatures and Heat Waves	41	59	227
Sea Level Rise	87	117	122
Wildfire Smoke	20	66	238
Wildfires	15	53	259

Respondents were very concerned about most of these climate impacts. Only Flooding and Storm Damage saw more respondents choosing "Not at all" or "Somewhat". Wildfires and Wildfire Smoke had the most concern, likely related to the volatile 2020 wildfire season in California that brought that state's largest wildfire to date and many days of unhealthy air quality.

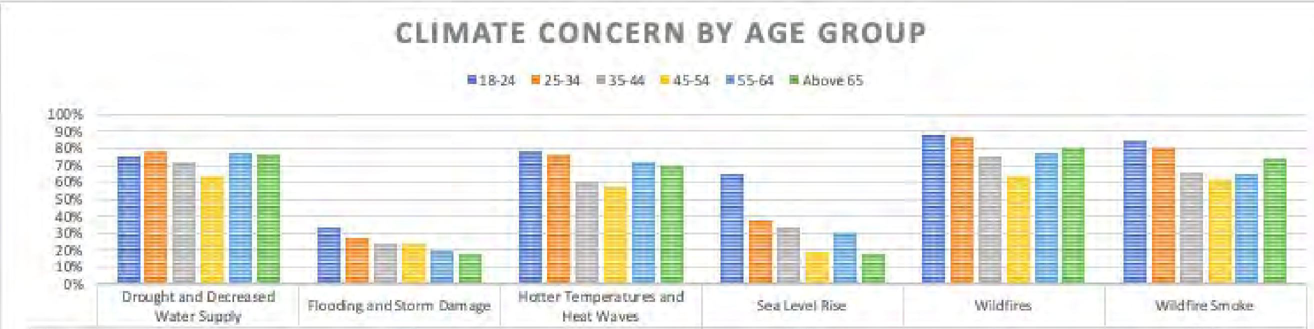


Variation by Income Group



When evaluated by income group, all groups, regardless of income, expressed strong concern about Wildfires (80%, 81%, 80% respectfully); however, it is interesting to note that individuals in the lowest income group are more concerned with Wildfire Smoke than Wildfires as a climate category (80% v. 84%). Individuals within the lowest income group are also most concerned about Hotter Temperatures and Heat Waves (78%) and are significantly more concerned about Sea Level Rise than individuals in other income categories. In comparison, individuals within the highest income group are most concerned about Drought and Decreased Water Supply (76%); their tertiary concern is Wildfire Smoke. Individuals within the middle-income group share similar concerns with some variation in percentage (71% for both).

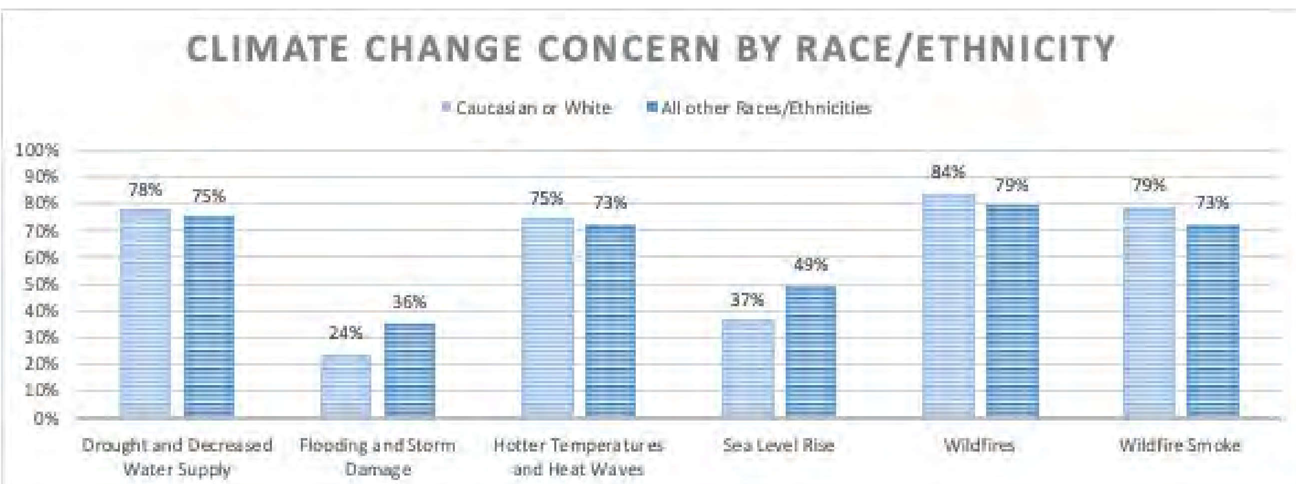
Variation by Age Group



	Drought and Decreased Water Supply	Flooding and Storm Damage	Hotter Temperatures and Heat Waves	Sea Level Rise	Wildfires	Wildfire Smoke
18-24	75%	34%	79%	65%	88%	85%
25-34	78%	27%	76%	37%	86%	80%
35-44	72%	25%	60%	34%	75%	66%
45-54	64%	24%	57%	19%	64%	62%
55-64	78%	20%	73%	30%	78%	65%
Above 65	76%	17%	70%	17%	80%	74%

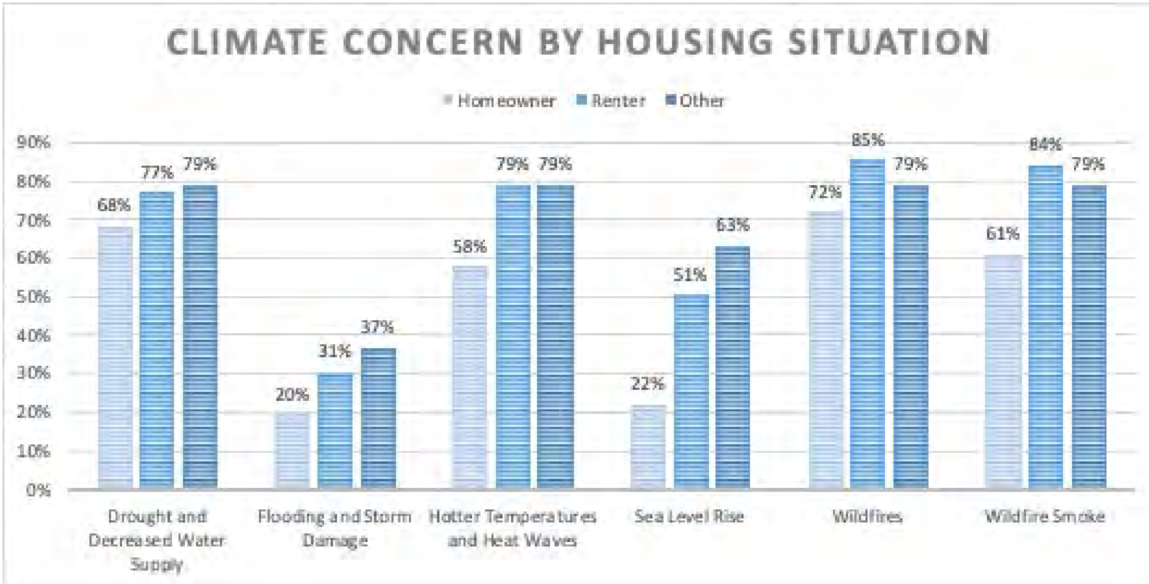
When evaluating climate concern by age, a few patterns emerge. Across the board, individuals are most concerned about Wildfires. Within that category, individuals between the ages of 18 and 24 are most concerned (88%), followed by individuals between the ages of 25 and 34 (86%). There is greater variation when evaluating individual's secondary concerns. Wildfire smoke is the second highest concern for individuals between the ages of 18 – 24 and 25 – 34. For all other age groups, their second highest concern is Drought and Decreased Water Supply. The greatest variance in concern among age groups is with Sea Level Rise. Individuals between the ages of 18 and 24 have the highest level of concern (65%), with individuals above the age of 65 expressing the least amount of concern (17%).

Variation by Race/Ethnicity



Climate concerns between different racial and ethnic groups (in this case, Caucasian v. All other Races/Ethnicities) was fairly uniform on a majority of issues (+/- 6%) – Drought and Decreased Water Supply (78% v. 75% respectfully); Hotter Temperatures and Heat Waves (75% v. 73%); Wildfires (84% v. 79%); and Wildfire Smoke (79% v. 73%). The largest divergences occurred for Flooding and Storm Damage (24% v. 36%) and Sea Level Rise (37% v. 49%). Regardless of racial or ethnic identify, all individuals noted the same top concern: Wildfires. Secondary and tertiary concern varied slightly – Wildfire Smoke (79%) and Drought and Decreased Water Supply (78%); vs. Drought and Decreased Water Supply (75%), Hotter Temperatures and Heat Waves (73%), and Wildfire Smoke (73%).

Variation by Housing Situation



Climate concerns among individuals in different housing situations varied slightly. The top concern for Homeowners and Renters is Wildfire (72% v. 85% respectfully). Secondary concern for these two groups deviated; renters are more concerned about Wildfire Smoke (84%); homeowners are more concerned about Drought and Decreased Water Supply (68%). Individuals identifying their housing situation as "Other" had four competing interests at 79% - Drought and Decreased Water Supply, Hotter Temperatures and Heat Waves, Wildfires, and Wildfire Smoke. The greatest divergence on level of concern occurred between Homeowners and Renters on the issue of Sea Level Rise: 51% of renters expressed concern versus only 22% of homeowners.

Open-Ended Responses

Question: If there are other climate change impacts not listed above that you are concerned about, please provide them here.

There were 77 responses to this question. Answers were categorized by topic area. The four most prevalent themes discussed by respondents were:

1) Biodiversity and Health of Inland and Marine Ecosystems

2) impacts to Agriculture & Food Systems

3) Water Supply

4) Social Inequality.

Biodiversity and impacts to wildlife and their habitats were key concerns for respondents. Concerns were raised about both inland and marine ecosystems. Key concerns for marine ecosystems included plastic pollution and ocean acidification. Respondents were also concerned with the impacts of climatic changes on agriculture and how agricultural changes might impact food supply and access. Water supply was also frequently mentioned. Over half of comments related to water discussed over-building and the impacts of new development on water supply. Comments also mentioned modified agricultural practices, water conservation, use of non-potable water and desalinization as potential solutions. Social inequality was another key issue. Comments in this category mentioned social justice, systemic and environmental racism, environmental justice, issues of representation, impacts to low income communities, and wealth inequality.

Subject Area	Issue	Frequency of Mentions
Environmental impacts	Biodiversity and Health of Inland and Marine Ecosystems	22
	Pests and Diseases	4
	Negative Environmental Impact of Development	2
Water	Water Supply	8
Agriculture	Agriculture & Food Systems	11
Human Systems	Social Inequality	7
	Economy	4
	Public Health	3
Energy & Infrastructure	Energy	4
	Transportation	4
Natural Disasters	Extreme Weather	5
	Mudslides/Mudflows	3
	Wildfire or forest management	3
	Temperature	2
Other	Climate Change is not occurring or should not be addressed by City	6

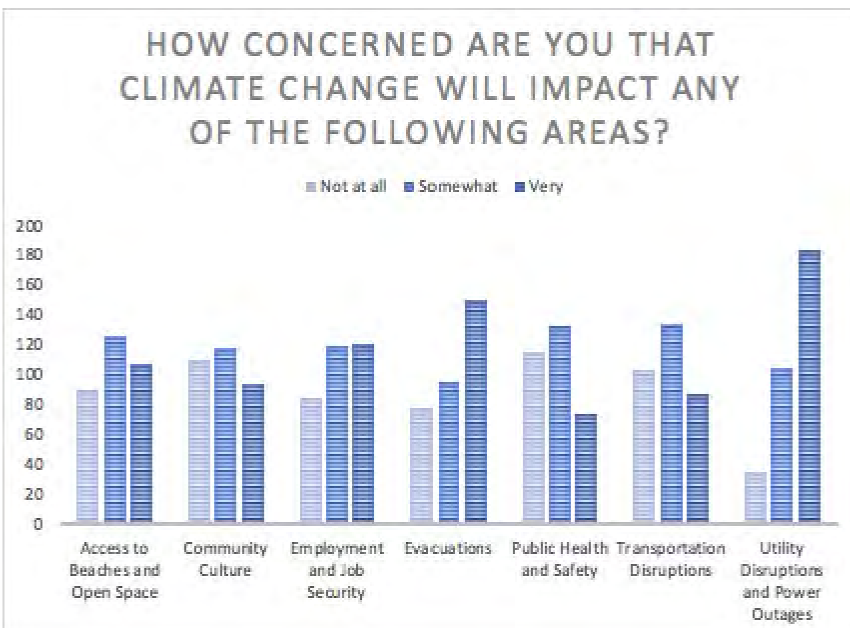
Responses to the open-ended question were also used to generate a Word Cloud (shown below). The Word Cloud illustrates the prevalence of words such as water, agriculture, environment, native, wildfire, food, etc. The frequency of these themes indicates that topics related to environment, water and agriculture are common concerns for respondents.

HOW CONCERNED ARE YOU THAT CLIMATE CHANGE WILL IMPACT ANY OF THE FOLLOWING AREAS?

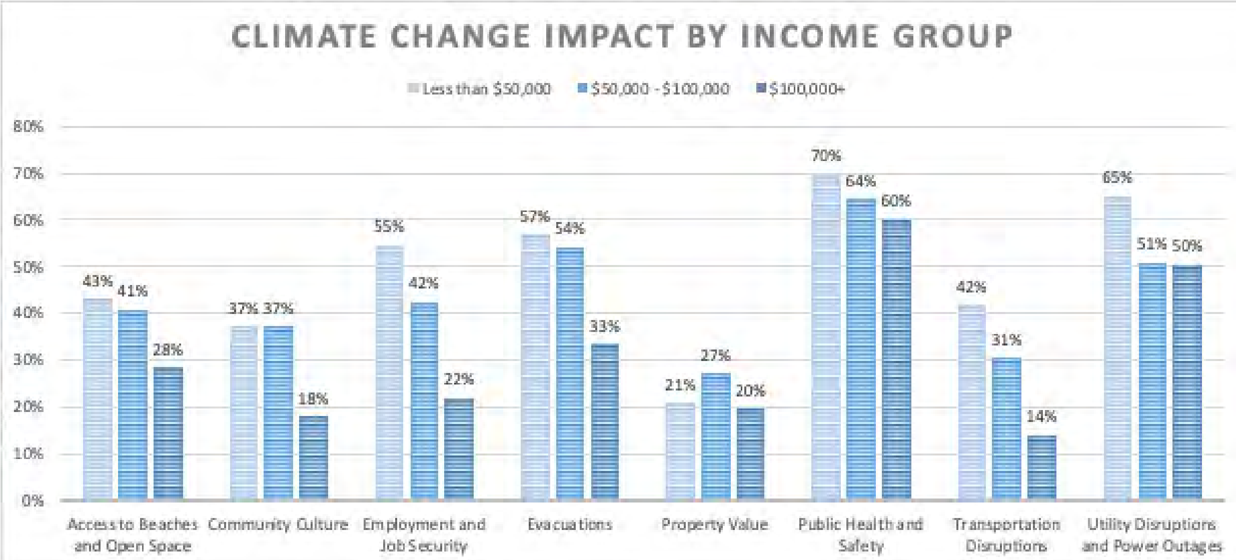
Overall Results

Row Labels	Not at all	Somewhat	Very
Access to Beaches and Open Space	90	126	107
Community Culture	110	118	94
Employment and Job Security	85	119	120
Evacuations	77	95	150
Public Health and Safety	115	133	74
Transportation Disruptions	103	134	87
Utility Disruptions and Power Outages	35	104	184

Respondents chose "Very Concerned" with less frequency for this question than previous questions. There is high concern about Utility Disruptions and Power Outages which aligns with the context of this survey's timing. Summer 2020 brought extreme heatwaves in the state and the California Independent System Operator issued multiple "flex warnings" statewide to conserve energy and blackouts occurred as demand for electricity to combat extreme heat increased. Customers in Northern San Luis Obispo county experienced outages in August 2020. Additionally, Pacific Gas & Electric has also participated in Public Safety Power Shutoffs as a wildfire prevention tool that also created utility disruptions. High concern around Employment and Job Security and Evacuations also fits trends seen in earlier questions and align with later concerns about Wildfires and Wildfire Smoke.

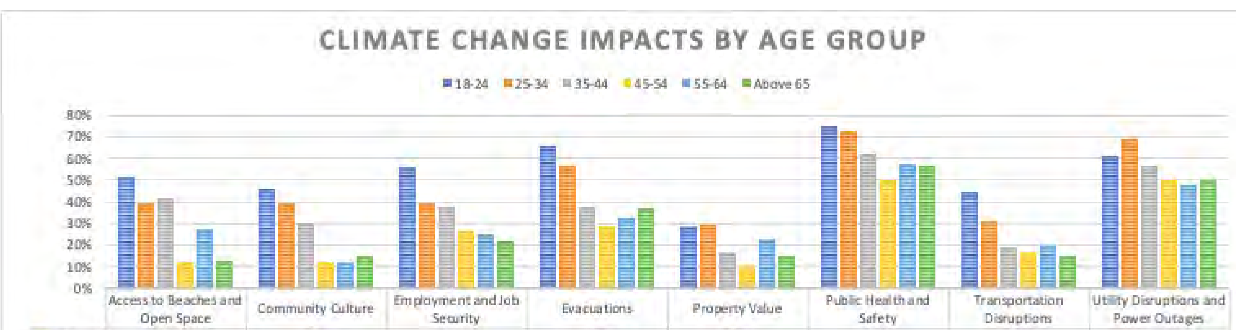


Variation by Income Group



As noted on the graph above, regardless of income, all individuals expressed the highest level of concern for Public Health and Safety (70%, 64%, 60% respectfully). Secondary concern varied slightly. After Public Health and Safety, individuals with household incomes of less than $50,000 or more than $100,000 were most concerned with Utility Disruptions and Power Outages. In comparison, individuals in the middle-income group ($50,000 - $100,000) had a secondary concern of Evacuations. The greatest divergence in level of concern occurred between individuals with a household income of less than $50,000 and more than $100,000 on the issue of Transportation Disruptions. Individuals within the lower income group had the highest level of concern among the three groups for this category - 42%. On the other end of the spectrum, the opposite was true: individuals within the highest income group had the lowest amount of concern – 14%.

Variation by Age Group

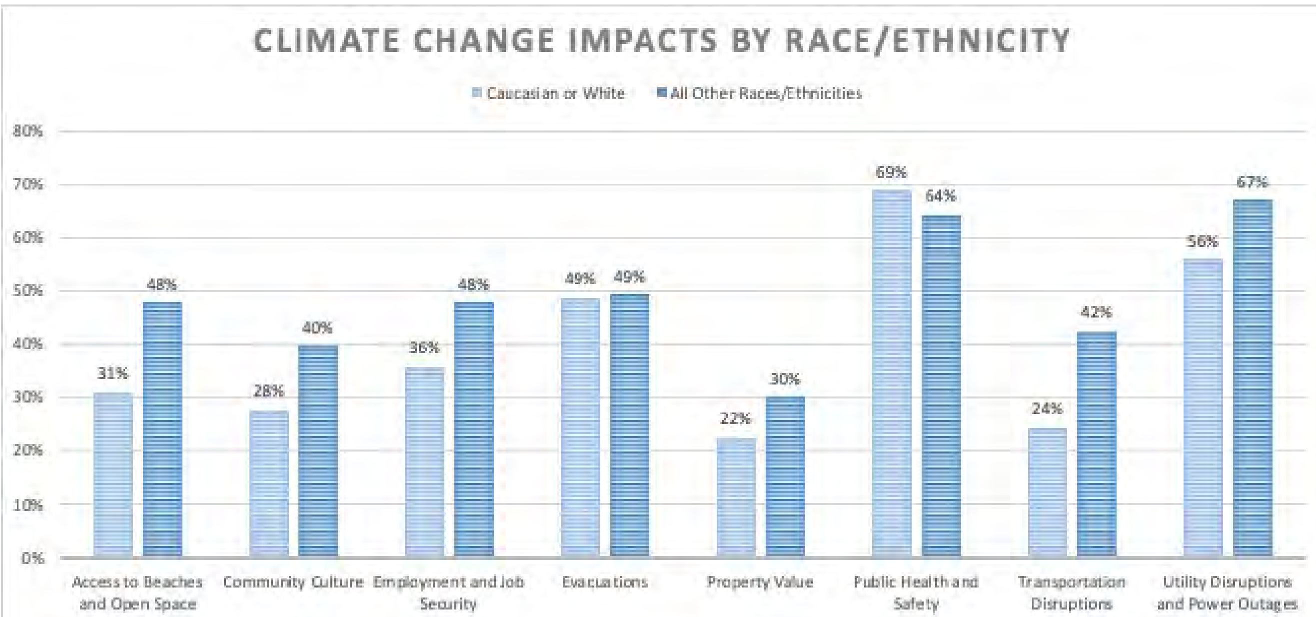


	Access to Beaches and Open Space	Community Culture	Employment and Job Security	Evacuations	Property Value	Public Health and Safety	Transportation Disruptions	Utility Disruptions and Power Outages
18-24	51%	46%	56%	66%	29%	75%	45%	61%
25-34	39%	39%	39%	57%	29%	73%	31%	69%
35-44	42%	30%	38%	38%	17%	62%	19%	57%
45-54	12%	12%	26%	29%	10%	50%	17%	50%
55-64	28%	13%	25%	33%	23%	58%	20%	48%
Above 65	13%	15%	22%	37%	15%	57%	15%	50%

When viewing concern for climate change impacts by age, a few patterns emerge. Across the board, individuals are most concerned about climate's potential impact on Public Health and Safety. Within that category, individuals between the ages of 18 and 24 are most concerned (75%), followed by individuals between the ages of 25 and 34 (73%). Utility Disruptions and Power Outages are also a common concern among the age groups, with at least 50% of individuals in five age groups (all except individuals between the ages of 55 and 64) expressing concern.

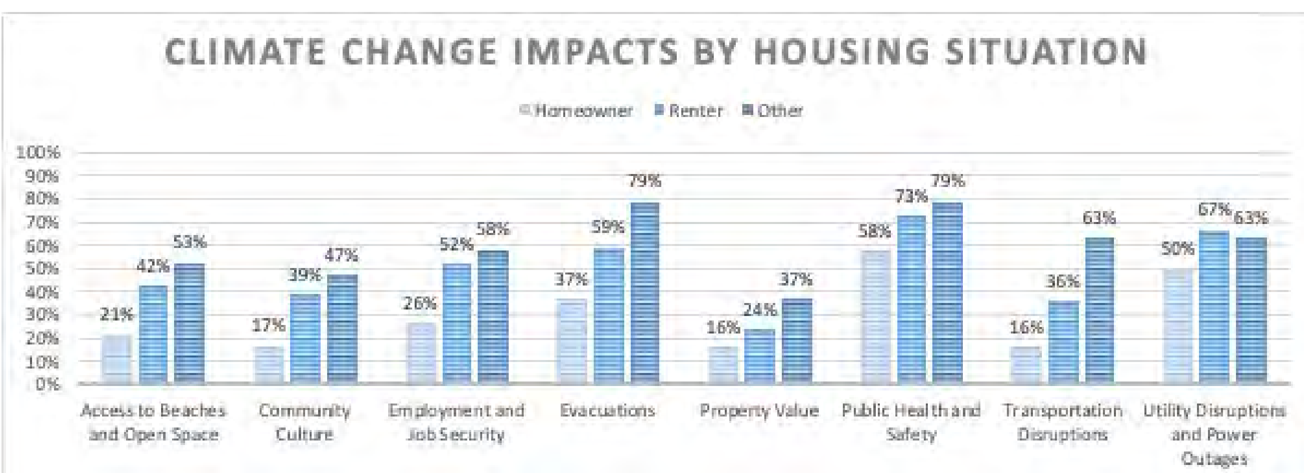
Omitting Public Health and Safety, individuals between the ages of 18 and 24 are most concerned about climate's potential impact on Evacuations (66%); and Utility Disruptions and Power Outages (61%). Individuals between the ages of 25 and 34 are also concerned about the same two categories with some variation in level of concern (57% and 69% respectfully). Individuals between the ages of 35 and 44 share a similar level of concern for Utility Disruptions and Power Outages (57%); they are also concerned about Access to Beaches and Open Space (42%). Individuals between the ages of 45 and 54 are concerned about Utility Disruptions and Power Outages (50%), followed by Evacuations (29%). Individuals between the ages of 55 and 64 are also concerned about Utility Disruptions and Power Outages (48%), in addition to Evacuations (33%). Finally, individuals above the age of 65 are concerned about Utility Disruptions and Power Outages (50%) and Evacuations (37%).

Variation in Race/Ethnicity



Regardless of racial or ethnic identify, individuals expressed similar levels of concern for two potential climate change impacts: Public Health and Safety (69% v. 64%, respectfully) and Utility Disruptions and Power Outages (56% v. 67% respectfully). Tertiary concerns were also the same – Evacuations (49% for both). The greatest divergence between groups occurred for Transportation Disruptions; only 24% of White or Caucasian respondents expressed concern compared with 42% of respondents of respondents identifying as all other races and ethnicities.

Variation by Housing Situation



When viewed through a housing situation lens, a few patterns emerge. Despite the variability, all respondents regardless of housing situation are concerned about Public Health and Safety, with individuals in the "Other" category reporting the highest level of concern at 79%. This same group expresses the same level of concern for Evacuations. Both renters and homeowners also list Utility Disruptions and Power Outages as a secondary concern (50% and 67% respectfully). This is a tertiary concern for individuals in "Other" alongside Transportation Disruptions. In terms of priority, homeowners and renters share a similar view on their concern for Evacuations (37% v. 59% respectfully). Of all the questions so far, this answer elicited the highest level of variability in level of concern; the smallest variation among levels of concern is for Utility Disruptions and Power Outages at 4%.

Open-Ended Responses

Question: If there are other areas impacted by climate change not listed above that you are concerned about, please provide them here

Respondents were also able to write in other concerns that were not addressed above. 54 respondents wrote in a concern.

6 of the respondents brought up concerns over how marginalized communities would feel climate impacts first. Selected responses:

- "I am concerned about how climate change will impact low income communities and communities of color first."
- "Health effects upon the poor and elderly, especially during the summer."
- "We need a community plan to support frail elders and people with chronic illness who are reliant on electricity, and cannot be without power. Example: people w/ lung disease, who use oxygen, electric beds, breathing assist machines. The rolling blackouts that are happening in CA (due to fire and maxing out of the power grid) are devastating for this portion of our community. We need an organized, local government plan to identify and support these folks."

8 Respondents brought up concerns about biodiversity, natural resources, and wildlife. Selected responses:

- "Access to food and use of agricultural resources, impacts to marine life and fisheries (including for food)"
- "Again, that we are not considering the impact on local wildlife" or preparing to create safe zones for animals (inland & marine)
- "Natural resource conservation is being impacted by the lack of regional consensus about conservation and habitat restoration goals as the climate changes. SLO has an opportunity to build on leadership and successes from within City government to emphasize natural resource conservation measures in a changing climate."
- "Loss of biodiversity, climate refugees, natural resources"

8 Respondents brought up concerns about agriculture and/or local food access:

- "Weather patterns, heat waves, and quality of air and water affecting the ability to grow food."
- "crop yield and tourism"

Remaining responses ranged from denying the city's role in responding to climate change, concerns over utilities or utility shut offs, concerns over evacuations, from where evacuees can go to how to handle refugees coming to the SLO region. A few respondents brought up concern for "hope" in the future.

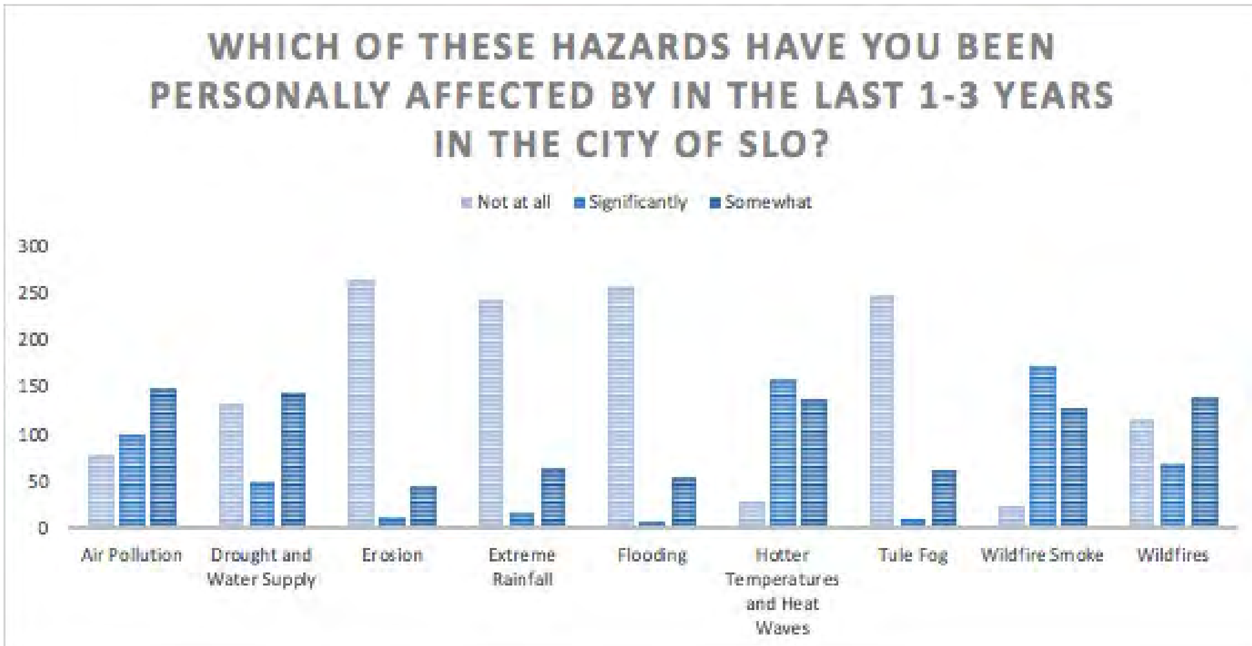
Open-ended responses were used to generate a Word Cloud (shown below). The words shown were frequently used by respondents.

WHICH OF THESE HAZARDS HAVE YOU BEEN PERSONALLY AFFECTED BY IN THE LAST 1-3 YEARS IN THE CITY OF SLO?

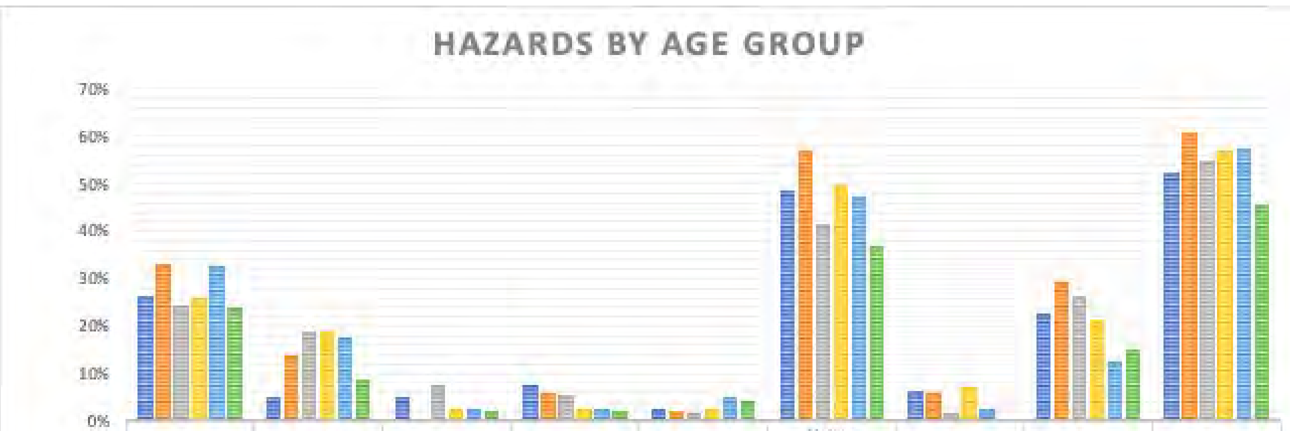
Overall Results

Impact in Last 1-3 Years	Not at all	Significantly	Somewhat
Air Pollution	79	100	148
Drought and Water Supply	133	50	144
Erosion	265	13	45
Extreme Rainfall	244	17	64
Flooding	257	9	54
Hotter Temperatures and Heat Waves	30	158	138
Tule Fog	247	11	62
Wildfire Smoke	24	173	127
Wildfires	117	68	140

This question has more respondents reporting they have not been personally affected by about half of these impacts in the last 1-3 years. The most significantly reported impacts were of Wildfire Smoke, Hotter Temperatures and Heat Waves, and Air Pollution which matches the trends in other questions and references the context of events in 2020 (i.e. wildfire and extreme events). Even when wildfires do not occur in the city boundaries, impacts of wildfire smoke and air pollution affect many residents somewhat or significantly which explains why “Wildfire” has less significant direct impact for respondents than “Air Pollution” and “Wildfire Smoke.’



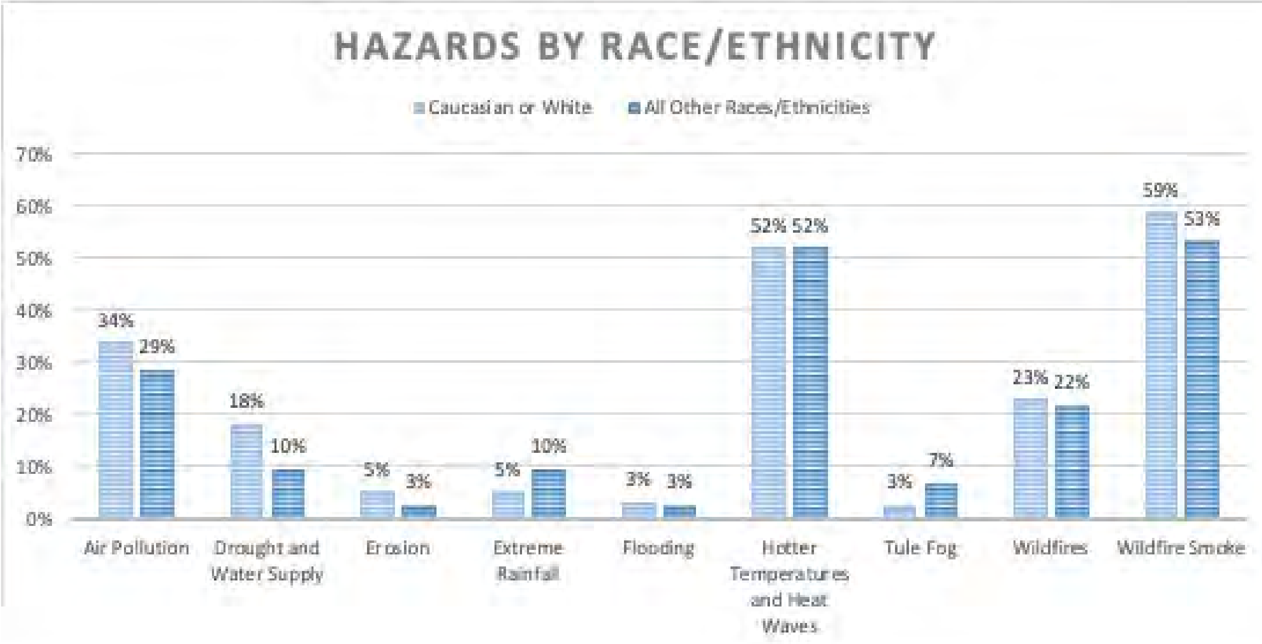
Variation by Age Group



	Air Pollution	Drought and Water Supply	Erosion	Extreme Rainfall	Flooding	Hotter Temperatures and Heat Waves	Tule Fog	Wildfires	Wildfire Smoke
18-24	26%	5%	5%	8%	3%	49%	6%	23%	53%
25-34	33%	14%	0%	6%	2%	57%	6%	29%	61%
35-44	25%	19%	8%	6%	2%	42%	2%	26%	55%
45-54	26%	19%	2%	2%	2%	50%	7%	21%	57%
55-64	33%	18%	3%	3%	5%	48%	3%	13%	58%
Above 65	24%	9%	2%	2%	4%	37%	0%	15%	46%

In terms of Hazards, all age groups have been quite impacted by Wildfire Smoke and Hotter Temperatures and Heat Waves. Within these two categories, individuals between the ages of 25 and 34 were most impacted (61% and 57%, respectfully). Individuals above the age of 65 indicate the lowest level of impact for these two categories (46% and 37%, respectfully). Other impactful hazards include Wildfires - with individuals between the ages of 25 and 34 reporting the highest level of impact at 29%, followed by individuals between that ages of 35 and 44 at 26% - and Air Pollution – with individuals between 25-34 and 55-64 each expressing the highest impact – at 33%. Erosion, Extreme Rainfall, Flooding, and Tule Fog were very rarely listed as a high impact for individuals across the age groups.

Variation by Race/Ethnicity

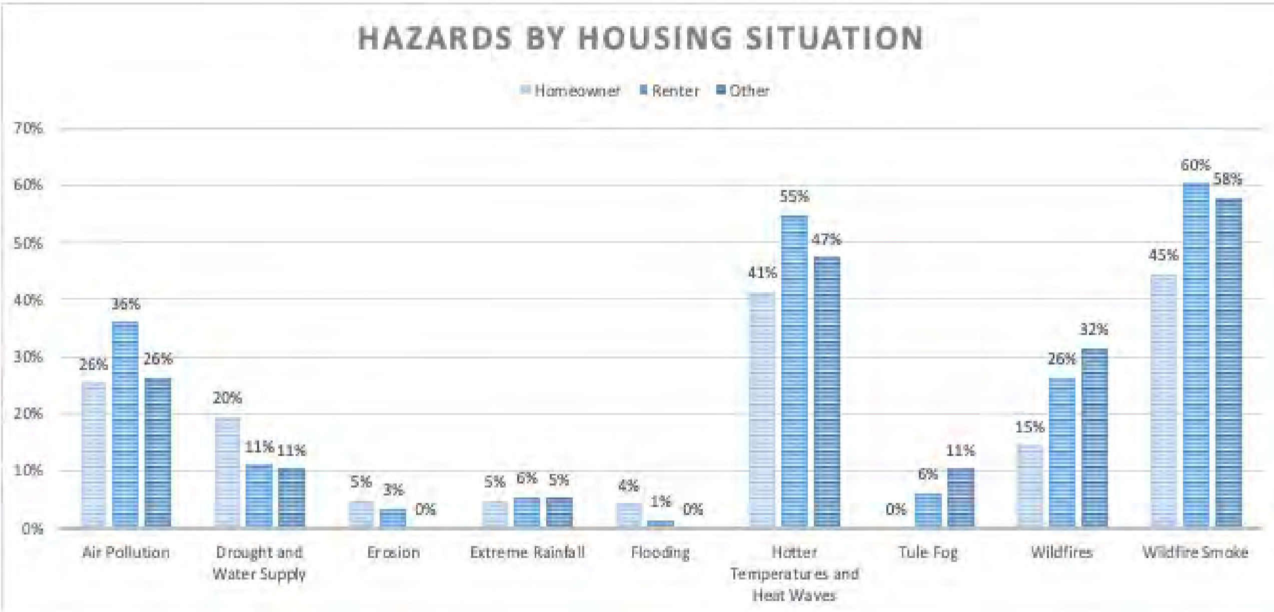


In terms of racial and/or ethnic identity, all groups expressed a high level of impact for Wildfire Smoke (59% and 53% respectfully) and for Hotter Temperatures and Heat Waves (52% for both). A tertiary concern was Air Pollution (34% and 29%). Similar to the other analyses for this question, respondents did not express high levels of impact for Erosion, Flooding, Extreme Rainfall or Tule Fog. The greatest divergence between groups occurred for Drought and Water Supply; Caucasian or White respondents reported a higher level of impact – at 18% - than individuals of other races/ethnicities – at 10%.

Variation by Income Group

From an income perspective, individuals within the lower income bracket were most impacted by Hotter Temperatures and Heat Waves (58%), followed by Wildfire Smoke (53%). Individuals in the other two categories expressed a similar level of impact for Hotter Temperatures and Heat Waves (46% and 44% respectfully), with a higher level of impact for Wildfire Smoke (63% and 50%). In fact, individuals in the middle-income group express the highest level of impact for Wildfire Smoke. Other shared impacts include Air Pollution (35%, 27%, and 29% respectfully) and Wildfires (24%, 25% and 17%).

Variation by Housing Situation



Homeowners, renters, and individuals indicating "Other" report being most impacted by Wildfire Smoke (45%, 60%, and 58%, respectfully), followed by Hotter Temperatures and Heat Waves (41%, 55%, and 47%, respectfully). Aside from these two categories, renter and homeowners report being more impacted by Air Pollution than Wildfires (26% v. 36%; 15% v. 26%); individuals indicating "Other" report the opposite (26% v. 32%).

Open-Ended Responses

Question: If there are other hazards that you have been personally affected by in the past 1-3 years in the City that are not listed above, please provide them here.

There were 37 responses to this question. Of those responses, 10 discussed climate related hazards. The remaining 27 discussed other community issues not directly applicable to climate change. Related responses discussed the following:

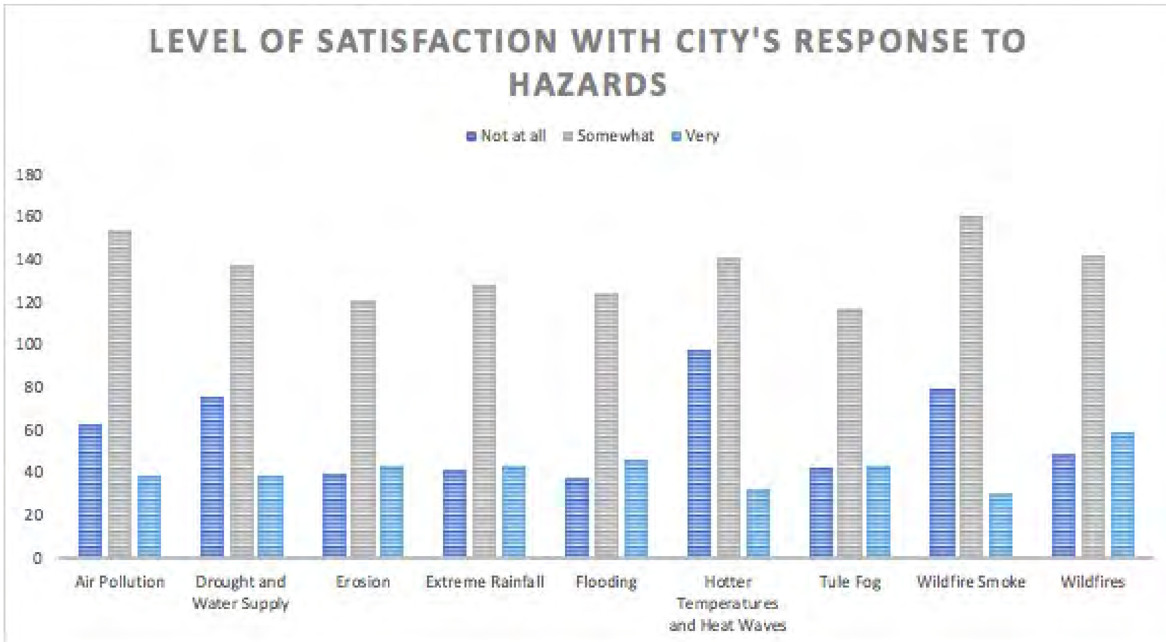
- Mortality of trees that were weakened by drought. Tree caused damage to the home and increased cost of air conditioning due to loss of canopy.
- Extreme 116 degree heat
- Nearby wildfires and the impacts of smoke on an asthmatic
- Experience with Lyme Disease
- Landslide from extreme rainfall
- Air pollution that lead to the development of asthma
- Dust
- Power outages
- Invasive species
- Loss of biodiversity affecting people psychologically and economically.

Responses to question 11 were used to generate a Word Cloud (see below).

FOR EACH HAZARD THAT YOU WERE AFFECTED BY, PLEASE RANK YOUR LEVEL OF SATISFACTION WITH THE CITY'S RESPONSE.

Overall Results

Satisfaction of City Response to Impact Area	Not at all	Somewhat	Very
Air Pollution	63	154	39
Drought and Water Supply	76	137	39
Erosion	40	121	43
Extreme Rainfall	41	128	43
Flooding	38	124	46
Hotter Temperatures and Heat Waves	98	141	32
Tule Fog	42	117	43
Wildfire Smoke	79	160	30
Wildfires	49	142	59



Open-Ended Responses

Question: Do you have any comments to share regarding how you were affected by past hazards and/or city response efforts? Please describe specific hazard, location, and response

Write-in answers to this question demonstrate that respondents are either not clear on how much the city can do in responding to climate impacts, don't believe the city can respond to impacts that they few as "natural" or at the state/federal scale or they do not know how the city responded and wish for more publicity about city response efforts. Because of these frequently cited opinions, multiple respondents indicated they used "Not at all satisfied" to indicate "not applicable" or they skipped responding at all. For these reasons, write-in responses are a more useful analysis than the absolute numbers. 83 respondents wrote in a short answer.

Select responses that express doubt or confusion about the city's ability to respond:

- "Several of the above items are caused by nature and the city can't do anything about them so they should not even have been included."
- "I cannot see how the city could do anything about fires, floods, fog and rain. The city can and should focus on eliminating trash and waste in our local parks and waterways. That will have a huge impact on its citizens' outlook on our government taking care of the city."
- "Let's act now to reduce the burnable debris around out (*sic*) homes and stream beds."
- "I don't think the city can do anything to control or improve these items except for provide infrastructure that allows emergency responders to quickly and safely access the entire population. In that regard the city has actively made response times and access to core populations worse by converting roadways to bicycle paths and failing to add lanes to major thoroughfares. I think the city really needs to reassess its willingness to sacrifice human lives in the name of environmentalist ideals. When someone has a stroke every minute of delay in transport to the hospital costs that person brain function and treatment options. Additionally these alternative modes of transportation have no ability to help facilitate business growth or commerce, and as such provide no return on the funds the city invests in them."
- "I really don't see how the City can "respond" to some of these. Air pollution from what? If wildfires, not much the City can do apart from abatement and building codes already in place. Auto pollution is minimal. And City Hall cannot dictate the weather."

- "I'm not aware of the City's response to any of the above listed items except to say the more growth, housing, etc. that occurs the more air pollution and lack of water supply will be factors in everyday life. As well as infrastructure that cannot support the housing growth all around the city."
- "I used "Not at all satisfied" to indicate more of "not applicable" Air pollution is being worked upon by the City, and awareness of the need for conservation of water was an ad campaign and a hotline, both appreciated. The effects of the others I cannot see the City's responsibility to. In my case only."
- "I only rated a few factors because many of these issues are not truly under local influence/control. The City has done a good job addressing our flood control system. More needs to be done about wildfire prevention but a significant challenge is the amount of overgrown vegetation on private property or land just outside the City's footprint."
- "In general, I feel the city hasn't really acknowledged it's general resident experiences with climate change. Too much focus on bike lanes and ignoring the less glamorous/ youth-focused, and middle/upper class side of being impacted by climate change."
- "I'm not sure how to respond to some of these questions where I do not have a direct experience, and as a result don't have a level of satisfaction to report. I believe the City leadership's push for climate action, sustainable transportation, affordable housing, and protection of open space are all in the right direction."
- "You should have had a "not applicable" column. There is little the City can do about hot temperatures or wildfire smoke drifting into the area. Drought and water supply is something the City can control. Constantly raising water rates while allowing hundreds of new homes it NOT the way to respond."
- "What is the city doing for any of these? If they are doing something, they sure aren't doing a good job publicizing what they are doing."

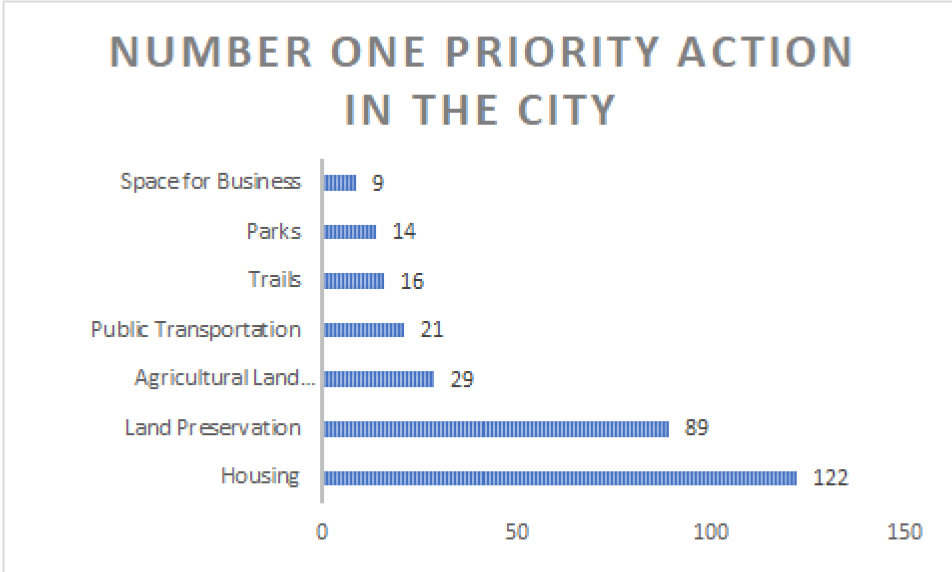
Select responses that offer more concrete feedback:

- "Storm drain clearance especially on the north end of the city near Loomis Street is sometimes lacking and more frequent patrols by city personnel to this area would be appreciated."
- "Appreciate the notifications we get through Twitter and other platforms."
- "Address fire prevention like the Native Americans and how we used to. Prevent forest fires."
- "City could do more to reduce water use - encourage lawn reduction, including on City properties."
- "The city has used a wide brush to paint very high fire hazard and should be more specific/precise in classifying fire hazard. A city perimeter approach would be more effective and appropriate. Over-classifying can have dire effects on residents ability to obtain fire insurance. Just like keeping areas in flood zones that have been mitigated is a problem."
- "The potential for water shortage is ignored when the city approved extensive new housing. Otherwise these developments would have been disapproved. The city says one thing but does another with respect to this topic."
- "While the firefighters have indeed been heroes in this scenario, the city need to undertake extreme conservation measures, plant more trees to increase air quality, install solar throughout the town, enforce xeriscaping and the like. I do appreciate the city/county air report."
- "Stonewalling on the Lake Dredging project is unacceptable."
- "Keep beaches open for locals during heat waves."
- 'I actually was not aware of the City's response at all to any of these issues."
- "Last winter when highway 5 was closed due to snow. The freeways and highways were blocked for HOURS and HOURS because we only have one or two routes to use in Southern California and the Central Coast."

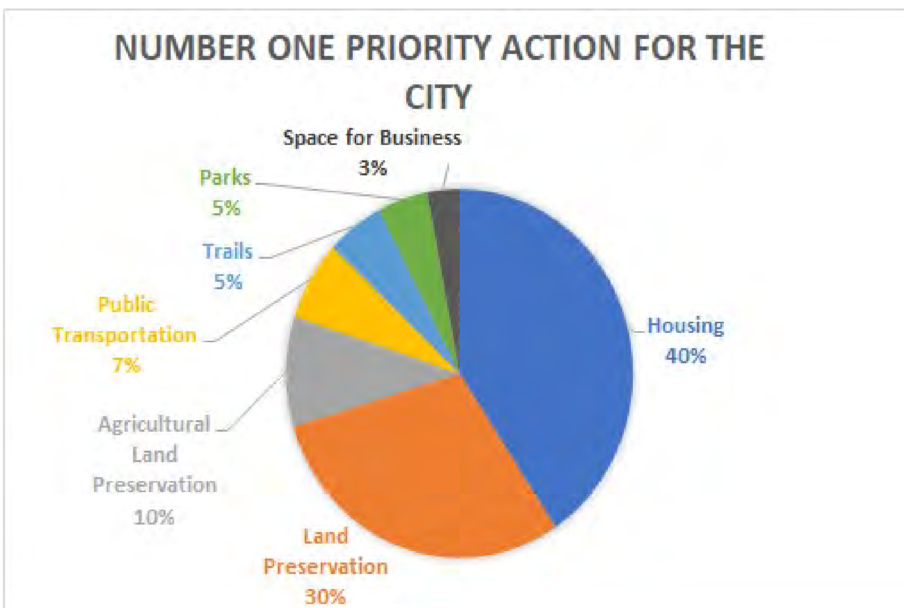
- "What is the city doing to capture and utilize the very little rain we get each year? How much of it are we losing to runoff in our ocean? What is the city doing to implement a carbon free grid by 2030? How can we take wisdom and advice from our local indigenous people to better understand working with the environment?"
- "My property is located within a flood zone. Mitigations, such as creek debris clearance, have been successful (so far!). Though many residential neighborhoods back up to steep, somewhat denuded hills, there have not been any significant mudflows (so far!). There is an inadequate supply of N95 masks which are necessary when doing errands during periods of hazardous air quality."
- "Allowing 75 foot buildings downtown adds to the heat zone of the downtown corridor"
- "I'm glad a notice has been put out about the air pollution hazards. We need strong messaging from our leadership to help us through challenges."
- "heat mitigation in low income housing is not being taken seriously."
- "I do not think, in a town where the majority do not have AC, we (the city) are ready for extreme heat."
- "It wasn't apparent to me that the homeless had options to shelter in a cool/clear air space"
- "Hotter temperatures, but the city does not have shade structures in many areas."
- "Flooding. If we and our neighbors didn't go out and clean the storm drains when it rains hard, multiple yards would be underwater."
- "Wildfires: Reverse 911 works really well but most of my friends didn't know about it so trying to get the word out better. The Reverse 911 message also needs to be more clear including identifying the threat."

Responses to this question were used to generate a word cloud (see below).

HOW WOULD YOU PRIORITIZE THE FOLLOWING ACTIONS IN THE CITY OF SLO?



Respondents were asked to prioritize actions in the City of San Luis Obispo. Housing was most frequently listed as a number one priority; housing was chosen as the top priority 122 times or by 40% of respondents. Land Preservation, another priority topic, was selected as the number one priority 89 times or by 30% of respondents. Selected as the number one priority less frequently were Agricultural Land Preservation (selected 29 times or by 10% or respondents), Public Transportation (21 times or 7%), Trails (16 times or 5%), Parks (14 times or 5%), and Space for Business (9 times or 3%).



WHAT CLIMATE CHANGE ADAPTATION AND COMMUNITY RESILIENCE TOPICS ARE YOU INTERESTED IN LEARNING MORE ABOUT?

There were 104 responses to this question. The most common topical areas mentioned by respondents were transportation, energy, and the environment. Water, wildfire, housing and social issues were also prevalent topics, in addition to agriculture, temperature changes, development, and emergency management. Issues related to climate change mitigation, waste and pollution and the economy were also mentioned. Multiple comments indicated interest in any topic related to climate adaptation and resilience. There were also several comments that the City should not be pursuing this topic. The table below summarized the approximate number of mentions for each topical area and topics suggested by respondents.

Topical Area	Topics	Mentions
Transportation	▸ Electric vehicles and charging ▸ Public transportation ▸ EV charging for apartment renters ▸ Active Transportation/bikeability/walkability ▸ Reducing emissions from transportation ▸ Traffic reduction ▸ Walkable neighborhoods with access to services ▸ Pro Con approach to transportation decisions	19
Energy	▸ Solar, wind and renewable energy sources ▸ Solar for residential & existing homes ▸ Require rooftop solar ▸ Microgrids, batteries, & energy reliability ▸ Affordable energy ▸ Alternate technology such as trash to energy ▸ Preventing early close of Diablo Canyon ▸ Eradication of gas burning engines	15
Environmental Protection	▸ Open Space/land preservation ▸ Wildlife conservation ▸ Air pollution ▸ Urban forestry and trees to for urban cooling and societal benefits ▸ Ecosystem-based adaptation ▸ Saving beaches ▸ Natural landscaping	15
Water	▸ Water conservation ▸ "Integrated water resource management (intersections of flood management, water supply, watershed/habitat/GW protection, and water quality protection)." ▸ Drought and water supply ▸ Increasing infiltration ▸ Community outreach on water conservation	11
Wildfire	▸ City wildfire mitigation efforts ▸ Fire prevention & planning ▸ Outreach to property owners at the wildland urban interface ▸ Native land management practices and knowledge	10

Topical Area	Topics	Mentions
	▶ Fire safe building ▶ Wildfire smoke ▶ Prescribed burns ▶ Fire response	
Housing	▶ Balancing housing needs with land preservation ▶ Affordable housing ▶ Tiny homes ▶ Housing for Cal Poly students ▶ Repurposing existing developed land for housing ▶ Off-grid housing ▶ How climate change will impact housing prices	9
Social Issues	▶ How can the City encourage residents to contribute more? ▶ Homelessness ▶ Mass migration into City ▶ How can the City avoid an increase in the wealth gap and unequal burden of climate change on marginalized communities? ▶ Social equity and justice ▶ Community outreach regarding personal actions such as water conservation, wildfire mitigation, carbon footprint reduction, etc. ▶ How can the government better understand community wants and needs? ▶ Covid-19	9
Agriculture	▶ Community gardens ▶ Healthy food access ▶ Local food ▶ Soil health ▶ Regenerative agriculture and permaculture	7
Temperature Changes	▶ Extreme heat leading to AC installation and impacts on grid ▶ AC for schools and senior centers ▶ Alternatives to AC	7
Development	▶ How can we accommodate growth in a less dense format? ▶ Environmentally friendly development/ how can growth contribute to resilience? ▶ Encouraging businesses and government to be environmentally conscious ▶ Analysis of environmentally damaging industries and promoting more sustainable industrial practices ▶ Resilient construction materials and landscaping	5
Emergency Management	▶ Faster warning systems for natural disasters ▶ Planning for compound hazards ▶ Pandemic and epidemic planning ▶ Disaster preparedness and planning ▶ Neighborhood resilience ▶ Resilience	5
Climate Change Action	▶ City efforts to plan for and combat climate change	4

Topical Area	Topics	Mentions
	▸ Transitioning to a fossil fuel free society	
Waste & Pollution	▸ Waste in parks and open spaces ▸ Recycling and composting programs ▸ Compost use in community gardens ▸ Noise and light pollution	3
Economy	▸ Job security ▸ Diversifying employment from tourism	2

Responses to this were also used to generate a Word Cloud. As the Word Cloud highlights, water, transportation, energy, housing and land were among the frequently used words.

Appendix E Environmental Justice and Disadvantaged Communities

The City is home to populations with sociodemographic characteristics that may have a higher vulnerability to climate impacts. These groups may be concentrated in key areas of the City and have the potential to overlap with key climate related hazards that place these populations at a disproportionate higher risk from climate impacts. In general, low-income residents, communities of color, tribal nations, and immigrant communities have disproportionately experienced some of the greatest environmental burdens and related health problems throughout the history of the U.S. and in California.

These historic inequities are, in the majority of cases, not a coincidence but a result of inappropriate zoning and negligent land use planning, intersecting structural inequalities, failure to enforce proper zoning or conduct regular inspections, deed restrictions and other discriminatory housing and lending practices, limited political and economic power among certain demographics, the prioritization of business interests over public health, development patterns that tend to concentrate pollution and environmental hazards in certain communities, and the placement of economic and environmental benefits in areas outside of disadvantaged communities (California Environmental Justice Alliance 2017).

Based on the State's definition of disadvantaged communities, no census tracts within the San Luis Obispo region are designated as disadvantaged communities. However, the San Luis Obispo Council of Governments (SLOCOG) has created a regional definition of disadvantaged communities to help distribute funds more equitably, and meet the state and federal environmental justice requirements. In the San Luis Obispo Region, disadvantaged communities are defined as disproportionately burdened areas that are economically distressed and/or historically underrepresented as a part of the local government process. The Disadvantaged Communities Assessment identifies 13 variables that address a wide range of socioeconomic and population-based factors to geographically define these disproportionately-burdened areas. The 13 variables are:

1. Racial Minority
2. Ethnic Minority
3. Disability Status
4. Household Income
5. Free or Reduced-Price Meals
6. Educational Attainment
7. Language Proficiency
8. Renter Affordability
9. Housing Ownership Affordability
10. Older Adults: Age 75 Years and Older
11. Youth: Age 15 Years and Under
12. Households with No Vehicle Available
13. Households with No Computing Device Available

SLOCOG completed analysis at the traffic analysis zone (TAZ) level using these variables and evaluated relative to state and county averages. Points were assigned accordingly for each variable, and a composite score was derived for each TAZ in the region. The top quintile (top 20 percent) of TAZs were considered meeting the regional definition of disadvantaged communities. Individuals or households that include one or more of these variables are considered more vulnerable to natural and manmade hazards as well as the local impacts of climate change.

ENVIRONMENTAL JUSTICE SURVEY RESULTS

In preparation for development of the Community Safety and Resilience Element, an Environmental Justice Survey for community organizations was conducted to gather input on environmental topics from organizations that serve vulnerable and/or disadvantaged communities in the city. The survey gathered input on how the city can better support disadvantaged communities by reducing environmental pollution, identifying key community needs, and increasing the voice of marginalized groups in the City's decision-making process. Highlights from the survey are included below and have been integrated into the environmental justice goals, policies, in programs in this element. The full survey results can be found in Appendix D.

The survey was sent via email to 59 staff members at local organizations or agencies that work with disadvantaged communities or focus on diversity, equity, and inclusion. The survey received seven responses from community organizations that serve populations that live, work, and/or go to school in the city and in San Luis Obispo County.

Survey respondents noted the following types of environmental pollutants adversely impacting vulnerable populations:

1. Exhaust and traffic pollution from living in proximity to major roadways
2. Contaminated drinking water
3. Lead paint or pipes in housing
4. Pesticide pollution from agriculture
5. Living/working near environmental clean-up sites
6. Smoke from wildfires

Survey respondents included the following recommendations for how the City can help protect vulnerable populations from environmental pollutants, hazards and climate change impacts:

7. Host listening sessions inside of affected communities
8. Devote new human and material resources to investigate and remedy environmental injustices
9. Identify and appoint leadership from within the affected communities
10. Provide monetary or other basic needs support to farmworkers when their work is disrupted by unusual or dramatic climate events
11. Incorporate greater city plans to clean up pollutants and test for pollutants in soil and other locations

12. Provide access to resources, education, funding, and create platforms or events where community members may share their experiences and be intentionally listened to

Community Resilience and Social Infrastructure

Adaptive capacity is defined as the ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences (IPCC 2014). Alongside the steps the City and partner agencies have already taken to protect the City from existing climate-related hazards and increase its adaptive capacity, it is important to recognize the role community organizations and informal social networks can play in building adaptive capacity to the impacts of climate change.

Social cohesion, generally understood as the extent of connectedness and solidarity among groups in society or community, is one of the strongest indicators of resilience during disaster events as well as in post-disaster recovery efforts (Townshend et al. 2015). Social cohesion can play an important role in helping protect residents, particularly vulnerable populations, during climate-related disasters.

Important indicators of social cohesion identified in this research include:

1. Belonging versus isolation, which means shared values, identity, feelings of commitment;
2. Inclusion versus exclusion, which concerns equal opportunities of access;
3. Participation versus non-involvement;
4. Recognition versus rejection, which addresses the issue of respecting and tolerating differences in a pluralist society; and,
5. Legitimacy versus illegitimacy (Jenson 1998).

An important component in remaining resilient to the impacts of climate change and climate-related disasters is the post-disaster recovery period. As noted in research on the topic, a focus not only of the physical rehabilitation of the built environment but on addressing the emotional and mental health impacts of disasters is needed to ensure a successful community recovery during the post-disaster period. The emotional and mental health impacts of disasters can be addressed through various types of social cohesion including social and support networks (including access to social support in times of need), social participation (as the obverse of social isolation and being cut off from relationships providing friendship and company), and community engagement (including volunteering which draws people together to work for the benefit of others) (Townshend et al. 2015). While measuring the degree of social cohesion present in the city is not possible at this point, this subject is discussed here to emphasize the importance of social cohesion in increasing community resilience to the impacts of the climate change. Social cohesion here is highlighted as important component of community-based adaptative capacity and is discussed, as appropriate, in the discussions on specific climate-related hazards.

COMMUNITY ASSETS SURVEY RESULTS

In preparation for development of the Community Safety and Resilience Element, and Community Assets Survey was conducted to gather input from the general public about social cohesion, community strengths, and disaster preparedness. Survey respondents were asked which community assets and resources were most important to them under four different scenarios: Normal Life, Disaster Preparation, During a Disaster Event, and during Post Disaster recovery. The survey was open from August 12 through August 30, 2021. There were 266 responses to the survey. Highlights from the survey are included below and have been integrated into the goals, polices, in programs in this element. The full survey results can be found in Appendix D.

Community Strengths: Across all four scenarios, these assets were frequently mentioned:

1. Public Information (Disaster Information, Social Media, News)
   a. 47 mentions accounting for 20% of responses
2. Medical/Emergency Services (Public Safety)
   a. 41 mentions accounting for 17% of responses
3. Open Space/Trails
   a. 31 mentions accounting for 13% of responses

Respondents listed receiving the following benefits from the assets listed above:

Public Information: (Disaster Information, Social Media, News)

6. Access to accurate and understandable information
7. Informs about the current state of situation
8. Enhances ability to prepare and mobilize
9. Provides direction and recommendation
10. Connects community members to resources

Medical/Emergency Services:

11. Vaccines, injuries, aid
12. Provides reassurance and “peace of mind” when services are well staffed, present, and equipped

Open Space/Trails:

13. Improves mental and physical health
14. Outlet for activity or relaxation
15. Overall fitness and wellbeing are supported

Overview:

The Environmental Justice Survey for Community Organizations was intended to gather input on environmental topics from organizations that serve vulnerable and/or disadvantaged communities in the City of San Luis Obispo. More specifically, the survey gathered input on how the city can better support disadvantaged communities by reducing environmental pollution, identifying key community needs, and increasing the voice of marginalized groups in the City's decision-making process. The survey findings will support the integration of environmental justice into the City's General Plan Safety and Community Resilience Element.

The survey was open for two weeks from August 12th, 2021 to August 26th 2021. The survey was sent via email to 59 staff members at local organizations or agencies that work with disadvantaged communities or focus on diversity, equity, and inclusion. The survey was also shared with participants of the Environmental Justice Working Group.

Participation:

The survey received 7 responses from the following organizations:

- Diversity Coalition San Luis Obispo County
- SLO Food Bank
- HASLO
- United Way of San Luis Obispo County
- Lumina Alliance
- CAPSLO
- Habitat for Humanity SLO County

Populations Served:

All respondents indicated that they serve populations that live, work, and/or go to school in the City of San Luis Obispo. All organizations reported that they serve low-income, non/limited English speakers. Also, all organizations serve young children and youth within SLO. The majority (6/7) of responses showed to support those who are unhoused, unemployed, and uninsured. People without vehicle access, undocumented individuals and families, people with disabilities, and outdoor workers are also served by a majority of organizations. About half of respondents show support for people with chronic health conditions and people with severe mental illness.

Only one organization (Diversity Coalition SLO County) indicated that they aid racial and ethnic people of color and faith-based communities, this same organization specifically supports BIPOC populations. One individual organization described that they serve "low income residents of SLO County who lack the resources to purchase or obtain enough food for themselves or their families" while another organization noted they assist those with affordable housing ownership. One other organization serves victims of violence particularly.

Environmental Pollutants Adversely Impacting Vulnerable Populations

Types of environmental pollutants (all listed frequently among the respondents)

- Exhaust and traffic pollution from living in proximity to major roadways
- Contaminated drinking water
- Lead paint or pipes in housing
- Pesticide pollution from agriculture
- Living/working near environmental clean-up sites
- Smoke from wildfires

Populations are affected mostly by living and working near the environmental pollutants listed.

Farmworkers are at risk to greater pesticide exposure and are also impacted more by wildfire smoke as they are working outdoors.

Low income housing are often based in areas that are more impacted by pollutants such as noise and exhaust from higher traffic volumes.

Due to insufficient resources and low level priorities from local governments, vulnerable populations are subject to substandard living conditions, lack of proper education/recognition, and are of a low priority for remediation.

Recommendations for how the City can Help Protect Vulnerable Populations from Environmental Pollutants, Hazards and Climate Change Impacts

- Host listening sessions inside of affected communities.
- Devote new human and material resources to investigate and remedy environmental injustices.
- Identify and appoint leadership from within the affected communities
- Provide monetary or other basic needs support to farmworkers when their work is disrupted by unusual or dramatic climate events
- Incorporate greater city plans to clean up pollutants and test for pollutants in soil and other locations
- Provide access to resources, education, funding, and create platforms/events where community members may share their experiences and be intentionally listened to

Community Improvements to Protect the Wellbeing and Safety of Vulnerable Populations

1. Better transit services (more routes, more stops, shorter wait times).
2. Low income housing.
3.
    - Cooling Centers.
    - Broadband access.
    - Cooling/heating for homes and apartments (air conditioning/heat pumps).
4.
    - Park access.
    - Address food deserts by providing farmers markets and such in low income areas.
    - Street Trees.
    - Translation Services.

- Safe parking/ camping areas for the unhoused population that includes services and resources.
- Community gathering places.

"Real, tangible short and long-term, result driven solutions that are not based in politically motivated rhetoric and empty promises"

A general consensus shows these needs are anticipated to change beside one organization which does not think community needs will change as impacts increase. It was noted that better public transportation and cooling centers will rise in importance. Additionally, heightened rates of demographic change will increase need for affordable housing, educational resources, and access to broadband.

Important Public Services and Amenities

- Access to safe living conditions, legal services, and affordable child care.
- Libraries, bus transit, bicycling paths, safe overnight parking, public bathrooms, programs specifically targeted towards low-income housing.
- Living wage jobs and access to affordable housing.
- Access to public parks and recreation
- Transit improvements for senior and disabled populations.

Specifically for disaster situations

- Cooling centers, clean and safe shelters
- Access to food, clean water, electricity, and transportation
- Translation services and assistance for those with mobility issues
- Temporary housing for displaced individuals

Healthy Food Access

- Increase support for food banks
    - Partner with SLO Food Bank to determine regional gaps in service.
    - Create opportunities for food distributions, pantries, free farmer's markets in underserved communities.
- Improve public transportation to super markets and farmers markets
- Support food banks, farms, and gardens for low income neighbors

Participation in the Public Decision-Making Process

Barriers

- Language barriers seem to be most prevalent.
- Lack of trust also drives participation downward.
- Don't hear about opportunities (e.g not well connected to the City communication channels)
- Seems to be inaccessible to many people:
    - Too little time to engage (when struggling to put food on table, dealing with violence, engagement in public government not on radar.

    - Inaccessible meeting times
- Disconnection between members of the public and government body
    - Topics of city meeting not relevant
    - Lack of interest
    - Lack of knowledge on government processes.

Recommendations for improved involvement and communications

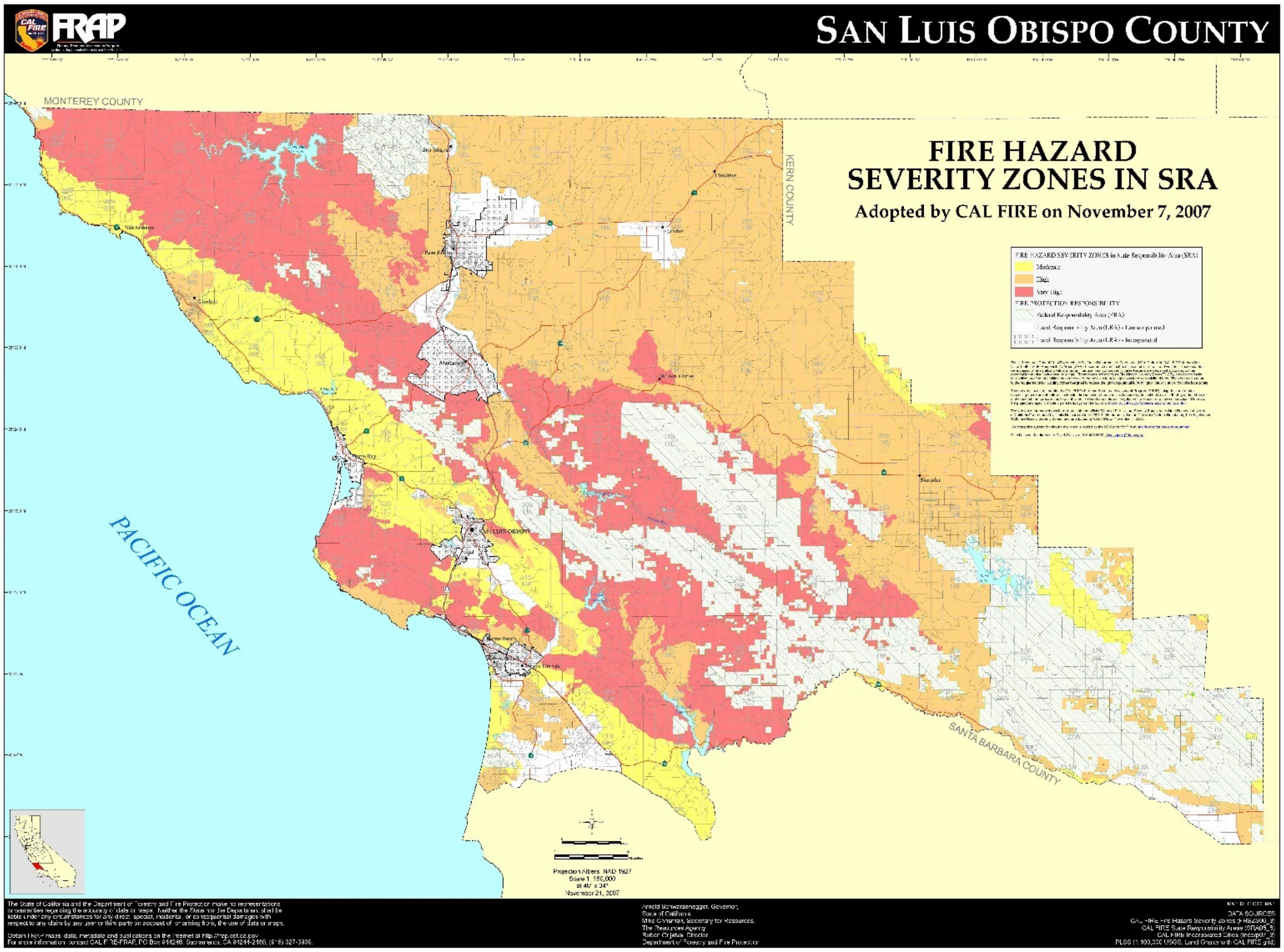
- Ensure affected communities have opportunities to create agendas, not simply respond to agendas.
- Incentivize participation
- Consider alternative meeting times outside of work week/hours
- Collaborate with trusted partners/agencies within different communities to spread information (specific recommendation to use CAPSLO to disseminate info of interest to civilians.
- "Prioritize and focus on real life, basic needs that enhance and sustain"

Additional Comments

- "Further reduce jobs/housing imbalance in order to reduce job commute times and all things associated with them (reduced air quality, decreased quality of life etc.)
- Please sustain our work making environmental justice a core priority in the city's service to all its citizens, don't allow to fall between the cracks… Thank you.

Appendix A

CAL FIRE San Luis Obispo County
Hazard Severity Zone Map


SAN LUIS OBISPO COUNTY
FIRE HAZARD
SEVERITY ZONES IN SRA
Adopted by CAL FIRE on November 7, 2007
MONTEREY COUNTY
KERN COUNTY
PACIFIC OCEAN
SANTA BARBARA COUNTY

Chapter 17.78
FLOOD DAMAGE PREVENTION

Sections:

17.78.010 Statutory authorization, findings of fact, purpose, and methods.

A. *Statutory Authorization.* The Legislature of the State has in Government Code Sections 65302, 65560, and 65800 conferred upon local governments the authority to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry. Therefore, the council does hereby adopt these floodplain management regulations.

B. *Findings of Fact.*

1. The flood hazard areas of the city are subject to periodic inundation, which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

2. These flood losses are caused by uses that are inadequately elevated, floodproofed, or protected from flood damage. The cumulative effect of obstructions in areas of special flood hazards that increase flood heights and velocities also contributes to flood losses.

C. *Statement of Purpose.* It is the purpose of this chapter to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by legally enforceable regulations applied uniformly throughout the community to all publicly and privately owned land within flood-prone, mudslide (i.e., mudflow), and/or flood-related erosion areas. These regulations are designed to:

1. Protect human life and health;

2. Minimize expenditure of public money for costly flood control projects;

3. Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

4. Minimize prolonged business interruptions;

5. Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone and sewer lines; and streets and bridges located in areas of special flood hazard;

6. Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future blighted areas caused by flood damage;

7. Ensure that potential buyers are notified that property is in an area of special flood hazard; and

8. Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

D. *Methods of Reducing Flood Losses.* To accomplish its purposes, this chapter includes regulations to:

1. Restrict or prohibit uses that are dangerous to health, safety, and property due to water or erosion hazards, or that result in damaging increases in erosion or flood heights or velocities;

2. Require that uses vulnerable to floods, including facilities that serve such uses, be protected against flood damage at the time of initial construction;

3. Control the alteration of natural floodplains, stream channels, and natural protective barriers which help accommodate or channel floodwaters;

4. Control filling, grading, dredging, and other development that may increase flood damage;

5. Prevent or regulate the construction of flood barriers that will unnaturally divert floodwaters or that may increase flood hazards in other areas; and

6. These regulations take precedence over any less restrictive conflicting local laws, ordinances, and codes. (Ord. 1650 § 3 (Exh. B), 2018)

17.78.020 Definitions.

Words or phrases used in this chapter shall be interpreted so as to give them the meaning they have in common usage and to give this chapter its most reasonable application, and as defined in Chapter 17.158 (General Definitions) under “Floodplain Management Regulations.” (Ord. 1650 § 3 (Exh. B), 2018)

17.78.030 General provisions.

A. *Lands to Which This Chapter Applies.* This chapter shall apply to all areas of special flood hazards and where specifically identified, XB zones, within the jurisdiction of the city.

B. *Basis for Establishing the Areas of Special Flood Hazard.* The areas of special flood hazard identified by the Federal Emergency Management Agency (FEMA) in the “Flood Insurance Study (FIS) for the City of San Luis Obispo, California in San Luis Obispo County” dated October 1978, with accompanying flood insurance rate maps (FIRMs) and flood boundary and floodway maps (FBFMs), dated April 1979, and all subsequent amendments and/or revisions, are hereby adopted by reference and declared to be a part of this chapter. This FIS and attendant mapping are the minimum areas of applicability of this chapter and may be supplemented by studies for other areas, including local experience and historical data which allow implementation of this chapter and which are recommended to the council by the floodplain administrator to be included in the regulated area. The study, FIRMs, and FBFMs are on file at the Department of Public Works, 919 Palm Street.

C. *Compliance.* No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this chapter and other applicable regulations. Violation of the requirements (including violations of conditions and safeguards) shall constitute a misdemeanor. Nothing here shall prevent the council from taking such lawful action as is necessary to prevent or remedy any violation.

D. *Abrogation and Greater Restrictions.* This chapter is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this chapter and another ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

E. *Interpretation.* In the interpretation and application of this chapter, all provisions shall be:

1. Considered as minimum requirements;

2. Liberally construed in favor of the governing body; and

3. Deemed neither to limit nor repeal any other powers granted under state statutes.

F. *Warning and Disclaimer of Liability.* The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by human-made or natural causes. This chapter does not imply that land outside the areas of special flood hazards or uses allowed within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the council, any officer or employee thereof, the state, or the Federal Emergency Management Agency, for any flood damages that result from reliance on this chapter or any administrative decision lawfully made hereunder. (Ord. 1650 § 3 (Exh. B), 2018)

17.78.040 Administration.

A. *Designation of the Floodplain Administrator.* The public works director or his/her designee is hereby appointed to administer, implement, and enforce this chapter by granting or denying development permits in accord with its provisions.

B. *Duties and Responsibilities of the Floodplain Administrator.* The duties and responsibilities of the floodplain administrator shall include but not be limited to the following:

1. *Permit Review.* Review all development permits to determine:

   a. Permit requirements of this chapter have been satisfied, including determination of substantial improvement and substantial damage of existing structures;

b. The applicant was advised other local, state or federal permits may be required;

c. The site is reasonably safe from flooding;

d. The proposed development does not adversely affect the carrying capacity of areas where base flood elevations have been determined but a floodway has not been designated. This means that the cumulative effect of the proposed development when combined with all other existing and anticipated development will not increase the water surface elevation of the base flood more than one foot at any point within the city;

e. If the proposed development is within a designated infill area, special floodplain management zone, or the Mid-Higuera Specific Plan Area as defined by the Drainage Design Manual, that the more stringent requirements of the manual have been met; and

f. All letters of map revision (LOMRs) for flood control projects are approved prior to the issuance of building permits. Building permits must not be issued based on conditional letters of map revision (CLOMRs). Approved CLOMRs allow construction of the proposed flood control project and land preparation as specified in the "start of construction" definition.

2. *Development of Substantial Improvement and Substantial Damage Procedures.*

a. Using FEMA publication FEMA 213, "Answers to Questions About Substantially Damaged Buildings," develop detailed procedures for identifying and administering requirements for substantial improvement and substantial damage, to include defining "market value."

b. Ensure procedures are coordinated with other departments/divisions and implemented by community development department staff.

3. *Review, Use, and Development of Other Base Flood Data.* When base flood elevation data has not been provided in compliance with Section 17.78.030(B) (Basis for Establishing the Areas of Special Flood Hazard), the floodplain administrator shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal or State agency, or other source, in order to administer Section 17.78.050 (Provisions for Flood Hazard Reduction).

NOTE: A base flood elevation may be obtained using one of two methods from the FEMA publication FEMA 265, "Managing Floodplain Development in Approximate Zone A Areas—A Guide for Obtaining and Developing Base (100-Year) Flood Elevations" dated July 1995.

4. *Notification of Other Agencies.*

a. *Alteration or Relocation of a Watercourse.*

i. Notify adjacent communities and the California Department of Water Resources prior to alteration or relocation;

ii. Submit evidence of such notification to the Federal Emergency Management Agency; and

iii. Ensure that the flood carrying capacity within the altered or relocated portion of the watercourse is maintained.

b. *Base Flood Elevation Changes Due to Physical Alterations.*

i. Within six months of information becoming available or project completion, whichever comes first, the floodplain administrator shall submit or ensure that the permit applicant submits technical or scientific data to FEMA for a letter of map revision (LOMR).

ii. All LOMRs for flood control projects are approved prior to the issuance of building permits. Building permits must not be issued based on conditional letters of map revision (CLOMRs). Approved CLOMRs allow construction of the proposed flood control project and land preparation as specified in the "start of construction" definition.

Such submissions are necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and floodplain management requirements are based on current data.

c. *Changes in Corporate Boundaries.* Notify FEMA in writing whenever the corporate boundaries have been modified by annexation or other means and include a copy of a map of the community clearly delineating the new corporate limits.

5. *Documentation of Floodplain Development.* Obtain and maintain for public inspection and make available as needed the following:

a. Certification required by Sections 17.78.050(A)(3) and 17.78.050(D) (lowest floor elevations);

b. Certification required by Section 17.78.050(A)(3) (elevation or floodproofing of nonresidential structures);

c. Certification required by Section 17.78.050(A)(3) (wet floodproofing standard);

d. Certification of elevation required by Section 17.78.050(C)(1) (subdivisions and other proposed development standards);

e. Certification required by Section 17.78.050(F)(2) (floodway encroachments); and

f. Maintain a record of all variance actions, including justification for their issuance, and report such variances issued in its biennial report submitted to FEMA.

6. *Map Determination.* Make interpretations, where needed, as to the exact location of the boundaries of the areas of special flood hazard where there appears to be a conflict between a mapped boundary and actual field conditions. The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in subsection (D) of this section.

7. *Remedial Action.* Take action to remedy violations of this chapter as specified in Section 17.78.030(C) (Compliance).

8. *Biennial Report.* Complete and submit biennial report to FEMA.

9. *Planning.* Ensure the general plan is consistent with floodplain management objectives here.

10. *Nonconversion of Enclosed Areas Below the Lowest Floor.* To ensure that the areas below one foot above the base flood elevation (BFE) shall be used solely for parking vehicles, limited storage, or access to the building and not be finished for use as human habitation without first becoming fully compliant with the floodplain management ordinance in effect at the time of conversion, the floodplain administrator shall:

a. Determine which applicants for new construction and/or substantial improvements have fully enclosed areas below the lowest floor that are five feet or higher;

b. Obtain a "Conversion Agreement for Construction Within Flood Hazard Areas" or equivalent between the property owner and the city. The agreement shall be recorded with the county of San Luis Obispo recorder as a deed restriction. The conversion agreement shall be in a form acceptable to the floodplain administrator and city attorney and:

i. Condition the property that there shall be no conversion of enclosed areas below the lowest floor elevation without first becoming fully compliant with this chapter and other city requirements.

ii. Have the authority granted to the city to inspect any area of a structure below the base flood elevation to ensure compliance upon prior notice of at least seventy-two hours.

C. *Development Permit.* A development permit shall be obtained before any construction or other development, including manufactured homes, within any area of special flood hazard established in Section 17.78.030(B) (Basis for Establishing the Areas of Special Flood Hazard). Application for a development permit shall be made on forms furnished by the city. The applicant shall provide the following minimum information:

1. Plans in duplicate, drawn to scale, showing:

a. Location, dimensions, and elevation of the area in question, existing or proposed structures, storage of materials and equipment and their location;

b. Proposed locations of water supply, sanitary sewer, and other utilities;

c. Grading information showing existing and proposed contours, any proposed fill, and drainage facilities;

d. Location of the regulatory floodway when applicable;

e. Base flood elevation information as specified in Sections 17.78.030(B) (Basis for Establishing the Areas of Special Flood Hazard) or subsection (B)(3) (Review, Use, and Development of Other Base Flood Data) of this section;

f. Proposed elevation in relation to mean sea level, of the lowest floor (including basement) of all structures; and

g. Proposed elevation in relation to mean sea level to which any nonresidential structure will be floodproofed, as required in Section 17.78.050(A)(3) (Elevation and Floodproofing) and detailed in FEMA Technical Bulletin TB 3-93.

2. Certification from a registered civil engineer or architect that the nonresidential floodproofed building meets the floodproofing criteria in Section 17.78.050(A)(3) (Elevation and Floodproofing).

3. For a crawlspace foundation, location and total net area of foundation openings as required in Section 17.78.050(A)(3) (Elevation and Floodproofing) and detailed in FEMA Technical Bulletins 1-93 and 7-93.

4. Description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

5. All appropriate certifications listed in subsection (B)(5) (Documentation of Floodplain Development) of this section.

D. *Appeals.* The council shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the floodplain administrator in the enforcement or administration of this chapter. (Ord. 1650 § 3 (Exh. B), 2018)

17.78.050 Provisions for flood hazard reduction.

A. *Standards of Construction.* In all areas of special flood hazards, the following standards are required:

1. *Anchoring.* All new construction and substantial improvements of structures, including manufactured homes, shall be adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.

2. *Construction Materials and Methods.* All new construction and substantial improvements of structures, including manufactured homes, shall be constructed:

a. With flood-resistant materials, and utility equipment resistant to flood damage for areas below the base flood elevation;

b. Using methods and practices that minimize flood damage;

c. With electrical, heating, ventilation, plumbing and air conditioning equipment, and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding; and

d. Within zones AH or AO, so that there are adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

3. *Elevation and Floodproofing.*

a. *Residential Construction.* Upon the completion of the structure, the elevation of the lowest floor, including basement, shall be certified by a registered civil engineer or licensed land surveyor, and verified by the Building Official to be properly elevated. Such certification and verification shall be provided to the floodplain administrator. All new construction or substantial improvements of residential structures shall have the lowest floor, including basement:

i. In AE, AH, A1-30 zones, elevated one foot above the base flood elevation.

ii. In an AO zone, elevated above the highest adjacent grade to a height one foot above the depth number specified in feet on the FIRM, or elevated at least three feet above the highest adjacent grade if no depth number is specified.

iii. In an A zone, without BFEs specified on the FIRM [unnumbered A zone], elevated one foot above the base flood elevation; as determined under Section 17.78.040(B)(3) (Review, Use, and Development of Other Base Flood Data).

iv. In an XB zone, above the base flood elevation.

b. *Nonresidential Construction.* All new construction or substantial improvements of nonresidential structures shall either be elevated to conform with subsection (A)(3) (Elevation and Floodproofing) of this section or:

i. Be floodproofed, together with attendant utility and sanitary facilities, below the elevation recommended under subsection (A)(3) (Elevation and Floodproofing) of this section, so that the structure is watertight with walls substantially impermeable to the passage of water;

ii. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and

iii. Be certified by a registered civil engineer or architect that the standards of subsection (A)(3) (Elevation and Floodproofing) of this section are satisfied. Such certification shall be provided to the floodplain administrator.

c. *Flood Openings.* All new construction and substantial improvements of structures with fully enclosed areas below the lowest floor (excluding basements) that are usable solely for parking of vehicles, building access or storage, and which are subject to flooding, shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwater. Designs for meeting this requirement must meet the following minimum criteria:

i. For nonengineered openings:

(a) Have a minimum of two openings on different sides having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding;

(b) The bottom of all openings shall be no higher than one foot above grade;

(c) Openings may be equipped with screens, louvers, valves or other coverings or devices; provided, that they permit the automatic entry and exit of floodwater; and

(d) Buildings with more than one enclosed area must have openings on exterior walls for each area to allow floodwater to directly enter; or

ii. Be certified by a registered civil engineer or architect.

d. *Manufactured Homes.*

i. Manufactured homes located outside of manufactured home parks or subdivisions shall meet the elevation and floodproofing requirement in subsection (A)(3) (Elevation and Floodproofing) of this section.

ii. Manufactured homes placed within manufactured home parks or subdivisions shall meet the standards in subsection D (Standards for Manufactured Homes Within Manufactured Home Parks or Subdivisions) of this section. Additional guidance may be found in FEMA Technical Bulletins TB 1-93 and TB 7-93.

e. *Garages and Low-Cost Accessory Structures.*

i. Attached Garages.

(a) A garage attached to a residential structure, constructed with the garage floor slab below the BFE, must be designed to allow for the automatic entry of floodwaters. See subsection (A)(3) (Elevation and Floodproofing) of this section. Areas of the garage below the BFE must be constructed with flood-resistant materials. See subsection (A)(2) (Construction Materials and Methods) of this section.

(b) A garage attached to a nonresidential structure must meet the above requirements or be dry floodproofed. For guidance on below-grade parking areas, see FEMA Technical Bulletin TB-6.

ii. *Detached Garages and Accessory Structures.*

(a) Accessory structures used solely for parking (two-car detached garages or smaller) or limited storage (small, low-cost sheds), as defined in Section 17.158.016—F Definitions, under Floodplain Management Regulations, may be constructed such that its floor is below the base flood elevation (BFE), provided the structure is designed and constructed in compliance with the following requirements:

(1) Use of the accessory structure must be limited to parking or limited storage;

(2) The portions of the accessory structure located below the BFE must be built using flood-resistant materials;

(3) The accessory structure must be adequately anchored to prevent flotation, collapse, and lateral movement;

(4) Any mechanical and utility equipment in the accessory structure must be elevated or floodproofed to or above the BFE;

(5) The accessory structure must comply with floodplain encroachment provisions in subsection F (Floodways) of this section; and

(6) The accessory structure must be designed to allow for the automatic entry of floodwaters in compliance with subsection (A)(3) (Elevation and Floodproofing) of this section.

(b) Detached garages and accessory structures not meeting the above standards must be constructed in compliance with all applicable standards in subsection A (Standards of Construction) of this section.

B. *Standards for Utilities.*

1. All new and replacement water supply and sanitary sewage systems shall be designed to minimize or eliminate:

a. Infiltration of floodwaters into the systems; and

b. Discharge from the systems into floodwaters.

2. On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

C. *Standards for Subdivisions and Other Proposed Development.*

1. All new subdivisions proposals and other proposed development, including proposals for manufactured home parks and subdivisions, greater than fifty lots or five acres, whichever is the lesser, shall:

a. Identify the special flood hazard areas (SFHA) and base flood elevations (BFE).

b. Identify the elevations of lowest floors of all proposed structures and pads on the final plans.

c. If the site is filled above the base flood elevation, the following as-built information for each structure shall be certified by a registered civil engineer or licensed land surveyor and provided as part of an application for a letter of map revision based on fill (LOMR-F) to the floodplain administrator:

i. Lowest floor elevation.

ii. Pad elevation.

iii. Lowest adjacent grade.

2. All subdivision proposals and other proposed development shall be consistent with the need to minimize flood damage.

3. All subdivision proposals and other proposed development shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage.

4. All subdivisions and other proposed development shall provide adequate drainage to reduce exposure to flood hazards.

D. *Standards for Manufactured Homes Within Manufactured Home Parks or Subdivisions.* All manufactured homes in special flood hazard areas shall meet the anchoring standards in subsection (A)(1) (Anchoring) of this section, construction materials and methods requirements in subsection (A)(2) (Construction Materials and Methods) of this section, flood openings requirements in subsection (A)(3) (Elevation and Floodproofing) of this section, and garages and low-cost accessory structure standards in subsection (A)(3) (Elevation and Floodproofing) of this section. Manufactured homes located outside of manufactured home parks or subdivisions shall meet the elevation and floodproofing requirement in subsection (A)(3) of this section.

1. All manufactured homes that are placed or substantially improved on sites located: (a) in a new manufactured home park or subdivision; (b) in an expansion to an existing manufactured home park or subdivision; or (c) in an existing manufactured home park or subdivision on a site upon which a manufactured home has incurred "substantial damage" as the result of a flood shall within zones A1-30, AH, and AE on the community's flood insurance rate map, shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated one foot above the base flood elevation and be securely fastened to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.

2. All manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within zones A1-30, AH, and AE on the community's flood insurance rate map that are not subject to the provisions of subsection (D)(1) of this section shall be securely fastened to an adequately anchored foundation system to resist flotation, collapse, and lateral movement, and be elevated so that either the:

   a. Lowest floor of the manufactured home is at least one foot above the base flood elevation; or

   b. Manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than thirty-six inches in height above grade.

Upon the completion of the structure, the elevation of the lowest floor, including basement, shall be certified by a registered civil engineer or licensed land surveyor, and verified by the building official, to be properly elevated. Such certification and verification shall be provided to the floodplain administrator.

E. *Standards for Recreational Vehicles.*

1. All recreational vehicles placed in zones A1-30, AH, and AE shall either:

   a. Be on the site for fewer than one hundred eighty consecutive days; or

   b. Be fully licensed and ready for highway use. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick-disconnect-type utilities and security devices, and has no permanently attached additions; or

c. Meet the permit requirements of Section 17.78.040(C) (Development Permit) and the elevation and anchoring requirements for manufactured homes in subsection (D)(1) of this section.

F. *Floodways.* Since floodways are extremely hazardous areas due to the velocity of floodwaters that carry debris, potential projectiles, and erosion potential, the following provisions apply:

1. Until a regulatory floodway is adopted, no new construction, substantial development, or other development, including fill, shall be allowed within zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other development, will not increase the water surface elevation of the base flood more than one foot at any point within the city.

2. If the proposed development is within a designated infill area, special floodplain management zone, or the Mid-Higuera Specific Plan Area as defined by the Drainage Design Manual, the more stringent requirements of the manual apply.

3. Within an adopted regulatory floodway, the city shall prohibit encroachments, including fill, new construction, substantial improvements, and other development, unless certification by a registered civil engineer is provided demonstrating that the proposed encroachment shall not result in any increase in flood levels during the occurrence of the base flood discharge.

4. If subsections (F)(1) and (F)(2) of this section are satisfied, all new construction, substantial improvement, and other proposed new development shall comply with all other applicable flood hazard reduction provisions of this subsection. (Ord. 1650 § 3 (Exh. B), 2018)

17.78.060 Variance procedure for floodplains.

A. *Nature of Floodplain Variances.* The issuance of a variance is for floodplain management purposes only. Insurance premium rates are determined by statute according to actuarial risk and will not be modified by the granting of a variance.

The variance criteria contained in this section of the chapter are based on the general principle of zoning law that variances pertain to a piece of property and are not personal in nature. A variance may be granted for a parcel of property with physical characteristics so unusual that complying with the requirements of this chapter would create an exceptional hardship to the applicant or the surrounding property owners. The characteristics must be unique to the property and not be shared by adjacent parcels. The unique characteristic must pertain to the land itself, not to the structure, its inhabitants, or the property owners.

It is the duty of the council to help protect its citizens from flooding. This need is so compelling and the implications of the cost of insuring a structure built below flood level are so serious that variances from the flood elevation or from other requirements in this chapter are quite rare. The long-term goal of preventing and reducing flood loss and damage can only be met if variances are strictly limited. Therefore, the variance guidelines provided in this chapter are more detailed and contain multiple provisions that must be met before a variance can be properly granted. The criteria are designed to screen out those situations in which alternatives other than a variance are more appropriate.

B. *Conditions for Variances.*

1. Generally, variances may be issued for new construction, substantial improvement, and other proposed new development to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level; provided, that the procedures of Sections 17.78.040 (Administration) and 17.78.050 (Provisions for Flood Hazard Reduction) of this chapter have been fully considered. As the lot size increases beyond one-half acre, the technical justification required for issuing the variance increases.

2. Variances may be issued for the repair or rehabilitation of “historic structures” (as defined in Chapter 17.158: General Definitions, under Floodplain Management Regulations) upon a determination that the proposed repair or rehabilitation will not preclude the structure’s continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.

3. Variances shall not be issued within any mapped regulatory floodway if any increase in flood levels during the base flood discharge would result.

4. Variances shall only be issued upon a determination that the variance is the “minimum necessary,” considering the flood hazard, to afford relief. “Minimum necessary” means to afford relief with a minimum of deviation from the requirements of this chapter. For example, in the case of variances to an elevation requirement, this means the council need not grant permission for the applicant to build at grade, or even to whatever elevation the applicant proposes, but only to that elevation which the council believes will both provide relief and preserve the integrity of this chapter.

5. Any applicant to whom a variance is granted shall be given written notice over the signature of the floodplain administrator that:

a. The issuance of a variance to construct a structure below the base flood level will result in increased premium rates for flood insurance up to amounts as high as twenty-five dollars for one hundred dollars of insurance coverage; and

b. Such construction below the base flood level increases risks to life and property. It is recommended that a copy of the notice shall be recorded by the floodplain administrator in the office of the County of San Luis Obispo recorder and shall be recorded in a manner so that it appears in the chain of title of the affected parcel of land.

6. The floodplain administrator shall maintain a record of all variance actions, including justification for his/her issuance, and report such variances issued in its biennial report submitted to the Federal Emergency Management Agency.

C. *Authority to Grant Variances.* Notwithstanding the provisions of Chapter 17.114 (Variances), the council shall be responsible for conducting public hearings on variances pertaining to the provisions of this chapter and for acting upon such variance applications.

1. In acting upon requests for variances, the council shall consider all technical evaluations, all relevant factors and standards specified in other sections of this chapter, and the:

a. Danger that materials may be swept onto other lands to the injury of others;

b. Danger of life and property due to flooding or erosion damage;

c. Susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the existing individual owner and future owners of the property;

d. Importance of the services provided by the proposed facility to the community;

e. Necessity to the facility of a waterfront location, where applicable;

f. Availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;

g. Compatibility of the proposed use with existing and anticipated development;

h. Relationship of the proposed use to the general plan and floodplain management program for that area;

i. Safety of access to the property in time of flood for ordinary and emergency vehicles;

j. Expected heights, velocity, duration, rate of rise, and sediment transport of the floodwaters expected at the site; and

k. Costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water system, and streets and bridges.

2. Variances shall only be issued upon a:

a. Showing of good and sufficient cause;

b. Determination that failure to grant the variance would result in exceptional hardship to the applicant; and

c. Determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, or extraordinary public expense, create a public nuisance, cause fraud and victimization of the public, or conflict with existing local laws or ordinances.

3. Variances may be issued for new construction, substantial improvement, and other proposed new development necessary for the conduct of a functionally dependent use; provided, that the provisions of subsections (C)(1) through (C)(4) of this section are satisfied and that the structure or other development is protected by methods that minimize flood damages during the base flood and does not result in additional threats to public safety and does not create a public nuisance.

4. Upon consideration of the factors of subsection B of this section and the purposes of this chapter, the council may attach such conditions to the granting of variances as it deems necessary to further the purposes of this chapter. (Ord. 1650 § 3 (Exh. B), 2018)

The San Luis Obispo Municipal Code is current through Ordinance 1720, passed August 16, 2022.

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