RESILIENT SLO

DROUGHT FLOODING WILDFIRE EXTREME HEAT

CLIMATE CHANGE HAZARDS AND VULNERABILITY ASSESSMENT REPORT SUMMARY

The climate is changing, and the pace of global warming is rapidly increasing from human activities. According to the Intergovernmental Panel on Climate Change, human-caused climate change is likely to increase the global average temperature by 1.5 degrees Celsius (2.7° Fahrenheit) between 2030 and 2052. If warming is higher than 1.5 degrees Celsius, many natural systems that sustain life will be pushed past a dangerous turning point and have limited ability to recover. While the global community continues to work to reduce greenhouse gas emissions moving forward, historic global greenhouse gas emissions have already solidified permanent changes to the environment. These changes bring substantial impacts to the world, the state, the region, and the City of San Luis Obispo. Acknowledging the severity of these impacts and the importance of preparedness and resilience, the City of San Luis Obispo City Council has identified climate adaptation and resilience as a top priority.

RESILIENT SLO OVERVIEW

The City is conducting the Resilient SLO project, a community-led initiative to improve community resilience to the worsening impacts of climate change. To learn more about the project and keep up to date, visit the Resilient SLO website at: www.lgc.org/resilient-slo/.

This booklet provides key highlights and findings from the City's **Climate Change Hazards and Vulnerabilities Report** (Report). The Report assesses how climate change will impact the City by identifying:

- The City's exposure to climate-related hazards
- Potential impacts of climate-related hazards
- Populations in the community that are most vulnerable to climate change impacts
- City infrastructure and ecosystems that are vulnerable to climate change impacts
- The City's existing capacity to address climate change impacts.

The Report focuses on four key climate-related hazards: Drought, Flooding, Wildfire, and Extreme Heat. To help better understand how these hazards will affect different components of the City, the analysis of impacts has been organized into three categories listed and defined below.

- **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.
- **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.
- **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).

WHAT IS THE CITY ALREADY DOING?

DROUGHT

Because drought is not new to the central coast region, the City already has a comprehensive set of initiatives and resources to address drought including:

- the **Urban Water Management Plan** and **Water Shortage Contingency Plan** to manage the City's water supply,
- the **Recycled Water Master Plan** for use of recycled water in the City, and
- the **San Luis Valley Groundwater Sustainability Plan** to manage groundwater resources.

FLOODING

Because flooding has been an issue in SLO, historically, The City is already supporting or implementing a comprehensive set of plans and policies with regional partners to reduce the risk of flood impacts including:

- Through the County's Flood Control District, the Mid-Higuera Bypass Project is proposed to increase the flood control capacity of the San Luis Obispo Creek between Marsh Street and Madonna Road.
- the City's **Local Hazard Mitigation Plan** that includes strategies to reduce risk from flooding events;
- the City's **Waterway Management Plan** to address flooding, erosion, water quality, and ecological issues in the San Luis Obispo Creek Watershed; and
- the City's participation in the **National Pollution Discharge Elimination System Program** which includes requirements to help manage urban stormwater.

WILDFIRE

The City and regional partners are already implementing a comprehensive set of plans and policies to reduce the risk of wildfire impacts including:

- implementing the City's **Community Wildfire Protection Plan** to minimize wildfire risk to areas in and around the City limits;
- implementing the City's **Vegetation Management Plan: The Wildland-Urban Interface** to reduce wildfire risk in the City's open space areas; and the development of the **Comprehensive Disaster Leadership Plan** which includes procedures and protocols to be implemented during emergency evacuation events as well as during utility disruptions (e.g., electricity, telecommunications).
- Central Coast Community Energy (3CE) as well as Pacific Gas & Electric have begun to help fund the installation of reliable backup power systems for public and private entities operating critical facilities, increasing energy resilience during utility disruptions.
- Pacific Gas & Electric Company has begun the hardening of their electrical equipment and conducting fuel reduction efforts around energized lines to reduce the likelihood of an equipment-caused fire and reduce the frequency of future Public Safety Power Shutoff events.

EXTREME HEAT

Currently, the City does not have comprehensive plans and policies to address extreme heat because, historically, extreme heat has not been an issue. However, the **Climate Action Plan for Community Recovery** includes a measure to plan 10,000 new trees by 2035 which will contribute some shade to the City landscape, and the Parks and Recreation blueprint for the Future 2021-2041 includes some shade infrastructure for City parks. As temperatures continue to change, the City will be working to address extreme heat through services and policies.

ENVIRONMENTAL JUSTICE AND VULNERABLE POPULATIONS

ENVIRONMENTAL JUSTICE OVERVIEW

ENVIRONMENTAL JUSTICE

The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

According to the U.S. Environmental Protection Agency, environmental justice can be defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. As the City continues to plan for the impacts of climate change, it is important to recognize that certain populations and areas of the City are more vulnerable to climate-related impacts (e.g., flooding, extreme heat). As identified in the Report, populations with specific vulnerabilities are 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.

DISADVANTAGED COMMUNITIES IN SAN LUIS OBISPO

DISADVANTAGED COMMUNITIES

Disproportionately burdened areas that are economically distressed and/or historically underrepresented as a part of the local government process.

The San Luis Obispo Council of Governments (SLOCOG) has created a regional definition of disadvantaged communities to help distribute funds more equitably and meet 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 SLOCOG Disadvantaged Communities Assessment has identified 13 variables that address a wide range of socioeconomic and population-based factors to geographically define these disproportionately burdened areas.

To read more about the SLOCOG's assessment, visit:

https://www.slocog.org/programs/data-services/gis-mapping/disadvantaged-communities

DISADVANTAGED COMMUNITIES IN SAN LUIS OBISPO

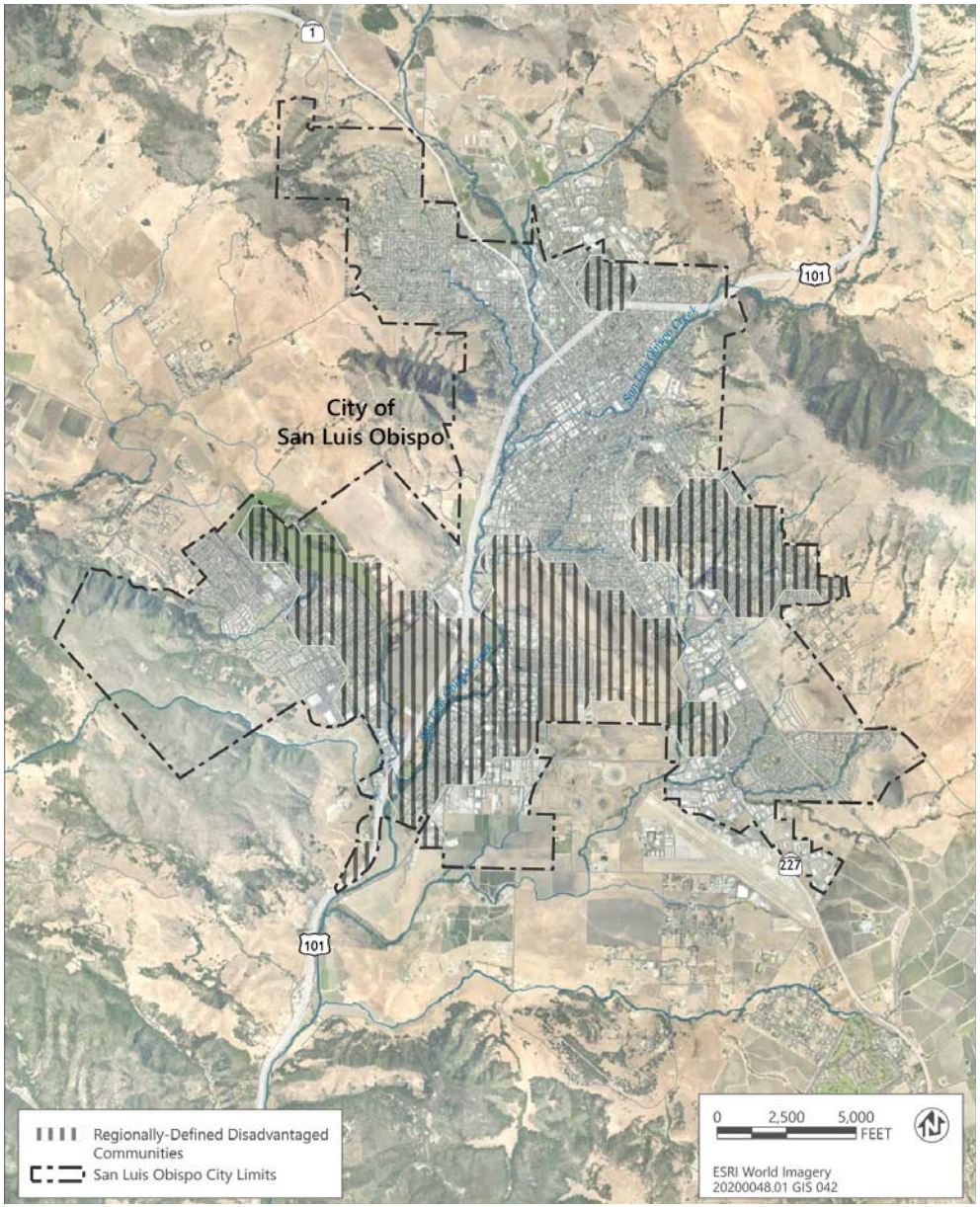
The map on the right includes the areas with the City of San Luis Obispo with regionally defined disadvantaged communities.

Included below are key findings from the social vulnerability analysis which is included in the Report:

Cost of Living: Overall, the cost of living in the City is high relative to household income. According to data from the U.S. Census Bureau, around 57 percent of renters in the City spend 35 percent or more of their income on rent. The high cost of living makes these residents more vulnerable to climate-related hazard events with less financial resources to prepare and recover from these events.

Vulnerable Neighborhoods: The neighborhood to the east of South Higuera Street along Margarita Avenue and Prado Road, as well as the neighborhood west of South Higuera Street near Tank Farm Road, stand out as a particularly vulnerable area of the City. Notable characteristics of these areas include a high percentage of elderly and disabled residents, a high percentage of residents experiencing linguistic isolation (i.e., speaking a language other than English at home), low access to supermarkets and grocery stores, and a larger percentage of residents earning less than 200% of the federal poverty level.

Unhoused Populations: The city's homeless population is particularly vulnerable to climate-related hazards with less access to shelter and resources to protect themselves during emergency events (e.g., flooding, heat waves). Shelters and encampments built by unhoused individuals are often developed in or near flood plains and areas with higher wildfire risk, placing these populations at increased risk during emergency events, particularly in areas with lower levels of access to transportation.



Disadvantaged Communities in the City of San Luis Obispo

DROUGHT

CHANGES IN DROUGHT RISK

Precipitation patterns in California shift between dry and wet multi-year periods. Climate change is projected to intensify these seasonal extremes. Dry periods are projected to become dryer and wet periods wetter, leading to longer and more severe droughts when they do occur. While average annual precipitation in the County is projected to trend upward in future years, precipitation patterns are expected to become more volatile, with potentially less frequent but more intense storms that produce above average amounts of precipitation.

ANNUAL PRECIPITATION

During non-drought periods, annual average precipitation in San Luis Obispo County is projected to **INCREASE FROM 16.1 INCHES TO 19.8 INCHES BY AS EARLY AS 2070.** However, this increased precipitation will come through less frequent but more intense rainfall events.

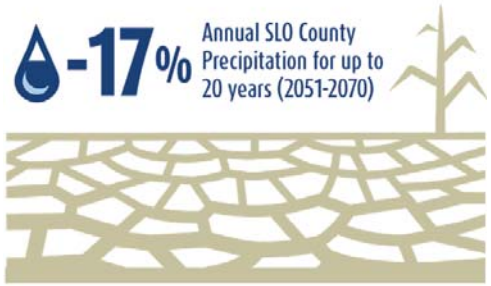
LONG-TERM DROUGHT

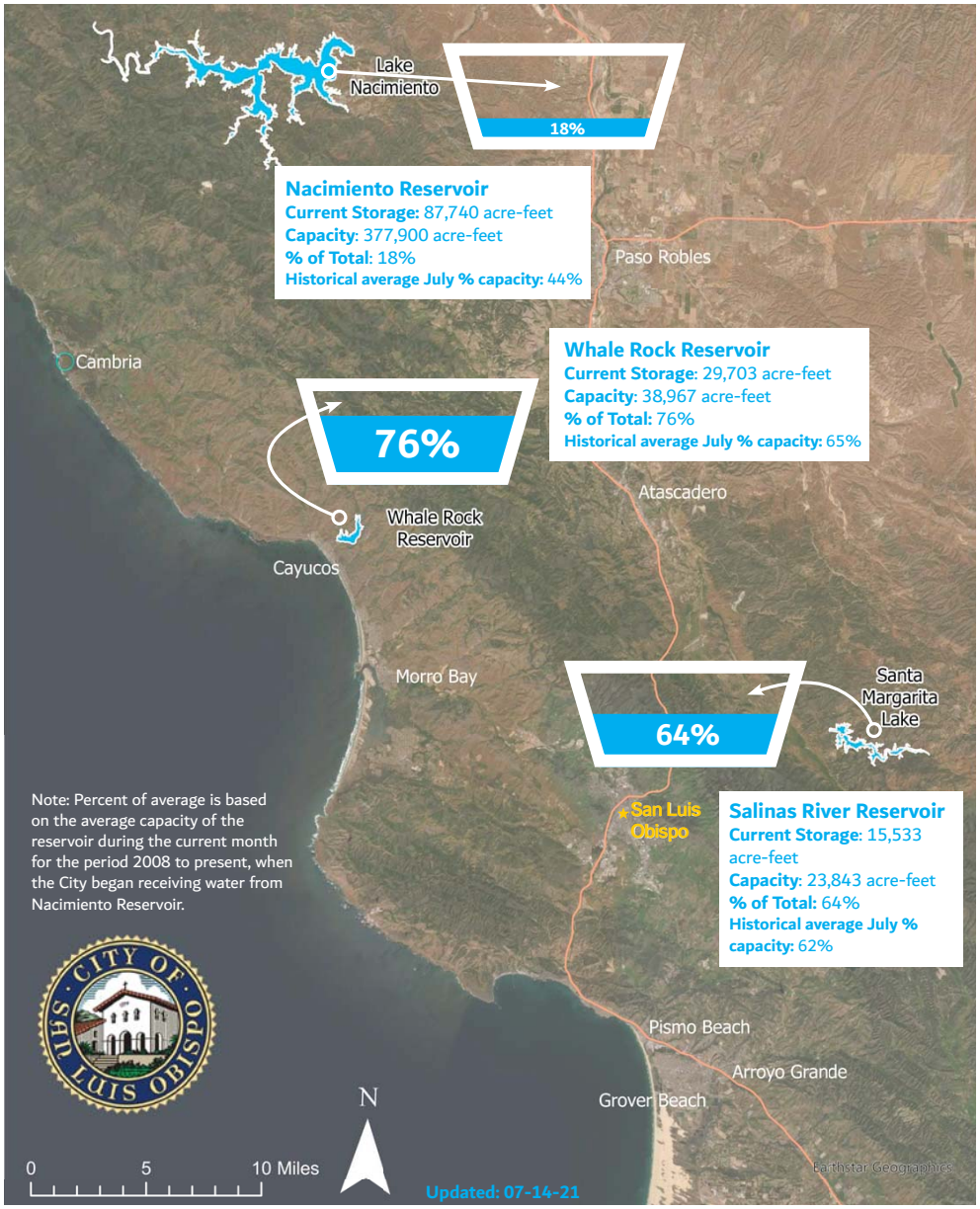
Climate change will increase the likelihood of a long-term (20-year) drought occurring, with **AVERAGE ANNUAL RAINFALL DECREASING 17% FOR UP TO 20 YEARS.**

WHIPLASH EVENTS

Shifts between extremely dry and extremely wet multi-year 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".

Long-Term Drought Scenario





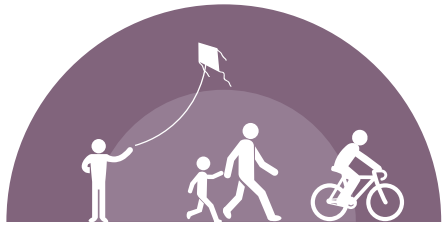
City of San Luis Obispo Multi-Source Water Supply Network and Storage Levels (July 2021)

DROUGHT IMPACTS

In the future, drought scenarios will have the largest potential impact on natural systems (e.g., plants and animals, urban trees, landscaped areas) and the City's water supply (i.e., Whale Rock Reservoir, Salinas Reservoir, Nacimiento Reservoir, and recycled water). Future drought scenarios could result in voluntary or mandatory water use reductions for City residents and businesses. However, the City incorporates climate-related projections into long-range water resource plans.

BUILT ENVIRONMENT

Rainfall runoff that drains into the City's reservoirs results in the buildup of sediment and can reduce the reservoir's overall water storage capacity. Landscape disturbances including wildfire, post-wildfire runoff, or landslides after wet winters, are projected to increase sedimentation in reservoirs in the central coast region in the future. This has the potential to affect the City's water supply. However, the City proactively implements best management practices to reduce erosion and sedimentation in its reservoirs.



COMMUNITY RESILIENCE

Long-term drought scenarios may result in intensified water conservation measures for residents and businesses in the City. Future long-term drought could result in the increased prevalence of certain vector-borne diseases present in the central coast region including Lyme disease and valley fever.

NATURAL SYSTEMS

The City's designated open space areas include a mixture of vegetation types including oak woodland, grassland, coastal sage scrub, and chaparral that are likely to be impacted by long-term droughts. As dry years and long-term droughts become more common in the future, populations of annual plant species may decline and certain plant species are likely to become locally extinct.

FLOODING

CHANGES IN FLOOD RISK

California's location, next to the Pacific Ocean, exposes the state to the atmospheric rivers. An Atmospheric River is a narrow corridor of concentrated moisture in the atmosphere. The presence of an Atmospheric River contributes to the frequency of "wet years"-years with above-average annual precipitation and large storms. The frequency of these large storm sequences over short timeframes is projected to increase noticeably in the future, with the size and frequency of events dependent on future levels of global greenhouse gas emissions.

PEAK STREAM FLOW

During the 10-year storm event (10% chance of occurring in any year), the maximum instantaneous amount of water flowing (peak stream flow) through the City's streams will increase on average by 33% by 2070. Peak streamflow in the City will also **INCREASE ON AVERAGE BY 38% BY 2070 FOR VERY LARGE STORM EVENTS** (100-year storm or a storm with a 1% chance of occurring in any year).

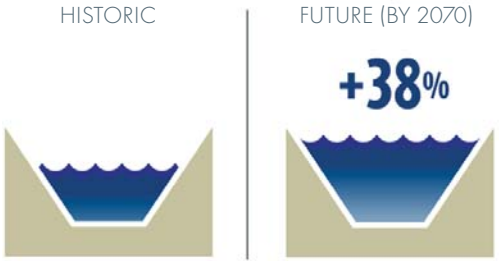
STORMWATER RUNOFF

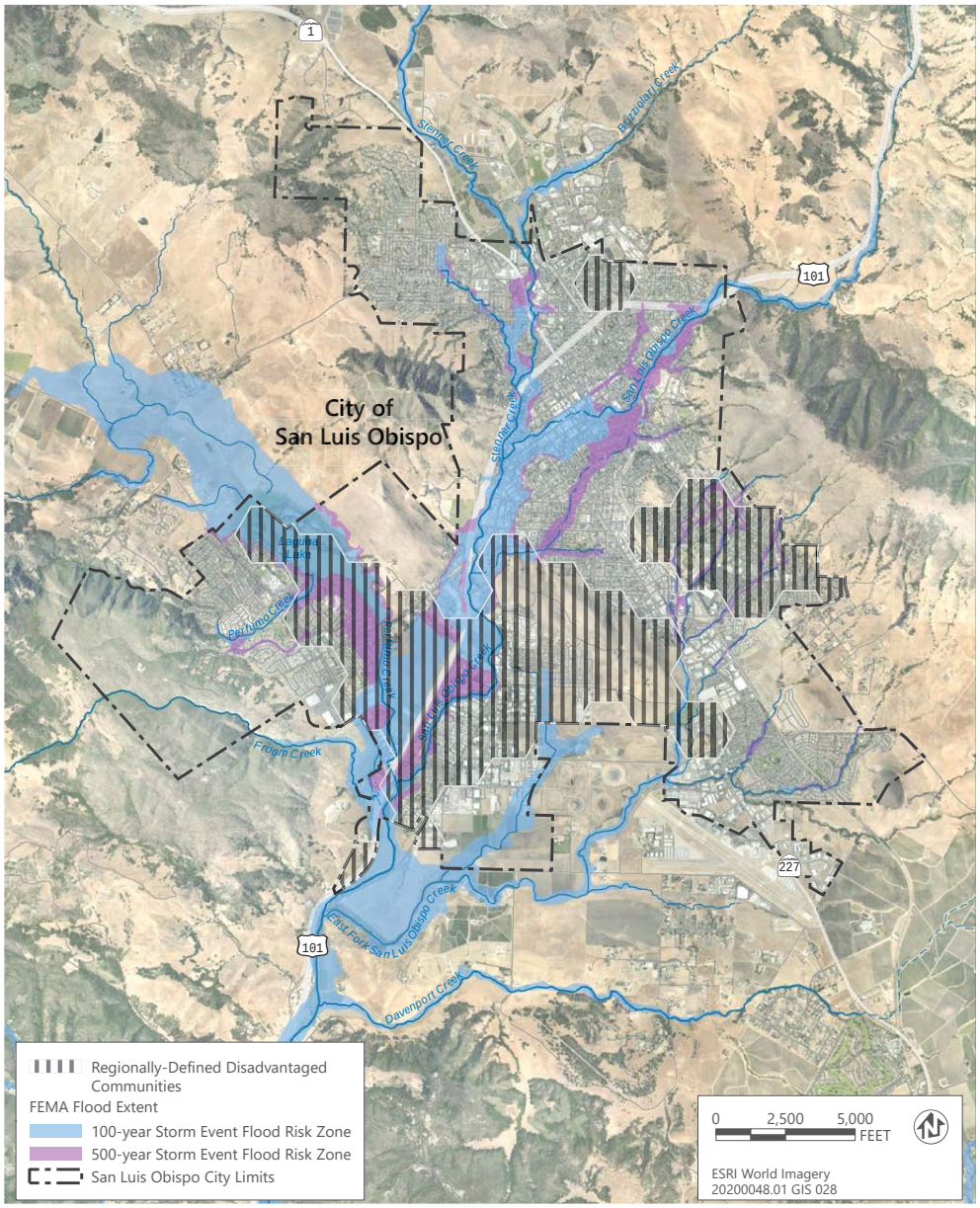
In the mid-winter months, the soils in the San Luis Obispo Creek Watershed are relatively saturated and generate runoff more quickly. For very large precipitation events, the capacity of the watershed to absorb incoming rainfall can be quickly exceeded, causing large increases in streamflow.

LARGE FLOODS

Historically, the greatest flooding impacts in City have occurred from **ATMOSPHERIC RIVER EVENTS WITH SEVERAL STORM EVENTS OCCURRING OVER SHORT TIME PERIODS** (typically 2 weeks to 3 months), similar to the Great Flood events of 1861–1862. A storm of similar magnitude is more likely than not to occur at least once between 2018 and 2060.

Peak Stream Flow During Large Storms





Flood Plains (100- and 500-year storms) and Disadvantaged Communities in the City of San Luis Obispo

FLOODING IMPACTS

Climate change is projected to increase the intensity (total rainfall) of storm events in the City, compromising the ability of the City's stormwater management system to manage rainfall during large storm events. Climate-informed flood modeling predicts that by 2070 the flood plains for the City's 100-year and 500-year storm events will expand, increasing the risk for properties in or near the City's existing floodplains.

BUILT ENVIRONMENT

The City's stormwater management system is designed to manage stormwater runoff based on the size of historic storm events. However, climate change is projected to increase the size of storm events. By 2070, the increased streamflow from a 100-year storm event (1% chance of occurring in any year) will likely overwhelm the City's existing stormwater infrastructure's ability to safely control floodwaters. This would cause floodwaters to break out of the San Luis Obispo Creek channel, flowing along the Higuera and Marsh Street corridor towards Stenner Creek as well as other locations. Large flooding events may also cause damage to buildings and degrade the lifespan of roadways and bridges.

COMMUNITY RESILIENCE

While all areas of the City within floodplains are at risk from large storm events, there is significant overlap between these floodplains and areas in the City with disadvantaged communities (defined by the San Luis Obispo Council of Governments as disproportionately burdened areas that are economically distressed and/or historically underrepresented as a part of the local government process.). This includes neighborhoods along South Higuera Street near San Luis Obispo Creek and the Laguna Lake neighborhood. Flooding may also disproportionately impact homeless populations whose settlements are often in floodplains and are less able to transport themselves out of flood areas during storm events.

NATURAL SYSTEMS

Increases in large storm events can result in increased erosion of creek banks and increased sedimentation in waterways and water bodies like Laguna Lake. "Wet years", with above average annual precipitation, can also increase plant growth resulting in increased fuel for wildfires during subsequent dry years.

WILDFIRE

CHANGES IN WILDFIRE RISK

Wildfire risk is determined by several factors, such as wind, available wildfire fuel (i.e., plants), fuel moisture levels, topography, past wildfire suppression, and the presence of the wildland-urban interface (i.e., development and homes in and around natural areas). Increasing temperatures and changes to rainfall patterns caused by climate change will increase the probability of wildfires occurring in San Luis Obispo County. These changes will also increase the size of fires when they do occur.

WILDFIRE FREQUENCY

By as early as 2035, the likelihood that one or more major wildfires (wildfires burning 988 acres or more) will occur in San Luis Obispo County over a ten-year period will **INCREASE FROM 20%, HISTORICALLY, TO 30%.**

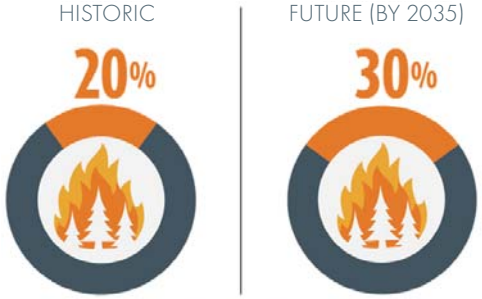
SIZE OF WILDFIRES

By as early as 2035, the average size of wildfires (wildfires burning 988 acres or more) in San Luis Obispo County, when they do occur, will **INCREASE BY 16%**. Historically, the average wildfire size in the County was 22,852 acres and by 2035 the average wildfire is projected to be 26,509 acres.

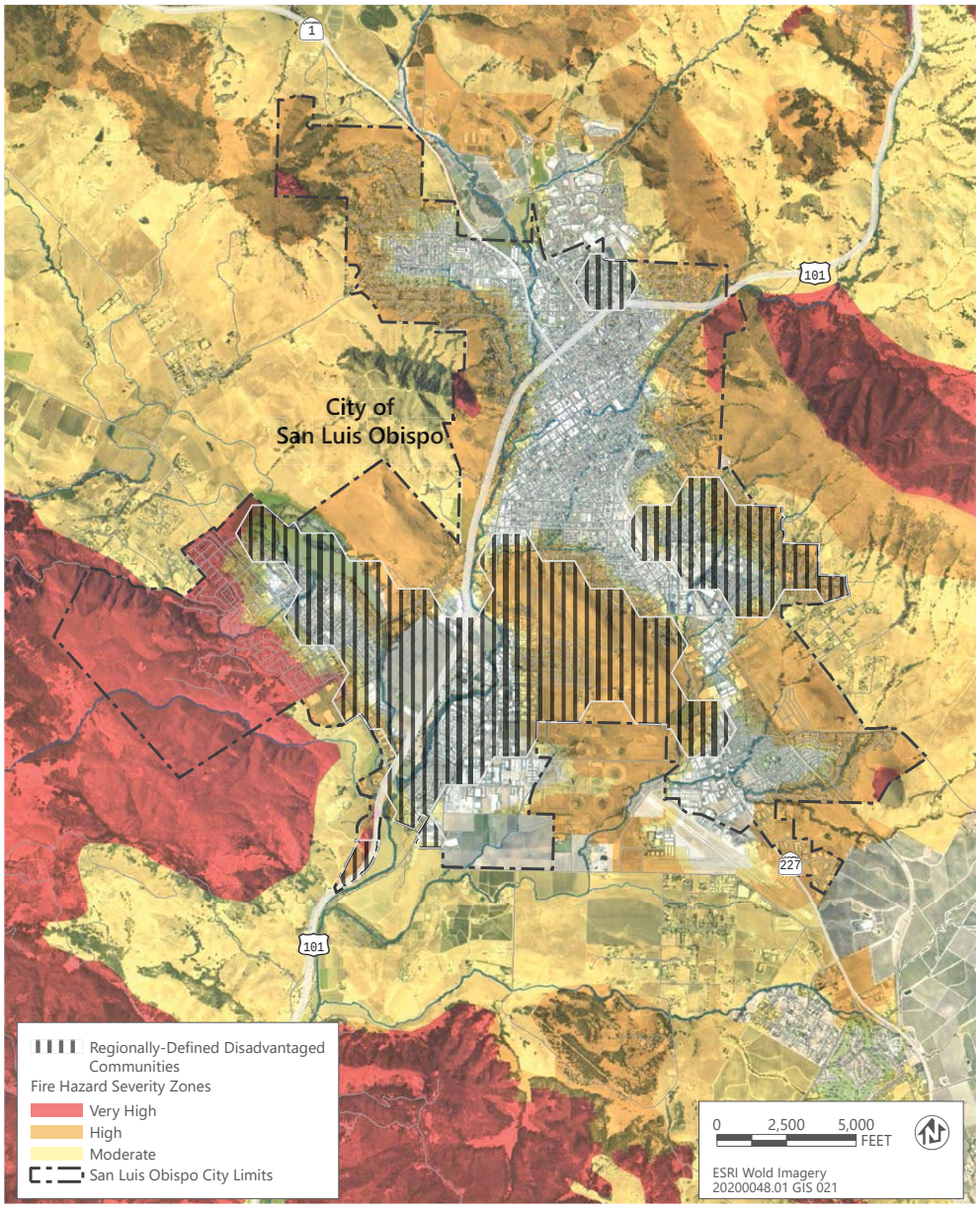
WILDFIRE LOCATION

Although areas surrounding the City will be at increased risk from wildfires, the largest anticipated countywide increases in the size of wildfires in the future will occur in the Santa Lucia Wilderness and the La Panza Mountain range located in the south-central portions of the County.

Probability of Major Wildfire in SLO County over 10 Years



major wildfire = wildfires burning 988 acres or more



Fire Hazard Severity Zones (Cal Fire designated) and Disadvantaged Communities in the City of San Luis Obispo

WILDFIRE IMPACTS

Increases in the frequency and size of wildfires in San Luis Obispo County may affect the City in different ways depending on the location and extent of the fires. Wildfires occurring in or surrounding the City will have a much larger impact on the community including potential loss of life, property damage, emergency evacuation events, and impacts on local air quality. Structures in the wildland-urban interface are at increased risk from wildfire impacts and increased risk for fire ignition.

BUILT ENVIRONMENT

The City includes areas that have been designated as Very High Fire Hazard Severity Zones by Cal Fire (e.g., areas at increased risk of property damage, loss of life). These areas include the neighborhood adjacent to the Irish Hills Natural Reserve, areas to the east of San Luis Drive in the north of the City, and small portions of the Ferrini Ranch Open Space area. To avoid wildfire ignitions, electricity utilities have begun implementing Public Safety Power Shutoffs (e.g., preemptive power shutoffs) during periods of high wildfire risk. Public Safety Power Shutoffs are projected to increase in the future, leaving City residents and businesses without power when they do occur.

COMMUNITY RESILIENCE

As a regional employment center in the County, the City experiences a large influx of daily visitors. Evacuation events during daytime hours would be challenging because of high numbers of daily visitors. Exposure to wildfire smoke, particularly exposure for vulnerable populations (i.e., elderly, youth, communities of color, individuals underlying health conditions), is a public health risk. Smoke exposure can result in worsening respiratory symptoms, increased rates of cardiorespiratory emergency visits, hospitalizations, and even death. Neighborhoods that are particularly vulnerable to wildfire impacts have relatively large elderly and youth populations and locations near fire hazard areas.

NATURAL SYSTEMS

The increasing frequency of fires in open space areas can affect local ecosystems. Specifically causing coastal sage shrubs and chaparral to shift to grasses over time. Large rainfall events in wildfire-affected areas can cause post-wildfire runoff and debris flows (e.g., mudslides with debris) potentially causing loss of life, property damage, blocking roadways, and increasing sedimentation in waterways.

EXTREME HEAT

CHANGES IN EXTREME HEAT

The City has a mild Mediterranean climate. Climate change is projected to increase both minimum and maximum annual average temperatures in the City and increase the prevalence of extreme heat events.

EXTREME HEAT DAYS

By as early as 2035, the City is likely to experience **APPROXIMATELY 10 EXTREME HEAT DAYS** (maximum temperature above 89.6 °F or higher) per year compared to 4 days historically.

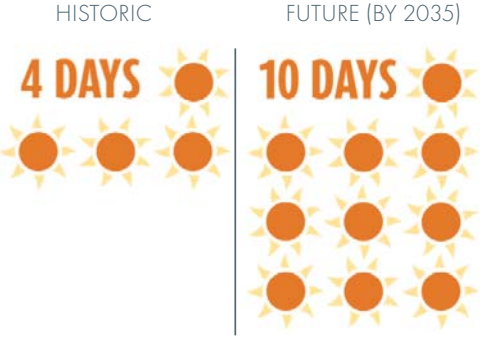
HEAT WAVE EVENTS

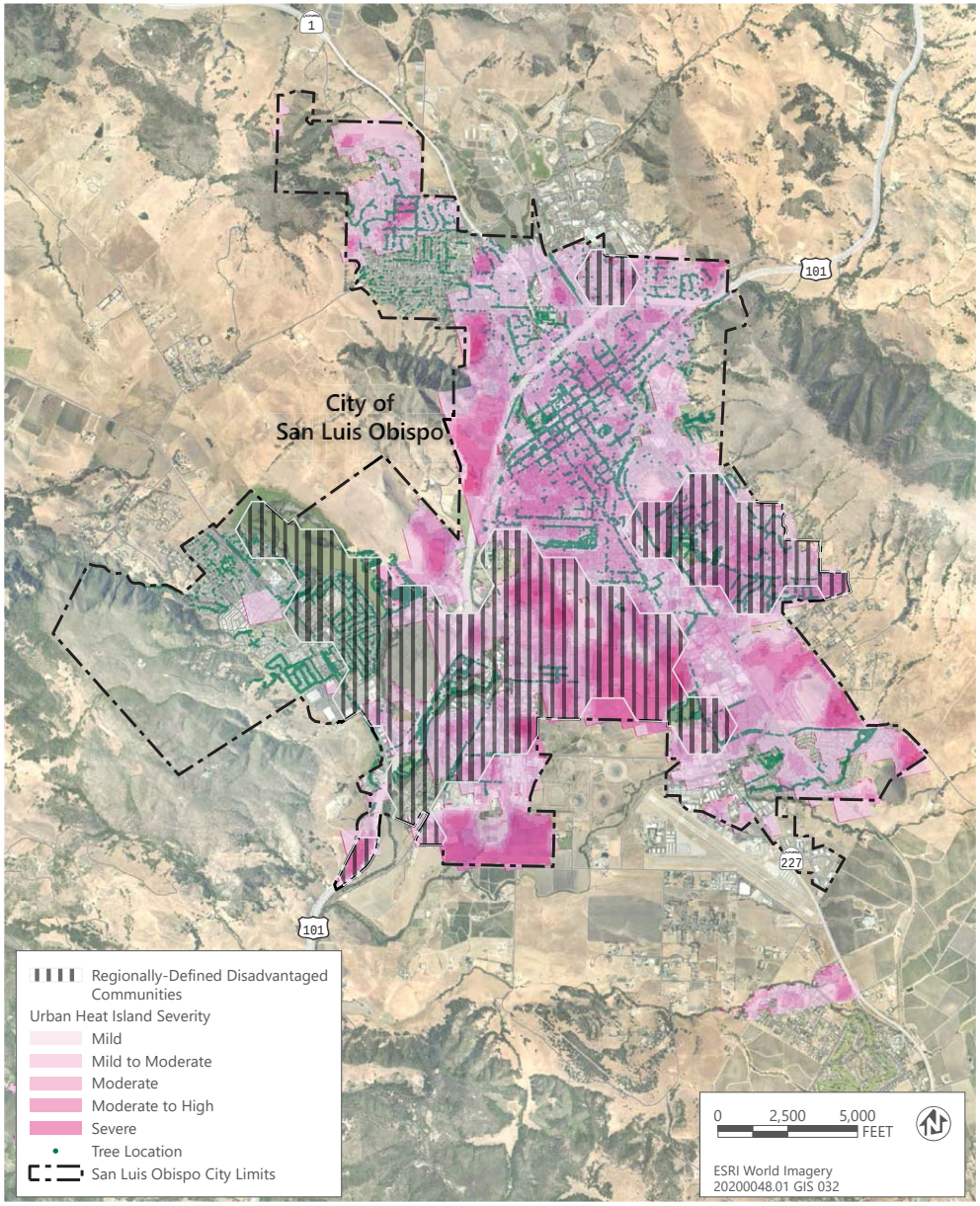
By as early as 2035, the City could experience a maximum of **THREE CONSECUTIVE EXTREME HEAT DAYS IN THE FUTURE** compared to a maximum of two consecutive heat days historically.

TIMING OF EXTREME HEAT

In the future, more extreme heat days and **HEAT WAVE EVENTS WILL OCCUR EARLIER IN THE YEAR** (April through May) with the most severe events occurring in the historically hot months of September and October.

Annual Extreme Heat Days (90° F or above)





Fire Hazard Severity Zones (Cal Fire designated) and Disadvantaged Communities in the City of San Luis Obispo

EXTREME HEAT IMPACTS

Future increases in extreme heat days and heat waves will affect the City's natural systems, built environment, and especially community members. Certain populations are at higher risk of extreme heat including residents over the age of 65, infants and children, individuals with chronic health conditions (e.g., cardiovascular disease, asthma), low-income populations, and outdoor workers.

BUILT ENVIRONMENT

Greater extreme heat will increase the urban heat island effect. The urban heat island 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. Higher temperatures and extreme heat will result in increased energy demand for cooling in the City. The greatest impacts may be in areas where the urban heat island effect is stronger, and in older, less energy-efficient homes. Extreme heat will also place increased stress on the electricity grid potentially leading to more electricity disruptions (e.g., brownouts and blackouts).

COMMUNITY RESILIENCE

Increased temperatures can cause heatstroke, heat exhaustion, heat syncope, and heat cramps. Vulnerable populations, such as those 65 or older, infants and children, and individuals with chronic health conditions, are at higher risk from heat-related impacts. Areas of the city particularly vulnerable to extreme heat have a high percentage of elderly, disabled, or low-income residents. Increases in extreme heat are projected to be more severe in the San Joaquin Valley and southern California than in San Luis Obispo. This may increase the number of tourists or new permanent residents coming to the City to escape the heat. This, in turn, may place increased pressure on City resources and services.

NATURAL SYSTEMS

Changes in temperature and extreme heat are likely to negatively impact the City's trees. Temperature changes may also impact the agriculture and viticulture industries. This may result in decreases in wine and vineyard-based tourism, industries that the City relies on for revenue and employment opportunities.