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.

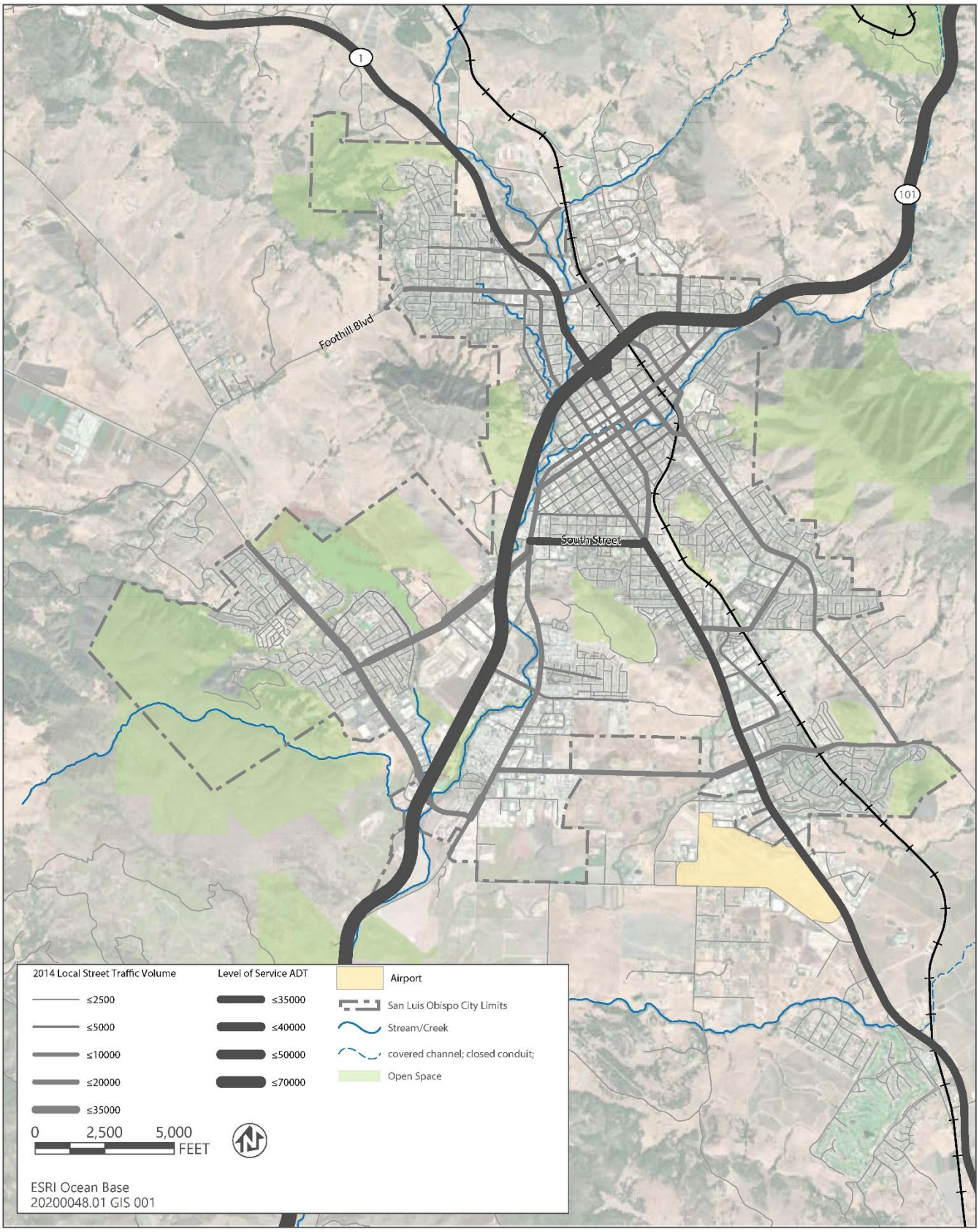
STREET NETWORK

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

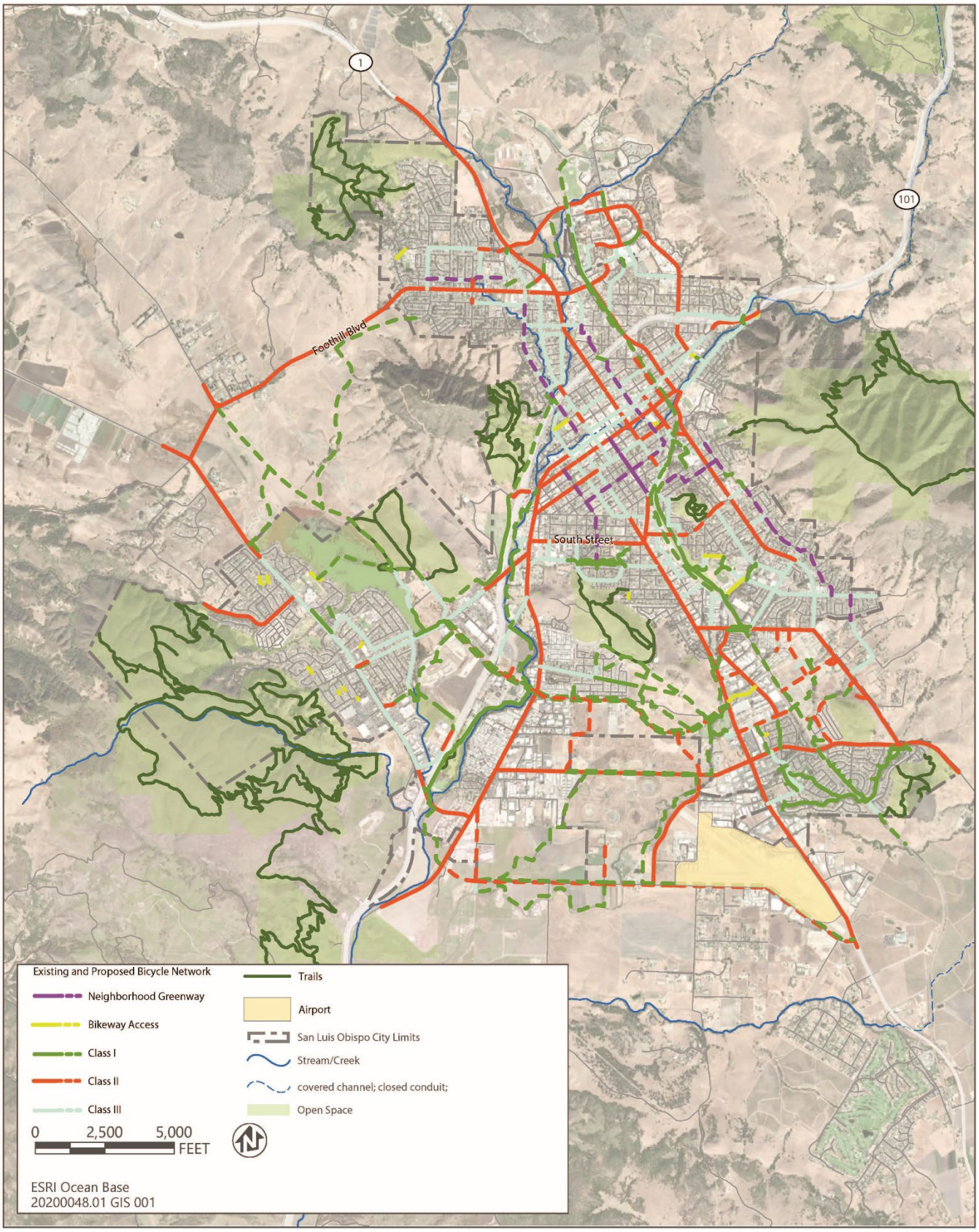
The pedestrian network in San Luis Obispo is well established with numerous sidewalks, multiuse trails, and hiking trails located throughout the City. Areas lacking pedestrian infrastructure are generally located in the northeastern part of the City. Figure 3-3 shows the pedestrian network, highlighting 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.

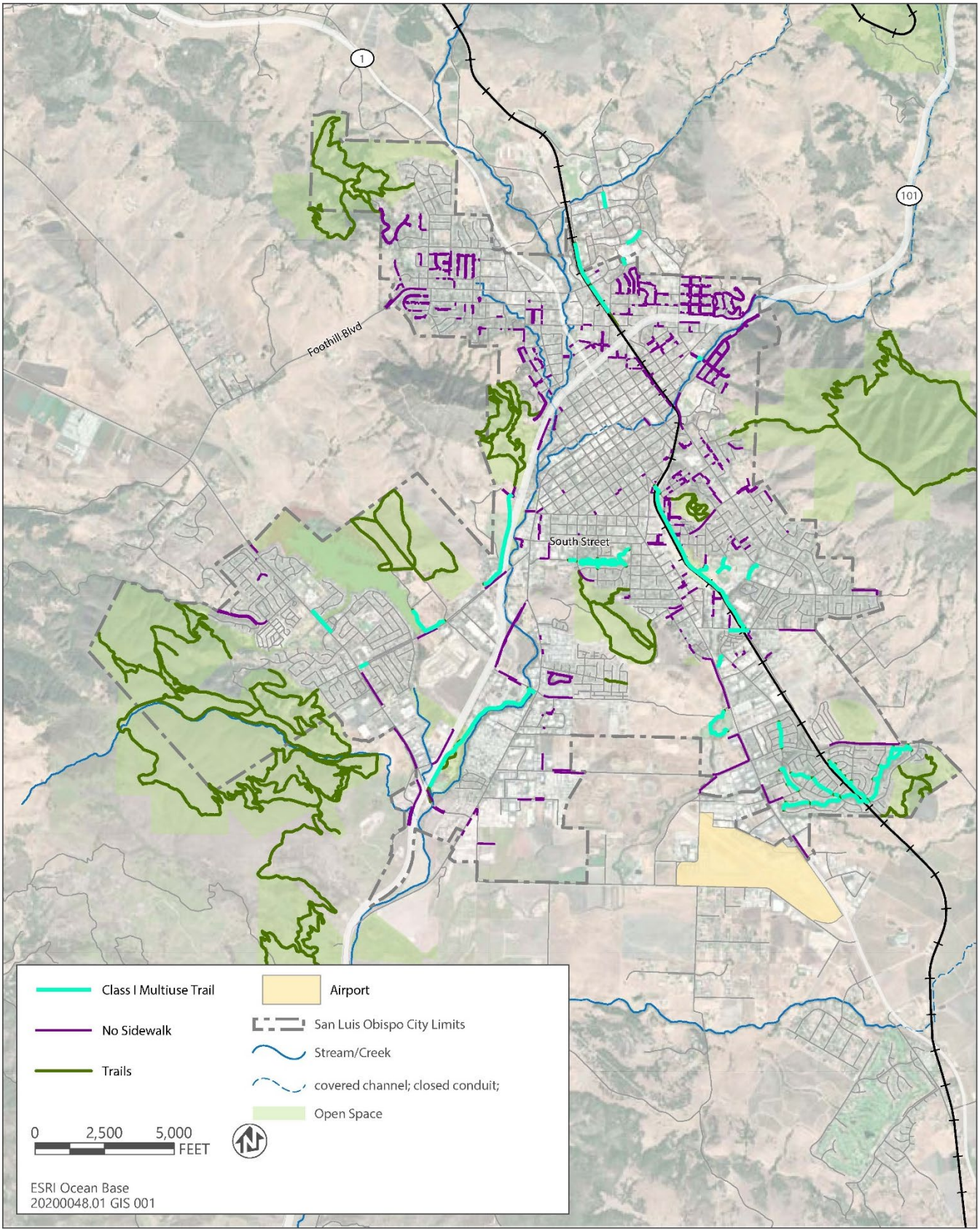
In addition to SLO Transit and RTA, Greyhound provides regional and long-distance bus routes via a stop in the City. The City also includes an Amtrak train station, which provides regional and interstate rail service to residents and visitors along railroad tracks owned and operated by the Union Pacific 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.



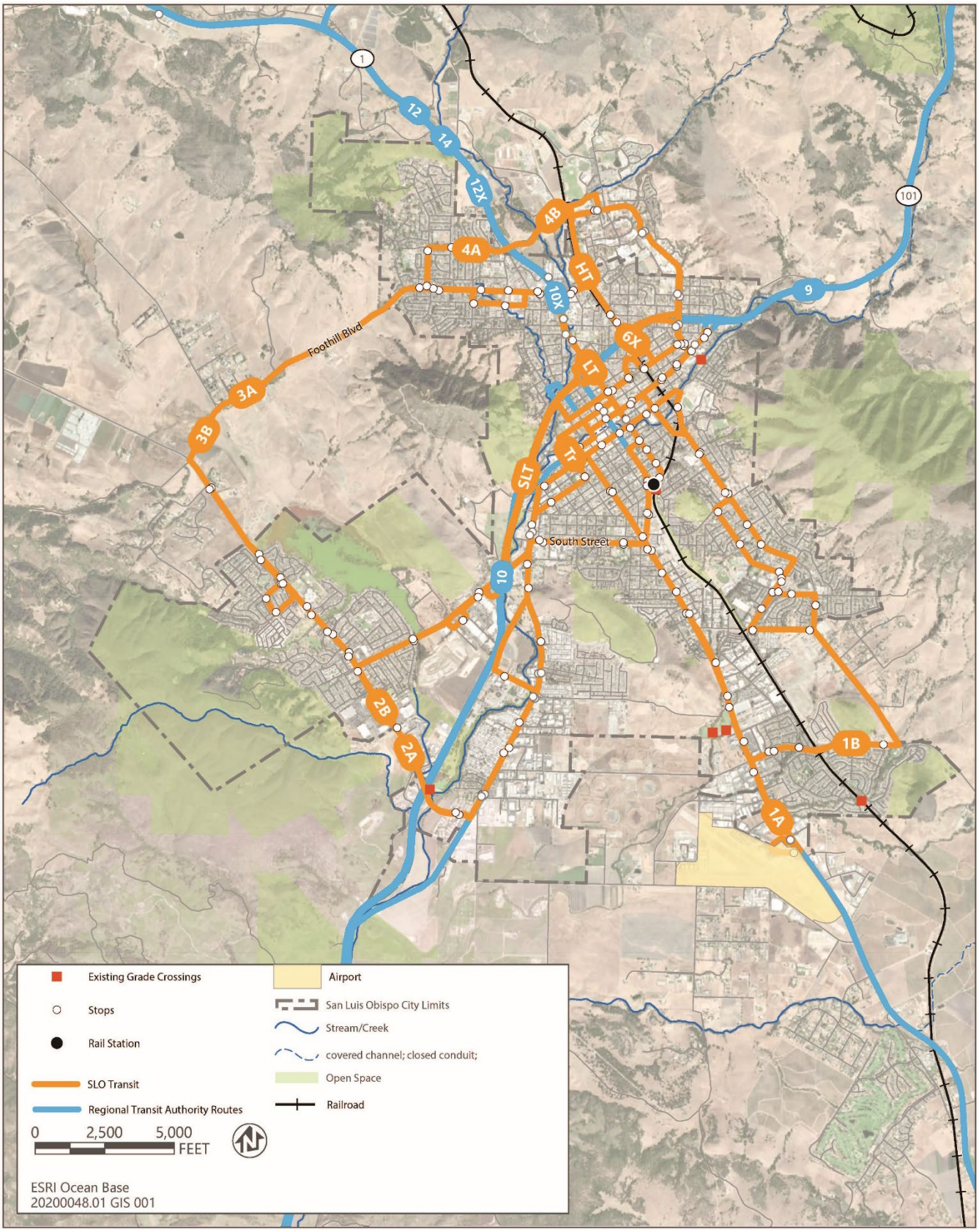
Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

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

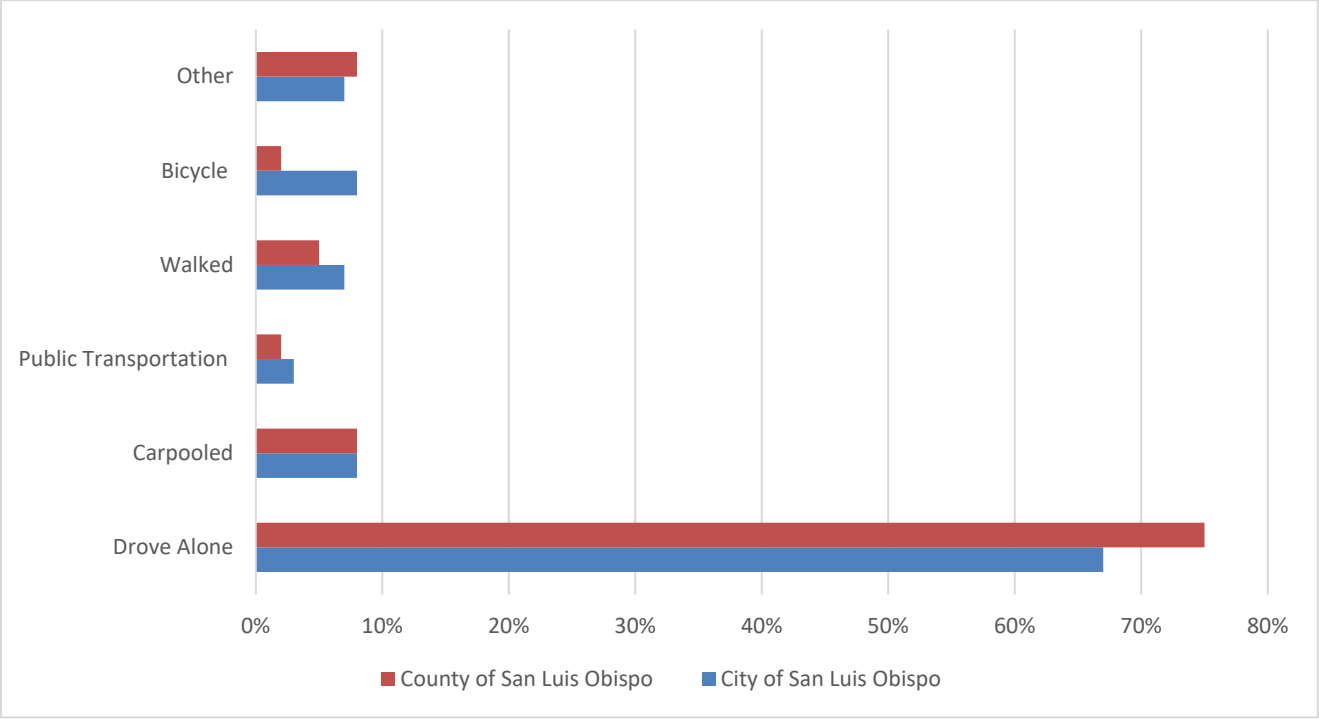


Sources: Data downloaded from City of San Luis Obispo in 2020 and County of San Luis Obispo in 2020

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

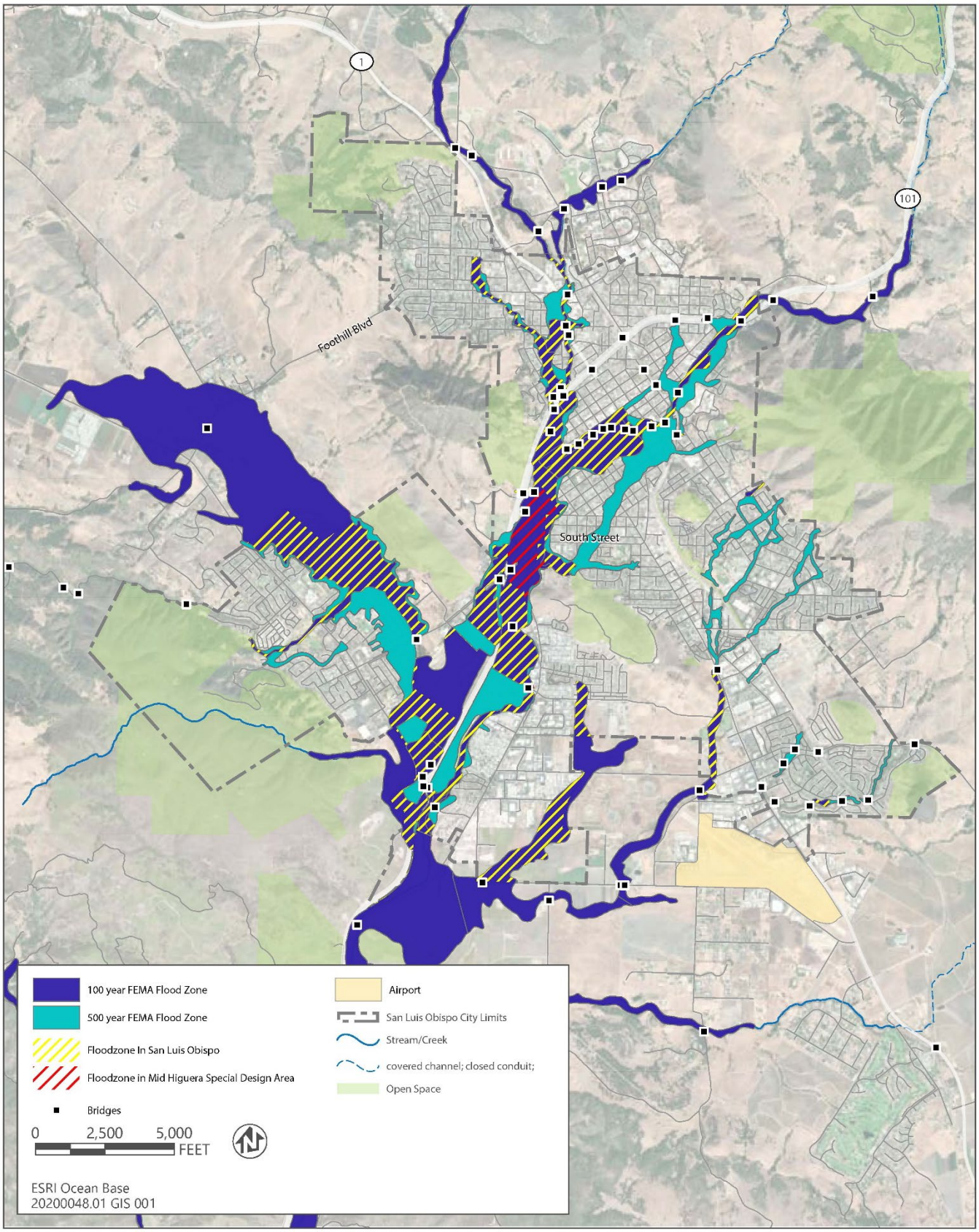
The transportation system facilitates movement of people and resources throughout the City and is both susceptible to existing hazards and a key component of effective emergency response during hazard events. Extreme heat events, wildfires and floods pose a direct physical threat to transportation facilities 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

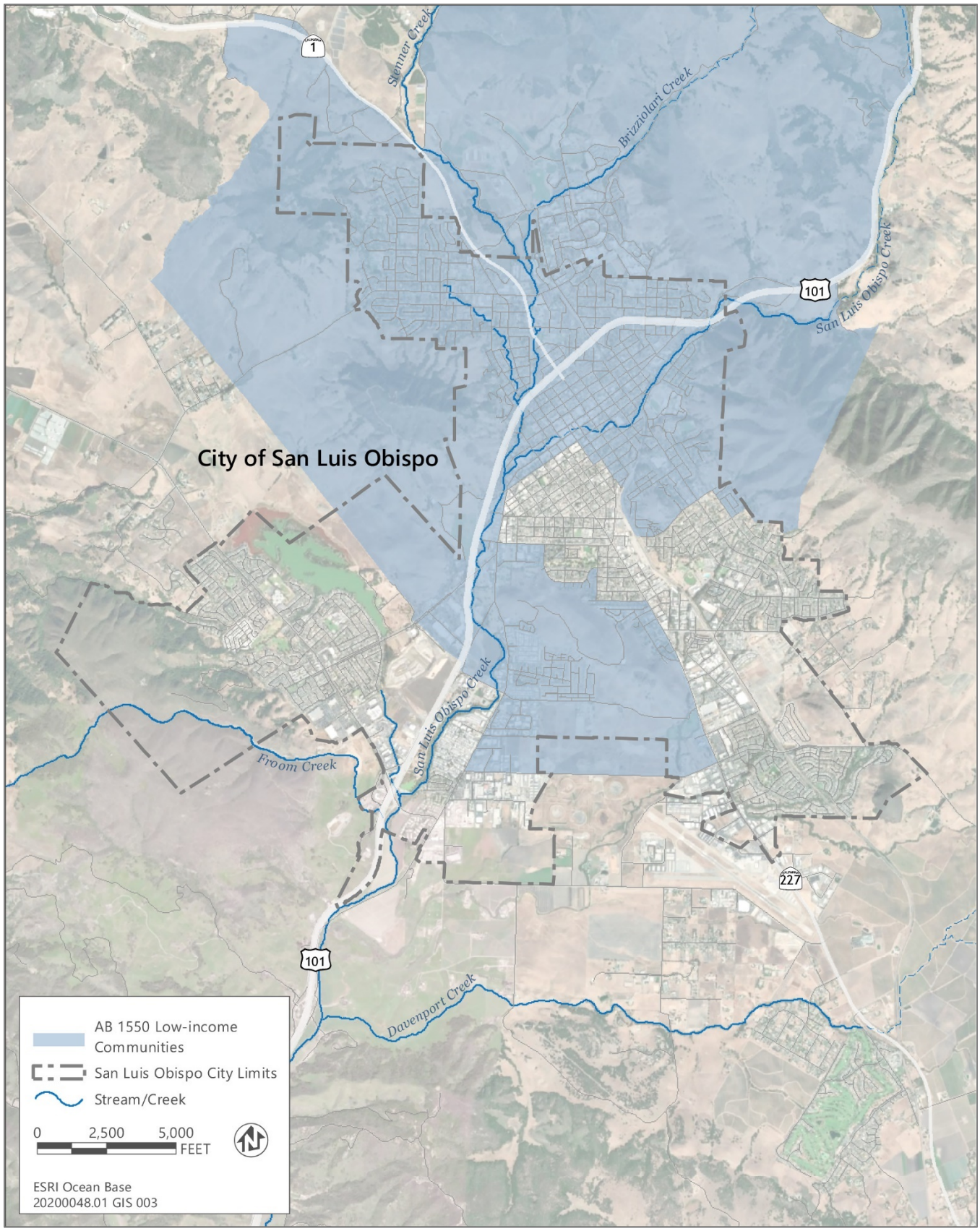
Source: U.S. Census Bureau 2018

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).