City of San Fernando

Safety Element Existing Conditions Report

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1 Introduction

This document is the Existing Conditions Report for the City of San Fernando Safety Element Update. Each section provides an overview of a relevant hazard or public safety consideration as follows:

- Geologic and Seismic Hazards
- Flooding and Dam Failure Inundation Hazards
- Wildland Fire Hazards
- Peak Load Water Demand
- Hazardous Materials Hazards
- Climate Change Hazards & Climate Vulnerability Assessment

1.1 Critical Facilities

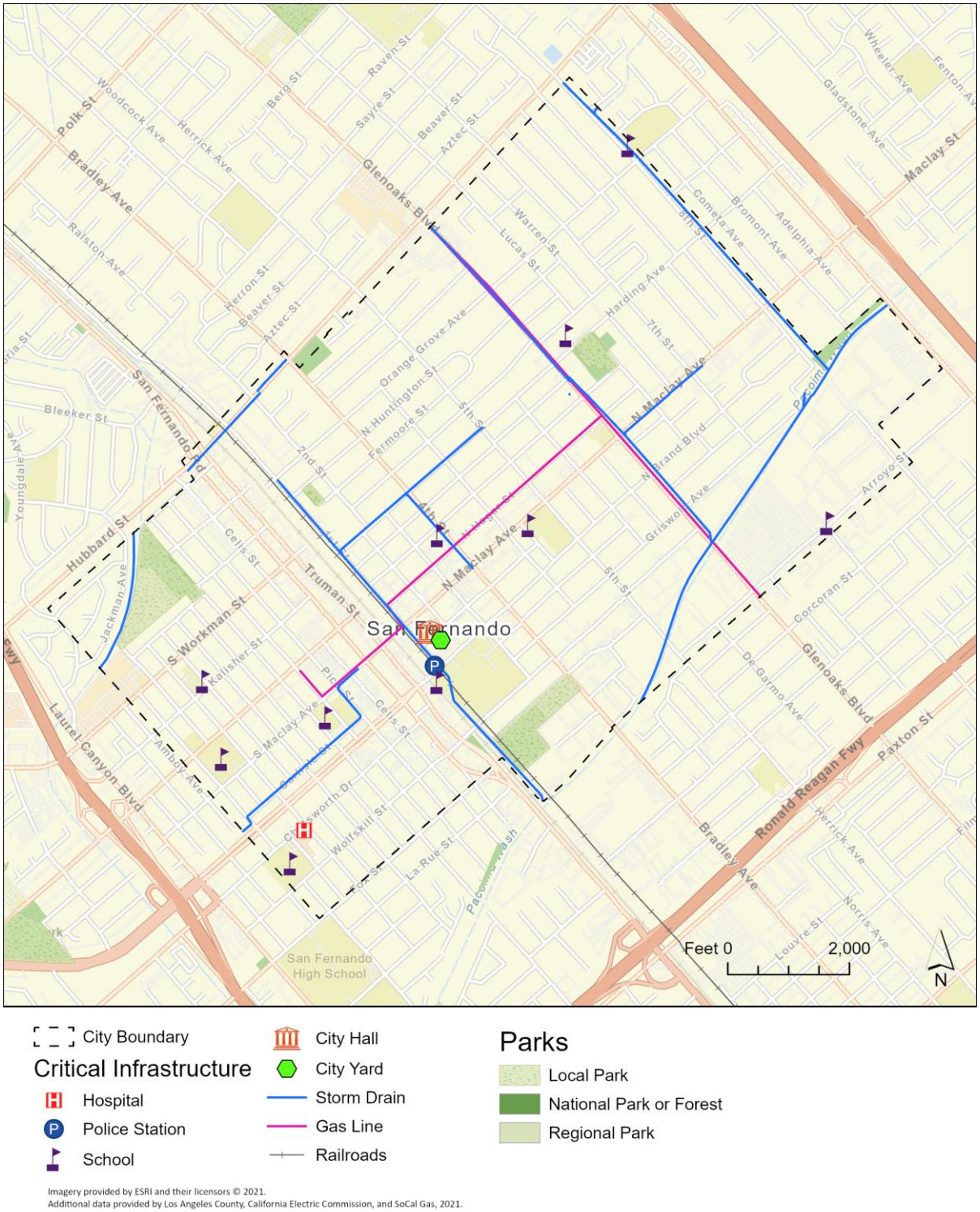
The Federal Emergency Management Agency separates critical buildings and facilities into the five categories shown below based on their loss potential.[1] All of the following elements are considered critical facilities:

1. Essential Facilities are essential to the health and welfare of the whole population and are especially important following hazard events. Essential facilities include hospitals and other medical facilities, police and fire stations, emergency operations centers and evacuation shelters, and schools.
2. Transportation Systems include airways – airports, heliports; highways – bridges, tunnels, roadbeds, overpasses, transfer centers; railways – trackage, tunnels, bridges, rail yards, depots; and waterways – canals, locks, seaports, ferries, harbors, drydocks, piers.
3. Lifeline Utility Systems such as potable water, wastewater, oil, natural gas, electric power, and communication systems.
4. High Potential Loss Facilities are facilities that would have a high loss associated with them, such as nuclear power plants, dams, and military installations.
5. Hazardous Material Facilities include facilities housing industrial/hazardous materials, such as corrosives, explosives, flammable materials, radioactive materials, and toxins.

Figure 1 shows the Critical Facilities in the city of San Fernando. The critical facilities identified in the city include City Hall, the city yard, one police station, one hospital, storm drains, gas lines, and numerous schools and parks. These facilities are located throughout the city, with City Hall, the city yard, police station and San Fernando Middle School all clustered near Downtown San Fernando in the southern portion of the city.

[1] City of San Fernando Multi-Hazard Mitigation Plan. 2021. https://ci.san-fernando.ca.us/wp-content/uploads/2021/09/San-Fernando-MHMP-8.23.2021-.pdf Accessed 9/30/2021

Figure 1 Critical Facilities



2 Geologic and Seismic Hazards

Earthquakes are characterized by sudden shaking or movement caused by a release of strain accumulated along the edge of the Earth's tectonic plates. Earthquakes typically occur without warning and can cause damages ranging from minimal with few or no injuries, to catastrophic with extensive casualties. Earthquake severity is measured by the Modified Mercalli Intensity (MMI) scale. The MMI measures earthquake intensity at a given site based on observed impacts such as damage done to structures, changes in the earth surface, and personal experiences. The scale uses roman numerals of increasing value to indicate increasing intensity. The lower numbers represent effects of an earthquake on people, and the higher numbers generally represent increasing levels of observed structural damage. Peak ground acceleration (PGA) is used to measure earthquake intensity by quantifying how hard the earth shakes in a given location.

The city of San Fernando is in a seismically active region at risk of hazards from earthquakes, including fault rupture, ground shaking, landslides, and liquefaction. The degree of damage to structures and property from geologic hazards depend on numerous mitigating factors such as distance from the fault of origin, soil, and ground properties, and building materials and structural design. Los Angeles County has active faults capable of causing large earthquakes that could affect the entire region including the city.

2.1 History of Earthquakes in San Fernando

The two most significant earthquakes to have recently affected the city are the 1971 San Fernando and the 1994 Northridge earthquakes. The epicenter of the 1971 San Fernando earthquake was located six miles northeast of Sylmar with a magnitude of 6.6. The earthquake caused 65 fatalities and millions of dollars in property loss in the city, including damage to several bridges, sections of freeway, and a hospital[2]. The Northridge earthquake occurred on January 17, 1994. This event was measured at a magnitude of 6.7 and caused 51 fatalities along with extensive damage to streets, the sewer system, the water system, public buildings, and privately-owned residential and commercial structures in the city. In the first six months following this disaster, the City spent approximately $1.8 million and over 9,100 person hours on earthquake-related activities.[3] Table 2 and Table 1 list the historical earthquakes of significance for Los Angeles County and the city of San Fernando, along with a summary of the impacts.

[2] City of San Fernando Multi-Hazard Mitigation Plan. 2021. https://ci.san-fernando.ca.us/wp-content/uploads/2021/09/San-Fernando-MHMP-8.23.2021-.pdf Accessed 9/30/2021

[3] Ibid

Table 1 History of Earthquakes Impacting the City of San Fernando

Year	Location	Impact on City of San Fernando
1933	Long Beach	No damage to the city
1971	Sylmar	65 fatalities, millions of dollars of property loss
1987	Whittier	No damage to the city
1994	Northridge	Damage specific to the City is unknown, however, county-wide there 51 fatalities and 9,000 injuries, thousands of structures damaged, $1.8 million in economic loss

Source: City of San Fernando Multi-Hazard Mitigation Plan, 2021

Table 2 Los Angeles County Significant Earthquakes Over the Last 50 Years

Earthquake	Magnitude	Date	Impact within Los Angeles County
La Habra	(M 5.1)	March 28, 2014	A few injuries and $10 million dollars in damages
Chino Hills	(M 5.5)	July 29, 2008	8 injuries and limited damages
Northridge	(M 6.7)	January 17, 1994	57 deaths, 8,700 injuries and up to $40 billion dollars in damages
Sierra Madre	(M 5.6)	June 28, 199	1 death, 100+ injuries and up to $40 million dollars in damages
Upland	(M 5.7)	February 28, 1990	30 injuries and $12.7 million dollars in damages
Whitter	(M 5.9)	October 1, 1987	8 deaths, 200 injuries and $358 million in damages
San Fernando	(M 6.6)	February 9, 1971	58 – 65 deaths, 200 – 2,000 injuries and up to $553 million in damages

Source: County of Los Angeles All-Hazards Mitigation Plan, 2019

2.2 Faults Affecting San Fernando

The City of San Fernando Multi-Hazard Mitigation Plan notes several faults that have the potential to impact the city. The San Andreas fault is considered a “master fault” because it is the boundary between the Pacific and North American geologic plates. There are several more active faults in eastern San Fernando and northern San Gabriel valleys, including the Northridge, Newport-Inglewood, and Sierra Madre faults. The presence of so many active faults increase the probability of a major earthquake impacting the city.

The segment of the San Andreas fault closest to the city of San Fernando is the Mojave segment, which is approximately 83 miles long. This segment extends from approximately Three Points (29 miles east of State Route 210 near Sulphur Springs) southward to just northwest of Cajon Creek, at the southern limit of the 1857 rupture. Using a slip rate of 30±8 millimeters per year (mm/yr) and a characteristic displacement of 4.5±1.5 meters (m), scientists have derived a recurrence interval of 150 years for this segment. The Mojave segment is estimated to be capable of producing a magnitude 7.1 earthquake. Scientists have calculated that this segment has a 26 percent probability of rupturing sometime between 1994 and 2024.[4] Figure 2 shows the fault lines mapped in San Fernando and the surrounding region.

[4] City of San Fernando Multi-Hazard Mitigation Plan. 2021. https://ci.san-fernando.ca.us/wp-content/uploads/2021/09/San-Fernando-MHMP-8.23.2021-.pdf Accessed 9/30/2021

2.3 Landslides and Liquefaction Hazards

Landslides can occur as a result of ground shaking of an earthquake. The most common earthquake-induced landslides include shallow, disrupted landslides such as rock falls, rockslides, and soil slides. Liquefaction occurs when seismic waves pass through water-saturated granular soil, causing some of the empty spaces between granules to collapse, resulting in a loss of ground strength and a near-liquid state. Liquefaction causes horizontal movements commonly 10 to 15 feet, but up to 100 feet, soil flows, and loss of bearing strength all of which could cause structures to settle or tip. Liquefaction can cause severe damage to property. Within the city there is one liquefaction hazard zone that extends along its western boundary beginning just southwest of 5th Street and extending to the southwest corner of the city. Much of the area within the hazard zone is comprised of single family residential and multifamily residential with the remainder made up of the western edge of the Corridors Specific Plan area, and the commercial development in the southwest of the city. There are no landslide hazard zones within the city. However, there is landslide hazard risk along the slopes of the San Gabriel mountains east of the city. Figure 3 shows the liquefaction and landslide hazard zones in San Fernando and proximal lands.

Figure 2 Faults in the City and Surrounding Area

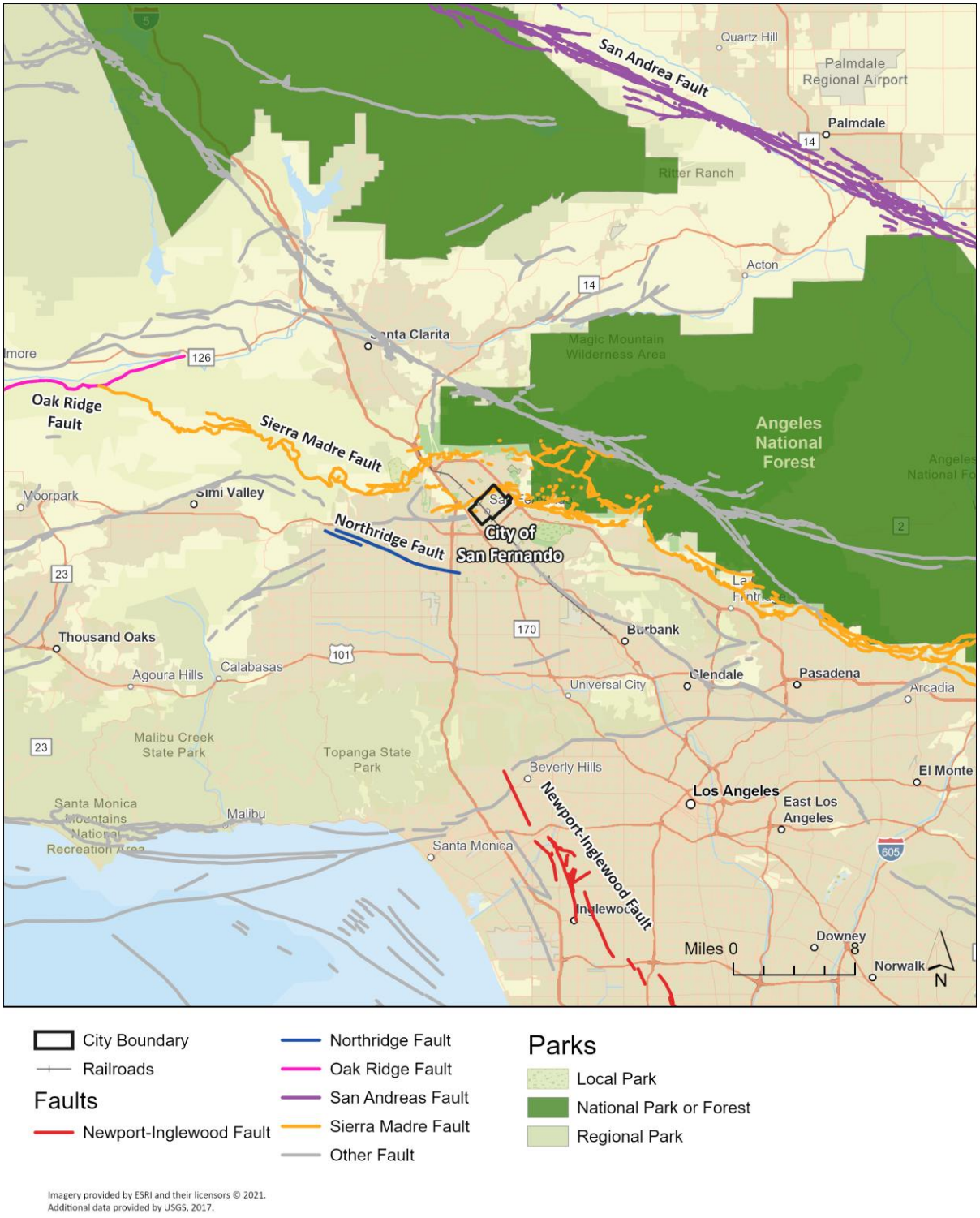
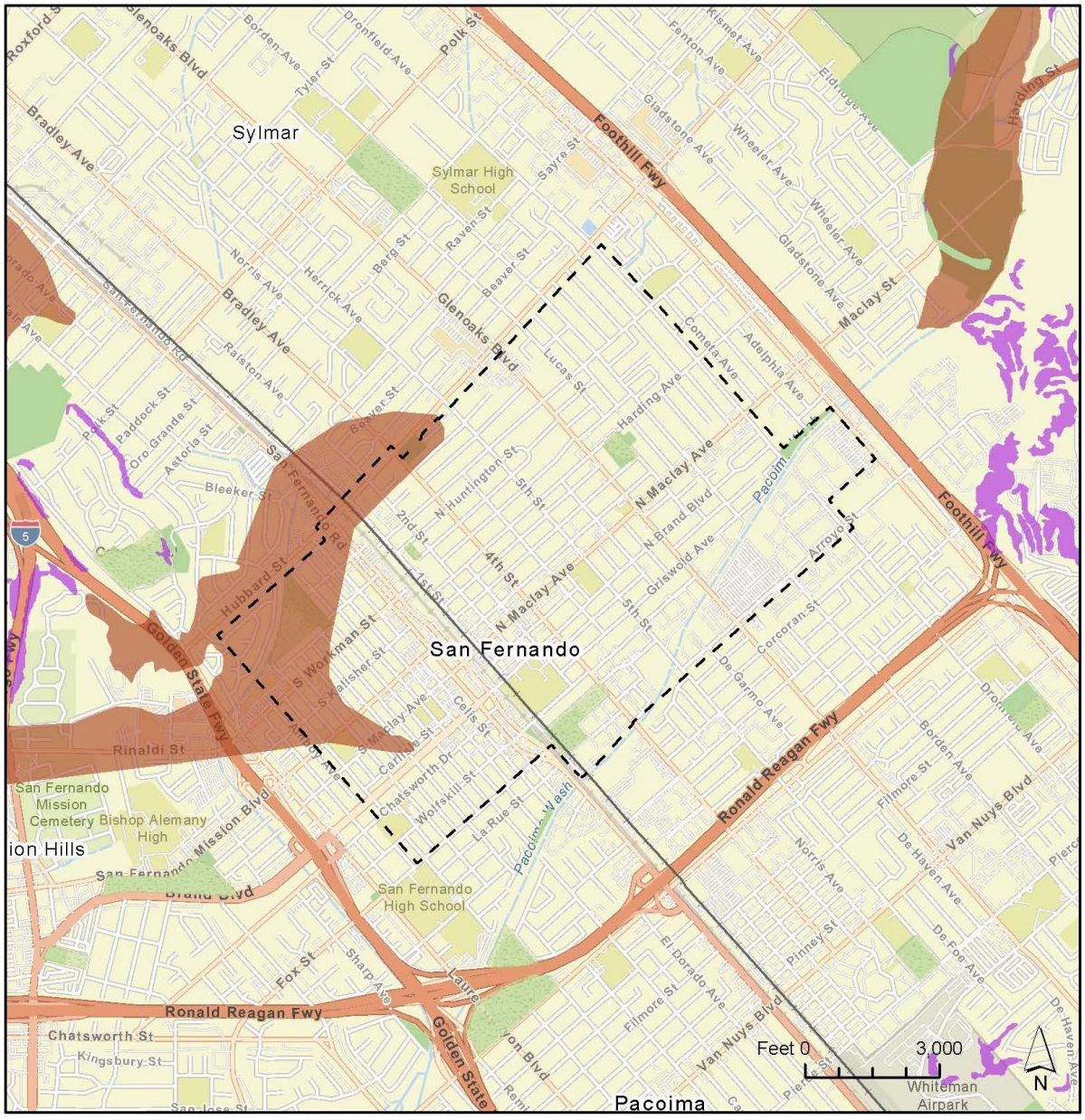


Figure 3 Geologic and Seismic Hazards



3 Flooding and Dam Failure Inundation Hazard

3.1 Flood Hazard

A floodplain is a land area around a river, stream, lake, estuary, or other water body that is subject to flooding. The 100-year flood event is a flood that has a one percent chance of occurring in any given year. Contrary to popular belief, it is not a flood that occurs once every 100 years. The 100-year floodplain is the area adjoining a river, stream, or watercourse that would be covered by water in a 100-year flood event. Two types of flooding primarily affect the Los Angeles county region: slow-rise or flash flooding. Slow-rise floods may be preceded by a warning period of hours or days. Evacuation and sandbagging for slow-rise floods have often effectively lessened flood related damage. Conversely, flash floods are most difficult to prepare for, due to extremely limited, if any, advance warning, and preparation time.

According to the County of Los Angeles All-Hazards Mitigation Plan (2019), the federal government has declared 13 flooding emergencies affecting Los Angeles County. See Table 3 for the dates and descriptions of the federally declared floods.

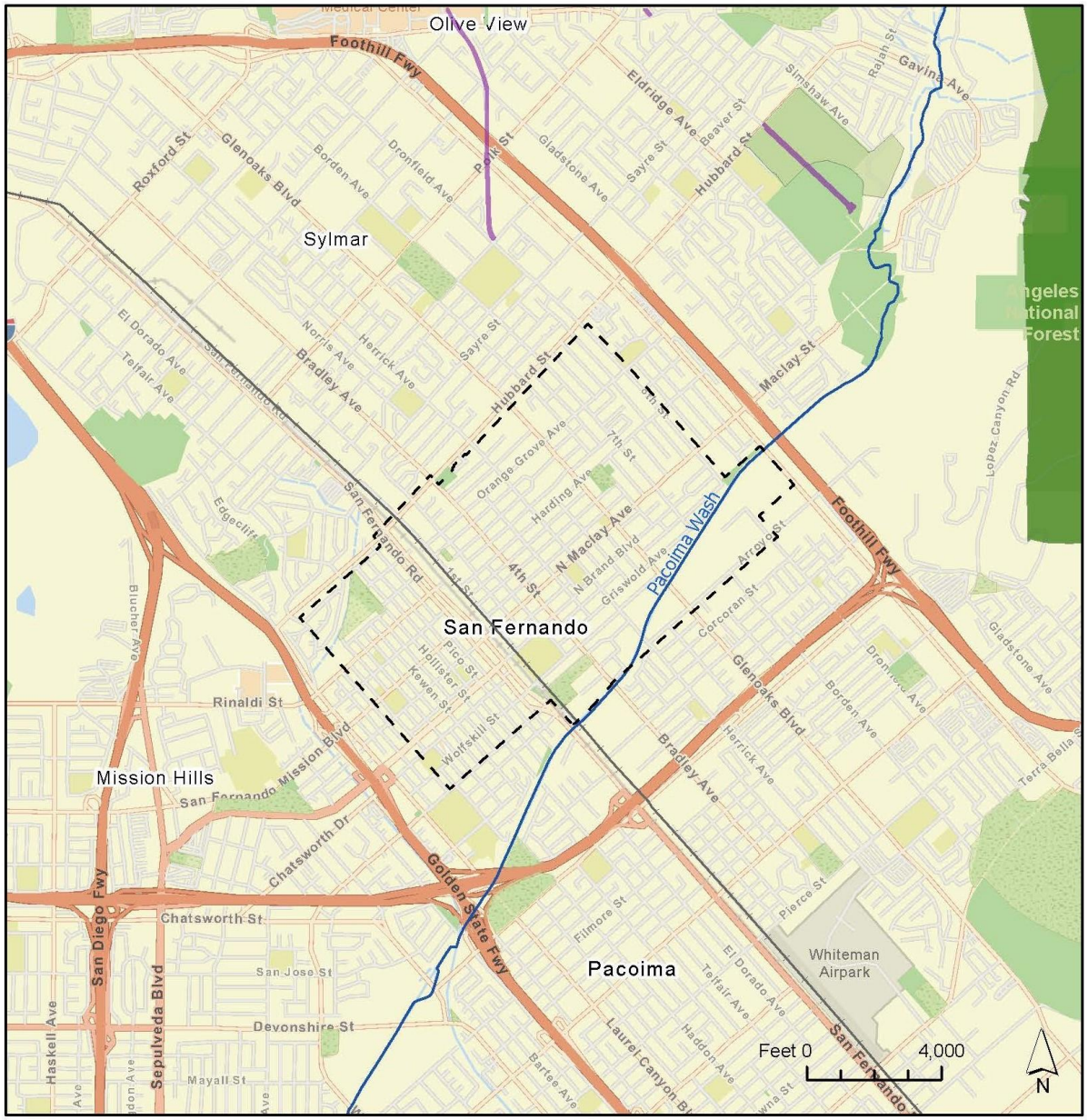
Table 3 Federally Declared Floods in Los Angeles County

Date	Description
February 5, 1954	California Flood and Erosion (Disaster Declaration # [DR]-15)
December 23, 1955	California Flooding (DR-47)
April 4, 1958	California Heavy Rainstorms, Flood (DR-82)
March 6, 1962	California Floods (DR-122)
October 24, 1962	California Severe Storms, Flooding (DR-138)
February 25, 1963	California Severe Storms, Heavy Rains, Flooding (DR-145)
August 15, 1969	California Flooding (DR-270)
February 15, 1978	California Winter Storms Flooding (DR-547)
February 7 and 21, 1980	Southern California Winter Storms (DR-615)
December 21, 1988	Coastal Storms (DR-812)
February 12 and 19, 1992	California Winter Storms (DR-935)
January 7, 1993-February 19, 1993	California Winter Storms (DR-979)
January 18, 2017-January 23, 2017	California Severe Winter Storms, Flooding, and Mudslides (DR-4305)

Source: County of Los Angeles All Hazards Mitigation Plan, 2019

As shown in Figure 4, the city is not situated within a 100-year floodplain. The last flooding event was in the 1930s and occurred prior to the completion of the Los Angeles River flood-control system. Following channelization, there is no record of occurrences of flooding in the city. The entirety of the city is located within an area of minimal flood risk. In 2017 there was a storm-related fatality believed to have been precipitated by the force of storm waters moving through the Pacoima Wash, and that caused the individual to be swept away as they attempted to cross the Pacoima Wash.

Figure 4 Flood Hazard Zones

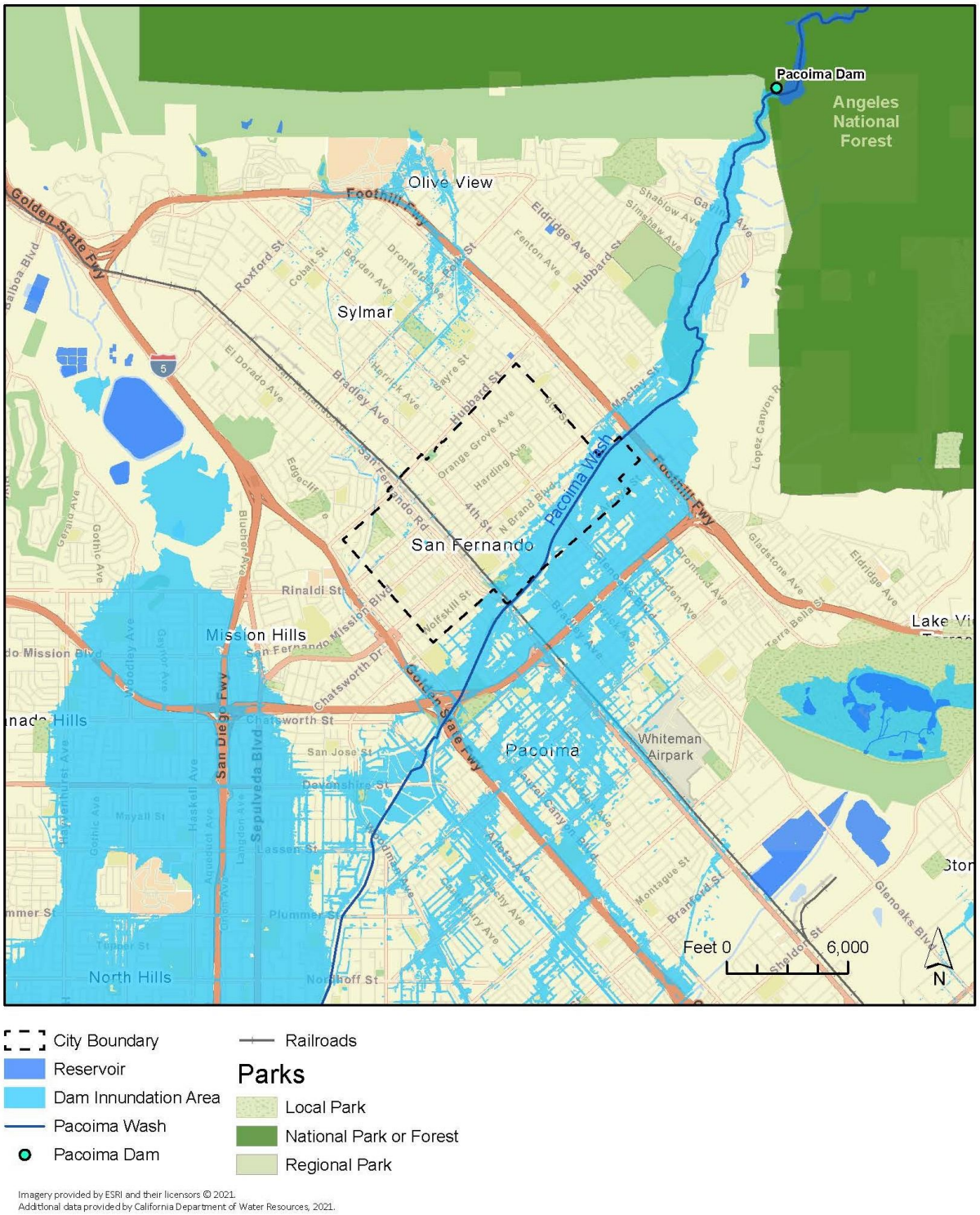


3.2 Dam Failure Inundation Zone

According to the City of San Fernando 2021 Hazard Mitigation Plan, the only part of the city susceptible to possible flooding is the commercial/industrial strip that is adjacent to the Pacoima Wash if the Pacoima Dam suffers a complete failure. The strip is approximately one block wide on either side of the Wash (See Figure 5). The Los Angeles County Flood Control engineers believe that temporary flooding up to six feet could occur in the Pacoima Wash and adjacent area if the Pacoima Dam, located northeast of the city, was filled to capacity and suffered a complete failure. The Lopez Dam is on the Pacoima Wash about 2.2 miles northeast of San Fernando and is owned and operated by the U.S. Army Corps of Engineers (USACE). The Lopez Dam serves to reduce flood damage associated with the Pacoima Dam,[5]. Failure of these dams could inadvertently result in the release of large amounts of water that would reach the city and result in inundation. However, the dam is normally maintained at one-quarter of its capacity and no longer allowed to reach full capacity. Additionally, average rainfall is low, and the Dam utilizes a monitoring system that provides early warning of a structural failure, thus making the probability of this type of flood event minimal. Figure 5below show the Dam Failure Inundation Areas for the city.

[5] Lopez Dam Basin. Master Plan and Environmental Assessment. Prepared by U.S. Army Corps of Engineers, Los Angeles District. June 2005. Available at: https://usace.contentdm.oclc.org/digital/collection/p16021coll7/id/2811.

Figure 5 Dam Failure Inundation Areas



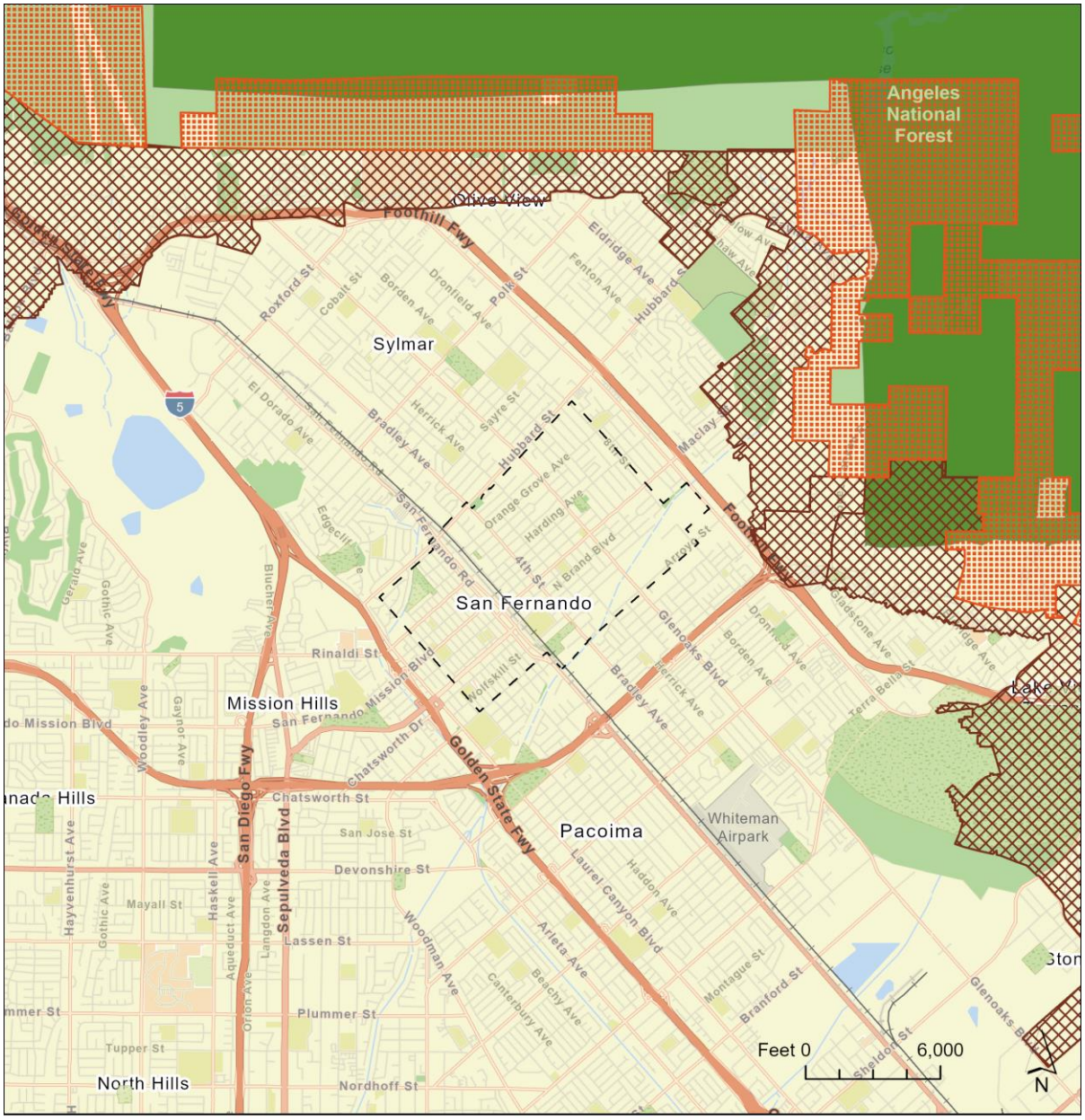
4 Wildland Fire Hazards

California law requires CAL FIRE to assess and identify the fire hazard severity across the state. CAL FIRE identified Fire Hazard Severity Zones are based on factors that influence the likelihood and behavior of fire. Such factors include fire history, existing and potential fuel, predicted flame height, slope of the land and fire weather. There are three levels of hazard: moderate, high, and very high. Urban and wildland areas are treated differently in the model, but it does recognize the influence of burning embers traveling into urban areas, which is a major cause of the spread of fire. CAL FIRE assigns responsibility for each zone to either the State or local jurisdictions. There are no CAL FIRE hazard severity zones located within the city, as shown in Figure 6.

Regionally, San Fernando is near other zones of high or very high wildfire severity, located to the northwest, north, and east. While the city is not in an area of high fire hazard severity, the city's proximity to the San Gabriel Mountains and nearby VHFHZs does pose a threat of wildfire spreading into the city. Windstorms and the periodic occurrence of the Santa Ana winds increases the risk of wildland fires in the wildland urban interface (WUI) spreading into the city when strong winds and wildland fires co-occur. Strong winds can increase the speed and reach of flames and carry embers to adjacent areas. During the planning process for the City of San Fernando 2021 Hazard Mitigation Plan, the Los Angeles Fire Department (LAFD) recommended that "Wildfire" be eliminated as a hazard and the planning team agreed and removed wildfire from the plan.

The city's street system is primarily arranged on a grid pattern, and there are no identified neighborhoods with only one point of ingress and egress.

Figure 6 Fire Hazard Severity Zones



5 Peak Load Water Demand

The existing water supplies available to the city include local groundwater extracted from the Sylmar Groundwater Basin. The City also has access to imported water from the Metropolitan Water District (MWD) as an emergency connection, and from the City of Los Angeles to be accessed only in extreme emergencies. The Sylmar Groundwater basin has been adjudicated, and the City of San Fernando has a current allotted draw from the basin of 3,570 acre-feet per year.[6] Additionally, the City has the right to receive stored water credit in the Sylmar Basin. In addition to these sources, the City of San Fernando 2021 Urban Water Management Plan (UWMP) discusses alternate water sources such as recycled stormwater, greywater (water used from bathroom sinks, showers, tubs, and washing machines), and desalinated seawater, as well as plans for reactivating one of the City's inactive ground wells to increase groundwater production capabilities.[7]

The 2020 UWMP includes a Water Shortage Contingency Plan. The City is allotted 3,570-acre feet per year (AFY), which is below the natural safe yield of the Sylmar Basin estimated at approximately 7,140 AFY54. By 2030, the city is expected to have 629 AFY of available imported water from Metropolitan Water District and 3,570 AFY available from the Sylmar Basin. The 2030 supply (4,199 AFY) is expected to exceed 2030 demand (2,960 AFY) by 1,239 AFY. MWD's 2020 UWMP finds that MWD can meet full service demands of its member agencies with existing supplies from 2025 through 2045 during normal years, single dry year, and multiple dry years. Prolonged dry periods may impact the City's imported water supply capacities significantly due to reductions in MWD's storage reservoirs resulting from increases in regional demand.

The City of San Fernando Water Production Division is responsible for the operation and maintenance of the City's four water wells, three booster pump stations, four reservoirs, and two pressure regulation stations. The current storage capacity for potable water across the City's four reservoirs is approximately 8.9 million gallons (MG). Peak day demand for the city as of 2008 was approximately 7.3 million gallons, or 82 percent of total storage capacity[8]. The City of San Fernando did not purchase any water during the window of peak demand from May 1st through September 30th during 2017, 2018, or 2019,[9] indicating that the City was able to supply enough water to meet peak demand during those years. The City of San Fernando is a member agency of the MWD; however, the last year the City purchased imported water from MWD was 2014 in the amount of 110 AF, and the City purchased no water at all from MWD during the period of 2015-2020.

[6] City of San Fernando Urban Water Management Plan. 2020. https://ci.san-fernando.ca.us/wp-content/uploads/2021/06/San-Fernando_2020-UWMP_Public-Draft_2021-06-02.pdf Accessed 10/5/21

[7] Greywater Action. 2021. https://greywateraction.org/greywater-reuse/#:~:text=Greywater%20is%20gently%20used%20water,and%20certain%20household%20cleaning%20products. Accessed 10/8/2021

[8] City of San Fernando 2013-2021 Housing Element. 2014. https://ci.san-fernando.ca.us/wp-content/uploads/2016/02/Adopted-2013-2021-Housing-Element-1.21.20141.pdf Accessed 9/30/21

[9] Metropolitan Water District Urban Water Management Plan. 2020. https://www.mwdh2o.com/media/21641/2020-urban-water-management-plan-june-2021.pdf Accessed 9/30/21

6 Hazardous Materials Hazards

A wide variety of products, chemicals and purified chemical compounds, and elements considered either hazardous or toxic are used in households, commercial businesses, and industrial operations and processes. These include home and pool related chlorine products, chemical fertilizers, stored fuels and waste oil, chemical solvents and lubricants, and a variety of medical materials. The improper use and management of hazardous materials can pose a potential threat to the community and the environment.

Leaking underground storage tanks (LUST) and former industrial and commercial sites can expose the community and environment to hazardous materials. Gasoline storage tanks from former or current gas stations are subject to leaking over time, which can contaminate soil, groundwater, and/or surface water. Leaks require immediate action upon detection to reduce the spread of contaminants and reduce potential harm. Industrial and commercial activities sometimes utilize hazardous and toxic chemicals for operations, and spills or mishandling of these materials can result in site contamination. These sites are known as “brownfields”, and their clean-up and revitalization are regulated by the United States Environmental Protection Agency (USEPA).

San Fernando contains hazardous material sites such as LUST sites, contaminated groundwater sites under the jurisdiction of the State Water Resources Control Board (SWRCB) Site Cleanup Program, and hazardous sites under the California Department of Toxic Substances Control (DTSC) Site Cleanup Program. There are a total of 17 sites in the city that contain hazardous materials (see Figure 7 and Table 4 below). Some sites have more than one type of site designation associated with the same physical address. There are 2 open or active cleanup sites in the city that have not been remediated or completed the remediation process. There are 9 closed sites which have been remediated. There are 10 permitted underground storage tank (UST) sites. As indicated in Table 4 below, several sites are in the dam failure inundation hazard zone and liquefaction hazard zone. As the entire city is likely to experience ground shaking during an earthquake, all sites within the city may be subject to seismic activity during such an event. While Figure 7 depicts hazardous materials sites within city borders, there are additional hazardous materials sites adjacent to the city to the southwest, southeast, northeast, and north that may be impacted during seismic events or by other hazards, which could in turn affect the city.

Because of the widespread use of hazardous materials in our communities, minor and major hazardous materials spills and incidents occur. Most of these incidents are related to transport of chemicals over roadways or through industrial accidents. Though no major transportation corridors go through the city of San Fernando, Interstate 5, State Route 118, and Interstate 210 surround the city on three sides. The City of San Fernando contracts with the LAFD to monitor facilities that generate hazardous waste. The LAFD is the Certified Unified Program Agency (CUPA) that provides regulatory oversight over hazardous materials and hazardous waste programs in both the City of Los Angeles and the City of San Fernando. The following programs are operated by the LAFD:

- Hazardous Materials Inventory and Business Plan
- Hazardous Waste Generator
- Onsite Hazardous Waste Treatment
- Underground Storage Tank
- Above-ground Storage Tank Spill Prevention Control and Countermeasure

- California Accidental Release Prevention

Every business that handles hazardous materials above established thresholds must file a Hazardous Materials Business Plan and Emergency Response Plan in the California Environmental Reporting System (CERS). State Assembly Bill 2948 (Tanner 1986) mandates that each local government has a hazardous waste management plan for dealing with hazardous waste generated within the community.

Figure 7 Hazardous Materials Sites

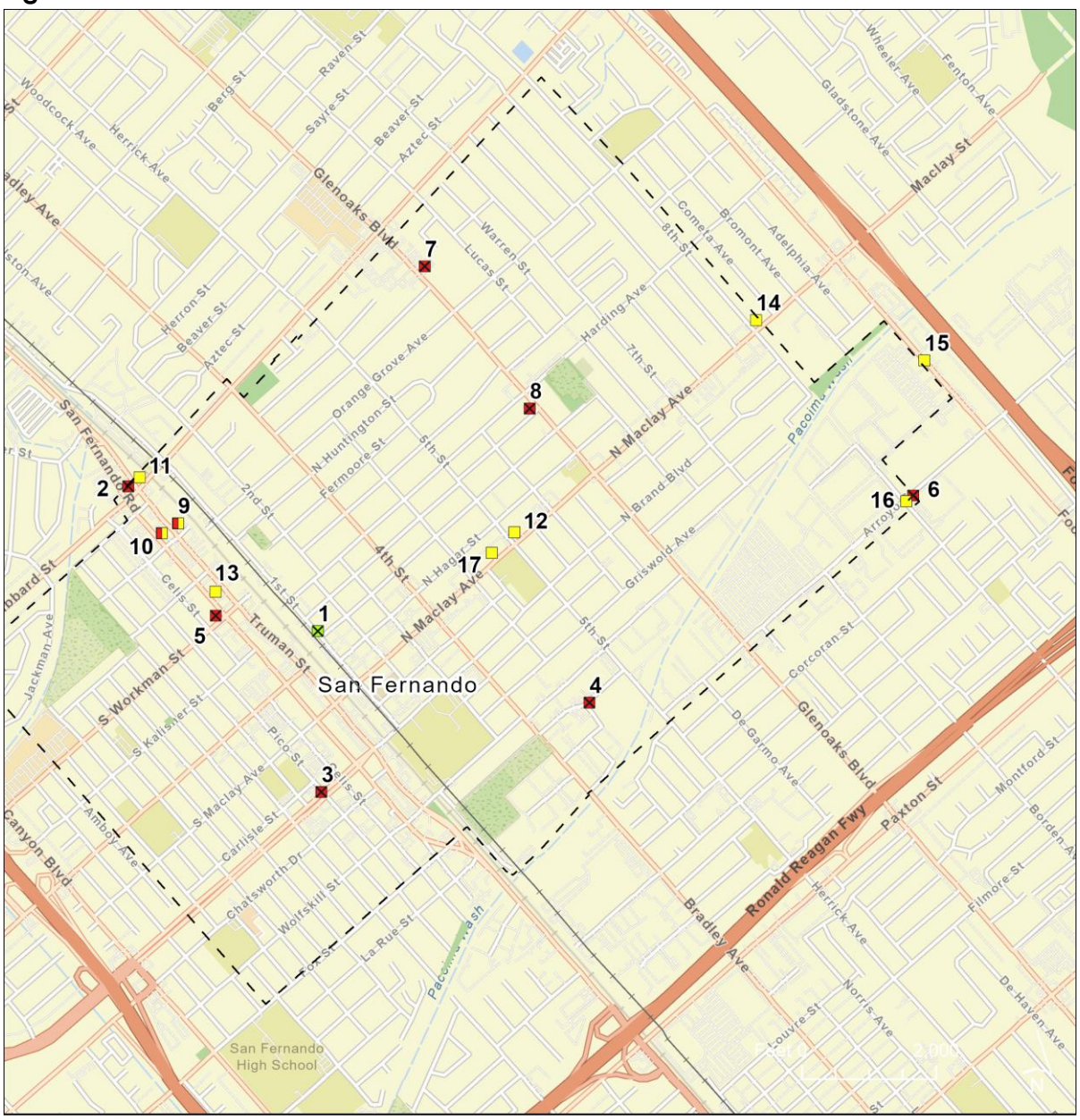


Table 4 Hazardous Waste Sites in the City of San Fernando

Figure 7 Map Number	Site Id	Site Name	Site Type	Site Status	Site Address	Contaminants Present	Hazard Zone
1	SL184531436	City National Bank Property	Cleanup Program Site	Completed - Case Closed	1321 1st Street	Volatile Organic Compounds	Seismic
2	T0603702259	Desert Petroleum #59 (Former)	LUST Cleanup Site	Completed - Case Closed	1753 San Fernando Road	Gasoline	Liquefaction, Seismic
3	T0603702247	GTE	LUST Cleanup Site	Completed - Case Closed	401 Brand Boulevard S	Gasoline	Seismic
4	T0603703955	GTE San Fernando Plant Yard	LUST Cleanup Site	Completed - Case Closed	510 Park Avenue	Gasoline	Dam Failure Inundation, Seismic
5	T0603702254	John Angel Property	LUST Cleanup Site	Completed - Case Closed	1404 San Fernando Road	Gasoline	Seismic
6	T0603713084	Pepsi Bottling Group	LUST Cleanup Site	Completed - Case Closed	1260 Arroyo Street	Diesel	Dam Failure Inundation, Seismic
7	T0603700025	Richard Sterman	LUST Cleanup Site	Completed - Case Closed	1955 Glenoaks Boulevard	Aviation	Seismic
8	T10000000589	Wm Waterston Trust	LUST Cleanup Site	Completed - Case Closed	1400 Glenoaks	None Specified	Seismic
9	T0603702250	Gem Fuel	LUST Cleanup Site	Open - Assessment & Interim Remedial Action	1601 Truman Street	Gasoline	Seismic
9	25541	Commercial Fueling Network	Permitted Underground Storage Tank (UST)	N/A	1601 Truman Street	N/A	Seismic
9	N/A	Truman Fuel	Permitted Underground Storage Tank (UST)	N/A	1601 W Truman Avenue	N/A	Seismic
10	T0603704772	Mission Car Wash	LUST Cleanup Site	Open - Remediation	1601 San Fernando Road N	Gasoline	Liquefaction, Seismic
10	FA0014075	Mission Carwash	Permitted Underground Storage Tank (UST)	N/A	1601 San Fernando Road	N/A	Liquefaction, Seismic

Figure 7 Map Number	Site Id	Site Name	Site Type	Site Status	Site Address	Contaminants Present	Hazard Zone
11	N/A	Arco #01904	Permitted Underground Storage Tank (UST)	N/A	1753 W Truman Street	N/A	Liquefaction, Seismic
11	T0603702251	Arco #1904	LUST Cleanup Site	Completed - Case Closed	1753 Truman Street	Gasoline	Liquefaction, Seismic
12	N/A	Arco - Maclay Inc.	Permitted Underground Storage Tank (UST)	N/A	601 N Maclay Avenue	N/A	Seismic
13	19752	Goodyear Tire Center #905946	Permitted Underground Storage Tank (UST)	N/A	1431 San Fernando Road	N/A	Seismic
14	N/A	Maclay Ave Investments LLC	Permitted Underground Storage Tank (UST)	N/A	1203 N Maclay Avenue	N/A	Seismic
15	FA0030348	Oky LLC, Dba: Slymar Shell	Permitted Underground Storage Tank (UST)	N/A	13641 W Foothill Boulevard	N/A	Dam Failure Inundation, Seismic
16	FA0015007	Pepsi-Cola Bottling Group	Permitted Underground Storage Tank (UST)	N/A	1200 Arroyo Street	N/A	Dam Failure Inundation, Seismic
17	FA0023295	Roy's Auto Repair	Permitted Underground Storage Tank (UST)	N/A	537 N Maclay Avenue	N/A	Seismic

Notes: N/A = Not Applicable

[1] Waste Discharge Requirements (WDR) Sites are sites that operate under Waste Discharger Requirements issued by the State Water Resources Control Board or a Regional Water quality Control Board. WDDRs address non-designated waste discharges that are typically applied to land.

Source: California State Water Resources Control Board. 2021. GeoTracker. Available <https://geotracker.waterboards.ca.gov/>. Accessed 9/30/2021.

7 Climate Change Hazards & Climate Vulnerability Assessment

7.1 Climate Change & Vulnerable Populations

This section describes climate change impacts associated with increases in temperatures, more severe storms, increases in extreme heat events, changes in precipitation patterns, extended drought conditions, and increasing wildfire risk.

7.2 General Plan Approach

Climate change adaptation and resilience strategies must be included in the City's General Plan via its Safety Element in accordance with California Government Code Section 65302(g) (as updated by SB 379). The review and update must consist of the following components:

1. A vulnerability assessment that identifies the risks climate change poses to the local jurisdiction and the geographic areas at risk from climate change.
2. Set of adaptation and resilience goals, policies, and objectives based on the information specified in the vulnerability assessment.
3. Set of feasible implementation measures designed to carry out the goals, policies, and objectives identified in the adaptation objectives.

The Intergovernmental Panel on Climate Change (IPCC) provides several greenhouse gas (GHG) emissions scenarios used to describe possible future GHG emissions and associated changes to global climate patterns. The State recommends two 'Representative Concentration Pathways (RCPs) to assess the city's potential vulnerability to climate change. RCP 4.5 represents a "medium emissions" scenario in which global emissions peak around 2040 and then decline at the end of the century. This scenario assumes global agreement and implementation of GHG reduction strategies. RCP 8.5 represents a "high emissions" scenario in which emissions continue to rise throughout the 21st century.

The State provides the Cal-Adapt tool to local jurisdictions for climate adaptation and resilience planning. Cal-Adapt is a web-based platform that provides climate change projections and climate impact research that are downscaled to the local level for different RCP scenarios. The projections are based on the extensive body of climate research described in California's Fourth Climate Change Assessment. The Safety Element includes climate change projections for the RCP 4.5 and RCP 8.5 scenarios taken from Cal-Adapt for temperature, precipitation, and wildfire relative to the health and safety of San Fernando residents. These climate change projections provide an understanding of possible future climate change impacts and help prioritize policies to increase community resilience to climate change.

7.3 Temperature

Observations over the past century indicate that temperature has increased across the Southern California region. Based on historical temperature records (1896-2015) from the California South

Coast NOAA Climate Division, which encompasses the Los Angeles region, significant trends were identified in annual average, maximum, and minimum temperatures.[10]

Warming is expected to increase across the Los Angeles region in the coming decades. Under RCP 4.5, future model-average temperature values are projected to increase by 2.3 degrees Fahrenheit (°F) by the early-21st century, 4.2°F by the mid-21st century, and 5.2°F by the late-21st century compared to the modeled historical annual average maximum temperature of 72.5°F. Furthermore, the intensity and frequency of extreme heat days are also projected to increase over the Los Angeles region. Under RCP 4.5, the average hottest day of the year is expected to increase by 4-7°F.

Average maximum and minimum temperatures are expected to increase in the city. Compared to the 1961-1990 baseline, average maximum temperatures in San Fernando are expected to rise between 5.3°F (RCP 4.5) and 8.7°F (RCP 8.5) by the end of the century.[11] Average minimum temperatures in San Fernando are expected to rise similarly, between 4.8°F (RCP 4.5) and 8.2°F (RCP 8.5) by the end of the century.

The number of extreme heat days per year is also expected to increase. In San Fernando an extreme heat day is when the maximum temperature exceeds 101.7°F. Historically, between 1961-1990, the region experienced 3 extreme heat days per year on average. By the end of the century, extreme heat days are expected to increase by 15 days per year under RCP 4.5 and approximately 33 days per year under RCP 8.5.

Changes in average maximum temperature extreme heat days are in Figure 8 and Figure 9, respectively. In both figures, the purple lines show high emissions scenario (RCP 8.5), the blue line shows the medium emissions scenario (RCP 4.5), the grey lines show the current trend (observed). The shaded areas indicate the range for the emissions scenario. For example, the blue shaded areas represent the range of data for the medium emissions scenario (RCP 4.5).

[10] Hall, Alex, Neil Berg, Katherine Reich (University of California, Los Angeles). 2018. Los Angeles Summary Report, California's Fourth Climate Change Assessment. Available:<https://www.energy.ca.gov/sites/default/files/2019-11/Reg%20Report-%20SUM-CCCA4-2018-007%20LosAngeles_ADA.pdf>. Accessed September 26, 2021.

[11] California Energy Commission. N.d. Cal-Adapt. Available: <https://cal-adapt.org/tools/local-climate-change-snapshot/>. Accessed September 26, 2021.

Figure 8 Annual Average Maximum Temperature

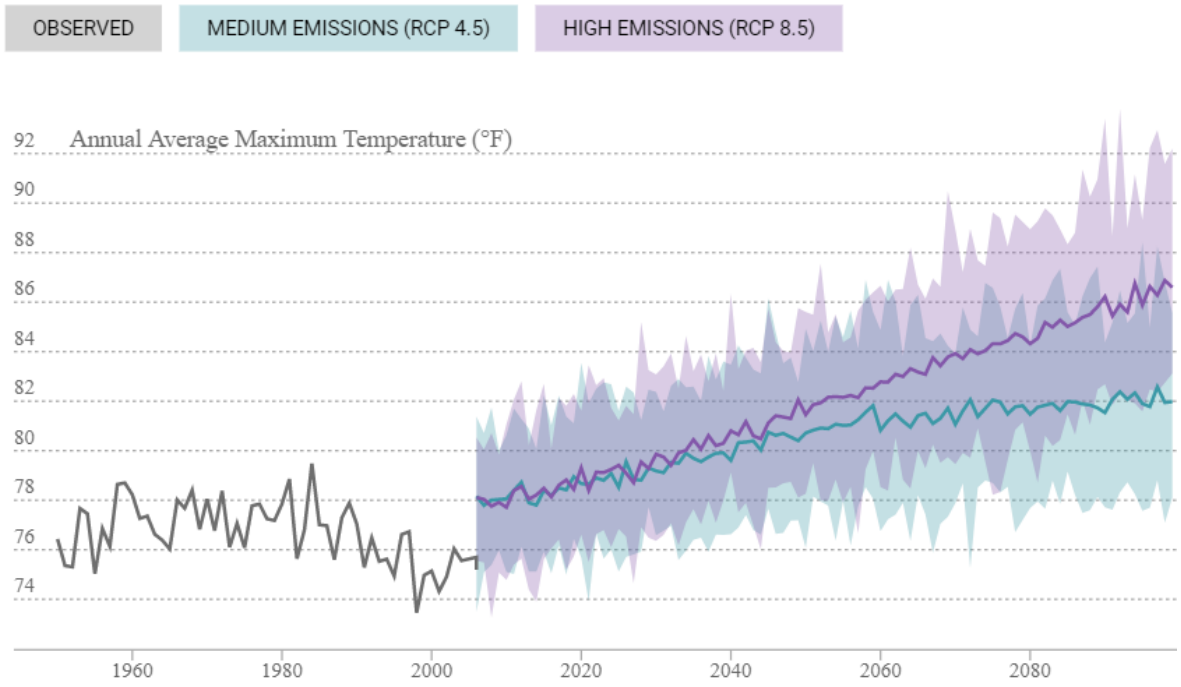
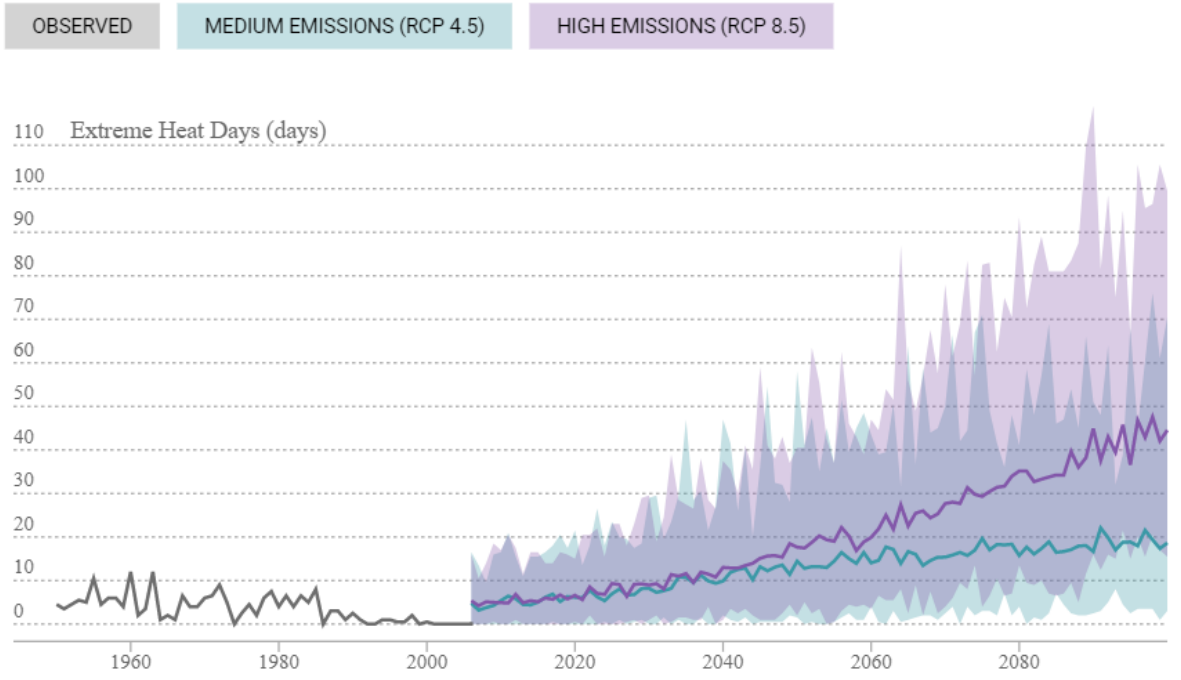


Figure 9 Extreme Heat Days



7.4 Precipitation

Precipitation over the Los Angeles region is highly variable from year to year. Typically, about five storms each year generate approximately 50 percent of total precipitation.[12] Model projections are inconsistent, but in general, small changes are expected relative to the region's historic variability in average annual precipitation. However, dry, and wet extremes are both expected to increase in the future thus increasing the potential for higher variability in precipitation. By the late-21st century, the wettest day of the year is expected to increase across most of the Los Angeles region, with some locations experiencing 25-30 percent increases under RCP 8.5.

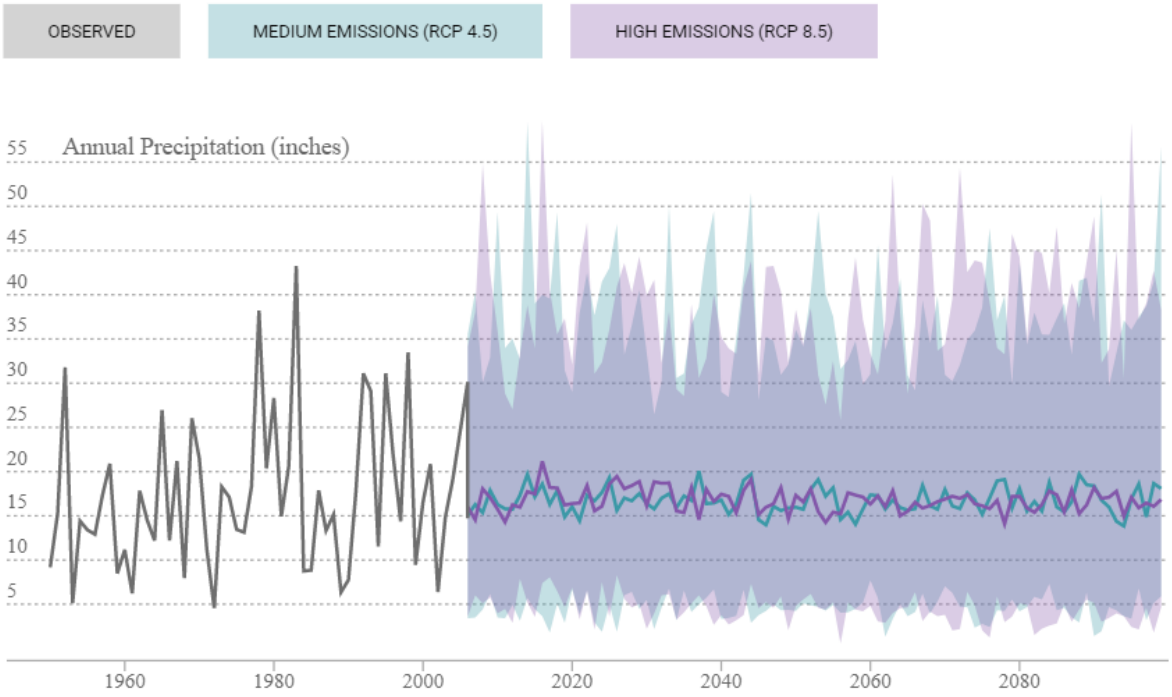
In the city, the modeled historical (1961-1990) annual precipitation is a 30-year average of approximately 17.5 inches.[13] Mid-century projections predict annual precipitation to decrease about 0.6 inches (both RCP4.5 and RCP8.5). By the end of the century, annual precipitation is expected to decrease between 0.3 (RCP4.5) to 0.6 inches (RCP8.5) below the current 30-year average of 17.5 inches. While average annual precipitation is not expected to change significantly, precipitation will likely fall in more intense storms within a shorter wet season. For much of the state, research suggests that wet years will become wetter and dry years will become drier and will extend for longer stretches of time, increasing the risk of extended drought.

Changes in precipitation are shown in Figure 10. The purple line shows high emissions scenario (RCP 8.5), the blue line shows the medium emissions scenario (RCP 4.5), the grey line shows the current trend (observed). The shaded areas indicate the range for the emissions scenario. For example, the blue shaded areas represent the range of data for the medium emissions scenario (RCP 4.5).

[12] Hall, Alex, Neil Berg, Katherine Reich (University of California, Los Angeles). 2018. Los Angeles Summary Report, California's Fourth Climate Change Assessment. Available:<https://www.energy.ca.gov/sites/default/files/2019-11/Reg%20Report-%20SUM-CCCA4-2018-007%20LosAngeles_ADA.pdf>. Accessed September 26, 2021.

[13] California Energy Commission. N.d. Cal-Adapt. Available: <https://cal-adapt.org/tools/local-climate-change-snapshot/>. Accessed September 26, 2021.

Figure 10 Annual Precipitation



7.5 Wildfire

In the Southern California region wildfire risk is influenced by a multitude of compounding factors that include its dry and warm Mediterranean climate, periodic episodes of offshore Santa Ana winds, drought events, the type and spatial distribution of vegetation, varying topography, large urban-wildland interfaces, past fire suppression attempts, and human activities.[14] Regionally, approximately 80 percent of wildfire events occur during the summer and fall, with a quarter of annual wildfires occurring during Santa Ana wind events. Future projections using statistical models indicate that Southern California may experience a larger number of wildfires and burned area by the mid-21st century under RCP 8.5. Overall burned area is projected to increase over 60 percent for Santa Ana-based fires and over 75 percent for non-Santa Ana fires. Many factors affect projected future occurrence of wildfire as a result of climate change. There are significant uncertainties associated with the influence of climate change on the future occurrence of wildfire in the city.

7.6 Vulnerability

Communities will be affected by climate change to varying degrees depending on their sensitivity to its impacts. Social vulnerabilities can greatly inhibit the adaptive capacity of a community. On a larger scale, communities may be more vulnerable because of limited access to financial capital and resources, various institutional barriers, social network limitations, and compromised access to critical infrastructure. Adaptive capacity is largely influenced by governance, management, and institutions, thus making it imperative that adaptive capacity is addressed through effective policy

[14] Hall, Alex, Neil Berg, Katherine Reich (University of California, Los Angeles). 2018. Los Angeles Summary Report, California's Fourth Climate Change Assessment. Available:<https://www.energy.ca.gov/sites/default/files/2019-11/Reg%20Report-%20SUM-CCCA4-2018-007%20LosAngeles_ADA.pdf>. Accessed September 26, 2021.

implementation. On a more local level, the sensitivity of a community depends more on the specific makeup of the community (i.e., specific populations and assets).

The most likely impacts of climate change that San Fernando may experience include increases in average maximum and minimum temperatures, more severe storms, increases in extreme heat events, changes in precipitation patterns, extended drought conditions, and increasing wildfire risk.

Certain population groups may be disproportionately harmed by the impacts of climate change in San Fernando. The California Healthy Places Index tool identifies vulnerable populations by census tract. Vulnerable populations identified in San Fernando include but are not limited to:

- Unemployed,
- Young children,
- Outdoor workers,
- Individuals with asthma,
- Individuals living in poverty,
- Low birth weights,
- Individuals with low educational attainment (less than a bachelor's degree), and
- Individuals that are linguistically isolated (non-English speakers).

The city's residents and workers rely on infrastructure for mobility, water, power, and communications. These systems are vulnerable to climate change, which in turn can reduce the ability of people to adapt. Health risks may arise or be exacerbated because of damaged infrastructure, such as from the loss of access to electricity, or impacts to sanitation, safe food, water supplies, health care, communication, and transportation. To help reduce negative impacts on vulnerable populations and increase adaptive capacity, strategies and policies are identified regarding vulnerable infrastructure, ensuring a high standard of condition and performance on infrastructure systems, and overall disaster preparedness.

External factors present in the San Fernando community that also contribute to climate change vulnerability include high housing cost burden and exposure to poor air quality and drinking water contaminants as well as other environmental conditions. Because climate change impacts are closely intertwined with vulnerable populations and inequities, climate adaptation planning presents a unique opportunity to address some of the external factors that contribute to climate change vulnerability, which are also root causes of inequity. Addressing these underlying causes can help increase resilience for all residents of San Fernando.