City of Pomona Local Hazard Mitigation Plan Update (2022-2027)

505 South Garey Avenue

Pomona, CA 9176

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CITY OF POMONA LOCAL HAZARD MITIGATION PLAN UPDATE (2022-2027)

The City of Pomona is seeking FEMA approval for this Local Hazard Mitigation Plan Update. The City of Pomona *Local Hazard Mitigation Plan Update (2022-2027)* establishes the City's strategy to implement improvements and programs to reduce community impacts in the event of local hazards. Prepared pursuant to the federal Disaster Mitigation Act of 2000, the LHMP comprehensively identifies potential local hazards, the extent of the risks posed by the hazards, the vulnerabilities of the City to these hazards, and actions the City will take to mitigate or reduce the potential impact of the hazards. Pomona initially adopted a Natural Hazards Mitigation Plan in 2015. This 2022 – 2027 Local Hazard Mitigation Plan (LHMP) is an update of the Natural Hazards Mitigation Plan approved by FEMA in 2015.

While the frequency of disaster occurrence is low, Pomona is susceptible to major local hazards with potential for catastrophic consequences. The ensuing devastation could tremendously disrupt daily activities, commerce, and economic development as well as the functions of the City and other public agencies, in addition to causing untold tragedy in life loss and widespread injuries. Earthquakes top the list of local hazards with potential widespread impacts in Pomona, as well as wildfire, landslides, flooding, windstorm, and pandemic/infectious disease.

The LHMP builds upon preparedness and hazard reduction programs currently employed by the City. There are, however, a variety of risks with potential for considerable community impacts that require commitment of additional City resources and staff. By partnering with emergency response providers and community members in the implementation of the actions outlined in this document, the City can achieve a greater level of resiliency and will avoid major disruptions and upheaval associated with a natural disaster.

ORGANIZATION

The LHMP is organized into eleven Chapters, beginning with an introduction to the plan which examines the purpose, process, and implementation and maintenance, as well as public participation, and related planning efforts. Chapter 2 outlines the community profile including the demographics, geography, existing land use and development patterns that are critical to understanding how to mitigate local hazards. Chapter 3 assessing the vulnerabilities particular to Pomona, while Chapters 4 through 9 assess individual hazards. Chapter 10 outlines the City's goals and objectives for this LHMP, and Chapter 11 outlines existing and proposed mitigation efforts. The appendices provide supplementary information and resources.

The structure of the LHMP document is outlined below.

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1 Introduction

1.1 Background

The City of Pomona is a desirable place to live with many attractive features: a favorable climate, diverse employment opportunities, historic downtown and neighborhoods, and more affordable housing than many of its neighboring communities. This quality of life attracts many new residents each year, resulting in a relatively steady growth rate over the last few decades. The population of Pomona grew from 149,058 in 2010 to 151,713 in 2019, a grow rate of approximately 1.8%[1]. Along with this growth, however, comes numerous challenges, one of which is how to effectively manage threats to the city resulting from a local hazard event. Southern California is home to a host of potential local hazards that could cause significant injury, loss of life, and property damage.

LOCAL HAZARDS

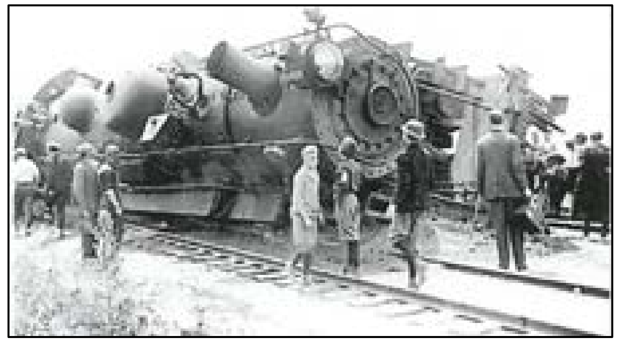
In Pomona, the greatest hazard threats are ground shaking and liquefaction from a major earthquake, although landslide, wildfire, flooding, windstorm events, and infectious disease also have potential to endanger people and/or property. As the City continues to grow, the exposure to these hazards increases, and the accompanying potential for negative impacts becomes even greater. Pomona's status as a nearly built-out city with limited natural open spaces, surrounded by substantially urban uses, affects the types of hazards and potential consequences of concern.

Pomona has been impacted by local hazards - namely earthquake and flooding in prior years. One of the most memorable disasters was a train wreck known to have occurred about 1900. The possible cause was a major earthquake registering approximately 6.5 on the Richter scale along the San Jacinto Fault on December 25, 1899. Over one hundred passengers were seriously injured. Because Pomona had no medical facility, injured passengers were taken into private homes and cared for by Pomona residents. This incident was the catalyst for Pomona to build a hospital, which today is Pomona Valley Hospital Medical Center. The Whittier-Narrows Earthquake of 1987 resulted in damage to many valued historic buildings, and several damaged unreinforced masonry buildings in the downtown area required demolition. Pomona has also had a long history of significant flooding in the eastern portions. Drainage improvements in the 1950s and 1960s and the construction of the San Antonio Dam have alleviated this hazard, although some localized flooding still occasionally occurs during heavy rainstorms (Reference 2).

To date, Pomona has not experienced disasters requiring a request for a Presidential Disaster Declaration and associated emergency assistance funds, with the exception of COVID-19 disaster

[1] *U.S . Census Bureau: United States Population and Housing Counts, 2010 and 2019.*
[2] *Gallivan, Mickey. President. Pomona Historical Society. Written Communication. June 22. 2004.*

declared on March 13, 2020, for the entire United States. The fact that a catastrophic situation requiring this request has rarely occurred should not in any way be interpreted as prediction of low hazard risk for the future. An event like the 1994 Northridge Earthquake, with damage totaling nearly 50 billion dollars, could realistically occur in Pomona.



Above. The derailment of a train in 1899 in Central Pomona prompted the construction of the City's hospital – Pomona Valley Hospital Medical Center. Traveling at high speeds, the train jumped track, potentially due to track damage caused by a large earthquake that occurred in the region on the same *day.*

HAZARD MITIGATION PLANNING

Exact prediction of disasters and the extent of impact on the city is impossible. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from local hazard events. Mitigation planning is an effective method of reducing risk from such local hazards. It is defined as "sustained action taken to reduce or eliminate long-term risk to people and their property from hazards and their effects[3]." This *Local Hazard Mitigation Plan* is the culmination of extensive research, analysis, and community outreach undertaken by the City of Pomona to identify potential local hazard risks and establish appropriate and effective mitigation to reduce the risks.

1.2 PURPOSE OF THE LHMP

In response to a series of costly and damaging disasters, Congress passed the Disaster Mitigation Act of 2000 (DMA 2000), which establishes a frame-work for proactive local planning for local hazard mitigation. This law requires that every local, county, and state government:

- Conduct an assessment of the local hazards that pose a threat to the jurisdiction;
- Determine the potential financial impact of these hazards;

[3] *Federal Emergency Management Agency, website:www.fema.gov, accessed September 14, 2021*

- Create a plan to mitigate these hazards; and
- Implement the plan to reduce the impacts of local hazards.

The preparation and adoption of such a plan is required in order to be eligible for funding from the Federal Emergency Management Agency (FEMA). This *Local Hazard Mitigation Plan* update for Pomona will ensure that the City is in compliance with this law and will be able to receive funding for mitigation projects and other assistance under DMA 2000.

As the costs of damage from local hazards continue to increase, the community realizes the importance of identifying effective ways to reduce vulnerability to disasters. Local Hazard Mitigation Plans assist communities in reducing risk from local hazards by identifying resources, information, and strategies for risk reduction, while helping to guide and coordinate mitigation activities throughout the City. This LHMP update establishes a set of action items to reduce risk from local hazards through education and outreach programs and to foster the development of partnerships, improvements to maximize emergency service response capabilities, and implementation of preventative activities such as land use programs that restrict and control development in areas subject to damage from local hazards.

1.3 RELATED MITIGATION PLANNING EFFORTS

The Pomona LHMP addresses local hazards, risks, and mitigation actions for the entire city. However, a variety of agencies and organizations have facilities in the city and take the lead on mitigation planning efforts for their facilities. LHMPs are under preparation or have been completed by the following for facilities located within Pomona:

- State of California Hazard Mitigation Plan, for State-owned facilities such as freeways, Cal Poly Pomona; and school district facilities, completed in 2013 and updated in 2018
- County of Los Angeles All Hazards Mitigation Plan, for County-owned facilities such as the courts; completed in 2014 and updated in 2019
- Pomona Valley Hospital Medical Center Emergency Operations Plan, completed in 1994 and most recently updated in December 2020.

Major utility infrastructure in Pomona is owned, operated, and managed by entities other than the City, such as Southern California Edison, Union Pacific Railroad, Southern California Gas Company, and the Los Angeles County Metropolitan Transportation Authority (MTA). Maintenance and emergency preparedness of these types of facilities are not under the City' s jurisdiction, although the City has a responsibility to coordinate with these infrastructure providers on emergency preparedness and risk reduction strategies, and advocate safety for Pomona residents, business, and property.

Partners and resources exist at the regional, State, and federal levels. Numerous State agencies have a role in local hazards and local hazard mitigation. Some of the key agencies include:

- The Governor's Office of Emergency Services (OES) is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds after a major disaster declaration;
- The Southern California Earthquake Center (SCEC), gathers information about earthquakes, integrates this information on earthquake phenomena, and communicates this to end-users and the general public to increase earthquake awareness, reduce economic losses, and save lives;
- The California Division of Forestry (CDF) is responsible for all aspects of wildland fire protection on private, and state lands, and administers forest practices regulations, including landslide mitigation, on non-federal lands;
- The California Division of Mines and Geology (DMG) is responsible for geologic hazard characterization, public education, the development of partnerships aimed at reducing risk of geologic and seismic hazards, including landslides and tsunamis; and
- The California Division of Water Resources (DWR) plans, designs, constructs, operates, and maintains the State Water Project; regulates dams; provides flood protection and assists in emergency management. It also educates the public and serves local water needs by providing technical assistance.

1.4 RELATED CITY PLANS AND DOCUMENTS

This LHMP update works in conjunction with other City plans and documents, specifically the General Plan, Zoning Code, the Emergency Operations Plan (EOP), and the Standard Emergency Management System (SEMS). The status of these documents is described below. The planning mechanisms in these documents will be amended to incorporate the LHMP mitigation actions.

POMONA GENERAL PLAN

The *Pomona General Plan* establishes a city-wide development plan and policies to help achieve the community's vision and goals for the City. Topics addressed in the *General Plan* include land use, circulation, economic development, urban design, historic and natural resources, open spaces, noise, as well as public safety. A comprehensive update of the *Pomona General Plan* was adopted in 2014. The Safety Element of the General Plan will be updated to address evacuation routes following the adoption of this LHMP update, and a comprehensive update to the General Plan will commence in the next 4-5 years. Through these updates, the City will seek to expand and improve on policies to reduce the risk of local hazards and will incorporate relevant information from this LHMP update.

ZONING CODE

The *Pomona Zoning Ordinance* establishes regulations for development in the City, implementing the General Plan policy framework. The Zoning Ordinance is currently being updated and will be revised to reflect the directives in the General Plan. The City will incorporate relevant information from this LHMP update to reduce the risks of local hazards, through the incorporation of improved development standards and consideration of restricting growth in areas of the City subject to severe hazards.

EMERGENCY OPERATIONS PLAN (EOP) AND STANDARDIZED EMERGENCY MANAGEMENT SYSTEM (SEMS)

The Emergency Operation Plan (EOP) last updated in 2011 establishes the emergency organization, task assignments, policies and general procedures, and coordination of the various emergency staff and service elements utilizing the Standardized Emergency Management Systems (SEMS). The objective is to incorporate and coordinate all the facilities and personnel of the City into an efficient organization capable of responding to any emergency, as an extension of the California Emergency Plan. In the event of a large-scale local hazard, technological incident or national security emergency, the City would employ the communication protocols and systems for emergency response established in the *Standardized Emergency Management System Plan.* Mitigation actions have been included in this LHMP update that incorporate policies and procedures from the EOP and SEMS, and conversely, when the EOP is next updated, relevant mitigation efforts from this LHMP update will be incorporated.

1.5 PLANNING PROCESS

In preparing the LHMP, the City utilized a step-by-step planning process incorporating thorough research, analysis, and participation by stakeholders and community members. This planning process consisted of six major steps:

- Identification of issues pertaining to local hazards, community risks and vulnerabilities, preparedness, and awareness;
- Intensive research and mapping of hazards, critical facilities, and vulnerabilities to identify potential risks in Pomona;
- Rating of risks according to potential extent of damage, injury and life loss, and severity of service disruptions impairing community functioning;
- Formulation of mission, goals, and objectives;
- Evaluation of mitigation actions to reduce risks and improve preparedness; and
- Plan preparation.

Community members, stakeholders, and partners in emergency preparedness were involved in each step providing input and assistance as described below.

1.6 STAKEHOLDER PARTICIPATION

Emergency preparedness and response in a city like Pomona depends on the coordinated efforts of emergency service providers, infrastructure partners, community leaders, and residents themselves. To be comprehensive, feasible, and effective, mitigation planning for local hazards must proceed in coordination with these entities. For these reasons, a multi-component public participation program was integrated with the planning process for the LHMP. The public participation program included:

- Technical Advisory Committee (TAC) comprised of members representing City departments, school district, medical facilities, airport and transit facilities, and utility and emergency service providers who provided input;
- Public survey;
- City Council presentation;
- Communications with stakeholders and partners to acquire data and planning information.

Table 1-1: Technical Advisory Committee

NAME	TITLE	AGENCY/DEPT.	EMAIL
CITY			
Naela Cansino, ARM	Safety & Emergency Mgmt. Officer	Risk Management	naela.cansino@pomonaca.gov
Chris Millard	Risk Manager	Risk Management	chris.millard@pomonaca.gov
Linda Matthews	Human Resources/Risk Management Director	Human Resources	linda.matthews@pomonaca.gov
Rene Guerrero	Public Works Director	Public Works	rene.guerrero@pomonaca.gov
Benita DeFrank	Neighborhood Services Director	Neighborhood Services	Benita.defrank@pomonaca.gov
Anita Gutierrez	Development Services Director	Development Services	anita.gutierrez@pomonaca.gov
Chris Diggs	Water Resources Director	Water Resources	chris.diggs@pomonaca.gov
Lt. Steve Congalton	Watch Commanders Office	Police	steve.congalton@pomonaca.gov
HEALTH CARE/MEDICAL SERVICE PROVIDERS			
Steven Storbakken	Director of Emergency	Pomona Valley Medical Center	steven.storbakken@pvhmc.org

	Preparedness		
Rimmi Hundal	Director	Tri-City Mental Health	rhundal@tricitymhs.org
Lisa Naranjo	Program Supervisor	Tri-City Mental Health	lnaranjo@tricitymhs.org
Erica Frausto Aguado	Executive Director for Greater San Gabriel and Pomona	American Red Cross	erica.fraustoaguado@redcross.org
Jose De Leon	Facilities Manager	San Gabriel Regional Center	jdeleon@sgprc.org
UTILITIES			
Bob Cruz	Regional Public Affairs Manager	Sempra/SoCal Gas	rcruz1@semprautilities.com
Marissa Castro-Salvati	Local Public Affairs Regional Manager	Southern California Edison	marissa.castro@sce.com
AIRPORT & TRANSIT			
Sam Carter	Airport Manager	Brackett Airport	scarter@americanairports.net
Dave Price	Assistant Airport Manager	Brackett Airport	pocasstmgr@americanairports.com
Tanya Pina	Emergency Contact	Foothill Transit	tpina@foothilltransit.org
LaShawn Gillespie	Emergency Contact	Foothill Transit	lgillespie@foothilltransit.org
COUNTY EMERGENCY SERVICES			
Jim Robinson	Assistant Fire Chief	LA County Fire	jim.robinson@fire.lacounty.gov
Diana Manzano-Garcia	Disaster Area Management Coordinator	Area D Community Emergency Response Team (CERT)	dmanzano@areadonline.com
BUSINESS & COMMUNITY INTERESTS			
Lorena Parker	Executive Director	Downtown Pomona Owner's Association	lorena@downtownpomona.org
Rene Martin	Chairman	Ecumenical and Interfaith Relations Committee	rene.joseph.martin@gmail.com
Monique	President & CEO	Chamber of	mmanzanares@pomonachamber.org

Manzanares		Commerce	
Minerva Hernandez	President	Hispanic Chamber of Commerce	cdhpomona@gmail.com
Barry Gillies	Director of Property Operations	Pomona Fairplex	gillies@fairplex.com
Doreen Weatherly	Safety Services Manager	Pomona Fairplex	weatherly@fairplex.com
SCHOOL DISTRICT			
Richard Martinez	Superintendent of Schools	Pomona Unified School District	Richard.martinez@pomona.k12.ca.us

LHMP UPDATE SCHEDULE

- The City released a Request For Proposals from qualified firms to update the LHMP on August 3, 2020.
- LHMP update kickoff meeting occurred on March 25, 2021. The attendees were able to review the departments that were involved in the original preparation and identified representatives from outsides agencies that could be invited to be members. The LHMP City project manager provided a list of agencies and organizations that participated in the 2012 NHMP adopted in 2015, and Interwest staff contacted each organization to update contacts and initiate the outreach process via email and phone correspondence.
- The TAC agreed upon a planning process/public outreach method. A public outreach online survey would be used for the 2022 update due to the ongoing COVID 19 pandemic. A review process of this survey was undertaken and comments and/or changes were subsequently made.
- The TAC also reviewed the hazards listed in the 2015 document and added pandemic to the list of hazards. Weekly Update Committee meetings were held for the first several weeks of this LHMP update, then shifted to bi-weekly meetings in late May 2021.
- A link and QR Code for the public survey were posted to the City's LHMP Update webpage on June 28, 2021 and provided in English and Spanish. Advertisements for the survey were posted to Instagram, Facebook, the City's website and TV station, the electronic message board outside of City Hall, and in the Pomona weekly report through the months of July and August. Survey flyers were also handed out to the public at the Public Resource Fair on November 6, 2021.
- A public meeting to introduce the LHMP to the City Council was held on May 17, 2021. No members of the public attended the meeting. The presentation was given by City staff and Interwest Consulting Group staff, which resulted in a discussion about Pomona's proximity to several earthquake faults, drought, fires, and pandemic.
- Email correspondence with Technical Advisory Committee agency members began in the last week of May with correspondence continuing through November of 2021.
- Meetings with City Departments occurred from January through March to update Mitigation Action Items and other background information (Appendix A).

TECHNICAL ADVISORY COMMITTEE MEETINGS

- **March 25, 2021** – Kick-off meeting to introduce Technical Advisory Committee and project schedule.
- **April 12, 2021** – Meeting to determine public outreach strategy and COVID 19 limitations, addition of pandemic/infectious disease as a new hazard, and requirement to address impacts of climate change on local hazards.
- **April 19, 2021** – Review of public survey and determination of when and how to release to public. Discussed presenting the LHMP update to City Council.
- **May 3, 2021** – Discussed annexations and major construction projects since 2012. May 17, 2021, chosen as City Council presentation date.
- **May 17, 2021** – Reviewed Power Point presentation for City Council and launch of public survey after the City Council presentation.
- **June 1, 2021** – Discussed update to hazard maps and other maps relevant to the LHMP update.
- **June 14, 2021** – New Emergency Services Manager introduced to TAC team and to take over management of LHMP update.
- **June 28, 2021** – Update to project timeline and discussion strategy to increase participation of public survey.
- **July 12, 2021** – Updates provided relating to City demographics.
- **July 26, 2021** - Check -in on survey participation and request for related City documents.
- **August 9, 2021** – Discussion regarding area schools and hospitals.
- **August 23, 2021** – Request for information regarding City facilities including water facilities such as reservoirs.
- **September 6, 2021 –** Discussed changing document name from Natural Hazard Mitigation Plan to Local Hazard Mitigation Plan. Also, updated City staff on HAZUS Report.
- **September 20, 2021** – Confirmation of critical facilities (Police and Fire Stations) number and status.
- **October 4, 2021** – Discussed lack of participation in public survey and City events to present informational flyers with QR Code to public survey. Decided on November 6, 2021, Resource Fair.
- **October 18, 2021** - Discussed additional information from the Housing Element Update to include in the LHMP Update. Coordinated with Emergency Services Manager to begin outreach with City Departments to update Mitigation Action Plan.
- **November 1, 2021** – Discussed who would be present for the November 6 Resource Fair to hand out informational flyers and answer questions as Interwest staff members not available to attend.
- **December 13, 2021** – Reviewed initial responses to Mitigation Action Plan update.
- **January 10,2021** – Discussed need for more in-depth department interviews to address updates to Mitigation Action Plan.
- **January 27, 2021** – Interview with Director of Neighborhood Services to discuss outstanding items, and Mitigation Actions under Neighborhood Services responsibility.

- **February 3, 2021** – Interview with Directors of Public Works and Water Resources Department to discuss outstanding items, and Mitigation Action items under department responsibility.
- **February 7, 2021** – Interview with Emergency Services Manager to discuss outstanding items, and Mitigation Action Items under Risk Management Division responsibility.
- **February 14, 2021** – Interview with Director of Development Services to discuss outstanding items, and Mitigation Action Items under department responsibility.
- **March 7, 2021** – Interview with Police Department to discuss Mitigation Action Items under department responsibility.

ONLINE PUBLIC SURVEY

To better understand the community's understanding and concerns regarding natural hazards and local response, the City solicited input from the community in the form of an online survey to determine:

- How the community prioritizes hazards facing the City.
- Actions the City and community can take to reduce future damage from natural hazards.
- How local government officials can better communicate natural hazard risks to the public.

The survey included 12 questions and a comment section created to identify the respondent's connection with City of Pomona, experience with previous natural hazard events, preparedness for future hazards, and opportunities to create a community more resilient to local hazards.

To ensure the community had ample opportunities to provide input, the City promoted the survey using the following methods:

- City website – The City placed a link to the survey in a prominent location on the City's website homepage, ensuring all website visitors were aware of the opportunity.
- A City Council presentation introducing the Local Hazard Mitigation Plan and the importance of maintaining an up-to-date version of this LHMP. The presentation included information about the survey.
- Hard Copy surveys – The City provided paper (hard) copies of the survey at counters of City department offices including City Hall and handed out at the Resource Fair on November 6, 2021.

Outreach materials used to promote the public survey can be found in Appendix A.

PUBLIC SURVEY RESULTS

The following summary highlights the key responses and findings of the survey. These survey results help to inform staff of community concerns.

Community Participation

The City received responses to the survey from 62 individuals (62 in English, and 0 in Spanish).

Level of Concern

Respondents were asked to review the city's likely natural hazards and rate their level of concern on a scale from not concerned, not very concerned, neutral, somewhat concerned, to very concerned, for each local hazard. Climate change was identified as the highest level of concern among participants. While climate change is not identified as a specific hazard in this LHMP, it has the potential to impact all of the listed hazards, either directly or indirectly. Of the listed hazards in this LHMP, participants indicated the highest levels of concern for earthquakes, pandemics, and wildfire hazards/brush fire respectively pandemic which may have been temporarily inflated due to the fact that the worldwide COVID-19 pandemic was still ongoing at the time the survey was released. Lowest levels of concern include flood, dam failure and inundation hazards, severe windstorms, and landslides.

Actions to Prepare

The results of the survey indicate that many respondents have taken actions to reduce damage from a local hazard. The majority of respondents had purchased homeowners' insurance (75.81%), talked with family members about what to do in case of a disaster or emergency (54.84%), and prepared a "Disaster Supply Kit" (53.23%).

Local Government Efforts to Reduce Hazards

Respondents were asked to provide input as to the most important things the local government can do to help the community be more prepared for a disaster by ranking them as very important somewhat important, neutral, not very important or not important. Those following measures are ranked based on highest percentage of respondents identifying as very important:

Protecting critical facilities (hospitals, fire stations, etc.):	88.33%
Protecting and reducing damage to utilities:	80.33%
Strengthening emergency services (police, fire, ambulance):	75.41%
Protecting private property:	73.77%
Protecting the natural environment:	65.00%
Protecting K-12 schools:	61.67%
Promoting cooperation among public and private organizations and citizens:	59.02%
Preventing development in hazard areas:	57.38%
Protecting Colleges/Universities:	47.46%
Protecting small businesses:	45.90%
Protecting historical/cultural landmarks, museums, etc.:	37.70%
Protecting major employers:	24.59%

Community Assets

Respondents were asked to determine the importance of protecting the following community assets for planning for local hazards. Those following community assets are ranked based on highest percentage of respondents identifying as very important:

Human: Loss of life and/or injuries:	90.32%
Governance: Ability to maintain order and/or provide public amenities/services:	77.05%
Infrastructure: Damage or loss of bridges, utilities, schools, etc.:	75.81%
Environmental: Damage or loss of forests, rangeland, waterways, etc.:	59.68%
Economic: Business closures and/or job losses:	56.45%
Cultural Historic: Damage or loss of libraries, museums, fairgrounds, etc.:	41.94%

Incorporation of Public Survey Results

Based on feedback gathered from the public survey, the Mitigation Action Plan focused on mitigations that would address the areas of deepest concern to the community such as protecting human life and property, preserving government facilities and services, improving local utilities and infrastructure, increasing community knowledge through public awareness campaigns.

Public Review Period

The draft 2021 LHMP was released for public review from April 4, 2022 through April 26, 2022. The release of the public draft LHMP was promoted through a variety of means including:

City of Pomona website

City of Pomona social media pages

Inland Valley Daily Bulletin

Hard copy at City Facilities

The public review period of the draft LHMP conclude on April 26, 2022. The public, and City staff provided comments and questions on the draft LHMP. No comments were received from the public, city staff, the TAC, public stakeholders, neighboring communities, or local and regional agencies during the public review period.

1.7 LHMP IMPLEMENTATION AND MAINTENANCE

Implementation of the updated LHMP will involve the coordinated efforts and commitment of City officials, City staff, emergency preparedness partners, and community leaders and residents. The timetable for implementation of the mitigation actions is five years, although a variety of actions will be ongoing once initiated. Other actions may take several years to complete, as detailed in **Chapter 11 Mitigation Action Plan**.

PLAN ADOPTION

The LHMP is intended to be adopted by the City Council, following review and comment by the State Hazard Mitigation Officer in the Governor's Office of Emergency Services, FEMA, and the public. Once adopted, the adoption resolution will be submitted to FEMA for final review and acceptance. Upon acceptance by FEMA, the City will regain eligibility for Hazard Mitigation Grant Program funds.

IMPLEMENTATION STRUCTURE

The Human Resources Department, Risk Management Division will take the lead in supervising implementation, working closely with the LHMP Committee. Each year in an Annual Report, priorities will be established for mitigation implementation, with consideration of cost-effectiveness per FEMA approved techniques. The City will update the LHMP every five years – in coordination with the LHMP Committee and with public input – by evaluating the effectiveness of mitigation implementation, addressing vulnerabilities, incorporating advancements in emergency response and post-disaster services, and updating hazard and risk assessments as new information becomes available. This includes incorporating new data from federal, State, or regional hazard mapping and delineation efforts.

The LHMP implementation structure is established in **Mitigation Action 1.1 in Chapter 11**, which should be referred to for more detail.

MAINTENANCE OF PLAN

The Human Resources Department, Risk Management Division will call an annual meeting that will consist of City departments, the general public and stakeholders to review the Local Hazard Mitigation Plan and take input for any changes or updates that might be needed to the plan. This meeting will take place in November and will be announced through the normal channels the City utilizes for meetings of this type.

2 Community Profile

This Community Profile provides background information on Pomona's geography, environment, population, and economy to better understand local hazards and vulnerabilities of the City. The 2014 *General Plan* is the source for much of the discussion in this chapter and should be referred to for greater detail on conditions, trends, and planning issues.

2.1 INTRODUCTION

Located in the highly urbanized Los Angeles metropolitan area, the City of Pomona shares many attributes with its neighbors. This includes a vulnerability to the volatile natural systems and features that distinguish the area. The semi-arid climate that attracts many people to the region also creates the conditions for fast-spreading wildfires. The infrequent but intense winter rainstorms can create the potential for flooding, should the flood prevention infrastructure ever fail. The hillsides that frame the Pomona Valley and that are home to well-established neighborhoods are also subject to destructive landslide conditions. And perhaps most dramatically, Pomona is located in one of the most earthquake prone urbanized areas in the United States.

Although situated in a high-risk metropolitan region, Pomona has been fortunate to avoid catastrophic local hazard events since its incorporation and development. Southern California earthquakes have impacted Pomona, although major damage has been limited. Fire has also impacted Pomona, although major wildfires such as the kind seen in recent years, have not spread into Pomona. Large scale flooding has not been a threat since the channelization of local creeks, and significant landslides have not caused widespread damage. Nevertheless, the threat of a local hazard event is always present. The potential for property loss and personal injury is particularly profound in Pomona due to its nearly built-out status. As the City continues to intensify with infill development, the risks, as well as the opportunity to build in mitigation, increases.

The inevitability of local hazards, and the growing population and activity within the City, create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future hazard events. Identifying the risks posed by local hazards and developing strategies to reduce the impact of a hazard event, can assist in protecting life and property of citizens and communities. Local residents and businesses have worked together with the City to create this *Local Hazard Mitigation Plan* that addresses the potential impacts of hazard events.

2.2 GEOGRAPHY AND THE ENVIRONMENT

The City of Pomona covers 22.84 square miles, or approximately 14,620 acres in eastern Los Angeles County, approximately 30 miles from downtown Los Angeles. To the west are the cities of the San Gabriel Valley and to the east is the fast-growing San Bernardino-Riverside region, as shown in **Figure 2-1 Regional Location**. The majority of the City is situated on the low-lying floor of the Pomona Valley and is bisected by major transportation corridors - freeways, rail corridors, and arterial roads. The San Jose and Puente Hills provide distinct edges to the northwest and southern boundaries, respectively of Pomona see **Figure 2-2 Topography and City Boundaries**.

Pomona is located on a gently sloping alluvial fan, which originates at the mouth of the San Antonio Canyon and slopes gradually to the south and southwest. Pomona is mostly characterized by flat topography (average slope in the valley floor area is a little under one percent) and there are only minor topographic variations except for the hillside areas to the northwest and south. Elevations in the City range from 1,100 to 1,300 feet in the San Jose and Puente Hills to 800 to 900 feet on the valley floor.
In general, the City is primarily urbanized, with limited open space and parks (221 acres, or 1.5% of total), and vacant areas (597 acres, or 4.1% of total). The City has no major water features, such as rivers or lakes; development patterns were defined in Pomona’s early history by the railroad and later by the freeways. Creeks have been channelized and do not create significant physical boundaries.

2.3 HISTORICAL DEVELOPMENT

Pomona is one of the most well-established cities in the San Gabriel Valley. The City was initially plotted out in 1876 as a one square-mile townsite built around the Southern Pacific railroad station and the City itself was later incorporated in 1888, the fifth chartered City in Los Angeles County. Pomona started as a major center for citrus orchards, but also developed a well-defined town area. Residential neighborhoods soon developed, some of which are highly regarded for their exceptional architecture and style. These neighborhoods, along with the unique downtown core, give Pomona a historic character that is a source of community pride and an asset to be protected.

Today, Pomona is the seventh most populous city in Los Angeles County. It is a City with a diverse mix of people, neighborhoods, and business opportunities and has also developed into a very urban place. The City has a well-developed mixed-use downtown that is a center for arts and culture, and the site of substantial redevelopment and infill development.

Figure 2-1: Regional Location

2.4 CLIMATE

One of the Pomona's great assets is its Mediterranean Southern California climate. Average temperatures range from 41 degrees in the winter months to 89 degrees in the summer months. However, the temperatures can vary over a wide range, particularly when the Santa Ana winds blow from October to March, bringing higher temperatures and very low humidity. Temperatures rarely exceed 100 degrees in the summer months (June - September), nor drop below 30 degrees in the winter months (November-March).

Rainfall in the city averages 16.99 inches of rain per year. Over the recorded history of rainfall in Pomona, amounts have ranged from lows of seven inches in some years to 46 inches of rain in very wet years. Furthermore, actual rainfall in Southern California tends to fall in large amounts during sporadic and often heavy storms rather than consistently over storms at somewhat regular intervals. Because the metropolitan basin is largely built out, water originating in higher elevation communities can have a sudden impact on adjoining communities that have a lower elevation such as Pomona.

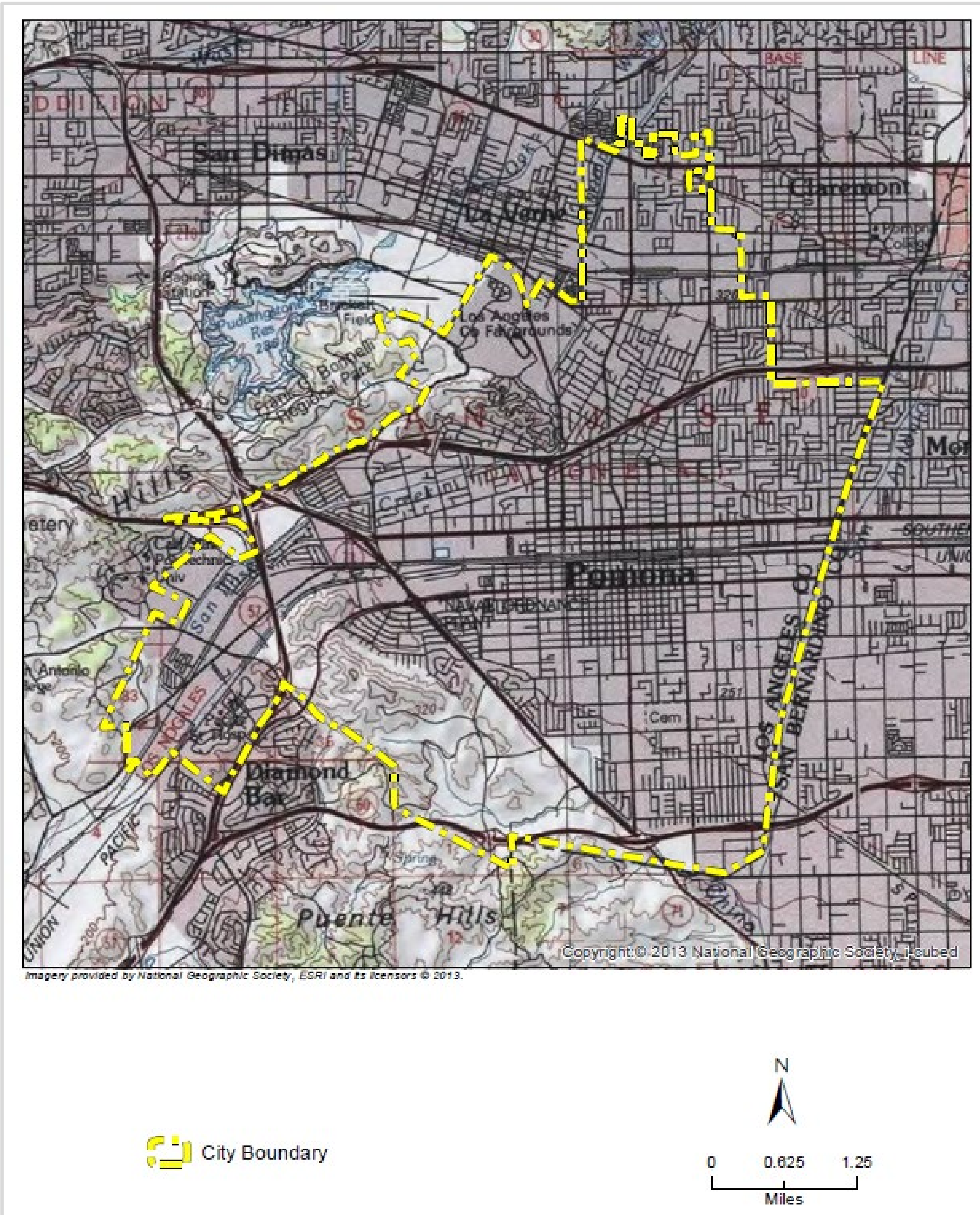
2.5 GEOLOGIC CONDITIONS

REGIONAL GEOLOGIC SETTING

Pomona lies within the western portion of the Transverse Ranges geomorphic province, characterized by numerous earthquake faults. The Transverse Ranges consist of a distinct group of east-west trending ranges and valley that truncate the prevailing north-northwest trend of the southern Coast Ranges and Peninsular Ranges. This region encompasses approximately 325 miles, and extends from Point Aguello, located along the western coast of California, eastward to Joshua Tree National Park, where it merges with the Mojave and Colorado Deserts.

Within the Transverse Ranges there are abundant compressional reverse and thrust normal faults, and curvilinear strike-slip faults that generally trend in an east-west direction. The foremost structural feature that has affected the geologic evolution of the region is the San Andreas fault. This fault has a northwest strike, located both to the north and south of the Transverse Ranges, but changes to a west-northwest strike within the Transverse Ranges, thus forming a bend in the fault. Many of these normal faults break the ground surface south of the San Andreas fault along the southern flank of the San Gabriel and Santa Monica Mountains. The thrust faults that break the surface south of the San Andreas fault dip southward and merge with the broad, buried fold and thrust belts that underlie the Los Angeles basin and the southern margin of the Transverse Ranges.

Figure 2-2: Topography and City Boundaries



REGIONAL FAULTS

The major faults that have the potential to affect the greater Los Angeles Basin, and therefore Pomona, are the San Andreas Fault Zone, Sierra Madre Fault System, Whittier-Elsinore Fault Zone, Verdugo Fault, Norwalk Fault, Santa Monica Fault, San Fernando Fault Zone, and the Newport-Inglewood Fault Zone. These faults are described in greater detail in **Chapter 4 Earthquakes**.

LOCAL FAULTS

In addition to the regional faults, there are several local faults located within the city that are considered potentially active. No recent seismic activity has been recorded along these faults in the last 10,000 years. However, a major earthquake occurring along any of these faults would be capable of generating seismic hazards and strong ground shaking effects within the city. These local faults include the Indian Hill, Chino, Central Avenue, and San Jose Faults. These faults are described in greater detail in **Chapter 4 Earthquakes**.

LOCAL GEOLOGIC SETTING

The City is underlain by alluvium within the valley area and underlain by bedrock on the San Jose Hills on the northwest and the Puente Hills on the southwest. The unconsolidated alluvial soils of the San Gabriel Valley came from the transport of soils from the San Gabriel Mountains to the north, as well as soils that washed out of nearby foothills and the San Antonio canyon area. The alluvial soils are underlain by igneous metamorphic rock, as seen in outcrops in the Puente Hills and San Jose Hills. Soils on the western valley area are made up of unconsolidated coarse sands and gravel near the San Jose Creek, and very fine grain unconsolidated silty sands along the foothills.

The Puente Hills are made up of marine sandstones and siltstones of the Puente formation, with a mixture of volcanic rock and outcrops. The Ganesha Hills are made of igneous metamorphic outcrops, as found on the San Jose Hills. The rocks are as much as 24,000 feet thick and consist of fine to course-grained marine elastic sedimentary rocks of the Cenozoic era (12 million years to 10,000 years ago). These rocks also include volcanic rocks and some non-marine sedimentary rocks.

MINERALS AND SOILS

The characteristics of the minerals and soils present in Pomona indicate the potential types of hazards that may occur. Rock hardness and soil characteristics can determine whether or not an area will be prone to geologic hazards such as earthquake-induced ground shaking, liquefaction, and landslides.

Within the Pomona area, various soil associations are identified by the Natural Resources Conservation Service (NRCS). These soil associations consist of one or more soil types that have similar characteristics, and each is named for the predominant soil series it contains. Soil series within the City include Tununga-Sobada, Hanford, Cropley, Foster-Grangeville, Chino, Diablo-Altamont, Altamont-Diablo, San

Andreas-San Benito, San Benito-Soper, and Yolo. Generally, soils located in the western valley area comprise unconsolidated coarse sands and gravel, with very fine grain unconsolidated silty sands along the foothills.

Pomona is not located within a Significant Mineral Aggregate Resource Area (SMARA), as designated by the State Department of Conservation, nor is it located in an area with active mineral extraction activities.

2.6 POPULATION AND DEMOGRAPHICS

The City of Pomona has a population of about 151,713 people in an area of 22.84 square miles. The population has steadily increased from the late 1800s through 2020, and increased about 1.75 percent from 2010 to 2020, according to the 2020 Census. This rate of increase is similar the rate of increase for Los Angeles County as a whole over the same time period (1.95 percent).

Considering the historic trends, population growth is expected to continue in Pomona. This increase of people creates more community exposure, and changes how agencies prepare for and respond to natural hazards. For example, more people living in crowded neighborhoods can increase the risks associated with hazard events.

Furthermore, Pomona is experiencing a great deal of in-fill building, which is increasing the population density and creating greater service loads on the built infrastructure, including roads, water supply, sewer services, and storm drains.

According to the census 2019 American Community Survey 1-Year Estimates, the demographic make-up of Pomona is as follows:

Table 2-1: Pomona Demographics

Total Population	151,713
RACE	**% OF POPULATION**
White	21%
Black	5.8%
American Indian/Alaska Native	2.3%
Asian	10.7 %
Native Hawaiian/Pacific Islander	0.2%
Some Other Race	41.3%
Two Races	18.7%
Three Races	0.8%
Four Races	0.09%
AGE	
Median Age	34.3
Under 18 years	25%
Over 18 years	75%
LANGUAGE SPOKEN AT HOME	
English Only	34%
Spanish	56%
Other Indo European	1.1%
Asian and Pacific Islander	8.2%
Other Languages	0.6%
POVERTY BY AGE	
All	13%
Under 18 years	26.1%
Between 18 and 64 years	15.6%
65 years and over	12.9%
EDUCATION ATTAINMENT (POPULATION 25 YEARS AND OVER)	
High School or Equivalent Degree	23.6%
Some College, no Degree	21.1%
Associate's Degree	6.5%
Bachelor Degree	13.3%
Graduate or Professional Degree	4.8%
DISABILITY	
Total	11.8%
Hearing Difficulty	2.6%
Vision Difficulty	2.5%
Cognitive Difficulty	4.6%
Ambulatory Difficulty	6.2%
Self-Care Difficulty	2.6%
Independent Living Difficulty	5.4%
HEALTH COVERAGE	
Population w/out Health Coverage	11.2%

Natural hazards do not discriminate, but the impacts in terms of vulnerability and the ability to recover vary greatly among the population. According to Peggy Stahl of the Federal Emergency Management Agency (FEMA) Preparedness, Training, and Exercise Directorate, 80% of the disaster burden falls on the public, and within that number, a disproportionate burden is placed on special needs groups, women, children, minorities, and the poor. The ethnic and cultural diversity in Pomona suggests a need to address multi-cultural needs and services as described below.

Census data indicates that the number of Pomona residents in poverty decreased from 2010 to 2019. About 13 percent of the population in Pomona was determined to have poverty status in the 2019 estimates, less than the County at 13.4 percent of the population.

Vulnerable populations, including seniors, disabled citizens, women with children, as well as those people living in poverty, may be disproportionately impacted by natural hazards. In Pomona, the percentage of the population over 65 has increased from 7.6 percent in 2010 to approximately 10.6 percent in 2019. However, the percentage of residents under 18 years of age has decreased from 29.6 percent in 2010 to approximately 25 percent in 2019.

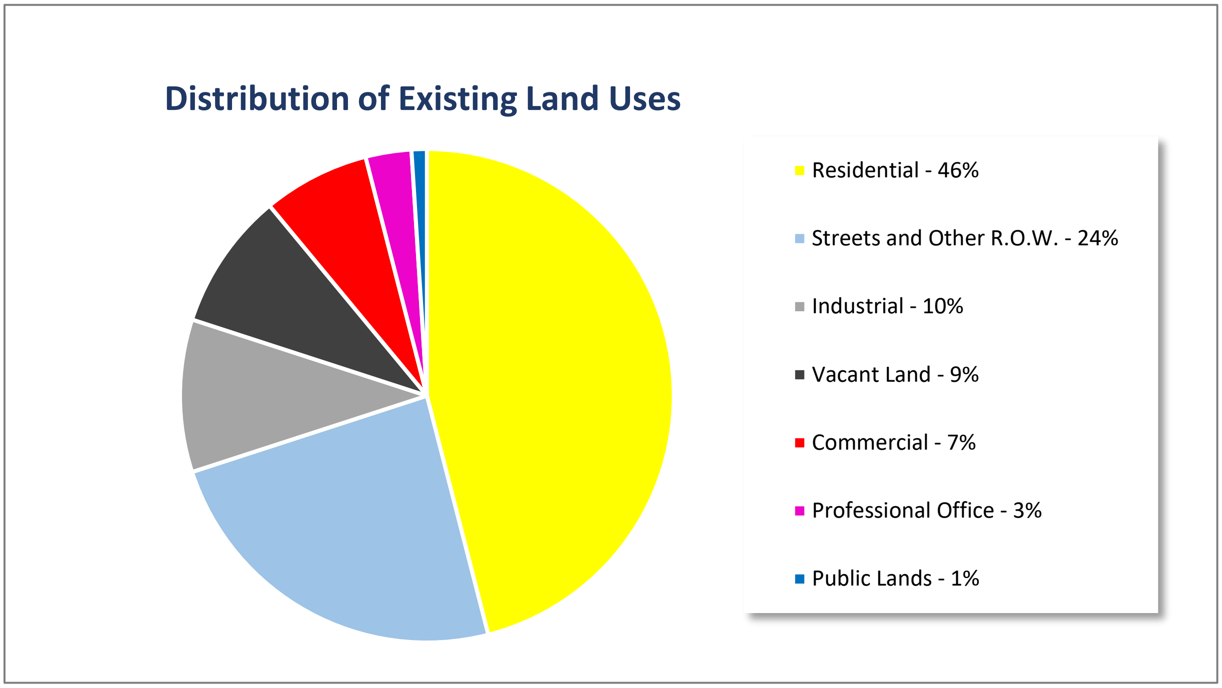
Examining the reach of hazard mitigation policies to special needs populations may assist in increasing access to services and programs. FEMA's Office of Equal Rights addresses this need by suggesting that agencies and organizations planning for natural disasters identify special needs populations, make recovery centers more accessible, and review practices and procedures to remedy any discrimination in relief application or assistance.

The cost of natural hazards recovery can place an unequal financial responsibility on the general population when only a small proportion may benefit from governmental funds used to rebuild private structures. Discussions about natural hazards that include local citizen groups, insurance companies, and other public and private sector organizations can help ensure that all members of the population are a part of the decision-making processes.

2.7 LAND USE PATTERNS

Pomona is a highly urbanized city with a rich history that is reflected in its current development pattern and diverse mix of land uses, building types and styles, and neighborhoods. The City is almost entirely built-out with only 9 percent vacant land and a 1 percent of public lands. The distribution of existing land uses is shown in **Figure 2-3 Current Distribution of Existing Land Use**.

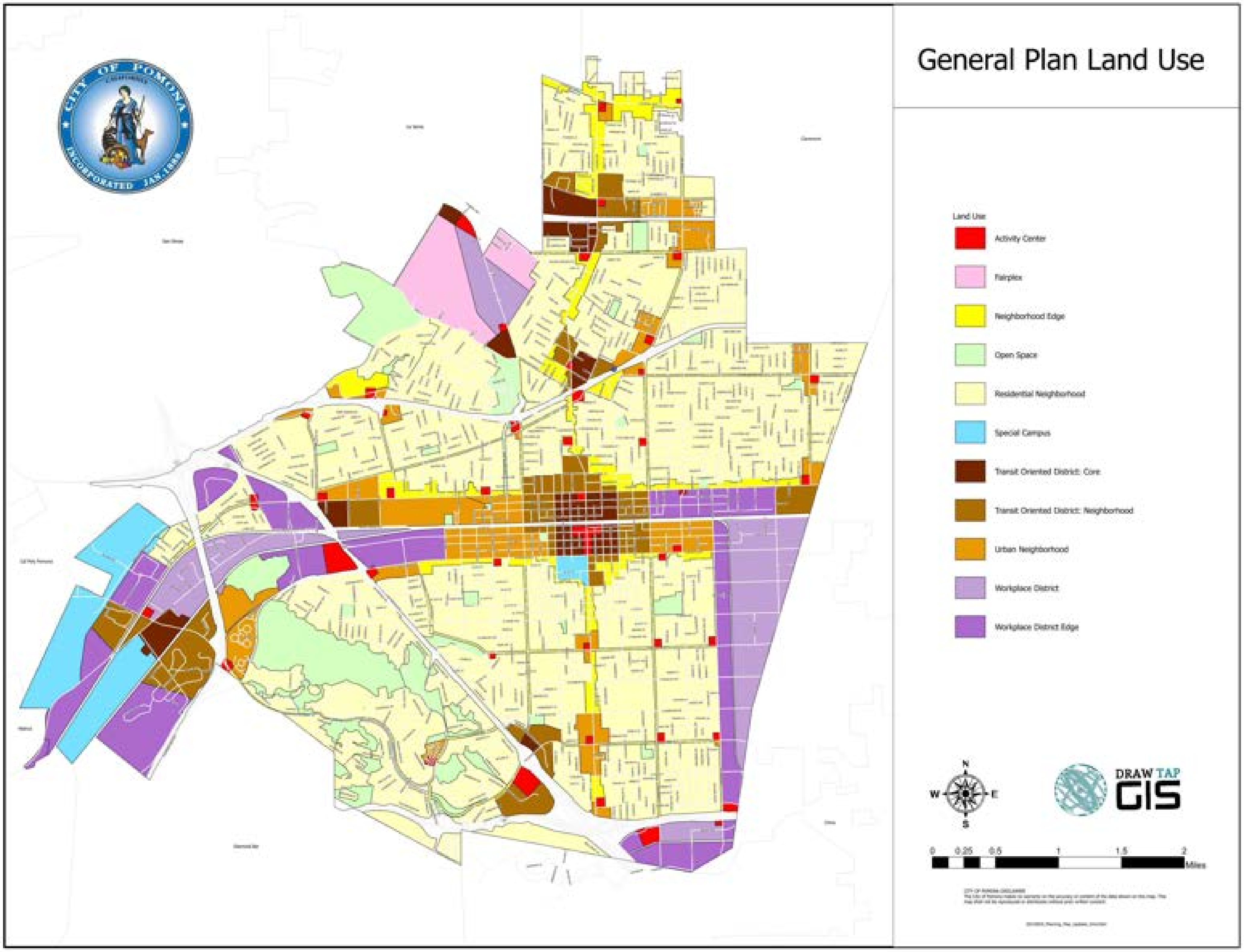
Figure 2-3: Current Distribution of Existing Land Use



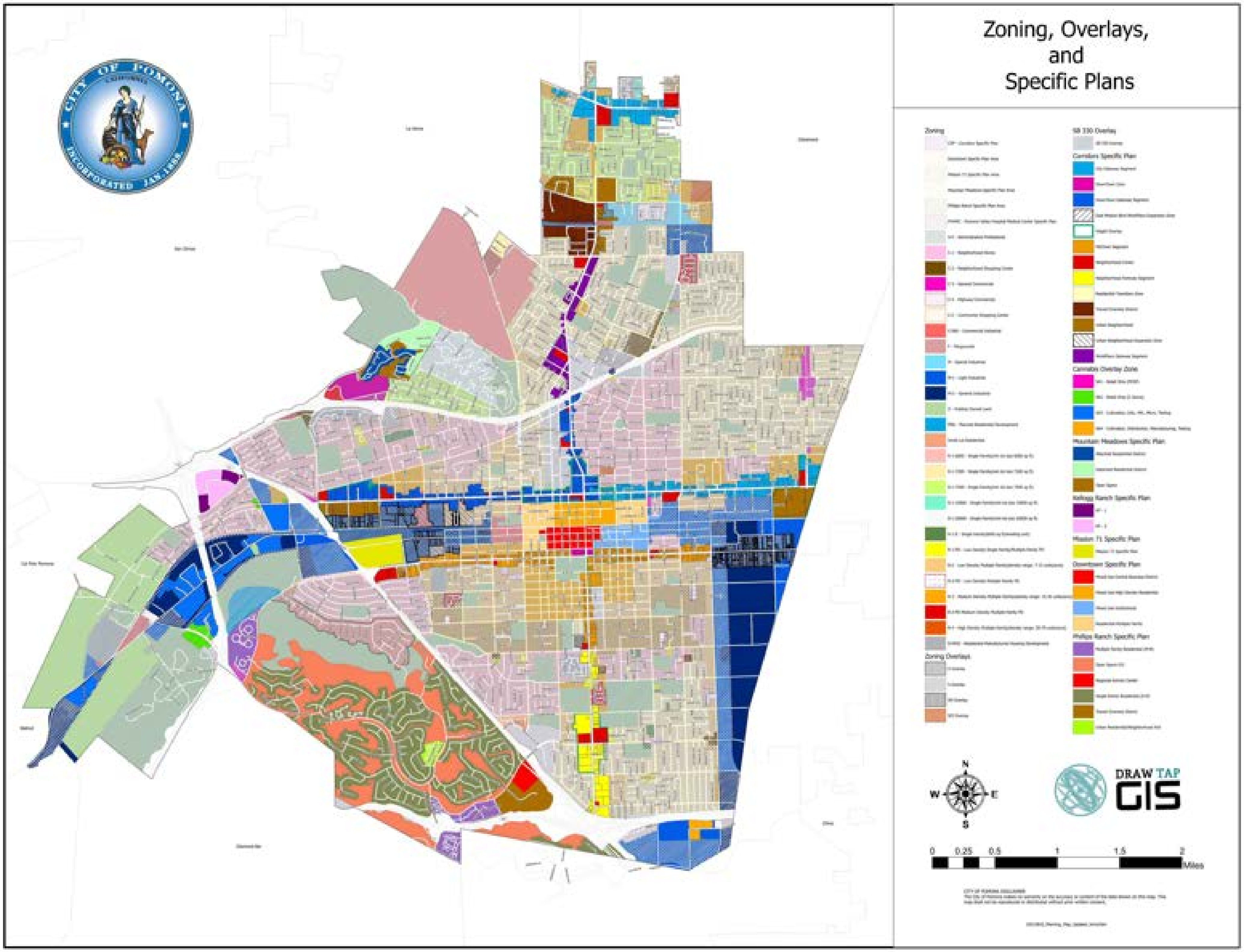
Above. Information provided by City staff June 2022.

Overall, Pomona's development pattern is typical of a city of its age, topography, and western U.S. location. Even in the city center, topography and lack of physical constraints has allowed for a relatively uniform street grid with residential neighborhoods and commercial corridors radiating outwards from the traditional mixed-use downtown core. Residential neighborhoods located further away from the downtown and along the hillsides to the north and south were built later in the 20th century and are more uniformly residential in use. At the western and eastern edges of Pomona, large industrial areas have developed with access to the railway and major transportation arteries.

Map 2-1: General Plan Land Use Map



Map 2-2: Zoning, Overlays, and Specific Plans Map



2.8 HOUSING AND COMMUNITY DEVELOPMENT

Although the cost of housing in Pomona is increasing and there is a lack of vacant land for new single-family residential homes, the mix of housing types has remained relatively consistent in recent years. Single-family residential is the primary housing type (69.5 percent of the total), with the remainder consisting of multi-family (26.2 percent) and mobile homes or other (4.3 percent). The majority of homes in Pomona are owner-occupied (57.4 percent of non-vacant units). The remaining 42.6 percent are renter- occupied. In order to increase the availability of housing units and meet its RHNA allocation, Pomona has adopted several ordinances, specific plans, and overlays to increase densities in the remaining developable land in the city.

Pomona has an older central district established during the City's early years of development, but what is not as readily apparent in the housing age statistics is the disparity of maintenance in many Pomona neighborhoods. While some of Pomona's older neighborhoods are remarkable for their largely excellent condition, there are also many areas that have become dilapidated. The condition of many of the City's older homes requires significant investment in renovation to bring them up to contemporary standards. The risk of property damage and injury is heightened in areas of older homes. To address housing issues, Pomona's Housing Division provides a number of programs including rental assistance, homebuyer mortgage assistance, housing rehabilitation, and facade improvement programs.

Overall, Pomona's annual median household income (2019) of $67,202 was about 7.6 percent less than the countywide average. About 15 percent of Pomona households earned an average annual income of less than $25,000.

2.9 EMPLOYMENT AND INDUSTRY

Pomona's job base is undergoing changes initiated by the closure of aerospace and manufacturing facilities in the late 1980s and early 1990s. Although the loss of large employers such as General Dynamics has had a negative impact. The COVID 19 pandemic has also significantly increased the unemployment rate in Pomona, particularly in the service industries, though the unemployment rate was highest between the months of March through July of 2020 and have already started to rebound.

Although employment growth has been negative, there have been other impacts from the job base changes. With the loss of major employers, Pomona has seen an increase in the diversity of job types and a shift to a wider range of smaller enterprises. This presents a challenge in coordinating with major employers to ensure the safety and welfare of workers and limit damage to industrial infrastructure. There is also a need to increase the number of high paying jobs.

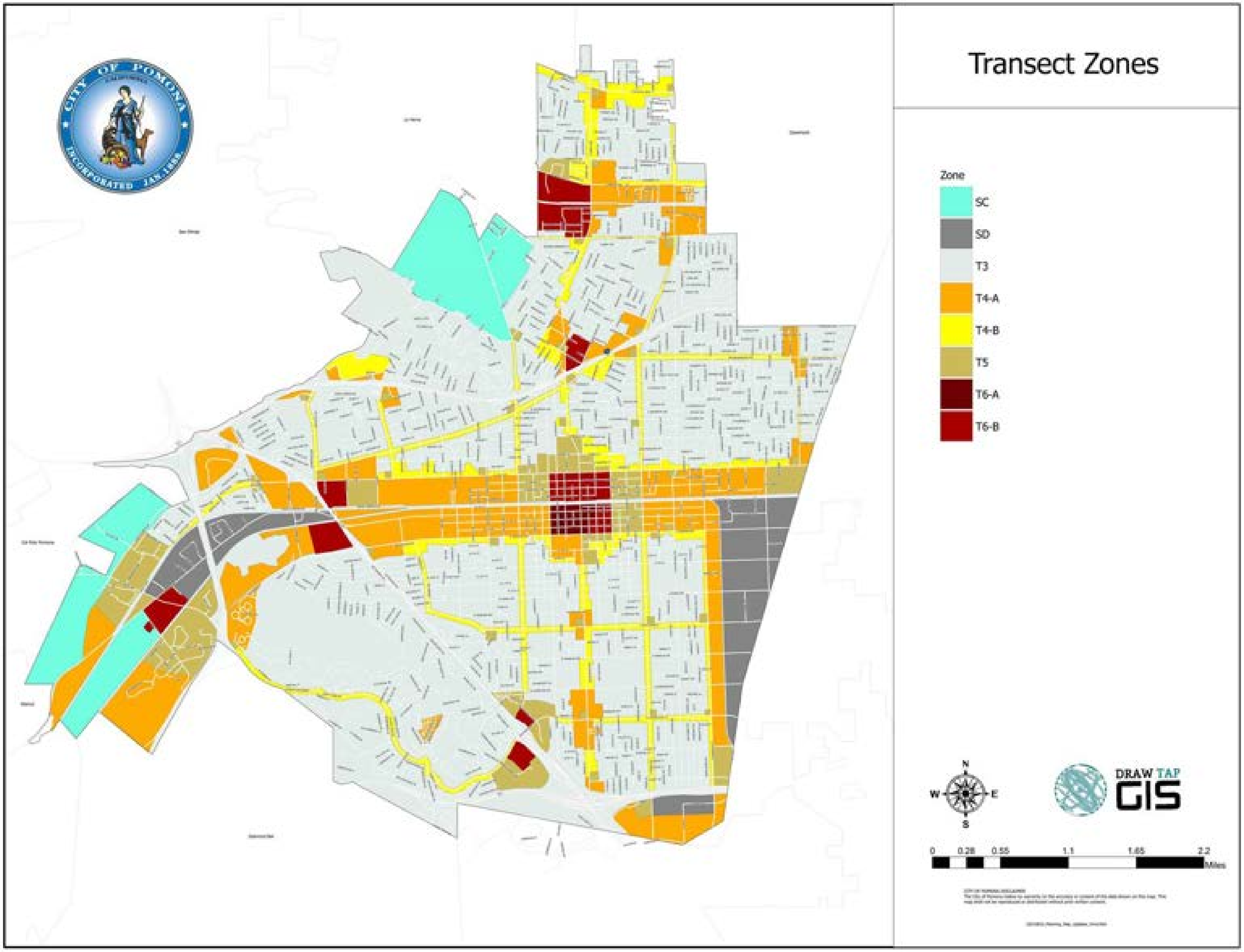
2.10 GROWTH AND DEVELOPMENT

As discussed in **Chapter 1 Introduction**, Pomona is located at the boundary of the highly urbanized metropolitan counties of Los Angeles and San Bernardino. It is surrounded and contained by the cities of Claremont, La Verne, San Dimas, Walnut, Diamond Bar, Chino, and Montclair. Within Pomona, all of the large land areas are developed, including most of the more remote hillsides. The remaining undeveloped land is either not suitable for development or has been set aside to remain as open space.

Although the City is considered built-out, development continues and is expected to continue to meet market demand created by population growth. Because there is a lack of available land suitable for development, new development will be primarily infill, reuse, and intensification.

Addressing the challenge of accommodating projected growth within the urban fabric of the City is a major goal of the 2014 *General Plan.* As part of this effort, a comprehensive assessment of areas in the City with potential for infill development, redevelopment, land use change, and/or development intensification has been conducted. The results of this assessment have resulted in the formulation of Transect Zones, which depict future density and intensity patterns that the General Plan identified the City could accommodate, as shown in **Map 2-3**.

Map 2-3: Transect Zones



Addressing the local hazard mitigation issues in an urbanized City like Pomona are different from those encountered in a community with room to expand outward. Due to its built-out status, future growth in Pomona will not stretch into undeveloped areas that could present additional natural hazard risks; rather, development will be integrated int o the existing urban fabric and affected by the same natural hazards that face the community in its present state. Challenges involved in mitigating risks associated with infill development primarily include concerns about the increase of risk from higher densities, some in already overcrowded neighborhoods. However, redevelopment also creates the opportunity to upgrade or replace older building stock with new construction that conforms to modern building codes. These include regulations for structural resistance to earthquakes, landslide mitigation efforts, fire-resistant materials, and elevation above flood levels. From a hazard mitigation perspective, through the replacement or renovation of older structures and infrastructure, infill and redevelopment can increase the City's safety significantly.

The primary way to mitigate hazard impacts on future development is to create hazard resilient development and infrastructure. Policies formulated in this document address this need and are discussed in detail in **Chapter 11 Mitigation Action Plan**.

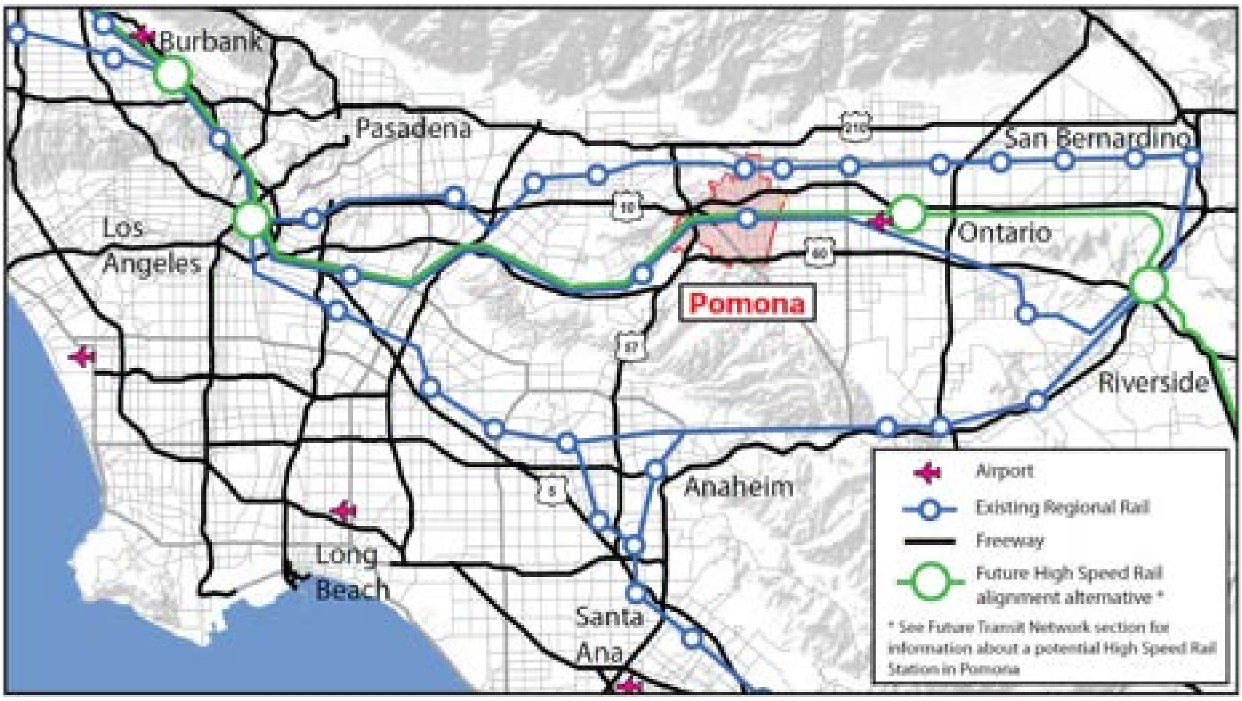
2.11 TRANSPORTATION AND COMMUTING PATTERNS

TRANSPORTATION INFRASTRUCTURE

Pomona is centrally located within the greater Los Angeles-San Bernardino-Riverside region. As such, the City is traversed by a number of key regional transportation routes, notably the five major freeways and two rail lines that provide passenger and freight access and connect Pomona with the Inland Empire, Los Angeles and Orange County (see **Figure 2-4 Transportation Network**). In addition, Ontario International Airport, located just ten miles to the east, has established itself as a major gateway to the region, serving approximately six million passengers annually.

The well-developed street system in the City provides access to and from the regional facilities described above and accommodates travel for various modes of transportation (automobiles, trucks, buses, bicycles, and walking). The local system and regional access provide many opportunities for Pomona residents to travel within their city and region, and well beyond. The road system is also complimented with service from three transit agencies (Los Angeles County MTA, Foothill Transit, and Omni Trans) and two lines of the Metrolink commuter rail system.

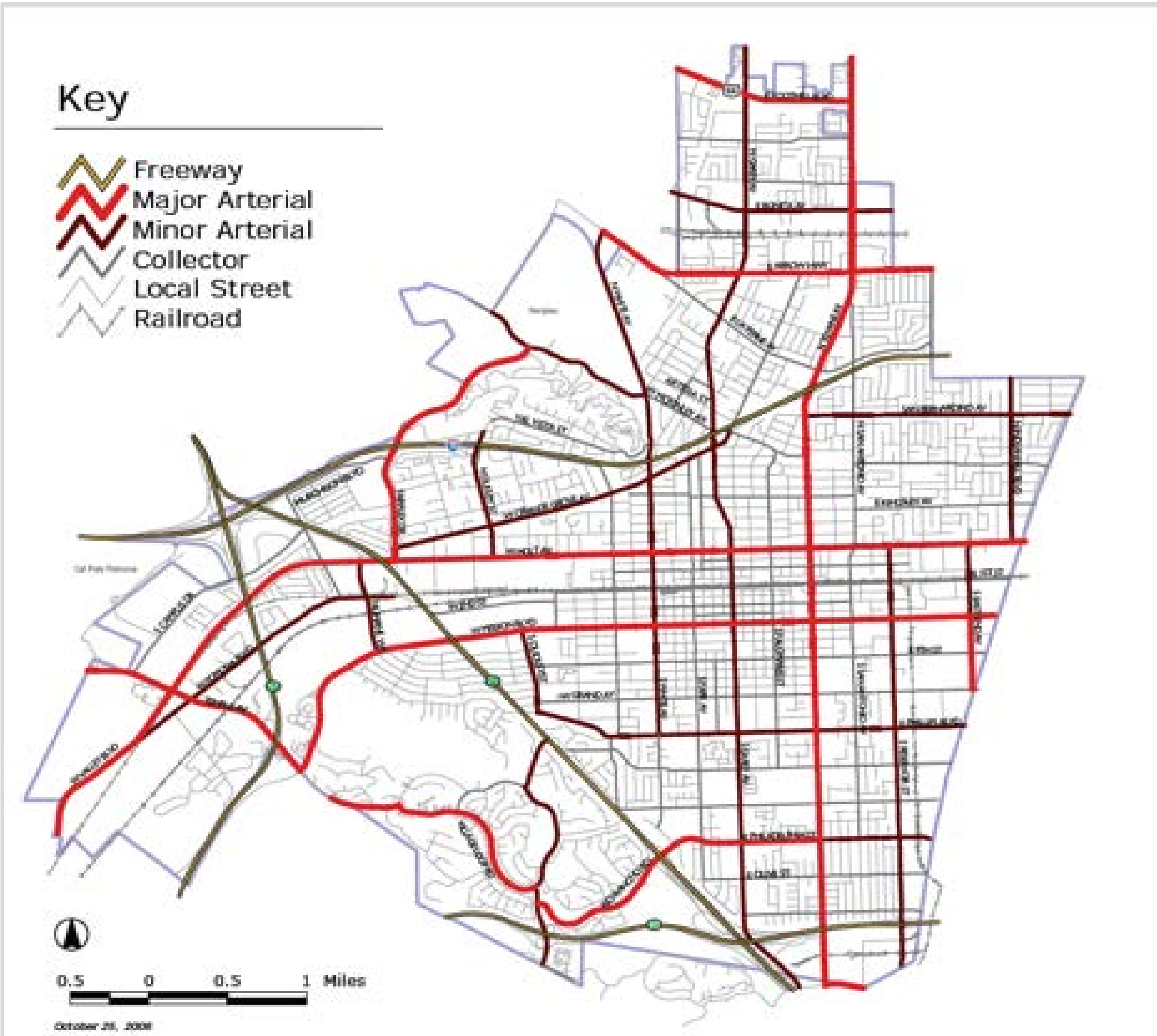
Figure 2-4: Transportation Network



The five major freeways provide east-west, and north-south access as follows:

- The San Bernardino Freeway (I-10) and the Pomona Freeway (SR-60) provide east-west access to Pomona from Santa Monica and Los Angeles to the west, and Ontario, San Bernardino, and Riverside to the east. The Foothill Freeway (I-210) provides an additional east- west connection to the north of Pomona, extending west to Pasadena and the San Fernando Valley.
- The Corona Expressway (SR-71) and Orange Freeway (SR-57) provide connections with Corona and Orange County.

Figure 2-5: Pomona Street Classification System



The City's 296-mile road system includes 28.2 miles of major arterials, 45.8 miles of minor arterials, 36.7 miles of collector roads, and 184.4 miles of local roads. **Figure 2-5** shows the local network of arterial collector, and local streets, which is generally organized as a traditional grid.

Overall, traffic volumes are quite high in the City. In places, Temple Avenue carries close to 33,000 vehicles per day, while seven other arterials carry in excess of 20,000 vehicles per day. Most other arterials carry between 10,000 and 20,000 vehicles per day, while all collectors for which data is available, carry less than 10,000 vehicles per day. As traffic volumes rise, there is an increased risk that a natural hazard event will disrupt the travel plans of residents across the region, as well as local, regional and national commercial traffic.

In addition to the transportation access for residents, Pomona is well located for goods transportation. In addition to the freeways, two major rail lines traverse the city, including the Alameda Corridor East, which links Pomona to the Ports of Los Angeles and Long Beach.

TRENDS AND ISSUES

Although there are many routes traveling through or near Pomona, population growth in the region, particularly in the fast-growing Inland Empire area, has put a considerable strain on the regional freeways serving the City. Transportation patterns have become more complex, as the traditional "suburb to central city" journey to work has been replaced by multi-directional travel patterns due to job growth in dispersed locations. Vehicle and rail volumes are increasing in the area. Freeway congestion has become an acute problem in the region. In Pomona, there are significant level of service deficiencies along I-10, at the interchange of I-10, SR-57, and SR-71.

The amount of rail traffic through Pomona is also substantial, roughly 80 freight trains per day. This number is expected to increase following improvements to the Alameda Corridor, which includes the Union Pacific Railroad, potentially up to 151 trains per day. This is a serious concern for the hazards mitigation planning effort in that only three grade separated crossings are in place for local traffic and emergency vehicles to cross the Alameda Corridor. However, the Alameda Corridor East project does provide for improvements in Pomona including median improvements, traffic signal improvements, construction of new sidewalks and construction for two new grade separations, one at East End Avenue and one at Temple Avenue.

3 Risk Assessment

3.1 INTRODUCTION

The critical step in hazard mitigation planning is comprehensive risk assessment. This involves first understanding the types of hazards that could occur in the City, and then determining the range of risks to the community from each of the hazards. Mitigation is then formulated to avoid or reduce the identified risks, thereby facilitating a safer and more resilient environment for residents and business when implemented. This chapter overviews the risk assessment process, including documentation of the approach employed in the LHMP planning process in Pomona, description of critical facilities and vulnerable populations, and summary of the identified risks.

3.2 APPROACH

The approach employed for risk assessment for the Pomona LHMP was designed to identify all possible risk scenarios, determine the potential impact to the community associated with each risk, and then accordingly prioritize risks having greater potential impacts to be targeted in the mitigation actions. The steps in this process, conducted in coordination with the Technical Advisory Committee (TAC) and with input from community members, included:

- Determination of hazard threats in Pomona by way of researching existing databases and discussions with the TAC, a process that resulted in focusing the Pomona LHMP on 1) earthquake-induced ground shaking, liquefaction, and landslide, 2) wildfire, 3) flooding, 4) windstorm, and 5) pandemic/infectious disease (see **Section 3.3** below and **Chapters 4 to 9**);

- Hazard identification and profiling, including documentation of the geographic extent, potential intensity, and the probability of occurrence of the local hazard with potential to affect Pomona, using the best available data (see **Chapters 4 to 9**). As an update from the last plan, consideration of the impacts of climate change on each of these hazards was also included in the plan update;

- Inventory of critical facilities, defined as services and infrastructure that are essential to emergency response and community function: examples include fire and police services, hospitals, circulation, and water and sewer systems (see **Section 3.4**);

- Inventory of vulnerable populations, defined as people who are particularly susceptible to impacts of a local hazard event and may have special post-disaster needs: examples include populations in schools, childcare facilities, and overcrowded neighborhoods (see **Section 3.5**);

- Consideration of risk scenarios for critical facilities and vulnerable populations utilizing the hazard information on extent, intensity, and probability;
- Rating risk scenarios according to potential impact on the community, with consideration of geographic extent, potential for disruption of emergency and essential services, duration, and potential for population injuries, fatalities, and/or dislocation (see **Chapters 4 to 9**); and
- Risk analysis, involving quantification of vulnerabilities in terms of dollar losses, where appropriate data was available (see **Chapters 4 to 9**).

3.3 LOCAL HAZARDS ANALYSIS

Pomona is potentially subject to risks associated with earthquakes, landslide, wildfire, flooding, windstorm, and pandemics/infectious disease. The greatest local hazard threats with potential for widespread injury, life loss, property damage, and prolonged disruption in Pomona are ground shaking and liquefaction associated with a major earthquake. Pomona is located in a seismically active region of Southern California, with several damaging earthquakes having occurred just in the past twenty years.

Important but potentially less destructive hazard threats (due to more limited geographic extent) include landslide associated with steeper slopes and wildfire associated with the remaining open spaces. Flooding occurs in some limited areas occasionally disrupting circulation arterials, and there is a risk- albeit very low- of flooding from dam inundation. Windstorm conditions resulting from strong seasonal Santa Ana winds occur, but the impact to the community is low relative to the potential impacts of other local hazard events.

At the time this plan update is being written, Pomona and the rest of the world are in the midst of a global pandemic caused by the Covid-19 virus. The pandemic has had far reaching health, social, educational, and economic impacts. This plan update incorporates a chapter specifically on pandemics/infectious disease.

Also new to this plan update is specific discussion of the implications of climate change on each hazard, contained within the hazard profiles.

Complete local hazard descriptions which include hazard identification and profiles, maps, and potential risks-are set out in separate chapters as follows:

- Chapter 4: Earthquake
- Chapter 5: Landslide
- Chapter 6: Wildfire

- Chapter 7: Flooding
- Chapter 8: Windstorm
- Chapter 9: Pandemic/Infectious Disease

3.4 CRITICAL FACILITIES

Following a local hazard event, the primary goals of the City emphasize maintaining services that are key to the functioning of Pomona. By identifying critical facilities that lie within potentially hazardous areas, the City can help to prepare for and minimize debilitating impacts on these services. The following is an overview of the critical facilities in Pomona. With the exception of utilities, which have been omitted for security purposes, the critical facilities are mapped in **Figure 3-1**.

GOVERNMENT EMERGENCY OPERATIONS FACILITIES

Maintaining the continuity of government during a local hazard event is essential in order to respond to emergencies, protect life and property, and recover in the aftermath of an event. The City of Pomona has formulated a comprehensive strategy to ensure proper functioning of the government during a crisis. This strategy is laid out in the City's *SEMS* (Standardized Emergency Management System), part of the City’s Emergency Operations Plan*.* The SEMS designated several sites as centers of emergency operation, communication, and governance during an emergency. Alternates for these facilities are also designated, in the event that the original facility is not operational. As shown in **Figure 3-1**, the majority of these facilities are centrally located in downtown Pomona, which is the " hub" of government emergency operations. Also located in close proximity, and in some instances serving as government operations facilities, are the headquarters of the Police and Fire Departments that serve the City.

EMERGENCY SERVICES

Police Services

The Pomona Police Department provides local police services for the City of Pomona. The primary facilities include the main headquarters and jail, the training bureau, the traffic bureau, and an aero bureau, which is located at Brackett Field in the City of La Verne. Pomona Police Department headquarters are located at 490 W. Mission Boulevard.

Fire Services

The Los Angeles County Fire Department (LACoFD) serves the City of Pomona. Pomona is part of the LACoFD Division VIII, located on the eastern boundary of the Department's jurisdiction. In addition to the City of Pomona, Division VIII includes the neighboring cities of Diamond Bar, Walnut, Industry, La Puente, and the unincorporated communities of Avocado Heights, Bassett, Hacienda Heights, Rowland Heights, and Valinda. Seven of the 19 fire stations in Division VIll are located in Pomona. If necessary, resources in the City's adjacent jurisdictions provide additional support.

Fire stations are strategically located throughout the City to provide prompt assistance to area residents. Each fire station operates with in a specific district that comprises the immediate geographical area around the station. Approximately 83% of the City is located within a one-mile radius of a fire station in Pomona. Division headquarters are located in Diamond Bar and Battalion 15 headquarters are located at 590 S. Park Avenue, at Station 181.

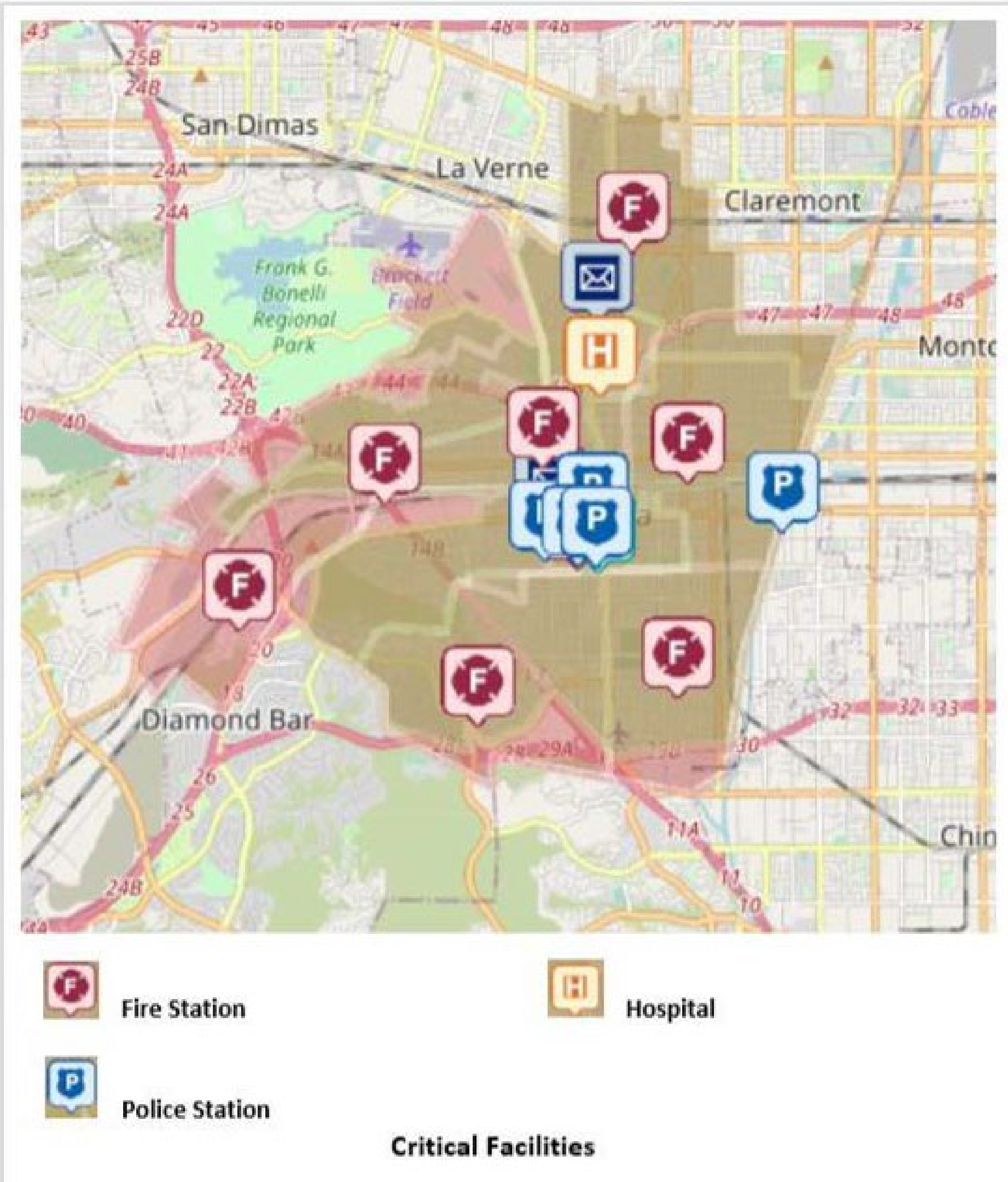
HOSPITALS

There is one major critical health care facility in Pomona, the Pomona Valley Hospital Medical Center. This facility is located at 1798 N. Garey Avenue. In addition to Pomona, it serves Eastern Los Angeles and Western San Bernardino Counties. It contains 412 beds, 70 emergency beds, and offers a complete range of medical services including general medical and surgical care, general intensive care, cardiac intensive care, open heart surgery, neurology, pediatrics, obstetrics, and neonatal intensive care. A staff of 700 physicians, 3,700 employees and more than 1,000 volunteers manage over 85,000 inpatient days, 5,000 newborn deliveries, and more than 75,000 ER patient visits.[4]

Two other hospitals serve the City of Pomona: Casa Colina Hospital for Rehabilitative Medicine and American Recovery Center. However, these facilities provide specialized care to treat specific illnesses, and would not be primary providers of emergency medical aid in the event of a disaster. A further discussion of these hospitals is presented in the following section on vulnerabilities. Other facilities, such as the county-operated Pomona District Health Center and the East Valley Community Health Center, provide important primary care services, but due to their limited size and services are not considered critical or vulnerable facilities for the purposes of this plan.

[4] *Correspondence with PVHMC staff, September 2021.*

Figure 3-1: Critical Facilities



TRANSPORTATION

There are five major freeways serving Pomona that provide primary regional access to and from the City. The I-10 and SR-60 freeways provide east west access to Pomona from Santa Monica and Los Angeles to the west, and Ontario, San Bernardino and Riverside to the east. The I-210 freeway provides an additional east west connection to the north of Pomona, extending west to Pasadena and the San Fernando Valley. The SR-71 and SR-57 freeways provide connections with Corona and Orange County.

In addition to the five freeways passing through the City, Pomona has an extensive street network. Classified as arterials, collectors, and local roads, Pomona's roads carry many thousands of vehicle and transit trips daily. Pomona's street network is primarily based on a grid, with several major north-south and east-west roadways interlaced with a system of intersecting minor streets.

Three railroads currently cross Pomona, which generally run east-west. Two railroad lines, located in the center of the City, are operated by Union Pacific Railroad (UPR) and are part of the Alameda Corridor. One of these lines was formerly the Southern Pacific Line (SPL) and is still marked as and commonly referred to under that name. The UPR tracks carry both freight and passenger trains. The northernmost railroad tracks were formerly operated by Atchison Topeka and Burlington Northern Santa Fe Railroad (BNSF). They are currently owned by the Los Angeles County Metropolitan Transportation Authority, which operates passenger trains on the line (Metrolink).[2]

The UPR located roughly between Holt Avenue and Mission Boulevard, bisects the center of the City and could be a significant impediment to north-south transportation if a train derailed within the City. Damage to the UPR tracks would also have far-reaching economic effects; the line is a major regional freight transportation artery. The location in Pomona is one through which all eastbound and westbound rail traffic must pass in Southern California. As part of the Alameda Corridor, the UPR will experience substantial structural improvements and increases of train traffic in the future.

A light rail passenger train extension of the Gold Line is currently under construction. The current phase will extend the Gold Line from Glendora to Montclair. Construction is currently underway through the cities of Glendora, San Dimas, La Verne, and Pomona, and the line extension is anticipated to be operational in 2025. Once completed, four and five tracks will run through the city of Pomona (depending on the location in the city). Tracks will run in two separate rail corridors – one on the north for the Gold Line and freight, and one on the south for Metrolink and freight. While Gold Line trains and freight trains share the northern corridor, they will not share tracks. Therefore, the freight tracks that currently run in the middle of the north corridor will be relocated to the northern half of that corridor, to make room for the Gold Line tracks to be built in the southern half. The Metrolink/freight corridor on the south will remain as is today and is not part of the Gold Line project.[5]

Each of the highways, freeways, and railroads are considered critical facilities in Pomona. A

[5] *https://foothillgoldline.org/cities_stations/pomona/, accessed September 2021.*

hazard that rendered these routes impassible would pose a significant challenge to the City in responding to and recovering from the event.

UTILITIES

Pomona is a large city, 23 square miles in size, and it is traversed by hundreds of miles of streets, transmission lines, pipelines, and other facilities that enable proper functioning of the utility systems that serve Pomona. Although each of the parts contribute to the health of these systems, it is infeasible to detail every component involved in Pomona's utility networks. This section, therefore, provides a brief description of utility services in the City, then summarizes the few critical facilities that contribute most to proper system functioning.

Water

The City of Pomona adopted a Water Master Plan in 2005 and subsequently adopted an Integrated Water Resource Management Plan in 2011.

The 2005 Water Master Plan indicated that the existing potable water system consisted of approximately 421 miles of pipelines, 22 storage reservoirs, 15 booster pumping stations, 41 groundwater wells (38 potable, 3 recycled), 4 imported water connections, 2 inter agency connections, 5 water treatment plants, 28 pressure regulating stations, 6,000 fire hydrants, and 11 pressure zones.[6]

Sewer

Wastewater service within Pomona is provided by the City's Utility Service Department, and the Los Angeles County Sanitation District (LACSD) treats wastewater from the City's system. A majority of the City's wastewater is treated and disposed of at the LACSD's Pomona Water Reclamation Plant (PWRP).[7] The plant occupies approximately 14 acres northeast of the intersection of the SR-57 and SR-60 Freeways. Sewage effluent from the neighboring cities of La Verne and Claremont is also treated at the PWRP.[8]

The City of Pomona adopted a Sewer System Master Plan in 1990 and updated the plan in 2005. The Sewer Master Plan indicates that the City provides sewer service throughout the City, approximately 14,680 acres, and to a limited area outside the City limits, approximately 6 acres. Approximately 2,000 acres in the City drain to other serving entities or currently produce no sewage.

The City's sewer system consists of approximately 300 miles of gravity sewer, four pump stations, 1.4 miles of force mains, and 4,600 manholes. The one known siphon in the City's system is

[6] *https://www.pomonaca.gov/home/showpublisheddocument/536/637457868354570000, accessed November 20, 2021.*
[7] *https://www.lacsd.org/services/wastewater-sewage/facilities/pomona-water-reclamation-plant, accessed November 20, 2021.*
[8] *https://www.pomonaca.gov/home/showpublisheddocument/542/637457870725430000, accessed November 20, 2021.*

located at 4200 West Valley Boulevard and was installed in the early 1960s to convey wastewater across the San Jose Wash.

Solid Waste

The City of Pomona Utility Services Department provides trash, recycling, and special pickup services for single-family residences, duplexes, triplexes, and some fourplexes. Franchise commercial waste haulers provide trash and recycling service for most fourplexes, all apartments with five or more units, as well as all commercial, governmental, and industrial facilities. Solid waste is transported to transfer stations for sorting and shipping to landfills; no transfer stations serving Pomona are located in the City.

Electricity

Southern California Edison Company is the primary distribution provider for electricity in the City. The power received by the City's residents is produced at the various generation plants located throughout the region. Upon leaving the plant, electricity is distributed to individual users via local distributing stations, located within and around the City. The four substations and two primary transmission lines in Pomona are considered critical facilities.

Natural Gas

Currently, Southern California Gas Company maintains transmission and distribution lines throughout the City. Most lines operate at a medium pressure of approximately 30 to 60 pounds per square inch (psi), except for those located in the industrial areas that require higher pressures.

3.5 VULNERABLE POPULATIONS AND FACILITIES

Local hazards will not equally affect all areas and populations of Pomona. Identifying the vulnerable populations and facilities in the City will help to avert damage and prepare the City to provide extra assistance to those who will need it. Facilities that support vulnerable populations are described below and depicted geographically in **Map 3-1**. Facilities that have particular vulnerabilities to specific hazards are discussed in further detail in the relevant hazard chapters (**Chapters 4 to 9**).

SCHOOLS AND DAY CARE CENTERS

Children are the primary vulnerable group in Pomona. Minimizing damage to schools and daycare facilities will help ensure their safety during a local hazard event. Preparing schools for local hazards not only helps prevent harm from coming to the children of Pomona; the schools can also be used as critical facilities following a local hazard event. During and after times of crisis, schools can be utilized to serve as mass care facilities and important centers of information and communication.

Public Schools

The Pomona Unified School District (PUSD) operates 41 schools within the City, which are mapped on **Map 3-1**. Two of PUSD's schools are located in Diamond Bar and, thus, serves a portion of that City's population. There are currently 21 elementary schools (grades K-6), 5 K-8 schools, 4 middle schools, 8 high schools (grades 9-12), and 3 other schools within the PUSD. Approximately 24,062 students attend PUSD schools, and the district is one of Pomona's largest employers.[9]

Private Schools

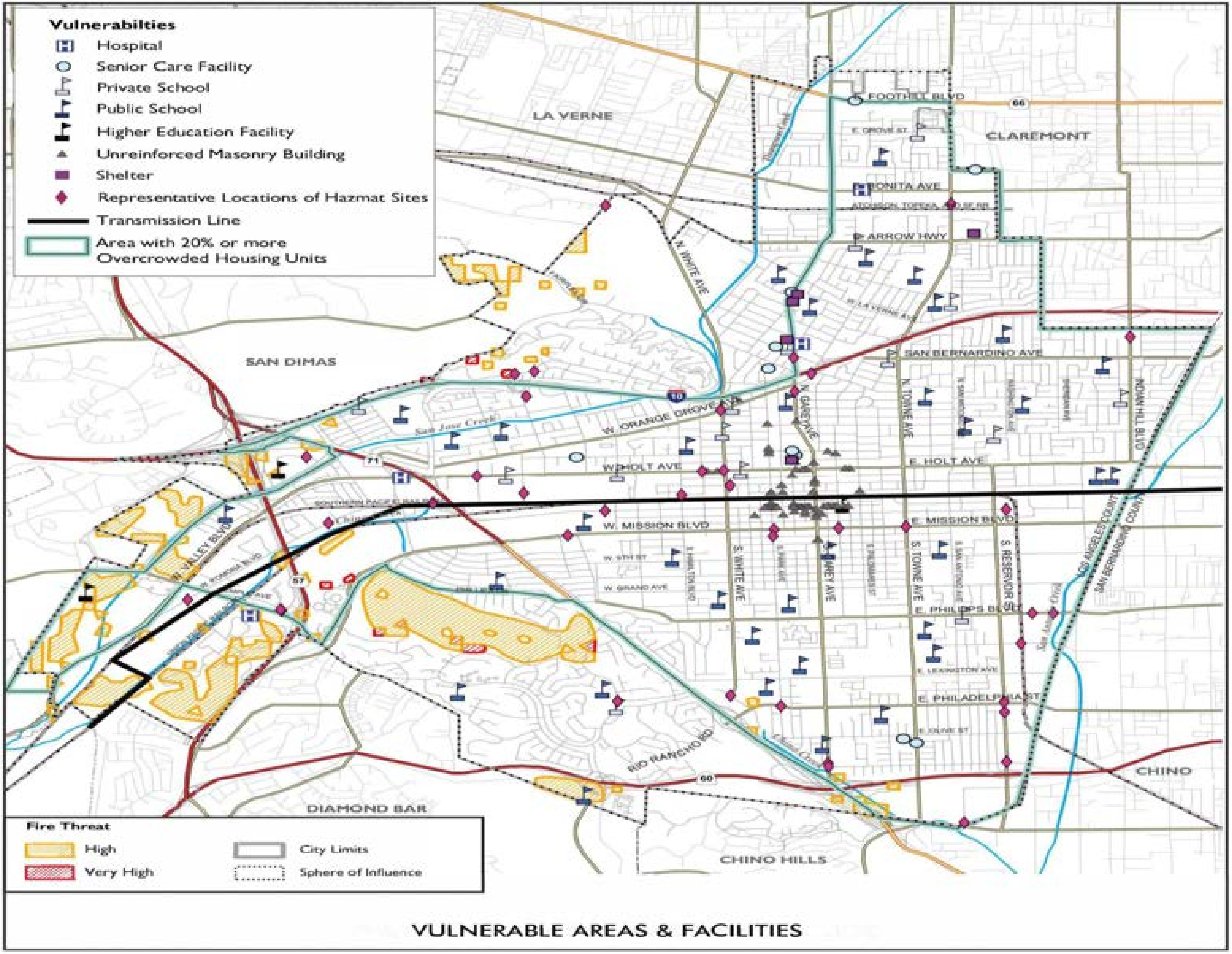
The City of Pomona has a number of private schools, including but not limited to St. Joseph Elementary School, Pomona Catholic Middle School and High School, American Christian Academy, and City of Knowledge. Locations of some of the larger private schools are depicted in **Map 3-1**.

Childcare Centers

There are 41 commercial day care providers in Pomona, which are considered greater vulnerabilities due to the larger number of children present at their facilities.[10] The locations of the commercial childcare centers are mapped in **Map 3-1**.

[9] https://proudtobe.pusd.org/apps/pages/Facts, accessed August 28, 2021.
[10] https://www.ccld.dss.ca.gov/carefacilitysearch/Search/ChildCare, accessed September 21, 2021.

Map 3-1: Vulnerable Facilities Map



Universities

There are several institutions providing higher education in Pomona. The largest of these is the California State Polytechnic University (Cal Poly Pomona). This University is located adjacent to the City's western border, mostly in unincorporated lands, but owns some land within city limits. Cal Poly Pomona employs more than 2,675 people and has an approximate enrollment of 27,915 graduate and undergraduate students.

Western University of Health Sciences (Western U) is located in downtown Pomona. Its main campus is at 309 E. 2nd Street. Western U opened a secondary campus in Oregon in 2017. At its Pomona campus, the University employs roughly 1,100 people and current enrollment is approximately 3,800 students.[11]

RECREATION AND COMMUNITY CENTERS

Approximately 25% of Pomona's population is younger than 18 years of age.[12] There are several recreation and community centers in the City that help to provide services to its young residents. These facilities also provide important services to seniors as well. Especially during after-school hours, these centers can become crowded with youth. The City operates community centers at six of its parks, as well as the Pomona Boys and Girls Club. There is also a YMCA in Pomona, which has served the community since 1884. The original YMCA building, completed in 1922, is also listed in the National Register of Historic Places and Pomona's Local Landmark Register. The facility was closed in 2012 and the existing building is currently approved for redevelopment.

SENIOR CARE FACILITIES

In addition to the care available at hospital facilities, seven senior care centers are located in Pomona. The residents of these facilities may require additional medical attention, transportation assistance, emergency housing, or other assistance following a local hazard event. Most senior fare facilities in Pomona are located north of Holt Avenue, and several are clustered along the Garey Avenue corridor.

HOSPITALS

Hospital facilities house large numbers of vulnerable patients who may need additional assistance in the event of an emergency. All of the hospitals in Pomona, including PVHMC, are considered assets with vulnerabilities. In addition, there are two other hospitals that serve as specialized treatment centers in Pomona: Casa Colina Hospital for Rehabilitative Medicine and Behavioral Health Services (BHS) - American Recovery Center. Information on PVHMC is provided in **Section 3-4**; Critical Facilities, and information about the remaining two hospitals is supplied

[11] *https://www.westernu.edu/publicaffairs/news/fact-sheet/, accessed August 28, 2021.*
[12] *https://www.census.gov/quickfacts/fact/dashboard/pomonacitycalifornia/AGE295219, accessed September 4, 2021.*

below.

Casa Colina Hospital for Rehabilitative Medicine

Casa Colina Hospital is an acute and sub-acute care hospital providing medical rehabilitation services. The hospital serves children and adults who have been disabled by spinal cord injury, brain injury, stroke, chronic lung disease, back injury, chronic pain, orthopedic conditions, neurological and neuromuscular disorders, developmental disorders, and other illnesses or injuries. The facility is located at 255 East Bonita Avenue and has 64 beds, a staff of 184 physicians, and 27 full-time staff nurses.

BHS - American Recovery Center

Behavioral Health Services is a not-for profit community-based healthcare organization providing medical services, substance abuse, mental health, drug-free transitional living, housing for women with HIV, and prevention services in Los Angeles County. BHS operates 21 locations, covering the South Bay, East Los Angeles, the San Gabriel Valley, and the metropolitan areas of LA County.[13] BHS – American Recovery Center located at 2180 Valley Boulevard in Pomona, provides 10 – 14 day medically assisted detox services with 24-hour medical supervision, 3 – 9 months intensive outpatient services, and 3 – 6 months inpatient services, depending on the client's needs.

SHELTERS

There are four shelters and transitional living facilities in Pomona identified by the City's department of Community Services. Such group living quarters are considered vulnerabilities because of their concentrations of people with special needs and limited resources. The potential for loss of life is much higher in the event of structural failure/building collapse. In addition, due to the limited financial resources of the inhabitants in these shelters, the residents may require special post-disaster assistance, in particular relocation assistance.

HAZARDOUS MATERIALS

Following a local hazard event, hazardous materials could potentially harm Pomona residents by exposing them to chemicals that may be poisonous, irritating, suffocating, or cause burns. The severity of hazardous materials impacts depends on many factors such as amount of chemical released, location, and rate and direction of dispersion. Identifying vulnerable toxic sites and preventing hazardous materials spills before they occur is fundamental to mitigating the myriad unpredictable impacts that such spills may have on the community.

Over 200 sites with exposed hazardous materials are located within the City of Pomona. These sites include leaking underground storage tanks (LUSTs), leaking underground fuel tanks (LUFT), and other hazardous materials sites that are listed by the California Department of Toxic

[13] *https://www.bhs-inc.org/, accessed December 8, 2021*.

Substances Control (DTSC). In order to address the primary hazardous waste vulnerabilities most efficiently, only the most acutely hazardous materials were mapped in **Map 3-1**. There is one location listed as a Federal Superfund site by the Environmental Protection Agency (EPA), under the Superfund Amendments and Reauthorization Act (SARA), Title III, and one Hazardous Waste and Substances (Cortese List) Site.[14] Of the many hazardous materials sites in the City, these represent the greatest threat to human and environmental health in the City if released.

In addition to stationary hazardous materials sites, hazardous material that is enroute to other locations via truck or train may also be present in Pomona at any given time. Restrictions placed on transporters of hazardous materials include the avoidance of heavily populated areas, unless no other satisfactory route exists, limitations on access to bridges and tunnels, and a one-mile-wide zone limitation along freeways for access to fuel and services. Railroad regulations stipulate that explosive materials are controlled within the train, but there are no controls regarding train routes. The only restriction is that potential flammable or explosive materials cannot be any closer than six rail cars from the train locomotive. This exposes neighborhoods near railway tracks in Pomona to potential hazards due to rail car derailment and hazardous spills.

UTILITIES

Critical facilities of the utility systems in Pomona are discussed in the previous section, but it is important to note that there are specific vulnerabilities associated with them as well. Undergrounded utilities may be subject to rupture during an earthquake, creating the potential for fire or releasing hazardous chemicals. Additionally, strong winds are capable of downing tree branches that can fall on power lines, and fires can damage aboveground utility lines. Depending on the event, impacts can remain localized or affect the entire City. Specific utility vulnerabilities are discussed further in the relevant hazard chapters, when appropriate (see **Chapters 4 to 9**).

VULNERABLE DEVELOPMENT PATTERNS

Overcrowded Communities

The U.S. Census collects information about the density and level of crowding in housing units. A unit is considered overcrowded if it has more than one occupant per room. The area of the City with 20 percent or more of housing units that are overcrowded, per census tract, is displayed in **Map 3-1**. Areas with a large percent of overcrowded units may experience greater impact during local hazard events due to their higher population densities. Because overcrowding is closely correlated with lower income levels and housing values, it is reasonable to assume that overcrowded neighborhoods may contain greater numbers of deteriorated buildings prone to damage than in other parts of the City. Emergency responders should be prepared to spend relatively greater amounts of time in the overcrowded neighborhoods when responding to the effects of a major disaster. Furthermore, there may be a need for higher levels of post-disaster assistance, such as short-term housing.

[14] *https://www.epa.gov/superfund/search-superfund-sites-where-you-live, accessed December 2021.*

Unreinforced Masonry (URM) Buildings

Unreinforced masonry buildings (URMs) are structures that are particularly vulnerable to damage during an earthquake. These buildings generally constructed prior to 1933 predate modern earthquake-resistant design standards. URM buildings are made of brick and have not been reinforced with strengthening steel bars in the structure. The walls of these buildings are more likely to disconnect from the foundation and fall during ground shaking, creating debris hazards and sometimes total collapse of the structure. URM buildings in Pomona are depicted on **Map 3-1**. Many of these were damaged in the 2008 Chino Earthquake.

Historic Properties

First incorporated in 1888 as the fifth city in Los Angeles County, Pomona has an impressive inventory of historic properties. It includes eight properties listed on the National Register of Historic Places, five properties designated as California Historic Landmarks, and twenty-six properties designated locally on Pomona's Landmark Register, as well as two historic districts. There are several additional districts with potential historic significance and more than 500 potential historic properties under consideration for local, state, or national historic designation.

Many of these structures are particularly vulnerable to damage from hazards due to their age, construction methods, and materials. Many historic buildings were heavily damaged in the last major hazard event to affect Pomona, the Whittier Narrows earthquake. The City of Pomona owns three of the most historic properties, which date back to the first modern settlement of the site that later became Pomona.

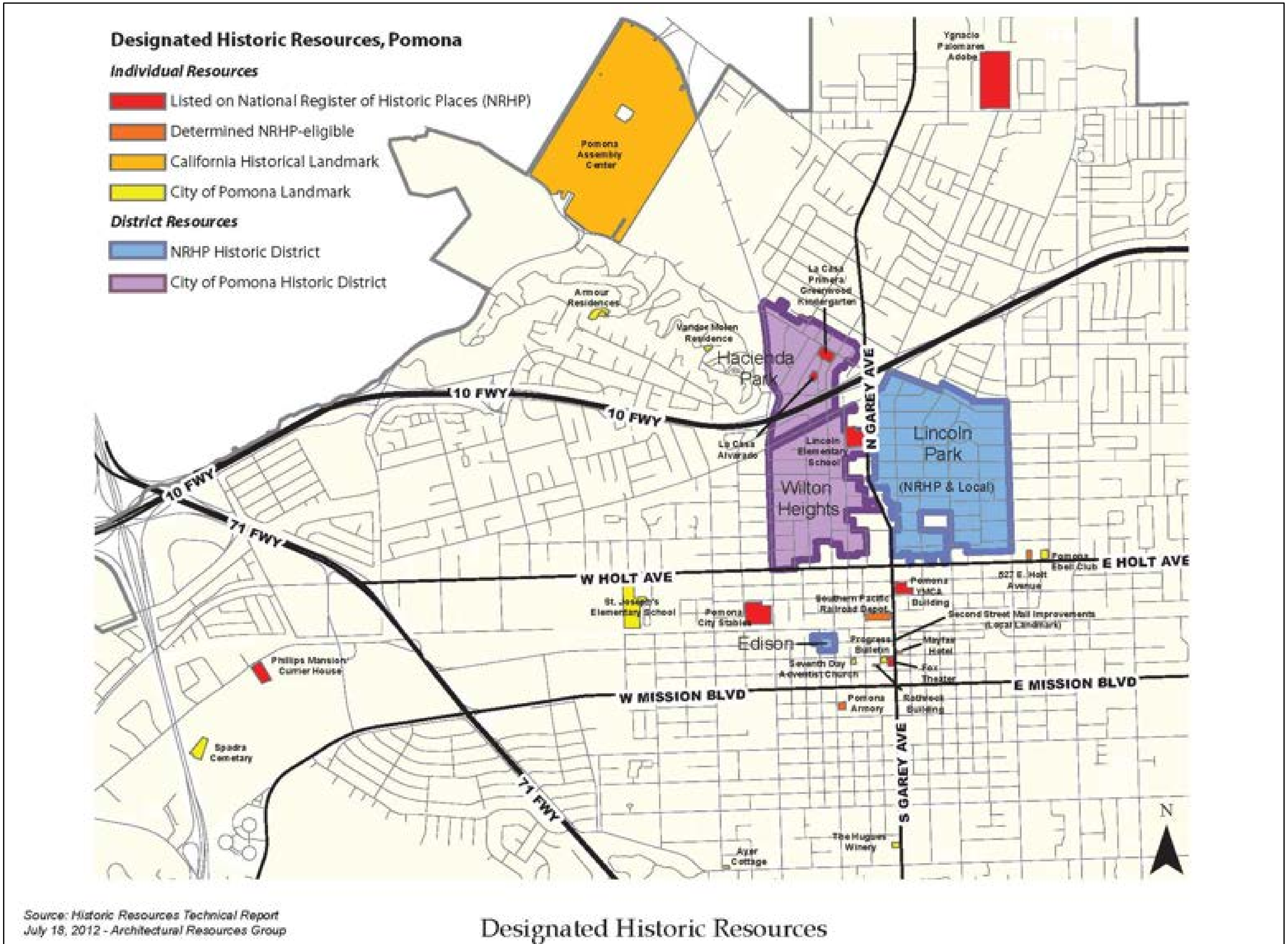
Pre-1976 Structures

Seismic safety standards were first incorporated into Pomona's building code in 1976. Due to the considerable age of the City, however, the majority of the structures were constructed before such standards were in place. Historic structures and areas have been mapped in **Map 3-2**. The distribution of structures by age clearly displays the evolution of Pomona: the oldest buildings are clustered downtown - including the URM buildings discussed above - and development radiates outward over time from this core. In the vast majority of cases, pre-1976 buildings are not required to conform to seismic safety requirements and have an elevated risk to damage due to earthquake. Older structures are also more prone to wind damage.

Hazard-Specific Land Uses and Construction

In addition to other types of vulnerable development patterns discussed in this section, there are specific land uses and construction types that are more susceptible to particular local hazards. For example, soft-story and tilt-up construction tends to be more vulnerable to ground shaking. Development in the urban/wildland interface increases the risk of damage due to wildfire. These types of hazard-specific developments are discussed in further detail in **Chapters 4 - 9.**

Map 3-2: Designated Historic Resources



3.6 RISK IDENTIFICATION AND VULNERABILITIES SUMMARY

Identified risks and vulnerabilities associated with local hazards in Pomona are summarized below. **Chapters 4 - 9** document the analyses yielding these conclusions.

EARTHQUAKE

The following risks and vulnerabilities associated with ground shaking, liquefaction, and earthquake-induced landslides have been prioritized for mitigation actions:

- Many of the buildings in Pomona were constructed before seismic safety standards were implemented in 1976; this includes a majority of the facilities that house emergency services and government operations.
- There are dozens of unreinforced masonry buildings, which are well-known for their poor ability to withstand earthquakes. They are especially prone to collapse and pose substantial risks to life and property.
- Historic properties are more prone to sustain damage and collapse during an earthquake. Historic structures and areas in Pomona are mapped in **Map 3-2**.
- Much of the utility infrastructure in Pomona is aging and will need maintenance or replacement. Critical components of the utility systems, such as water reservoirs, have partial seismic safety features in place but completion of retrofit programs has been deferred.
- Targeted transportation corridors have been identified as crucial and vulnerable lifelines, essential for emergency vehicle traffic. Collapse of underpasses or train derailment would impair proper provision of emergency services in the aftermath of an earthquake.
- Particular neighborhoods in Pomona have an elevated vulnerability to earthquake hazards due to the age of the structures, or due to a high percentage of overcrowding. Often these characteristics coincide; damage in these neighborhoods is expected to be relatively greater than the rest of the City and will require concomitant emergency response.

LANDSLIDE

The following risks and vulnerabilities associated with landslides have been prioritized for mitigation.

- Residential developments in the hills of Pomona are at risk to landslide. Not only are they built on areas that are historically prone to landslides due to topography and soil conditions, but road development, grading, excavation and other forms of development. (*4 homes were lost in a 2006 landslide in South Pomona*.)

WILDFIRE

The following risks and vulnerabilities associated with wildfire have been prioritized for mitigation.

- Development in the urban/wildland interface is especially vulnerable to wildfire damage. Communities such as Phillips Ranch and Ganesha Hills were built in these areas and require more stringent wildfire mitigation measures. Aging infrastructure in the City is vulnerable to damage from earthquake, which could affect the City' s water supply in the event of a wildfire.

FLOODING

The following risks and vulnerabilities associated with flooding have been prioritized for mitigation:

- A small number of locations in areas associated with flooding have been prioritized for mitigation. Pomona is prone to flooding due to storm drain deficiencies. The flooding that occurs seasonally at the railroad underpasses is of particular concern, as it has the potential to block routes that are considered key transportation lifelines. The City could be subject to flooding in the event of dam failure. However, due to the distance of the City from the reservoirs, the minimal amount of water that is stored at the relevant impoundments, and the very low probability of occurrence, this risk is not considered to have significant potential for widespread community impacts.

WINDSTORM

The following risks and vulnerabilities associated with windstorm have been prioritized for mitigation:

- Santa Ana winds which occur from October through March and can damage or dislodge roofs and topple trees and power lines. These windstorms can affect the entire city, but potential damage is not widespread and there are no high risks to critical facilities or city infrastructure. (*A windstorm in 2011 affected communities west of Pomona. Power was out for over a week due to tree damage.*)

PANDEMIC/INFECTIOUS DISEASE

The following risks and vulnerabilities associated with pandemics and infectious disease have been prioritized for mitigation:

- Protecting vulnerable populations has been prioritized. The health and safety of the public is threatened by pandemics/infectious diseases. As evidenced by the COVID-19 pandemic all communities, regardless of density may be severely impacted by a pandemic/infectious disease. However, an emerging infectious disease or novel virus may impact have a greater impact on overcrowded communities, particularly where there is a clustering of older residential structures that may not meet current building standards and may not have adequate ventilation. It is also likely, and also evidenced by COVID-19, that vulnerable communities are particularly susceptible to more severe impacts of emerging infectious diseases and novel viruses due to higher comorbidity rates, and pollution exposure, as well as socio-economic challenges that may prevent a person from working from home or taking time off and isolating, if necessary. (*As of December 9, 2021, there were approximately 514 deaths attributed to COVID-19 in Pomona*).

- Protecting business operations in the City has been prioritized. Business and economic impacts may be severe. The City must be able to be flexible with the business community and provide easy pathways toward allowing businesses to continue operating while protecting the health and welfare of the public.

3.7 POTENTIAL FINANCIAL LOSSES

POTENTIAL DAMAGE ESTIMATES

A comprehensive assessment of the potential risks faced by a community involves understanding financial vulnerabilities in addition to prospects for injury, life loss, and property damage. Estimates of financial costs help to underscore the cost effectiveness of emergency preparedness and hazard mitigation actions and improvements. In addition, cost estimates calculated for separate hazard scenarios-earthquake, flooding, landslide, etc.- provide a quantitative tool for comparing hazard effects and prioritizing mitigation.

For each hazard where data were available, cost estimates of potential damage have been calculated. The primary tool available to estimate the potential losses of local hazard events is the GIS-based software HAZUS. A HAZUS scenario was constructed to estimate losses due to earthquake damage in the City; total potential losses exceeded 2.5 billion dollars. While these estimates are highly hypothetical, they nevertheless provide a sense of the magnitude of potential financial impacts.

4 Earthquakes

4.1 INTRODUCTION

California is home to the most intense and greatest number of earthquakes in the contiguous United States: of the 20 largest earthquakes in the contiguous United States, 10 have occurred in California[15]. The State also ranks number one in the nation in the amount of damage caused by earthquakes, in large part due to its high population and degree of urbanization[16]. The City of Pomona is no exception to the rest of the State, and the threat posed by an earthquake is considered the most significant hazard facing Pomona. This chapter provides information about earthquake hazards in Pomona, beginning with an overview of historic events and the probability of future earthquakes in Southern California, and then identifies specific areas of hazards and risks within the city.

4.2 HAZARD PROFILE

HAZARD DESCRIPTION

Generally defined, an earthquake is an abrupt release of accumulated energy in the form of seismic waves when movement occurs along a fault. The City of Pomona lies in a seismically active region of Southern California, with several major active faults in the area, including the San Andreas, Sierra Madre, and Whittier - Elsinore fault zones. However, in addition to these known faults, movement along buried blind thrust faults that have no obvious surface features can also occur.

Faulting and Seismicity

Earth scientists use the angle of the fault with respect to the surface (known as the dip) and the direction of slip along the fault to classify faults. Faults that move along the direction of the dip plane are dip-slip faults and described as either normal or reverse, depending on their motion. Faults that move horizontally are known as strike-slip faults and are classified as either right-lateral or left-lateral. Faults that show both dip-slip and strike-slip motion are known as oblique-slip faults. The types of faults are described below and illustrated in **Figure 4-1**:

- *Normal Fault.* A dip-slip fault in which the block above the fault has moved downward relative to the block below. This type of faulting occurs in response to extension and is often observed in the Western United States Basin and Range Province and along oceanic

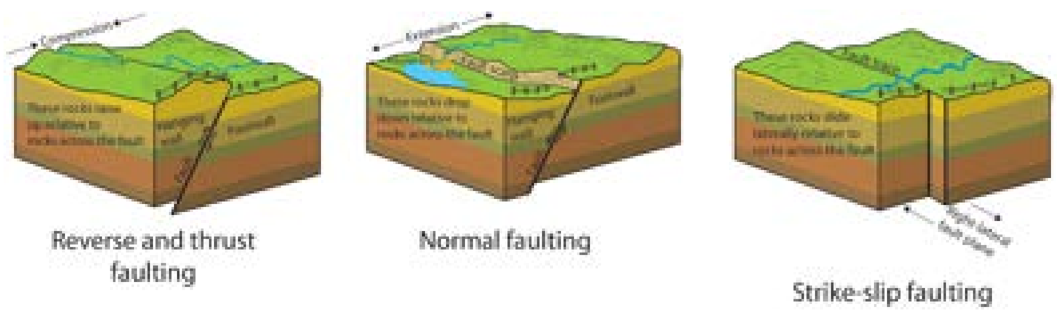
[15] *National Earthquake Information Center website: http://neic.usgs.gov/neis/eqlists/lOmaps_usa.html, accessed September 13, 2021.*
[16] *USGS Earthquake Hazards Program website: http://earthquake.usgs.gov/faq/hist.html#5, accessed September 13, 2021..*

ridge systems.

- *Thrust Fault*. A dip-slip fault in which the upper block, above the fault plane, moves up and over the lower block. This type of faulting is common in areas of compression, such as regions where one plate is being subducted under another. When the dip angle is shallow, a reverse fault is often described as a thrust fault.

- *Strike-Slip Fault*. A fault on which the two blocks slide past one another. A left lateral strike-slip fault is one on which the displacement of the far block is to the left when viewed from either side. A right lateral strike slip fault is one on which the displacement of the far block is to the right when viewed from either side. The San Andreas Fault is an example of a right lateral strike-slip fault[17].

Figure 4-1: Types of Faults



4.2.1 HISTORIC EVENTS

Although damaging earthquakes have occurred numerous times in Southern California, the City of Pomona has never declared a state of emergency due to an earthquake. During the 1987 Whittier Narrows earthquake, several historic buildings were damaged, but the city did not sustain any deaths or serious injuries. Relatively speaking, Pomona has been able to avoid many of the dire effects of earthquakes experienced by other Southern California communities. However, the risk to the city from an earthquake is still great given the history of earthquakes in the Southern California and the probability of future occurrence in the region. In order to examine the earthquake threat to Pomona, it is useful to review experiences of other Southern California cities in profiling earthquake hazards.

Historical earthquake records can generally be divided into records of the pre-instrumental period and the instrumental period. In the absence of the instrumentation the detection of earthquakes is based on the observations and witness reports and is dependent upon population density and distribution. Since California was sparsely populated in the 1800's the detection of pre-instrumental earthquakes is relatively difficult. However, two very large earthquakes, the

[17] *USGS Earthquake Hazards Program website: http: //earthquake.usgs.gov/faq/plates.html, accessed June 30, 2004*

Fort Tejon in 1857 (7.9) and the Owens Valley in 1872 (7.6) are evidence of the tremendously damaging potential of earthquakes in Southern California. In more recent times, four earthquakes greater than 7.0 have occurred in Southern California: 7.5 in Kern County (1952) 7.3 in Landers (1992), 7.1 in Hector Mine (1999), and 7.1 in Ridgecrest (2019). **Table 4-1** lists historic earthquakes in Southern California of a magnitude 5.0 or greater.

Table 4-1: Southern California Earthquakes with Magnitude 5.0 or Greater

Southern California Region Earthquakes with a Magnitude 5.0 or Greater			
1769	Los Angeles Basin – M6.0	1941	Carpinteria – M5.5
1800	San Diego Region – M6.3	1952	Kern County – M7.5
1812	Wrightwood – M7.5	1954	W. of Wheeler Ridge – M6.4
1812	Santa Barbara Channel – M7.2	1971	San Fernando – M6.6
1827	Los Angeles Region – M5.5	1973	Point Mugu – M5.3
1855	Los Angeles Region – M6.0	1986	North Palm Springs – M5.6
1857	Fort Tejon – M7.9	1987	Whittier Narrows – M5.9
1858	San Bernardino Region – M6.0	1992	Landers – M7.3
1862	San Diego Region – M5.9	1992	Big Bear – M6.5
1892	San Jacinto or Elsinore Fault – M6.3	1994	Northridge – M6.7
1893	Pico Canyon – M5.7	1999	Hector Mine – M7.1
1894	Lytle Creek Region – M6.0	2008	Chino Hills – M5.4
1894	E. of San Diego – M5.7	2014	La Habra – M5.1
1899	Lytle Creek Region – M5.7	2014	South Napa – M6.0
1899	San Jacinto and Hemet – M6.6	2016	Borrego Springs – M5.2
1907	San Bernardino Region – M5.3	2019	Ridgecrest (1 of 2) – M6.4
1910	Glen Ivy Hot Springs – M5.5	2019	Ridgecrest (2 of 2) – M7.1
1916	Tejon Pass Region – M6.1	2019-2020	Ridgecrest aftershocks; At least six occurrences greater than M5.0, less than M6.0
1918	San Jacinto – M6.8	2020	Lone Pine – M5.8
1923	San Bernardino Region – M6.3	2021	Calipatria/Brawley – M5.3
1925	Santa Barbara – M6.8	2021	Little Antelope Valley – M6.0
1933	Long Beach – M6.4		

Sources: Southern California Earthquake Data Center (SCEDC) Website, accessed November 2021.
Southern California Seismic Network Website, accessed November 2021

The damage from these four large earthquakes was limited because they occurred in areas that were sparsely populated. The seismic risk is much more severe today in areas of widespread growth throughout Southern California, with the population at risk in the millions, rather than a few hundred or a few thousand persons. This is evidenced by the Northridge earthquake of 1994.

Although the magnitude of the earthquake (6.7) was smaller than the aforementioned events, the Northridge earthquake became the costliest earthquake in California history. 57 people were killed, and more than 1,500 people were seriously injured.

For days afterward, thousands of homes and businesses were without electricity, tens of thousands had no gas, and nearly 50,000 had little or no water. Approximately 15,000 structures were moderately to severely damaged, which left thousands of people temporarily homeless. The total cost of the damage caused by the Northridge earthquake approached 50 billion dollars.

4.2.2 HAZARD LOCATION AND EXTENT

There are numerous faults in the Los Angeles area that are categorized as active, potentially active, and inactive. A fault is classified as active if it has either moved during the Holocene time (during the last 11,000 years) or is included in an Alquist Priolo Earthquake Fault zone (as established by the California Division of Mines and Geology). A fault is classified as potentially active if it has experienced movement within Quaternary time (during the last 1.8 million years). Faults that have not moved in the last 1.8 million years are generally considered inactive. Surface displacement can be recognized by the existence of cliffs in alluvium, terraces, offset stream courses, fault troughs and saddles, the alignment of depressions, sag ponds, and the existence of steep mountain fronts.

REGIONAL FAULTS

Earthquakes from several active and potentially active faults in the Southern California region could affect future development within the City of Pomona, although no known regional faults directly traverse the city. It should be noted, however, that the Northridge Earthquake occurred on a previously undetected active fault, and more faults may exist than are discussed here. The nearest identified regional faults are summarized below and presented in **Map 4-1**.

Active Faults

- *San Andreas Fault Zone.* Located approximately 20 miles to the northeast of the City, this fault zone extends from the Gulf of California northward to the Cape Mendocino area where it continues northward along the ocean floor. The length of the fault and its active seismic history indicates that it has a very high potential for large scale movement in the near future (magnitude 8.0+ on Richter scale) and should be considered important in land use planning for most cities in California.

Map 4-1: Seismic Hazards

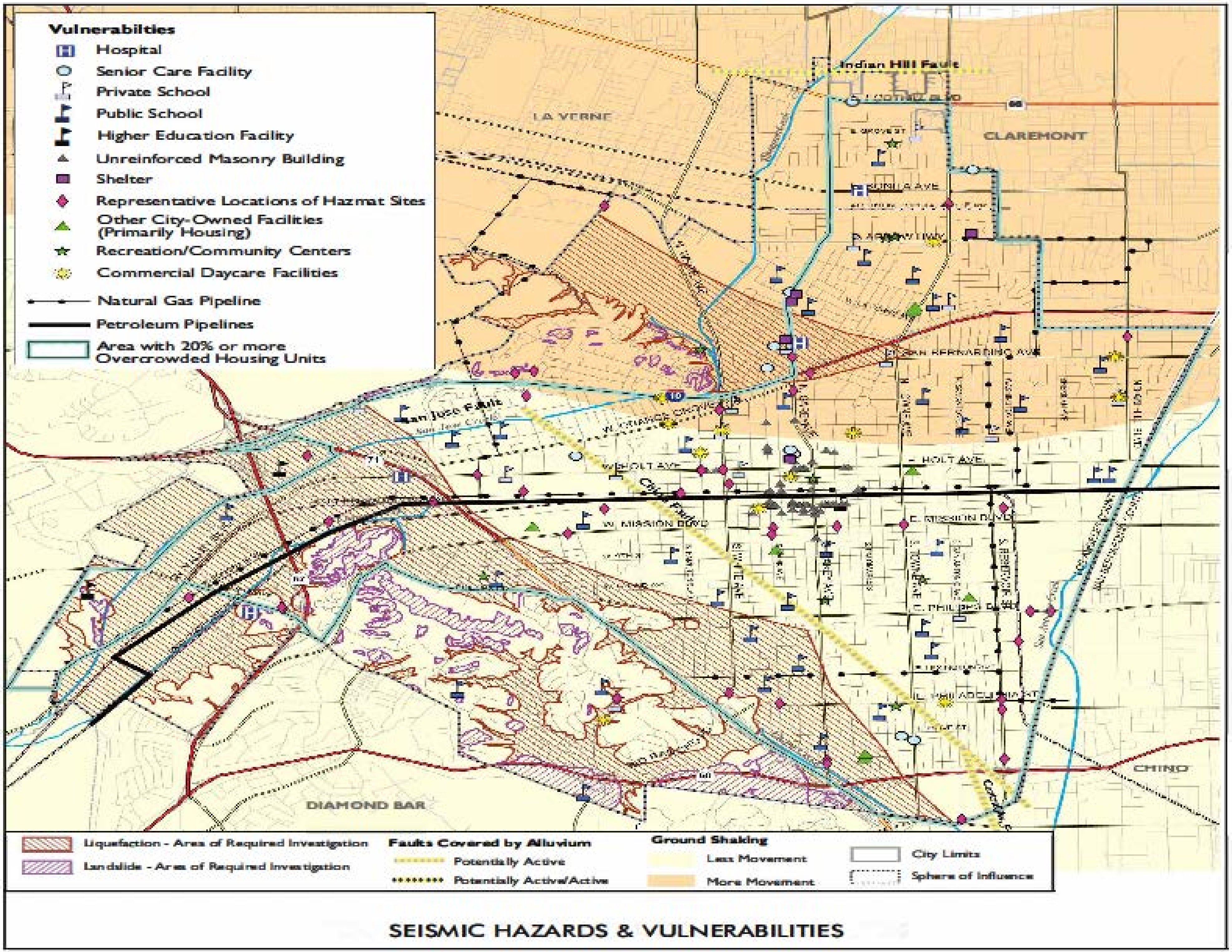
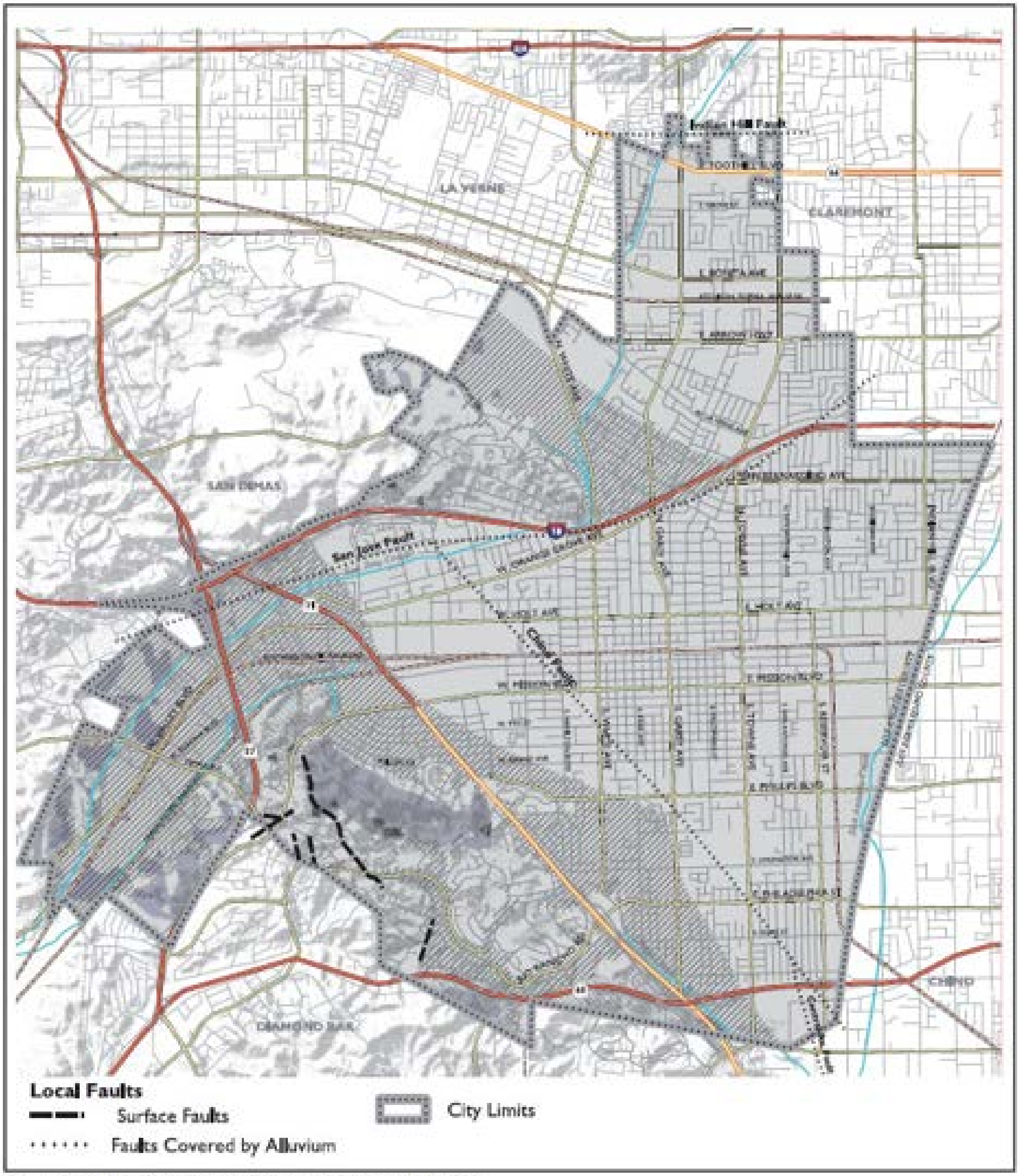


Figure 4-2: Regional Faults



Source: State of California Division of Mines and Geology, March 1999.

- *Sierra Madre Fault System.* Located approximately one mile north of the City, at the base of the San Gabriel Mountains, this fault system forms a prominent 50-mile long east-west structural zone on the south side of the San Gabriel Mountains. It consists of a complex system of dips and slips and has a left lateral reverse component. The Sierra Madre fault system has been responsible for uplift of the San Gabriel Mountains by faulting in response to tectonic compression. In many places, the faults have placed basement bedrock over alluvium where they dip northerly below the steep topographic front of the San Gabriel Mountains.

- *Whittier-Elsinore Fault Zone.* This fault zone is located along the southern base of the Puente Hills, approximately 9 miles to the southwest of the City. This northwest-trending fault trends from Whittier Narrows southeast across the Santa Ana River, past Lake Elsinore into western Imperial County and then into Mexico. This fault zone has the expected maximum capability of a magnitude 6.6 earthquake.

- *San Fernando Fault Zone.* This fault is located approximately 30 miles northwest of the City. Generally, fault segments are east-west trending thrust faults with associated left lateral movement.

- *Newport-Inglewood Fault Zone.* Located approximately 35 miles southwest of the City this fault zone could generate a 7.0 magnitude earthquake within the next 50 to 100 years.

- *Norwalk Fault.* Located approximately 25-miles southwest of the City, this fault strikes 65 to 85 degrees to the northwest and dips steeply to the northeast. The fault is approximately 16 miles long and has an accurate trace between Buena Park and Tustin. Micro seismic activity along the Norwalk Fault is high and it may be capable of generating a magnitude 6.3 earthquake.

Potentially Active Faults

- *San Gabriel Fault.* Labeled as potentially active, this fault is located approximately 20 miles northwest of the City. This fault extends from Frazier Park to Mount Baldy Village, a distance of approximately 84 miles. Because of its length and its ancestral relationship with the San Andreas Fault System, its potential future activity must be realized. Due to the length of its surface trace, the San Gabriel Fault is believed capable of generating a magnitude 7.8 earthquake.

- *Verdugo Fault.* Located approximately 22 miles west of the City, this potentially active fault bounds the south flank of the Verdugo Mountains and appears to merge with the Eagle Rock-San Rafael Fault System in the vicinity of the Verdugo Wash. Low magnitude earthquakes (less than 3.0) which have been attributed to activity along the Verdugo Fault are occasionally recorded in the Burbank-Glendale area. No direct evidence of ground displacement has been observed as associated with these low magnitude earthquakes.

The Verdugo Fault has a high potential for future activity and is capable of generating a magnitude 6.4 earthquake.

- *Santa Monica Fault.* This fault is located approximately 25 miles west of the City. No detailed information is available on the exact location of this southwest-northeast trending fault at the ground surface (fault trace), or on its geometric orientation. This fault the Malibu Coast Fault, and the Raymond Fault belong to one large fault system. Classified as a potentially active fault, this fault could generate a moderate seismic event (magnitude 6.6).

Local Faults

In addition to the regional faults, there are several local faults located within the city that are considered potentially active. No recent seismic activity has been recorded along these faults in the last 10,000 years. However, a major earthquake occurring along with any of these faults would be capable of generating seismic hazards and strong ground shaking effects within the City. These local faults include the San Jose, Indian Hill, Chino, and Central Avenue Faults. Of the local faults, the probability of earthquake activity is considered the highest along the San Jose Fault, with possible ground rupture. Neither the Indian Hills Fault, Chino Fault, nor the Central Avenue Fault have high probability of seismic activity, and their precise locations are currently not well defined. None of the local faults have been placed in an Alquist-Priolo Special Studies Zone. Thus, no fault rupture hazard is anticipated along the fault traces that pass through the City. These local faults are further described below and are illustrated in **Figure 4-2.**

- *San Jose Fault.* This fault is classified as potentially active and is located in the San Jose Hills, on the western edge of the City. The fault is approximately 13 kilometers long and runs in a northeast/southwest direction approximately parallel to the I-10 freeway. The fault has an 80-to-85-degree upward dip and has a revere movement with the north side up. The fault displaces upper Miocene sedimentary and volcanic rocks as much as 2,700 feet vertically, with a 100 - meter vertical offset in older subsurface alluvium. Some geologists consider this fault as seismically active and the origin of the L.A. County earthquakes in 1988 and 1990.

- *Indian Hill Fault.* This fault is located along the northern section of the city and runs an east/west direction for approximately 9 kilometers. It is believed to be a single strand and is considered potentially active. This fault serves as a barrier to groundwater movement and offsets soils of Late Pleistocene age which is the reason it is considered potentially active.

- *Chino Fault.* Considered to be a part of the Whittier-Elsinore fault system, this fault borders the Puente Hills to the northeast and is buried along most of its length. It is approximately 28 kilometers long from the Santa Ana Mountains to the City of Pomona in a northwest-southeast direction, as it joins the San Jose Fault, near the I-10. Based on geomorphic evidence, it does not appear to have as great a potential for seismic activity. The fault has an estimated slip rate of 0.2 mm/year. Some geologists have questioned whether the Chino fault is in reality an earthquake fault, since recent evidence indicates that it is not a fault but the contact point between bedrock and less consolidated alluvium, although in 2008 the Chino Fault had a quake that damaged Pomona City Hall and a number of URM buildings in the downtown area.

- *Central Avenue Fault*. Considered a potentially active fault and located in the City of Chino, this fault extends into the southern portion of the City of Pomona. This fault is approximately 8 kilometers long and believed to be a single strand that is subparallel to the Chino fault. The fault exhibits displacement on Quaternary and Holocene age deposits but has no surface expression.

EARTHQUAKE EXTENT

Magnitude

A seismograph can determine the size or magnitude (Richter Magnitude Scale) of an earthquake by measuring the movement of the Earth’s surface and recording the radiating earthquake waves. Each whole number magnitude increase represents a ten-fold increase in the up and down motion recorded by the seismograph. An M = 6 earthquake causes 10 times the recorded motion of an M = 5 and 100 times the motion of an M = 4 earthquake. The magnitude is then used to calculate the amount of energy released by the earthquake. Each whole number increase in magnitude corresponds to an energy increase of about 32 times the lower magnitude value. An M = 6 earthquake releases about 30 times the energy of a M = 5 and nearly 1,000 times the energy of a M = 4 earthquake.

As earthquakes increase in size, the ground motion no longer increases in a way directly related to the increased size of the earthquake. A different method of determining magnitude based on the number of factors, such as area of slip, is used to calculate the size of earthquakes generally greater than M = 8.

Intensity

Earthquake size may also be determined using a subjective scale of observed damage. This method was used before the installation of seismographs and before the development of the Richter Magnitude Scale. An example is the Modified Mercalli Intensity (MMI) Scale first published in 1931. The intensity of damage observed at a specific building depends upon a number of factors, such as the earthquake’s magnitude, distance from the fault generating the earthquake, type of geologic materials underneath the building, type of building construction, age of construction, and other attributes. Over time the MMI scale has been modified to address changes in building types. All these possible variations in damage result in a single earthquake being capable of producing intensities ranging from *not felt at a particular location* (MMI = I) to *causing catastrophic damage* (MMI = XII) at another place. Historical records generally list an earthquake's maximum observed intensity and the size of the area in which the earthquake was felt.

Table 4-2: Modified Mercalli vs. Richter Scale

Modified Mercalli vs. Richter Scale		
Category	**Modified Mercalli Description**	**Richter Scale**
I. Instrumental	Not felt	**2.5 – Generally not felt but recorded by seismograph**
II. Weak	Felt only a few people, especially on upper floors of tall buildings	
III. Slight	Felt by people lying down, seated on a land surface, or in the upper stories of tall buildings	**3.5 – Felt by many people**
IV. Moderate	Felt indoors by many, by few outside; dishes and windows rattle	
V. Rather Strong	Generally felt by everyone; sleeping people may be awakened; vibrations like train passing close to house	
VI. Strong	Trees and poles may sway, some damage from falling objects	**4.5 – Some local damage may occur**
VII. Very Strong	General alarm; walls and plaster crack; difficult to stand; noticed by people driving	
VIII. Destructive	Damage slight in specially designed structures; considerable in ordinary buildings with partial collapse; damage great in poorly built structures; damage to chimneys, factory stacks, columns, monuments, walls	**6.0 – Destructive earthquake**
IX. Violent	General panic; some houses collapse, pipes break; damage considerable in poorly designed structures; buildings shifted off of foundation	
X. Intense	Some well-built wooden structures destroyed,; most masonry and frame structures destroyed with foundation; obvious ground cracks; railroad tracks bent; some landslides on steep hillsides	**7.0 – Major earthquake**
XI. Extreme	Few buildings survive; bridges damaged or destroyed; all services interrupted (electrical, water, sewage, railroad, etc.); severe landslides	**8.0 and up – Great earthquakes**
XII. Catastrophic	Total destruction; objects thrown into the air; ground moves in waves or ripples; river courses and topography altered	

EARTHQUAKE HAZARDS

Several hazards can be produced by a single earthquake event. Ground shaking, landslides, and liquefaction are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake. A discussion of these hazards is presented below, and areas affected by each of these hazards are mapped in **Figure 4-2.**

Ground Shaking

Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. It is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault, and distance from the epicenter.

Although the entire city is susceptible to damage from ground shaking, geological conditions can greatly influence the amount of shaking experienced throughout the City. The majority of Pomona is underlain by alluvial soils, transported from the San Gabriel Mountains the north, which are less resistant to shaking than other soil types. However, portions of the city situated on bedrock such as San Jose (Ganesha Hills) and Puente (Elephant Hill, Phillips Ranch) would likely experience less ground shaking and associated damage.

Landslides

Landslides are secondary earthquake hazards that can occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond and recover from an earthquake.

The Northridge earthquake of 1994 provides an example of the serious and damaging effects of landslides. As a result of the magnitude 6.7 earthquake, more than 11,000 landslides occurred over an area of almost 400 square miles. The landslides destroyed dozens of homes, blocked roads, and damaged oil-field infrastructure. They indirectly caused deaths from Coccidioidomycosis (valley fever), the spore of which was released from the soil during landslide activity and blown towards populated coastal areas.[18]

Many communities in Southern California have a high likelihood of encountering such risks, especially in areas with steep slopes. In Pomona, the risk of damage due to landslides is confined to parts of Phillips Ranch and Ganesha Hills. These areas are delineated by the State of California Division of Mines and Geology and depicted in **Figure 4-2.** Although some of the susceptible areas have residential development, most of them are located in designated open space.

[18] *Highland. L.M. and R.L. Schuster, Significant Landslide Events in the United States. Accessed via website at: http://landslides.usgs.gov.html_tiles/pubs/report/Landslides_pass_508.pdf*

In the landslide-prone areas that are developed, the risk of a damaging flow is even greater. Although landslides are a natural geologic process in the hills around Pomona, residential developments in these areas exacerbate the risk of landslide hazards. Grading for road construction and development can increase slope steepness and contribute to the speed and severity of landslides. Grading and construction can also decrease the stability of a hill slope by adding weight to the top, removing support at the base of the slope, and increasing water content. Other human activities affecting landslides include excavation, drainage and groundwater alterations, and changes in vegetation.[19]

Liquefaction

The phenomenon of liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these structures. Pomona is one of many communities in Southern California that is built on an ancient river bottom and has sandy soil. In some cases, this ground may be subject to liquefaction, depending on the depth of the water table.

The California Geological Survey identifies and maps areas susceptible to liquefaction, based on groundwater levels and geologic materials. Pomona has 4,025 acres or 27 percent of the city area that fall within these zones and are susceptible to liquefaction. These areas generally occur at the base of the hills in the southern and western portions of the City. Liquefaction areas are presented in **Map 4-1.**

4.2.3 PROBABILITY OF FUTURE OCCURRENCE

The USGS estimates that within the next 30 years the probability is 99% that an earthquake measuring a magnitude of 6.7 or greater will occur in California[20]. It is impossible to predict exactly where it will take place; however, there are fault segments that are considered more likely than others to produce such an earthquake. Along the Earth's plate boundaries, segments exist where no large earthquakes have occurred for long intervals of time. Scientists term these segments "seismic gaps" and, in general, have been successful in forecasting the time when some of the seismic gaps will produce large earthquakes.

Geologic studies show that over the past 1,400 to 1,500 years large earthquakes have occurred at about 150-year intervals on the southern San Andreas fault. As the last large earthquake on the southern San Andreas occurred in 1857, that section of the fault is considered a likely location for an earthquake within the next few decades. However, the San Andreas fault is just one of

[19] *Planning For Natural Hazards: The Oregon Technical Resource Guide. Department of Land Conservation and Development. 2000: Chapter 5.*

[20] *https://www.usgs.gov/congressional-statement/statement-dr-david-applegate-senior-advisor-earthquake-and-geologic-hazards. September 15, 2021*

many faults capable of producing large earthquakes in the region.

Although the science of earthquakes is not exact, these predictions are persuasive reminders of the constant risk of earthquakes to Southern California communities. The focus of the research on estimating the timeframe and location of earthquakes is itself a reminder that when discussing earthquakes, it is not a matter of "if" one will occur, it is a matter of when and where.

4.3 VULNERABILITY ASSESSMENT

OVERVIEW

The effects of earthquakes span a large area, and large earthquakes occurring in many parts of the Southern California region would probably be felt throughout the region. However, the degree to which earthquakes are felt, and the damage associated with them may vary. At risk from earthquake damage are large stocks of old buildings and bridges; many high tech and hazardous materials facilities; extensive sewer, water, and natural gas pipelines; earth dams; petroleum pipelines; and other critical facilities and private property located in the City. Identifying these vulnerabilities and estimating potential losses that could occur due to an earthquake event are crucial steps in the process of formulating effective, efficient mitigation measures.

4.3.1 IDENTIFYING VULNERABILITIES

Chapter 3: Risk Assessment details the various types of critical and vulnerable facilities within Pomona. Each of these types of facilities is vulnerable to damage by an earthquake and its associated hazards of ground shaking, landslides, and liquefaction. Of these facilities, the Technical Advisory Committee, drawing upon available scientific research, building structural information, historical experience, and community knowledge, identified specific vulnerabilities to target in the earthquake hazard mitigation process. The following sections identify those facilities that are considered the most vulnerable portions of the city to earthquake damage and are specific targets of earthquake mitigation action items.

EMERGENCY SERVICES

As previously discussed in **Chapter 3: Risk Assessment**, much of Pomona was built before seismic safety standards were implemented in 1976. Many of the City's critical facilities were also built before 1976 and could be more vulnerable to the hazards associated with earthquakes. Detailed studies will have to be conducted in order to determine which, if any, of the City's buildings have the potential to suffer serious damage during an earthquake. However, identifying those that predate seismic safety standards will help to prioritize the inventory process.

- Emergency Government Operations. All the buildings that are designated as facilities for use during an emergency were likely built before 1976. The only location identified in the City's EOP that is not inside a potentially vulnerable structure is located in the west parking lot of City Hall. However, this location lacks many of the amenities of an operational building, such as shelter, electricity, restrooms, and additional assets that would be significant in the operation of the Emergency Operation Center (EOC).

- Police and Fire Facilities. The majority of police and fire facilities in Pomona were built before 1976. These building include the main building, jail, and property/evidence storage structures of the Pomona Police Department and five of the City's eight fire stations (an additional fire station was built in 1952, however it has been retrofitted to conform to 2003 building code standards). These five stations have not been seismically retrofitted, although they were evaluated in 2003 for seismic safety and each rated "better than average" for seismic performance relative to buildings of the same general type (see **Table 4-3**).

Table 4-3: Fire Stations Built Before 1976

FIRE STATION	YEAR BUILT	CONSTRUCTION MATERIALS	RETROFIT?
181	Unknown Pre-1976	Reinforced Concrete Reinforced Masonry	No
182	1963	Reinforced Masonry	No
183	1952	Reinforced Masonry	Yes (2003)
184	Unknown: (1959-1974)	Tilt-Up precast concrete	No
185	1962	Reinforced Masonry	No
186	1963	Reinforced Masonry	No

181 was closed in 2012, but the Division VIII Office, Battalion Chiefs, Fire Department Offices, and other department sections remained. In January 2020, the Division VIII Office and Fire Prevention Office were relocated from Pomona to Diamond Bar

HOSPITALS

Both of the major medical facilities in Pomona house vulnerable patient populations who would require substantial assistance in the event of damage. Additionally, damage that incapacitated Pomona Valley Hospital Medical Center, which is the only provider of emergency medical services in the City, would detrimentally affect Pomona's ability to care for people injured in a large earthquake.

In accordance with the Hospital Seismic Safety Act - which requires that all hospitals be in compliance with seismic standards to allow the hospital to be capable of reasonably providing continued operations following a major seismic event by January 1, 2030 - a number of structures at these facilities are being retrofitted or replaced. Further details on each of the facilities is provided below:

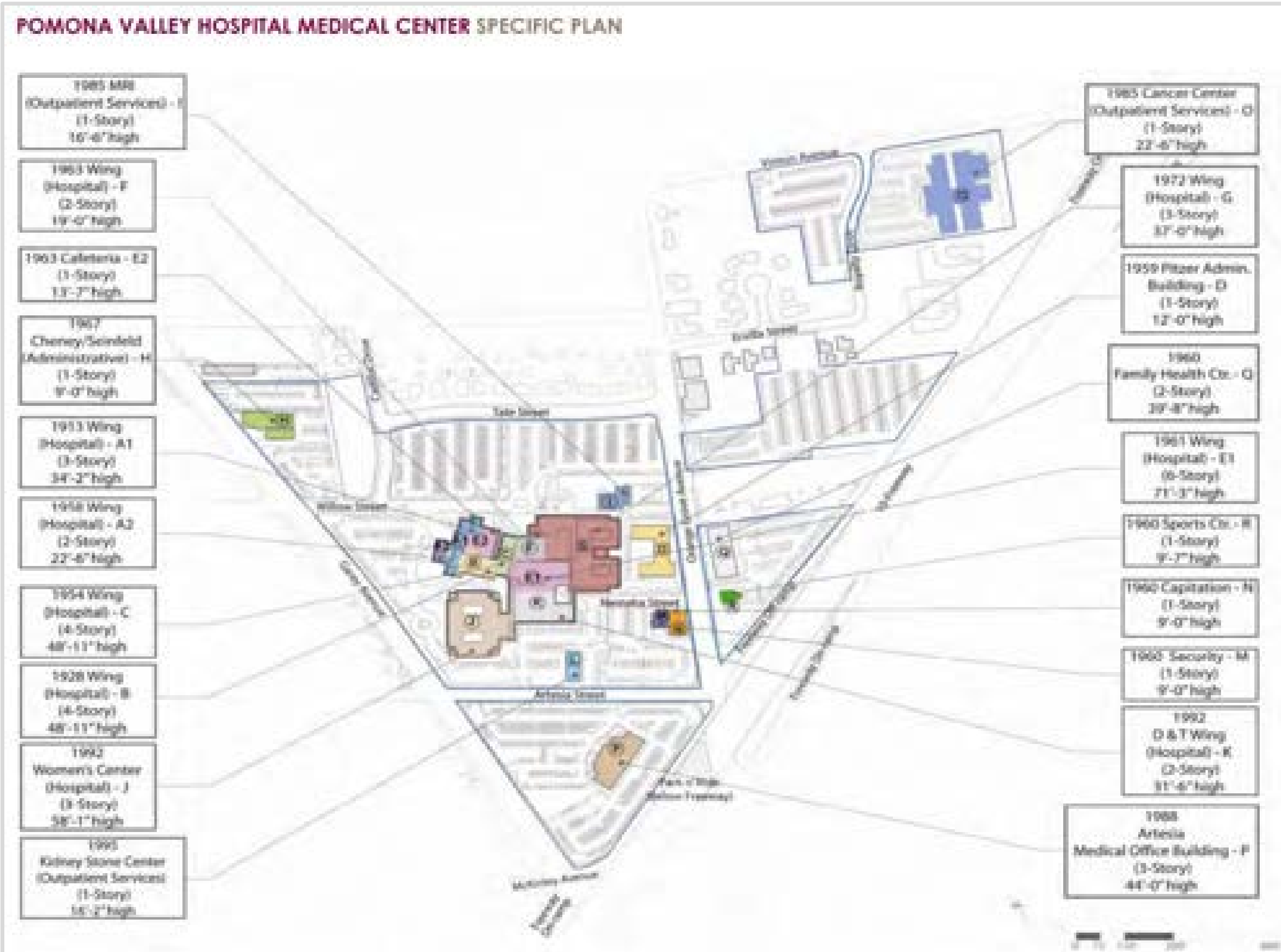
- *Pomona Valley Hospital Medical Center*. The hospital celebrated its 100-year anniversary in 2003. The buildings that make up the Pomona Valley Community Hospital Medical Center (PVHMC) were constructed over several decades. The hospital building has likewise been constructed in stages, beginning with the original 1913 structure (currently Wing A of the hospital building).

  A Specific Plan to address seismic safety issues and an expansion of the hospital facilities for the PVHMC was adopted in 2008 and most recently amended in 2016. The plan is intended to guide the future growth and operation of PVHMC and to meet Senate Bill 1953 (SB 1953) hospital seismic safety requirements. Under the Specific Plan, PVHMC would be expanded in three phases. Phase 1 would include the construction of a new 56,000 sf outpatient pavilion and a 138,000-sf inpatient wing and lobby addition to the main hospital building. Phase 2 would add a 54,000-outpatient pavilion and a 123,000-sf hospital inpatient wing. Phase 3 would add an additional 129,000 sf of inpatient facilities in a new wing and add a 400-stall parking structure. The PVHMC core campus will have expanded to include 1,012,314-sf of combined new and existing facilities, a net increase of 267,299-sf. Demolition of 232,701-sf of existing facilities is also proposed, the majority of which would occur at the end of Phase 3. Implementation of the Specific Plan would occur over a period of years, extending until 2030[21].

  In communication with hospital staff, it was conveyed that, as of May 2021, the Woman's Center and Diagnostics and Testing buildings are structurally compliant, and that several buildings were in plan check with OSHPD for material sampling, a precursor to plan check submittals for structural upgrades.

[21] *https://ceqanet.opr.ca.gov/2008031111/6. Accessed September 15, 2021*

Figure 4-3: PVHMC Specific Plan



- *Casa Colina Center for Rehabilitative Medicine*. Casa Colina completed construction of a new hospital facility which started receiving patients in 2005. This facility was built in full compliance with the safety standards of SB 1953. All outpatient facilities were built from 2001 to the present.

Although these private facilities are privately owned and will be responsible for mitigating hazards on their property, increased preparedness and communication between them and City officials will help to coordinate emergency efforts in the event of an earthquake.

UTILITIES

Each of the components of Pomona's utility systems contribute to its overall operation and efficiency. However, some components are more critical to system operation and have been targeted as specific vulnerabilities to be addressed during earthquake mitigation.

Water

Maintaining water quality and distribution are crucially important during and after hazard events. The following critical components of the City's water service system are vulnerable to earthquake damage:

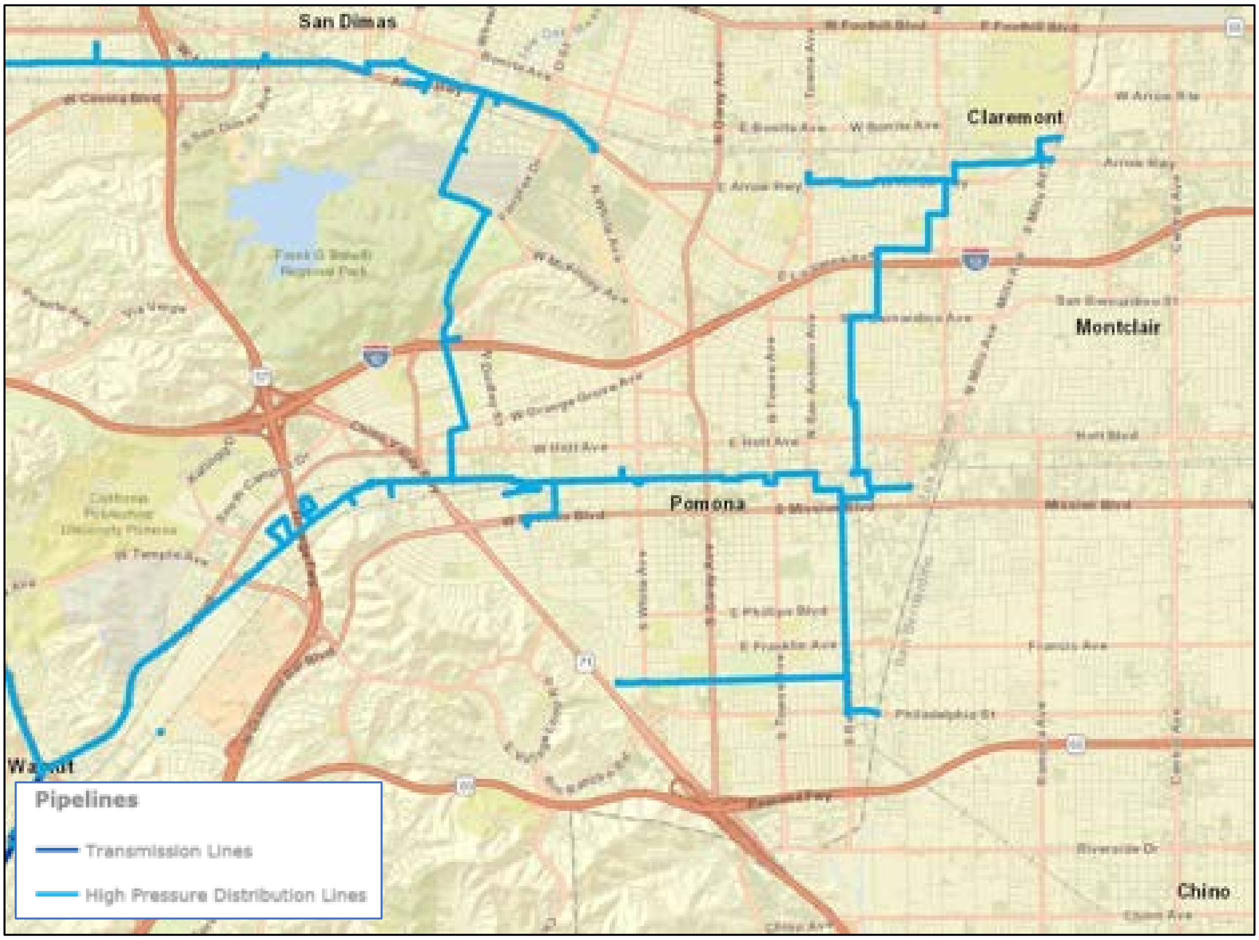
- *Water Reservoirs*. Six of the City's 22 water reservoirs have been upgraded with seismic safety valves which would shut off the reservoir in the event of a rupture, preventing drainage of the reservoir and potential flooding. Currently, there are no plans to upgrade the remaining 16.
- *Groundwater Wells.* A majority of Pomona's water supply is provided by local groundwater wells. The structural stability of these facilities is unknown and would have to be evaluated through further technical studies to assess vulnerability to ground shaking and liquefaction. None of the ground water wells are located in areas subject to earthquake-induced landslides. If a well(s) were to experience earthquake-related damage, local water supplies would only be incrementally affected, and the overall community impact is considered low.
- *Water Treatment.* The City's Anion Exchange Plant removes nitrates from the water supply for a significant portion of the City.[22] Failure of this plant has the potential to substantially limit potable water supply. The structural stability of the plant is unknown; however, it was completed in 1992, and is assumed to have a high level of resistance to ground shaking due to its modern construction standards.

Underground Utility Lines

Underground utilities - such as natural gas and petroleum - may be subject to rupture during an earthquake, creating the potential for fire or the release of hazardous chemicals. Specifically, the two petroleum pipelines and seven primary natural gas distribution pipelines could pose significant fire and hazardous materials risks if ruptured. In addition to these main lines, the aging underground utility network in Pomona may experience any number of ruptures along its lines, resulting in localized service disruptions or release of materials.

[22] *https://www.envirogen.com/wp-content/uploads/2019/07/Pomona-Case_Study-ETI-1.pdf, accessed November 6, 2021.*

Figure 4-4: Gas Transmission Lines in Los Angeles County



SCHOOLS

In increasing Pomona's resilience to earthquakes, prioritizing the safety of the community's children is a primary concern. The many schools within the City house thousands of students during school hours and are considered a substantial vulnerability. Many of Pomona's children attend school at private facilities, but the vast majority attend school at one of Pomona Unified School District's (PUSD) facilities.

RECREATION AND COMMUNITY CENTERS

In addition to schools, recreation and community centers also house a large number of children. As discussed in **Chapter 3: Risk Assessment**, the City of Pomona operates six community centers. Three of these facilities were constructed before seismic safety codes were established. Currently, no other information about the potential structural vulnerability to earthquake damage is available, and further studies would need to be conducted to determine their level of vulnerability. Two of the community centers are also in areas subject to liquefaction. The Ganesha Park Community Center, one of the City's most popular recreation facilities, is also the most potentially vulnerable. It was constructed in 1950 and located in an area subject to strong ground shaking, liquefaction, and earthquake induced landslides.

UNREINFORCED MASONRY BUILDINGS

The City of Pomona has dozens of unreinforced masonry (URM) buildings. These buildings are especially vulnerable to damage and collapse during earthquakes. Their potential for collapse poses hazards to life and property loss. Also, many of these buildings are valuable assets to the City's rich historical heritage. The URM buildings in Pomona are clustered in the oldest and most central portion of the city, largely located along 2nd Street in Downtown.

VULNERABLE DEVELOPMENT PATTERNS

In general, the size of Pomona households is large. 26% of Pomona households are considered “large” which is defined as five or more individuals per household. The average household size is 2019 was 3.77, which is almost one person per household more than the Los Angeles County average. Many of these households are also considered “overcrowded”, which is defined as more than one person living per room within a house. 31.3% of households are considered overcrowded, compared to 21.8% in Los Angeles County.

Central Pomona has a number of vulnerable development characteristics that could potentially result in more damage due to an earthquake when compared to other areas of the City. In general, census tracts with the highest percentages of overcrowded units are located in central Pomona; these high densities increase the potential number of people per neighborhood who would be impacted by an earthquake. Additionally, many of these overcrowded areas are located in neighborhoods with older structures, which pre-date seismic safety standards. Finally, large numbers of multi-family units are located in Central Pomona, of which a number are likely “soft story” apartment buildings. This type of construction is characterized by multi-storied structures that have an opening on the ground floor, such as a garage, that is less sturdy than the floors above it. These buildings are particularly vulnerable to earthquake damage, as the weakened first story may sustain damage, shift, or collapse. The combination of these development characteristics creates an area of the city with elevated susceptibility to the hazardous effects of earthquakes.

RAILROADS

The Union Pacific Railroad (UPR) line that is located in the center of the city is a primary east-west freight corridor. Trains on the tracks also carry passengers on a much more limited basis. An earthquake that caused derailment, damage to the tracks by liquefaction, or obstruction on the tracks due to landslides would be a tremendous vulnerability to the city. A train present on the tracks would seriously hamper the ability of emergency vehicles to traverse the city, especially if the crucial underpasses at Garey, White, and Towne Avenues were blocked. Although the possibility of a train derailment in the city seems remote, it was just such an event that prompted the construction of Pomona Valley Hospital Medical Center, as mentioned in **Chapter 1 Introduction**. The City does not have jurisdiction over the UPR tracks; hazard planning and mitigation is the responsibility of the Union Pacific Railroad. However, the City can coordinate with UPR on mitigation planning and work to maximize local emergency facility resiliency to help reduce risks associated with the railroad.

4.3.2 ESTIMATING POTENTIAL LOSSES

Risk analysis involves estimating the damage and costs likely to be experienced in a geographic area over a period of time[23]. Factors included in assessing earthquake risk include population and property distribution in the hazard area, the frequency of earthquake events, landslide susceptibility, buildings, infrastructure, and disaster preparedness of the region. This type of analysis can generate estimates of the damage to the region due to an earthquake event in a specific location. FEMA's software program, HAZUS, uses mathematical formulas and information about building stock, local geology and the location and size of potential earthquakes, economic data, and other information to estimate losses from a potential earthquake[24].

HAZUS EARTHQUAKE SCENARIO

To perform the risk analysis for this LHMP, a magnitude 6.7 earthquake was simulated using HAZUS. The earthquake scenario was based on ground shaking data derived from USGS shake map scenario on the San Jose Fault. It is impossible to exactly predict the circumstances of the next earthquake to affect the city, and the data provided by the HAZUS simulation will surely differ from the actual losses experienced due to such an event. However, the use of HAZUS allows the City to view reasonable potential losses from a modeled earthquake and make appropriate mitigation and emergency preparedness decisions.

It is noteworthy that this model assumes that the entire city is underlain by alluvial site conditions; although the majority of the city is located on an alluvial fan, portions on the western boundaries are underlain by bed rock, which is more resistant to ground shaking. Additionally, the secondary earthquake hazards of fire and debris generation were simulated in this scenario. A discussion of the risks associated with these hazards follows the summary of HAZUS results.

Structural Damage

In this HAZUS scenario, 12.5 percent of buildings in Pomona experienced at least moderate damage. Approximately 900 structures were completely destroyed, and the vast majority of these were residential uses. Overall, buildings that sustained the most damage were manufactured housing or structures with wood construction.

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[23] *Burby. R. (Ed.) Cooperating with Nature: Confronting Natural Hazard s with Land Use Planning for Sustainable Communities (1998). Washington D.C. Joseph Henry Press.*
[24] *FEMA HAZUS http://www.fema.gov/hazus (May 2021).*

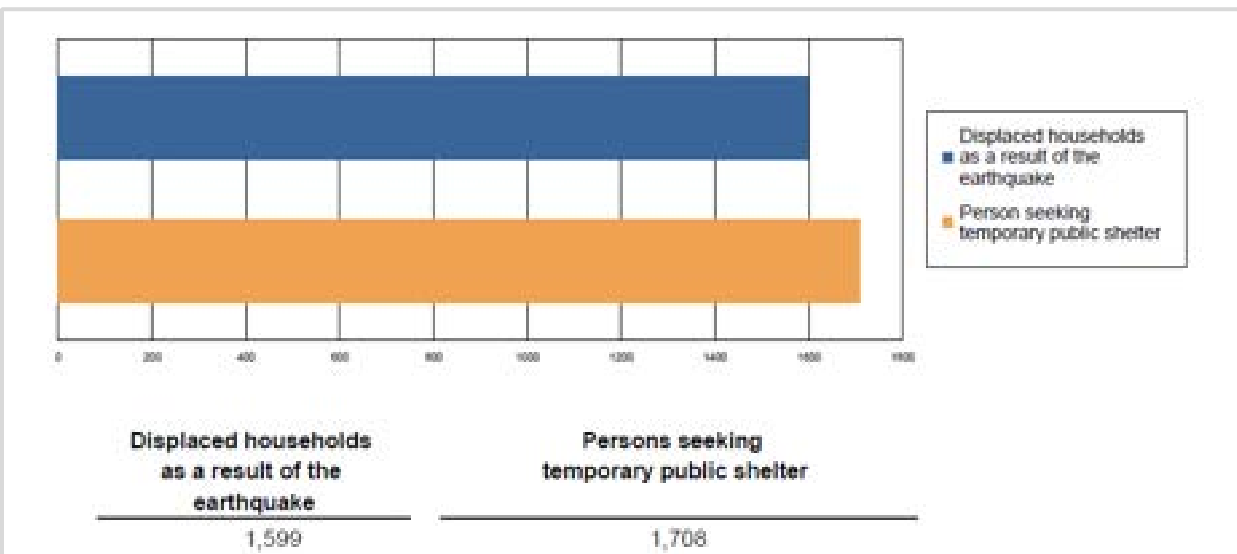
Table 4-4: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	7.29	0.08	10.73	0.08	11.87	0.14	6.10	0.29	3.01	0.33
Commercial	238.98	2.77	360.95	2.73	566.60	6.67	365.56	17.39	162.91	18.10
Education	18.99	0.22	24.78	0.19	27.19	0.32	13.38	0.64	4.66	0.52
Government	2.37	0.03	3.52	0.03	5.50	0.06	3.86	0.18	1.75	0.19
Industrial	60.74	0.71	93.99	0.71	164.91	1.94	113.17	5.38	54.19	6.02
Other Residential	452.06	5.25	768.73	5.81	925.52	10.90	798.66	38.00	447.04	49.68
Religion	24.94	0.29	35.75	0.27	44.41	0.52	27.58	1.31	12.32	1.37
Single Family	7807.31	90.65	11926.17	90.18	6745.15	79.44	773.37	36.80	213.99	23.78
Total	8,613		13,225		8,491		2,102		900	

Displaced Persons

This model estimated that the earthquake displaced 1,599 households. Although some of these people would be able to seek shelter with relatives, friends, or alternative means, approximately 1,708 people would require accommodation in temporary public shelters.

Table 4-5: Displaced Households/Persons Seeking Short Term Public Shelter



Casualties

Casualty estimates are provided for three times of day, 2:00 AM, 2:00 PM, and 5:00 PM. Casualties are highest during the 2:00 PM scenario with approximately 1,550 people were injured or killed during this earthquake scenario. The majority of these casualties, roughly 1,110, were due to minor injuries requiring medical attention but not hospitalization. The remaining number includes more serious injuries requiring hospitalization and approximately 90 deaths.

Table 4-6: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	10.80	3.03	0.49	0.96
	Commuting	0.03	0.07	0.08	0.02
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	20.04	5.48	0.83	1.64
	Other-Residential	221.85	53.32	6.12	11.60
	Single Family	165.69	24.49	1.21	2.10
	Total	**418**	**86**	**9**	**16**
2 PM	Commercial	640.02	179.18	28.92	56.83
	Commuting	0.30	0.59	0.76	0.16
	Educational	239.88	65.88	10.65	20.83
	Hotels	0.00	0.00	0.00	0.00
	Industrial	147.67	40.29	6.16	11.99
	Other-Residential	48.69	11.75	1.39	2.56
	Single Family	35.87	5.36	0.31	0.46
	Total	**1,112**	**303**	**48**	**93**
5 PM	Commercial	458.61	128.01	20.72	40.22
	Commuting	4.67	9.41	12.03	2.52
	Educational	23.33	6.44	1.05	2.05
	Hotels	0.00	0.00	0.00	0.00
	Industrial	92.29	25.18	3.85	7.49
	Other-Residential	83.22	20.07	2.37	4.38
	Single Family	64.27	9.60	0.56	0.81
	Total	**726**	**199**	**41**	**57**

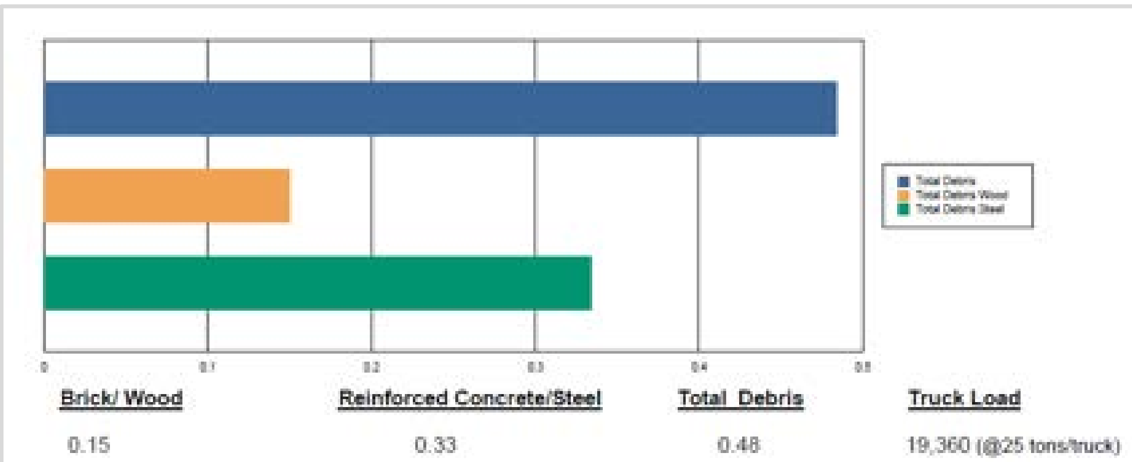
Fire Damage

Fires often occur following an earthquake, due to downed power lines, ruptured fuel lines or other flammable materials becoming exposed and ignited. In the wake of an earthquake water may not be immediately available or may be available in limited quantities. Additionally, emergency personnel may be stretched thin and responding to other emergency situations. These factors increase the hazard that such fires pose to Pomona. This HAZUS scenario modeled three fire ignitions in the City, resulting in the displacement of an additional 506 people and thirty-one million dollars of property damage.

Debris

The HAZUS-MH scenario produced an estimated 484,000 tons of debris. Following an earthquake, the City would need to devote resources to cleaning up brick, glass, wood, steel or concrete building elements, office and home contents, and other materials. This challenge includes disposing of or recycling the waste in compliance with the regulations of AB 939: The Integrated Waste Management Act. For these reasons, developing a strong debris management strategy is essential in post-disaster recovery.

Table 4-7: Earthquake Debris (millions of tons)

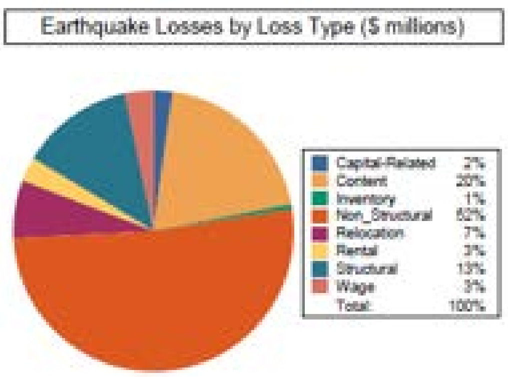


Direct Economic Impacts

The total estimated economic loss to the City in this scenario was 2.5 billion dollars. The economic losses calculated by HAZUS-MH include both income (wage, capital related, rental, relocation) and capital (structural, non-structural, content, inventory) losses incurred by earthquake damage, as well as damage to transportation and utility lifelines. The majority of losses were caused by building-related losses, which totaled 2.3 billion dollars. Within that category, residential losses comprise the largest portion 51% primarily due to damage of single-family homes.

The aforementioned economic impacts do not include indirect impacts, long-term changes that occur as a result of direct impacts. Such impacts include losses due to business closures, employment changes, loss of tourism revenues, changes in sales tax revenues, or other long-term consequences of earthquake damage.

Table 4-8: Building Related Economic Loss Estimates (millions of dollars)



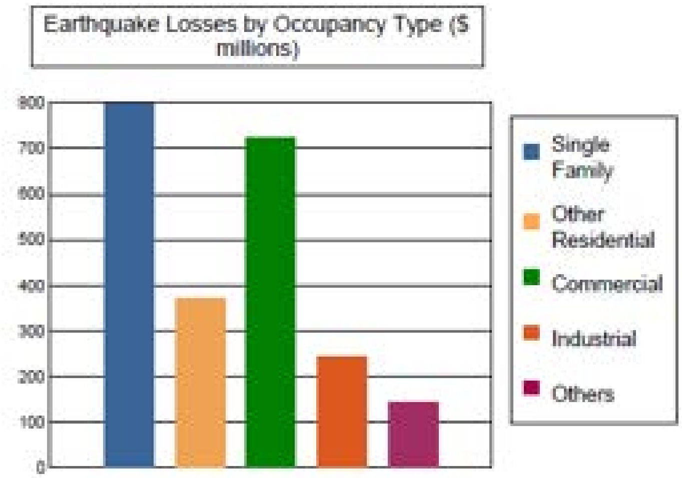


Table 11: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	4.0557	66.2671	4.1600	3.4403	77.9231
	Capital-Related	0.0000	1.7220	47.3160	2.5948	1.3086	52.9414
	Rental	15.9428	17.0835	28.5176	1.5857	1.9733	65.1029
	Relocation	58.1384	14.7344	50.3301	7.3132	18.5282	149.0443
	Subtotal	**74.0812**	**37.5956**	**192.4308**	**15.6537**	**25.2504**	**345.0117**
Capital Stock Losses							
	Structural	96.9492	44.6101	105.5313	31.5851	16.9782	295.6539
	Non_Structural	480.5309	234.2282	284.3100	109.6361	67.8937	1,176.5989
	Content	147.7758	54.2318	137.6300	73.6736	32.4963	445.8075
	Inventory	0.0000	0.0000	4.2226	10.7916	0.0965	15.1107
	Subtotal	**725.2559**	**333.0701**	**531.6939**	**225.6864**	**117.4647**	**1933.1710**
	Total	**799.34**	**370.67**	**724.12**	**241.34**	**142.72**	**2278.18**

Additional Risk Analysis Factors

This HAZUS scenario did not model the potential effects of liquefaction or earthquake-induced landslides, which are important secondary hazards associated with earthquakes. Of the two hazards, liquefaction presents a more serious risk to the City. It covers a widespread area, unlike the localized hazard of landslides, and includes many important lifelines that could be damaged due to liquefaction. **Table 4-9**, below, lists the total structural assets that are located within these secondary earthquake hazards areas.

Table 4-9: Structures within Liquefaction and Landslide Zones

LAND USE	UNITS	STRUCTURE VALUE (IN MILLIONS)	ACRES	UNITS	STRUCTURE VALUE (IN MILLIONS)	ACRES
Low Density Residential	5437	402.3	924.3	144	24.1	328
Medium Density Residential	988	47.4	121.4	17	1.3	3.8
High Density Residential	595	19.8	21.1			
Automotive, Motel, & Service Commercial	129	12.4	33.6			
Retail Commercial & Shop Centers	28	46.0	109.6			
Office	15	38.8	38.4			
Light Industrial	65	127.7	243.7			
Heavy Industrial & Outdoor Storage	99	30.8	143.7			
Parks & Open Space	N/A	N/A	86.0	N/A		253.8
Education	3	0.1	509.7			N/A
Public, Civic & Institutional	4	120.1	718.4			
Vacant Land		N/A	61.1	N/A		
Total	**7,364**	**846.6**	**3,011.1**	**161**	**25.4**	**325.3**

4.3.3 CLIMATE CHANGE IMPACT

Scientists are currently studying the impacts of climate change on seismic activity. While increased temperatures are not linked to an increased risk of earthquake occurrence, scientists are currently studying the seismic consequences of water and how climate change may factor into such phenomena as drought[25]. Furthermore, climate change may amplify the secondary effects of earthquakes, including increasing temperatures which could intensify fire risks, or contribute to drought which in turn dries out vegetation and affects available water supply, which

[25] *Source: https://climate.nasa.gov/news/2926/can-climate-affect-earthquakes-or-are-the-connections-shaky/, accessed November 4, 2021*

could further constrain firefighting efforts during fires caused by an earthquake. Droughts exacerbated by climate change can also lead to subsidence, that could intensify damage resulting from an earthquake.

5 Landslides

5.1 INTRODUCTION

Landslides are a serious geologic hazard in almost every state in America. Nationally, landslides cause 25 to 50 deaths each year.[26] The best estimate of direct and indirect costs of landslide damage in the United States range between $1 and $2 billion annually.[27] Some landslides result in private property damage, while other landslides impact transportation corridors, fuel and energy conduits, and communication facilities. They can also pose a serious threat to human life. California has had a significant number of locations impacted by landslides, attributable to a variety of conditions present in the state: seismic activity, heavy seasonal participation, rapid development, and varied topography. Landslides resulting from these types of conditions are discussed in this chapter, while earthquakes-induced landslides are addressed in **Chapter 4 Earthquakes.**

5.2 HAZARD PROFILE

HAZARD DESCRIPTION

A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Landslides are a type of “mass wasting" which denotes any downslope movement of soil and rock under the direct influence of gravity. Failure of a slope occurs when the force that is pulling the slope downward (gravity) exceeds the strength of the earth materials that compose the slope. They can move slowly, (Millimeters per year) or quickly and disastrously, as is the case with debris flows.

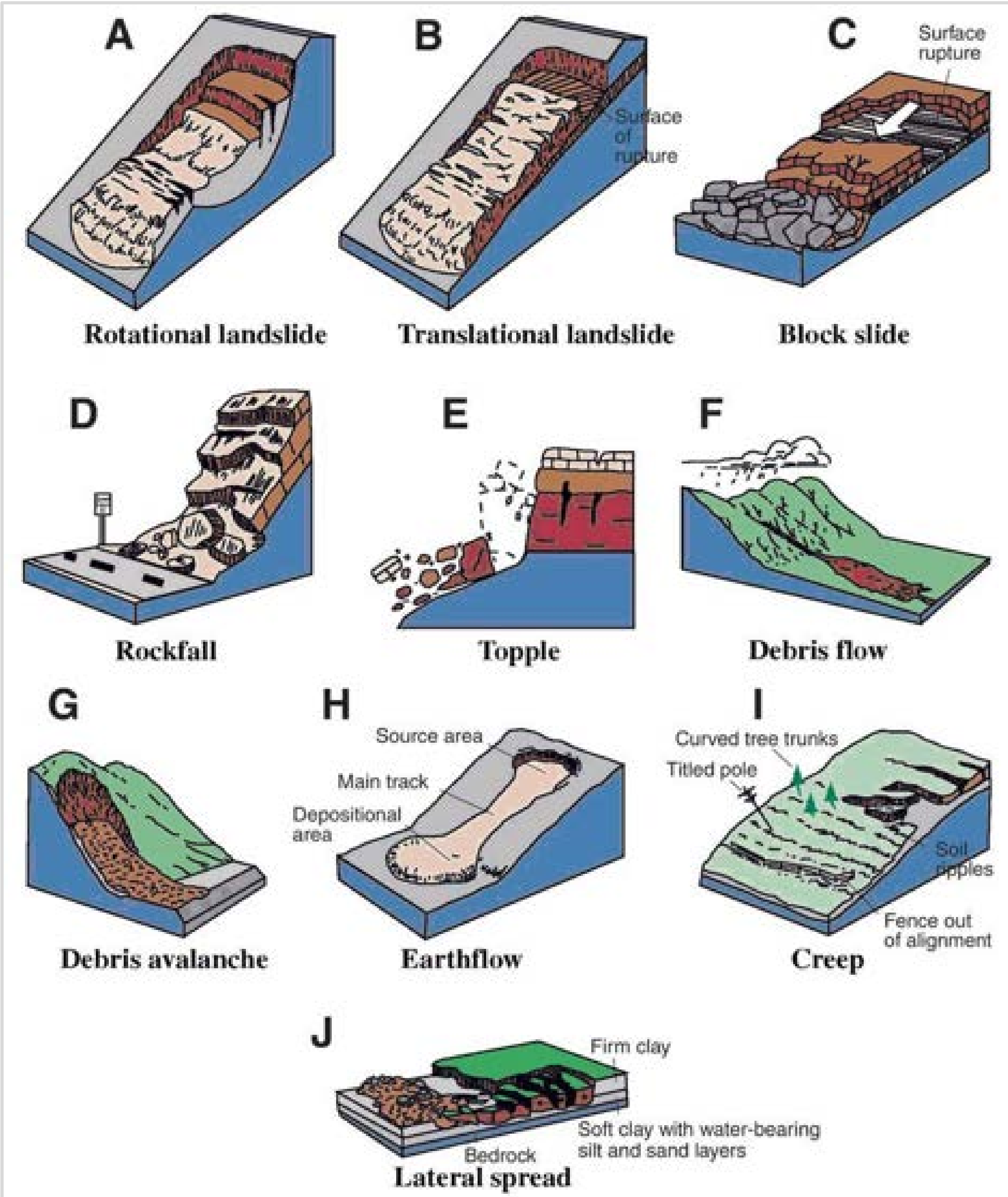
The term "landslide" encompasses events such as rock falls, topples, slides, spreads, and flows. Landslides can be initiated by rainfall, earthquakes, volcanic activity, changes in groundwater, disturbance and change of a slope by man-made construction activities, or any combination of these factors. Landslides can also occur underwater, causing tidal waves and damage to coastal areas. These landslides are called submarine landslides.[28]

[26] https://www.usgs.gov/faqs/how-many-deaths-result-landslides-each-year?qt-news_science_products=0#qt-news_science_products, *accessed November 2021*

[27] *Brabb, E.E., and B.L Harrod. (Eds) Landslides: Extent and Economic Significance. Proceedings of the 28th International Geological Congress Symposium on Landslides. (1989) Washington D.C., Rotterdam: Balkema.*

[28] *Landslide Hazards, U.S. Geological Survey Fact Sheet 0071-00, Version 1.0, U.S. Department of the Interior - U.S. Geological Survey,* http://pubs.usgs.gov/fs/fs-007 I-00/

Figure 5-1: Landslide Types



Source: https://www.nps.gov/articles/monitoring-slope-movements.htm, National Park Service webpage, accessed December 2021.

The size of a landslide usually depends on the geology and the initial cause of the landslide. Landslides vary greatly in their volume of rock and soil, the length, width, and depth of the area affected, frequency of occurrence, and speed of movement. Some characteristics that determine the type of landslide are slope of the hillside, moisture content, and the nature of the underlying materials. Landslides are given different names, depending on the type of failure and their composition and characteristics.

Landslides can be broken down into two categories: (I) rapidly moving-generally known as debris flows-and (2) slow moving. Rapidly moving debris flows present the greatest risk to human life, and people living in or traveling through areas prone to rapidly moving landslides are at increased risk of serious injury. Due to their sluggish rate of movement, slow moving landslides typically do not result in loss of life but can cause widespread property damage over time.

Debris Flows

A debris flow - also known as a mud flow - is a semi-fluid mass of rock, earth, vegetation, and other materials that is saturated with water. This high percentage of water gives the debris flow a very rapid rate of movement down a slope. Although debris flows can travel down a hillside of speeds up to 200 miles per hour, speeds more commonly range 30 -50 miles per hour. Travel rates depend on the slope angle, water content, and type of earth and debris in the flow.

This high rate of speed makes debris flows extremely dangerous to people and property in its path. Earthquakes often trigger debris flows, as discussed in **Chapter 4 Earthquakes**. These flows are also initiated by heavy, usually sustained, periods of rainfall, but sometimes can happen as a result of short bursts of concentrated rainfall in susceptible areas. Burned areas charred by wildfires are particularly susceptible to debris flows, given certain soil characteristics and slope conditions.[29]

Slow Moving Landslides

Landslides move in contact with the underlying surface. These movements include rotational slides where sliding material moves along a curved surface, and translational slides where movement occurs along a flat surface. These types of slides are generally slow moving and can be deep. Slumps are small rotational slides that are generally shallow. Slow-moving landslides can occur on relatively gentle slopes and can cause significant property damage over time but are far less likely to result in serious injuries than rapidly moving landslides.[30] The best-known example of a slow-moving landslide in Southern California is the Portuguese Bend translational landslide. This event was initially triggered in the 1950s due to road construction and continues

[29] *https://www.usgs.gov/faqs/what-should-i-know-about-wildfires-and-debris-flows?qt-news_science_products=0#qt-news_science_products, accessed November 2021*
[30] *https://www.usgs.gov/natural-hazards/landslide-hazards/science/slow-motion-landslides?qt-science_center_objects=0#qt-science_center_objects, accessed November 2021*

to move even today.[31] This landslide and other historic occurrences are discussed in more detail in the following section.

5.2.1 HISTORIC EVENTS

There are portions of the City of Pomona which are susceptible to landslides and should be mitigated accordingly. The City has a history of landslide events:

CITY OF POMONA

March 2003, Ganesha Park

In March 2003, a landslide occurred in Ganesha Park. The slide caused temporary closure of Paige Drive, which runs alongside the park's popular recreation center. The City commissioned a geotechnical study to investigate the event. It was determined that a buildup of water in the soil- due to irrigation and unexpectedly heavy rainfall- helped to trigger the landslide (in addition to landslides, Ganesha Park also harbors wildfire hazards, and regular irrigation is used to reduce fire threat in the area). Although there was not any significant damage caused by the event, it underscores the vulnerability of local slopes to this type of natural hazard.

February 2005, Phillips Ranch

In February of 2005, a landslide occurred in Phillips Ranch in the area of Meadow View Drive following unprecedented heavy rains. The landslide resulted in six homes being damaged or destroyed and approximately $6 million in damages.

February 2010, 57 & 10 Freeways

In 2010, a landslide occurred near the intersection of the 57 and 10 Freeways, at the transition road from the westbound San Bernardino (10) Freeway to the northbound Orange (57) Freeway in Pomona.[32]

[31] *https://www.rpvca.gov/719/Landslide-Management-Program, accessed November 2021*
[32] *https://www.dailynews.com/2010/02/19/geologists-to-study-pomona-landslide/, accessed November 2021*

Figure 5-2: Pomona Landslide 2010

SOUTHERN CALIFORNIA

In addition to local events, the following examples of historic events in the Southern California region provide baseline information to help understand the types of vulnerabilities and potential damage associated with landslides.[33]

1928, St. Francis Dam Failure Los Angeles County

Built atop the site of an ancient landslide, the dam gave way on March 12, 1928. Its waters swept through the Santa Clara Valley toward the Pacific Ocean, about 54 miles away. Sixty-five miles of the valley were devastated, and over 500 people were killed. Damages were estimated at $672.1 million (year 2000 dollars).

1956, Portuguese Bend Palos Verdes Peninsula

Land use on the Palos Verdes The Portuguese Bend landslide began its modern movement in August 1956, when displacement was noticed at its northeast margin. Movement gradually

[33] *Highland. L.M. and Schuster. R.L. Significant Landslide Events United States. USGS. Washington D.C.,* http://landslides.usgs.gov. html_files/pubs/report I /Landslides _pa.

extended downslope so that the entire eastern edge of the slide mass was moving within 6 weeks. By the summer of 1957, the entire slide mass was sliding towards the sea. This slow-moving landslide continues its movement in the area and is, even today, continuing to threaten the residential community that exists there. The estimated cost thus far is $14.6 million (2000 dollars).

1969, Glendora Los Angeles County

175 houses damaged, mainly by debris flows. Estimated cost: $26.9 million (2000 dollars).

1969, Seventh Ave., Los Angeles County

Damage to California Highway 60. Estimated cost: $14.6 million (2000 dollars).

1970, Princess Park California Highway 14

10 miles north of Newhall, near Saugus, northern Los Angeles County. Estimated cost: $29.1 million (2000 dollars).

1977-1980, Monterey Park. Repetto Hills, Los Angeles County

100 houses damaged in 1980 due to debris flows. Estimated cost: $14.6 million (2000 dollars).

1978, Bluebird Canyon, Orange County

60 houses destroyed or damaged. Unusually heavy rains in March of 1978 may have contributed to initiation of the landslide. Although the 1978 slide area was approximately 3.5 acres, it is suspected to be a portion of a larger, ancient landslide. Estimated cost: $52.7 million (2000 dollars).

1979, Big Rock, California, Los Angeles County

California Highway 1 rockslide. Estimated cost: approximately $1.08 billion (2000 dollars).

1980, Southern California

Estimated cost: $1.1 billion in damage (2000 dollars). Heavy winter rainfall in 1979-80 caused damage in six Southern California counties. In 1980, the rainstorm started on February 8. A sequence of 5 days of continuous rain and 7 inches of precipitation had occurred by February 14. Slope failures were beginning to develop by February 15 and then very high intensity rainfall occurred on February 16. As much as 8 inches of rain fell in a 6-hour period in many locations. Records and personal observations in the field on February 16 and 17 showed that the mountains and slopes literally fell apart on those 2 days. Estimated cost: $1.1 billion in damage (2000 dollars).

1983, San Clemente, California, Orange County. California Highway 1

Litigation at that time involved approximately $43.7 million (2000 dollars). Estimated cost: $65 million (2000 dollars).

1978-1980, San Diego County

Experienced major damage from storms in 1978, 1979, and 1979-80, as did neighboring areas of Los Angeles and Orange County, California. One hundred and twenty landslides were reported to have occurred in San Diego County during these 2 years. Rainfall for the rainy seasons of 78-79 and 79-80 was 14.82 and 15.61 inches (37.6 and 39.6 cm) respectively, compared to a 125-year average (1850-1975) of 9.71 inches (24.7 cm). Significant landslides occurred in the Friars Formation; a unit that was noted as slide-prone in the Seismic Safety Study for the City of San Diego. Of the nine landslides that caused damage in excess of $ I million, seven occurred in the Friars Formation, and two in the Santiago Formation in the northern part of San Diego County.

1995, Los Angeles and Ventura Counties

Above normal rainfall triggered damaging debris flows, deep-seated landslides, and flooding. Several deep-seated landslides were triggered by the storms, the most notable was the La Conchita landslide, which in combination with a local debris flow, destroyed or badly damaged 11 to 12 homes in the small town of La Conchita, about 20 km west of Ventura. There also was widespread debris flow and flood damage to homes, commercial buildings, and roads and highways in areas along the Malibu coast that had been devastated by wildfire two years before.

2005, Los Angeles and Ventura Counties

A subsequent landslide to the March 1995 landslide in La Conchita, this disaster resulted in 10 fatalities and the destruction of 13 homes and damage of 23 additional homes. The 2005 landslide occurred at the end of a 15-day period that produced record and near-record amounts of rainfall in many areas of southern California.[34]

2018, Montecito, Santa Barbara County

The most recent large devastating landslide event in California occurred in Montecito in Santa Barbara County on January 29, 2018. Twenty-three people were killed, at least 167 injured, and more than 400 homes were damaged by a series of debris flows. The debris flows were triggered by heavy rain that fell on steep hillsides that had been burned by the Thomas Wildfire, which at that time was the largest wildfire in California history.[35]

5.2.2 HAZARD LOCATION AND EXTENT

Most of Pomona is located on a flat alluvial plain, and therefore not subject to landslide hazards. However, hillsides in the western portion of the City are considered susceptible to landslides and

[34] *https://pubs.usgs.gov/of/2005/1067/508of05-1067.html#conchita05, accessed November 2021*
[35] *https://www.usgs.gov/faqs/how-many-deaths-result-landslides-each-year?qt-news_science_products=0#qt-news_science_products, accessed November 2021*

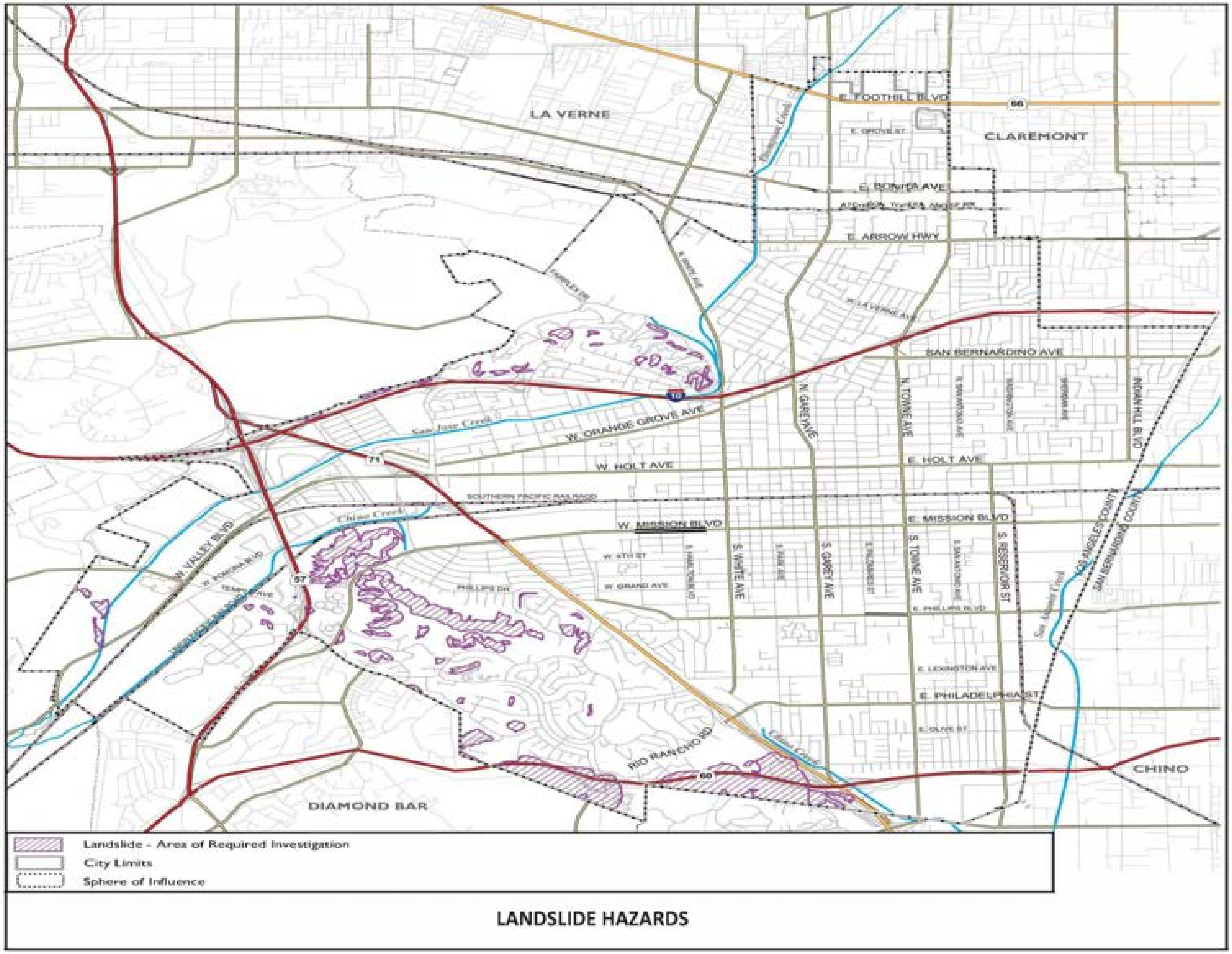
could sustain loss of life and property from this natural hazard. Initial mapping efforts have been conducted by the USGS to determine those areas in the City that have conditions conducive to landslides. **Map 5-1** displays relative susceptibility to landslides, as well as locations where landslides may be triggered by earthquake (this latter information is also mapped in **Map 4-1 Seismic Hazards**). This figure also includes the hillside area addressed in the City's Zoning Ordinance, which is further discussed in **Section 11.2.2 Existing Landslide Mitigation Activities**.

The landslide maps produced by the USGS are an invaluable asset to the City in identifying hazards and preparing mitigation measures. However, these maps were not prepared specifically for Pomona and may not provide the level of detail needed to identify all potentially hazardous areas. Additionally, changing local conditions associated with development may increase the potential for landslides to occur, and this dynamic nature of the hazard is not reflected in these published maps.

An awareness of the conditions that give rise to landslides will assist City officials in making prudent decisions about mitigation measures and regulating future development in areas at-risk to landslides. In general, locations at risk from landslides or debris flows include areas with one or more of the following conditions:

- On or close to steep hills;
- Steep road-cuts or excavations;
- Existing landslides or places of known historic landslides (such sites often have tilted powerlines, trees tilted in various directions, cracks in the ground, and irregular-surfaced ground);
- Steep areas where surface runoff is channeled, such as below culverts, V -shaped valleys, canyon bottoms, and steep stream channels;
- Fan-shaped areas of sediment and boulder accumulation at the outlets of canyons; or
- Canyon areas below hillside and mountains that have recently (within one to six years) been subjected to a wildland fire.

Map 5-1: Landslide Hazards



IMPACTS OF DEVELOPMENT

Although landslides are a natural occurrence, human impacts can substantially affect the potential for landslide failures. The increasing scarcity of developable land, particularly in urban areas, increases the tendency to build on geologically marginal land. Additionally, hillside housing developments in Southern California are prized for the views that they provide. Given the demand for such amenities, and the hazards that are present when building in areas of potential landslides, it is essential to exercise proper planning and geotechnical engineering to reduce the threat of safety of people, property, and infrastructure.

Excavation and Grading

Slope excavation is common in the development of home sites or roads on sloping terrain. Grading these slopes can result in some slopes that are steeper than the pre-existing natural slopes. Since slope steepness is a major factor in landslides, these steeper slopes can be at an increased risk for landslides. The added weight of fill placed on slopes can also result in an increased landslide hazard. Small landslides can be fairly common along roads, in either the road cut or the road fill. Landslides occurring below new construction sites are indicators of the potential impacts stemming from excavation.

Drainage and Groundwater Alterations

Water flowing through or above ground is often the trigger for landslides. Any activity that increases the amount of water flowing into landslide-prone slopes can increase landslide hazards. Broken or leaking water or sewer lines can be especially problematic, as can water retention facilities that direct water onto slopes. However, even excessive lawn irrigation in landslide prone locations can result in damaging landslides.

Ineffective storm water management and excess runoff can also cause erosion and increase the risk of landslide hazards. Development that results in an increase in impervious surface impairs the ability of the land to absorb water and may redirect water to other areas. Channels, streams, ponding, and erosion on slopes all indicate potential slope problems. Road and driveway drains, gutters, downspouts, and other constructed drainage facilities can concentrate and accelerate flow. Ground saturation and concentrated velocity flow are major causes of slope problems and may trigger landslides.[36]

Changes in Vegetation

Removing vegetation from very steep slopes can increase landslide hazards. Areas that experience wildfire and land clearing for development may have long periods of increased landslide hazard. Also, certain types of ground cover have a much greater need for constant watering to remain green. Changing away from native ground cover plants may increase the risk

[36] *Homeowners Guide for Landslide Control. Hillside Flooding. Debris Flows, Soil Erosion. (March 1997).*

of landslide.

Conclusion

The geographic extent of landslide hazards in Pomona is relatively small, comprising only a small percentage of the total area of the City. Additionally, the communities present in this area have some of the lower housing densities in the City; the number of people that would be directly impacted by a landslide is estimated to be very low. However, due to the potential for loss of life and property damage that can be caused by landslides, the extent of this hazard could have far-reaching community effects.

5.2.3 PROBABILITY OF FUTURE OCCURRENCE

The probability of a landslide event is fairly low. The City of Pomona has experienced three notable landslide events in the past twenty years; however, hillside areas where landslides could occur account for a small geographic area of the city. Additionally, revisions to the hillside ordinance in 2010 year put additional constraints on new development to decrease the risk of landslides to people and property.

5.3 VULNERABLILITY ASSESSMENT

OVERVIEW

Hillsides where landslides could occur comprise a small portion of the City, but the presence of lifeline routes and many residences in these areas augment the risk of significant damage to the City and its inhabitants. Development in these hillsides increases the risks in locations that are naturally prone to landslides, and where ancient landslides have occurred in the past.

5.3.1 IDENTIFYING VULNERABILITIES

Landslides can affect structures, utility services, transportation lifelines, and critical facilities. Communities may suffer immediate damages and loss of service. Disruption of infrastructure, roads, and critical facilities may also have a long-term effect on the economy. Utilities, including potable water, wastewater, telecommunications, natural gas, and electric power are all essential to service community needs. Loss of electricity has the most widespread impact on other utilities and on the whole community. Natural gas pipes may also be at risk of breakage from landslide movements as small as an inch or two.

LIFELINES AND CRITICAL FACILITIES

No critical facilities are located within areas susceptible to landslides. However, disruption of a major transportation lifeline could impair access to facilities in the City. To the greatest extent possible, lifelines and critical facilities should remain accessible during a natural hazard event. The impact of closed transportation arteries may be increased if the closed road or bridge is critical for hospitals and other emergency facilities. Therefore, inspection and repair of critical transportation facilities and routes is essential and should receive high priority. Primary transportation routes in Pomona that pass near hillsides at-risk to landslides are SR-57 and SR-60. Although debris that damaged or obstructed these routes would certainly have negative impacts on the flow of traffic, it would not be extremely adverse, as these routes do not pass through the center of the City and there are alternative corridors available should these become compromised. In addition, portions of the Union Pacific Railroad pass by areas that are susceptible to landslides. Debris on the tracks would delay both passenger and freight cargo, and potentially cause serious damage to the tracks.

RECREATION AND COMMUNITY CENTERS

As mentioned in **Chapter 4 Earthquakes**, the popular Ganesha Park is located near slopes susceptible landslides. In response to the landslide event of March 2003 in Ganesha Park (discussed above in the Historic Events portion of **Section 5.2 Hazard Profile**), the City evaluated the risk posed by slope movement, specifically to the park's swimming pool and community center. The City's geotechnical study asserted that in the event of a reoccurrence of slope failure at the site, the slide would be unlikely to reach the community center. The report concluded that this landslide area does not pose significant potential for loss of life or damage to the community center. In order to mitigate future occurrences from slope failure at the site, the City is in the process of requesting bids to implement recommendations contained in the geotechnical report.

VULNERABLE DEVELOPMENT PATTERNS

Fortunately, the majority of landslide-prone locations that have been mapped occur in areas of designated open space. However, nearby residential communities are at-risk to this hazard in portions of Phillips Ranch and of Ganesha Hills. These communities are largely developed, and any new development in these areas should be carefully evaluated to help avoid activities that increase landslide vulnerability.

5.3.2 ESTIMATING POTENTIAL LOSSES

Factors included in assessing landslide vulnerability include population and property distribution in the hazard area, the frequency of landslide or debris flow occurrences, slope steepness, soil characteristics, and precipitation intensity. This type of analysis could generate dollar estimates of the damages to the city due to a specific landslide or debris flow event. At the time of publication of this plan, data was insufficient to conduct a risk analysis and the software needed to conduct this type of analysis was not available.

5.3.3 CLIMATE CHANGE IMPACT

Climate change is a contributing factor for increased droughts, extreme storms, floods, and wildfire, all of which contribute to and can increase the rate and severity of landslides.[37]

[37] *https://climate.nasa.gov/effects/, accessed November 2021*

6 Wildfire

6.1 INTRODUCTION

For thousands of years, fires have been a natural part of the ecosystem in Southern California. However, wildfires present a substantial hazard to life and property in communities built within or adjacent to hillsides and mountainous areas. This risk is present wherever open space areas connect or 'interface' with urban and suburban areas. In California, the hot dry climate and large, mountainous wildland/urban interface area create a tremendous potential for losses due to wildfire.

In the last two decades, Californians have been sharply reminded of the devastating capabilities of wildfire. During this time, records have been broken and broken again in connection with total acres burned and lives and property lost.

6.2 HAZARD PROFILE

HAZARD DESCRIPTION

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly damaging or consuming structures. Wildfires often begin unnoticed and spread quickly, particularly in dry areas, and are usually signaled by dense smoke that fills the area for miles around. These fires are classified into two broad categories.

- A wildland fire is a wildfire in undeveloped areas, which excludes the urbanized regions.
- An urban-wildland interface fire is a wildfire in an area where the vegetative fuel meets or intermingles with wildlands or vegetative fuel.

Although Pomona is not adjacent to a large wildland area, Pomona contains some open space lands in the east. Although the amount of open space is small compared to developed lands in Pomona, the potential for wildland/urban interface fires poses a considerable hazard.

WILDFIRE CHARACTERISTICS

There are three categories of interface fire:[38]

- The classic wildland/urban interface exists where well defined urban and suburban development presses up against open expanses of wildland areas;

[38] *Planning for Natural Hazards: The Oregon Technical Resource Guide. (July 2000) Department of Land Conservation and Development.*

- The mixed wildland/urban interface is characterized by isolated homes, subdivisions and small communities situated predominantly in wildland settings; and
- The occluded wildland/urban interface exists where islands of wildland vegetation occur inside a largely urbanized area, as in the case of Pomona.

Certain conditions must be present for significant interface fires to occur. The most common conditions include hot, dry, and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and a large fuel load (dense vegetation). Once a fire has started. several conditions influence its behavior, including fuel topography, weather, drought, and development.

Fuel

Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is classified by volume and by type. Volume is described in terms of "fuel loading', or the amount of available vegetative fuel.

The type of fuel also influences wildfire. Chaparral is a primary fuel of Southern California wildfires. Chaparral habitat ranges in elevation from near sea level to over 5,000 feet in Southern California. Chaparral communities experience long dry summers and receive most of their annual precipitation from winter rains. Although chaparral is often considered as a single species, there are two distinct types: hard chaparral and soft chaparral. Within these two types are dozens of different plants, each with its own particular characteristics.

An important element in understanding the danger of wildfire is the availability of diverse fuels in the landscape, such as natural vegetation, manmade structures, and combustible materials. A house surrounded by brushy growth rather than cleared space allows for greater continuity of fuel and increases the fire's ability to spread. After decades of fire suppression “dog-hair" thickets have accumulated, which enable high intensity fires to flare and spread rapidly.

Topography

Topography influences the movement of air, thereby directing a fire course. For example, if the percentage of uphill slope doubles, the rate of spread in wildfire will likely double. Gulches and canyons can funnel air and act as chimneys, which intensify fire behavior and cause the fire to spread faster. Solar heating of dry, south-facing slopes produces up slope drafts that can complicate fire behavior. Unfortunately, hillsides with hazardous topographic characteristics are also desirable residential areas in many communities. This underscores the need for wildfire hazard mitigation and increased education and outreach to homeowners living in interface areas.

Weather

Weather patterns combined with certain geographic locations can create a favorable climate for wildfire activity. Areas where annual precipitation is less than 30 inches per year are extremely fire susceptible.[39] High risk areas in Southern California share a hot, dry season in late summer and early fall when high temperatures and low humidity favor fire activity. The “Santa Ana" winds, which are heated by compression as they flow down to Southern California from Utah, create a particularly high risk, as they can rapidly spread what might otherwise be a small fire.

Drought

Recent concerns about the effects of climate change - particularly drought - are contributing to concerns about wildfire vulnerability. The term drought is applied to a period in which an unusual scarcity of rain causes a serious hydrological imbalance. Unusually dry winters, or significantly less rainfall than normal, can lead to relatively drier conditions and leave reservoirs and water tables lower. Drought leads to problems with irrigation and may contribute to additional fires, or additional difficulties in fighting fires.

Development

Wildfire has an effect on development, yet development can also influence wildfire. Owners often prefer homes that are private, have scenic views are nestled in vegetation and use natural materials. A private setting may be far from public roads, or hidden behind a narrow, curving driveway. These conditions, however, make evacuation and firefighting difficult. The scenic views found along mountain ridges can also mean areas of dangerous topography. Natural vegetation contributes to scenic beauty, but it may also provide a ready trail of fuel leading a fire directly to the combustible fuels of the home itself.

6.2.1 HISTORIC EVENTS

Large fires have been part of the Southern California landscape for millennia. Written documents reveal that during the 19th Century human settlement of southern California altered the fire regime of coastal California by increasing the fire frequency. This was an era of very limited fire suppression, and yet like today, large crown fires covering tens of thousands of acres were not uncommon. One of the largest fires in Los Angeles County (60,000 acres) occurred in 1878, and the largest fire in Orange County's history, in 1889, was over half a million acres.[40]

2003 SOUTHERN CALIFORNIA FIRES

The fall of 2003 marked the most destructive wildfire season to that date in California history. In a ten-day period, 12 separate fires raged across Southern California in Los Angeles, Riverside, San Bernardino, San Diego, and Ventura counties. The massive “Cedar Fire” in San Diego County consumed 2,800 homes and burned over a quarter of a million acres. Although the 2003 fires did not reach Pomona, they did burn areas of the adjacent city of Claremont, and Santa Ana winds blew heavy smoke into Pomona.

[39] *Ibid.*
[40] *http://www.usgs.gov/public/press/public_affairs/press_releases/pr1805m.html, accessed November 2021.*

2007 SOUTHERN CALIFORNIA FIRES

In late October 2007, Southern California experienced an unusually severe fire weather event characterized by intense, dry, gusty Santa Ana winds. This weather event drove a series of destructive wildfires that took a devastating toll on people, property, natural resources, and infrastructure. Although some fires burned into early November, the heaviest damage occurred during the first three days of the siege when the winds were the strongest. During this siege, 17 people lost their lives, ten were killed by the fires outright, three were killed while evacuating, four died from other fire siege related causes, and 140 firefighters and an unknown number of civilians were injured. A total of 3,069 homes and other buildings were destroyed, and hundreds more were damaged. Hundreds of thousands of people were evacuated at the height of the siege.

The fires burned over half a million acres, including populated areas, wildlife habitats and watersheds. Portions of the electrical power distribution network, telecommunications systems, and even some community water sources were destroyed. Transportation was disrupted over a large area for several days, including numerous road closures. Both the Governor of California and the President of the United States personally toured the ongoing fires. Governor Schwarzenegger proclaimed a state of emergency in seven counties before the end of the first day. President Bush quickly declared a major disaster. While the total impact of the 2007 fire siege was less than the disastrous fires of 2003, it was unquestionably one of the most devastating wildfire events in the history of California.[41]

2017-2020 SOUTHERN CALIFORNIA FIRES

In terms of property damage, 2017 was the most destructive wildfire season on record in California at the time. Throughout 2017, the fires destroyed or damaged more than 10,000 structures in the state (destroyed 9,470, damaged 810), a higher tally than the previous nine years combined. In total 9,133 fires burned 1,248,606 acres. In December 2017, strong Santa Ana winds triggered a new round of wildfires, including the massive Thomas Fire in Ventura County. At the time, the Thomas Fire was California's largest modern wildfire, which has since been surpassed by the Mendocino Complex's Ranch Fire in 2018. The December 2017 fires forced over 230,000 people to evacuate. 2017 will be remembered as a year of extremes. It was the third-warmest year on record for the United States, and it was the second hottest in California, bringing to the surface the question of long-term climate change and its contribution to the 2017 California fires. The hotter temperatures dry out vegetation, making them easier to burn, predisposing vulnerable regions like California to more wildfires in the coming decades as temperatures continue to rise and rainfall continues to decline.[42]

The 2018 wildfire season was the deadliest and most destructive wildfire season on record in California, with a total of over 7,500 fires burning an area of over 1,670,000 acres. In mid-July to August 2018, a series of large wildfires erupted across California, mostly in the northern part of the state. In November 2018, another round of large, destructive fires launched including the Woolsey Fire in Los Angeles and Ventura counties and the Camp Fire in Butte County, which killed at least 85 people.[43]

While 2019 was a relatively mild fire season, it should be noted that Pacific Gas & Electric, Southern

[41] *http://www.fire.ca.gov/fire_protection/downloads/siege/2007/Overview_Introduction.pdf), accessed November 2021*
[42] *https://www.fire.ca.gov/incidents/2017/, accessed November 2021*
[43] *https://www.fire.ca.gov/incidents/2018/, accessed November 2021*

California Edison, and San Diego Gas & electric preemptively shut off power to 800,000 electrical customers to reduce the risk of wildfires by preventing electrical arcing in high winds from their above-ground power lines.[44]

The 2020 California wildfire season was characterized by a record-setting year of wildfires that burned across the state. As of the end of the year, nearly 10,000 fires had burned over 4.2 million acres, more than 4% of the state's roughly 100 million acres of land, making 2020 the largest wildfire season recorded in California's modern history.[45]

6.2.2 HAZARD LOCATION AND EXTENT

Wildfire hazard areas are commonly identified in regions of the wildland/urban interface. In Pomona, this interface is present in the western and southwestern hills. The California Department of Forestry and Fire Protection (CDF) maps levels of fire threat base on groundcover and topography. The increased threat of fires in the hilly areas of Pomona is illustrated in **Map 6-1,** with portions of the Phillips Ranch and Ganesha Hills areas obtaining a "High" and "Very High" level of fire threat. The rest of the City is considered to have a "Moderate" threat of fire as mapped by this system.[46] While groundcover and topography are the primary indices of fire vulnerability, there are other factors that can greatly influence the severity of a fire. Dry weather conditions, the natures of the fuel sources, the presence or absence of drought conditions, and the types of development present all have impacts on fire hazards. In Pomona, the critical times of the year when wildland fires could occur are the late summer and fall months, as the Santa Ana winds deliver hot, dry desert air into the region.

6.2.3 PROBABILITY OF FUTURE EVENTS

Although the probability of future wildfires in the region is high, the fire risk areas of Pomona are largely isolated from the fire prone mountainous areas in the region. Therefore, the probability of large wildfires in the San Gabriel Mountains or other large open space areas in the region spreading to Pomona is not considered a high probability event. However, the City does have large areas of fire risk, particularly in the southwestern corner of the City (in Phillips Ranch, and Cal Poly Pomona areas) and in the Ganesha Hills area. Provided with the right combination of factors (dry vegetation, Santa Ana winds), even a small fire could quickly spread and threaten nearby development.

6.3 VULNERABILITY ASSESSMENT

OVERVIEW

[44] *https://www.fire.ca.gov/incidents/2019/, accessed November 2021*
[45] *https://www.fire.ca.gov/incidents/2020,/, accessed November 2021*
[46] *California Department of Forestry and Fire Protection. website: http://frap.cdf.ca.gov/data/frapgismaps/select.asp, accessed June 6. 2004*

As a highly urbanized area, the risk of wildfire is limited to localized areas (see **Map 6-1**). The probability is very low however, in those areas where the risk from wildfire is considered high, there are a number of vulnerabilities that should be considered in the mitigation planning process. As building recovery continues the area of open space is rapidly diminishing. Very few open areas remain and those are on hillsides with strict building codes to mitigate fire risks.

6.3.1 IDENTIFYING VULNERABILITIES

There are two critical facilities located within a High Threat Zone, and several vulnerable public and private schools. Parts of Cal Poly Pomona are also vulnerable to wildfire. Factors that decrease a structures resistance to fire include combustible roofing material, wood construction, structures with no defensible space, and inadequate access for fire and other emergency vehicles. The highest rated risks from wildfire in Pomona are the residential communities near the wildland/urban interface. Not only are communities in Phillips Ranch and Ganesha Hills subject to fire risk due to prevalence of open spaces combined with steep slopes, but neighborhoods on the outskirts of fire hazard areas can be impacted by fire. This risk increases during Santa Ana wind conditions, with potential for property damage, injury, and fatalities. There are also a small number of facilities and assets that are considered to be at medium risk from wildfires in Pomona. These include the following:

- *Diamond Ranch High School*. The school is located in an area identified with a potential for wildfire. However, the modern building standards used in construction (including noncombustible materials) reduce the potential for damage to the facility.
- *Cal Poly Pomona*. The open spaces around Cal Poly Pomona create the potential for high fire hazard.

6.3.2 ESTIMATING POTENTIAL LOSSES

The primary vulnerability in Pomona to wildfire is development within High or Very High Fire Threat Zones. However, it should be considered that the actual risk to these structures is dependent on a number of factors, most notably construction type, building standards, how a fire spreads, and the response from local fire crews.

6.3.3 CLIMATE CHANGE IMPACT

Climate change is increasing the frequency and severity of wildfires in California. Since 1950, the area burned by California wildfires each year has been increasing, as spring and summer temperatures have warmed, and spring snowmelt has occurred earlier. During the recent "hotter" drought, unusually warm temperatures intensified the effects of very low precipitation and snowpack, creating conditions for extreme, high severity wildfires that spread rapidly. Of the

20 largest fires in California's history, eight have occurred since 2017.[47] The 2020 August Complex Fire is now the largest recorded wildfire in California, more than doubling the 2018 Mendocino Complex Fire's size to become California's largest recorded wildfire.[48]

[47] *https://science2017.globalchange.gov/chapter/8/, accessed November 2021*

[48] *Note: As of the preparation of this report, the Dixie Fire in Northern California has surpassed the August Complex Fire to become the largest in the state's history. As of August 25, 2021, CalFIRE reported more than 735,000 acres burned across five counties. Source: https://www.fire.ca.gov/incidents/2021/7/14/dixie-fire/*

Figure 6-1: Top 20 Largest California Wildfires

FIRE NAME (CAUSE)	DATE	COUNTY	ACRES	STRUCTURES	DEATHS
1 AUGUST COMPLEX *(Lightning)*	August 2020	Mendocino, Humboldt, Trinity, Tehama, Glenn, Lake, & Colusa	1,032,648	935	1
2 DIXIE *(Under Investigation)*	July 2021	Butte, Plumas, Lassen, Shasta & Tehama	963,309	1,329	1
3 MENDOCINO COMPLEX *(Human Related)*	July 2018	Colusa, Lake, Mendocino & Glenn	459,123	280	1
4 SCU LIGHTNING COMPLEX *(Lightning)*	August 2020	Stanislaus, Santa Clara, Alameda, Contra Costa, & San Joaquin	396,624	222	0
5 CREEK *(Undetermined)*	September 2020	Fresno & Madera	379,895	853	0
6 LNU LIGHTNING COMPLEX *(Lightning/Arson)*	August 2020	Napa, Solano, Sonoma, Yolo, Lake, & Colusa	363,220	1,491	6
7 NORTH COMPLEX *(Lightning)*	August 2020	Butte, Plumas & Yuba	318,935	2,352	15
8 THOMAS *(Powerlines)*	December 2017	Ventura & Santa Barbara	281,893	1,063	2
9 CEDAR *(Human Related)*	October 2003	San Diego	273,246	2,820	15
10 RUSH *(Lightning)*	August 2012	Lassen	271,911 CA / 43,666 NV	0	0
11 RIM *(Human Related)*	August 2013	Tuolumne	257,314	112	0
12 ZACA *(Human Related)*	July 2007	Santa Barbara	240,207	1	0
13 CARR *(Human Related)*	July 2018	Shasta County & Trinity	229,651	1,614	8
14 MONUMENT *(Lightning)**	July 2021	Trinity	223,124	50	0
15 CALDOR *(Under Investigation)*	August 2021	Alpine, Amador, & El Dorado	221,835	1,003	1
16 MATILIJA *(Undetermined)*	September 1932	Ventura	220,000	0	0
17 RIVER COMPLEX *(Lightning)**	July 2021	Siskiyou & Trinity	199,343	122	0
18 WITCH *(Powerlines)*	October 2007	San Diego	197,990	1,650	2
19 KLAMATH THEATER COMPLEX *(Lightning)*	June 2008	Siskiyou	192,038	0	2
20 MARBLE CONE *(Lightning)*	July 1977	Monterey	177,866	0	0

There is no doubt that there were fires with significant acreage burned in years prior to 1932, but those records are less reliable, and this list is meant to give an overview of the large fires in more recent times.
This list does not include fire jurisdiction. These are the Top 20 regardless of whether they were state, federal, or local responsibility.
*Numbers not final.

10/25/2021

Figure 6-2: Top 20 Deadliest California Wildfires

	FIRE NAME *(CAUSE)*	DATE	COUNTY	ACRES	*STRUCTURES*	DEATHS
1	CAMP FIRE *(Powerlines)*	November 2018	Butte	153,336	18,804	85
2	GRIFFITH PARK *(Unknown)*	October 1933	Los Angeles	47	0	29
3	TUNNEL - Oakland Hills *(Rekindle)*	October 1991	Alameda	1,600	2,900	25
4	TUBBS *(Electrical)*	October 2017	Napa & Sonoma	36,807	5,643	22
5	NORTH COMPLEX *(Lightning)*	August 2020	Butte, Plumas, & Yuba	318,935	2,352	15
6	CEDAR *(Human Related)*	October 2003	San Diego	273,246	2,820	15
7	RATTLESNAKE *(Arson)*	July 1953	Glenn	1,340	0	15
8	LOOP *(Unknown)*	November 1966	Los Angeles	2,028	0	12
9	HAUSER CREEK *(Human Related)*	October 1943	San Diego	13,145	0	11
10	INAJA *(Human Related)*	November 1956	San Diego	43,904	0	11
11	IRON ALPS COMPLEX *(Lightning)*	August 2008	Trinity	105,855	10	10
12	REDWOOD VALLEY *(Power Lines)*	October 2017	Mendocino	36,523	544	9
13	HARRIS *(Undetermined)*	October 2007	San Diego	90,440	548	8
14	CANYON *(Unknown)*	August 1968	Los Angeles	22,197	0	8
15	CARR *(Human Related)*	July 2018	Shasta County, Trinity	229,651	1,614	8
16	LNU Lightning Complex *(Lightning/Arson)*	August 2020	Napa/Sonoma/Yolo/Stanislaus/ Lake	363,220	1,491	6
17	ATLAS *(Powerline)*	October 2017	Napa & Solano	51,624	781	6
18	OLD *(Human Related)*	October 2003	San Bernardino	91,281	1,003	6
19	DECKER *(Vehicle)*	August 1959	Riverside	1,425	1	6
20	HACIENDA *(Unknown)*	September 1955	Los Angeles	1,150	0	6

** Fires with the same death count are listed my most recent. Several fires have had 4 fatalties, but only the most recent are listed.
***This list does not include fire jurisdiction. These are the Top 20 regardless of whether they were state, federal, or local responsibility.
* Numbers not final

10/22/2021

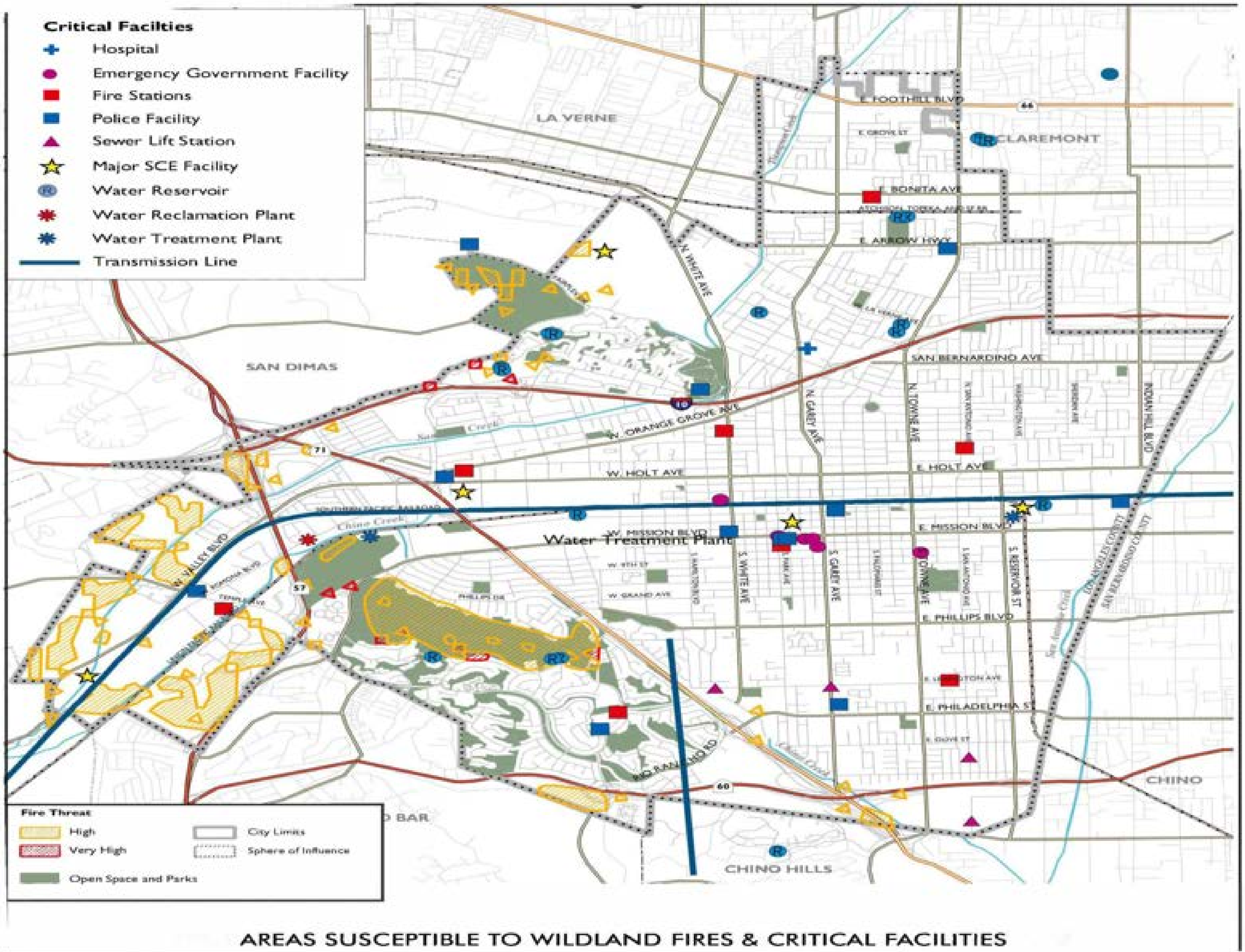
Figure 6-3: Top 20 Most Destructive California Wildfires

FIRE NAME (*CAUSE*)	DATE	COUNTY	ACRES	*STRUCTURES*	DEATHS
1 **CAMP** (*Powerlines*)	November 2018	Butte	153,336	**18,804**	85
2 **TUBBS** (*Electrical*)	October 2017	Napa & Sonoma	36,807	**5,636**	22
3 **TUNNEL - Oakland Hills** (*Rekindle*)	October 1991	Alameda	1,600	**2,900**	25
4 **CEDAR** (*Human Related*)	October 2003	San Diego	273,246	**2,820**	15
5 **NORTH COMPLEX** (*Lightning*)	August, 2020	Butte, Plumas, & Yuba	318,935	**2,352**	15
6 **VALLEY** (*Electrical*)	September 2015	Lake, Napa & Sonoma	76,067	**1,955**	4
7 **WITCH** (*Powerlines*)	October 2007	San Diego	197,990	**1,650**	2
8 **WOOLSEY** (*Electrical*)	November 2018	Ventura	96,949	**1,643**	3
9 **CARR** (*Human Related*)	July 2018	Shasta County, Trinity	229,651	**1,614**	8
10 **GLASS** (*Undetermined*)	September 2020	Napa & Sonoma	67,484	**1,520**	0
11 **LNU LIGHTNING COMPLEX** (*Lightning/Arson*)	August 2020	Napa, Solano, Sonoma, Yolo, Lake, & Colusa	363,220	**1,491**	6
12 **CZU LIGHTNING COMPLEX** (*Lightning*)	August 2020	Santa Cruz, San Mateo	86,509	**1,490**	1
13 **NUNS** (*Powerline*)	October 2017	Sonoma	54,382	**1,355**	3
14 **DIXIE** (*Under Investigation*)*	July 2021	Butte, Plumas, Lassen, & Tehama	963,309	**1,329**	1
15 **THOMAS** (*Powerline*)	December 2017	Ventura & Santa Barbara	281,893	**1,063**	2
16 **CALDOR**(*Under Investigation*)	September 2021	Alpine, Amador, & El Dorado	221,835	**1,003**	1
17 **OLD** (*Human Related*)	October 2003	San Bernardino	91,281	**1,003**	6
18 **JONES** (*Undetermined*)	October 1999	Shasta	26,200	**954**	1
19 **AUGUST COMPLEX** (*Lightning*)	August 2020	Mendocino, Humboldt, Trinity, Tehama, Glenn, Lake, & Colusa	1,032,648	**935**	1
20 **BUTTE** (*Powerlines*)	September 2015	Amador & Calaveras	70,868	**921**	2

"Structures" include homes, outbuildings (barns, garages, sheds, etc) and commercial properties destroyed.
This list does not include fire jurisdiction. These are the Top 20 regardless of whether they were state, federal, or local responsibility.
*Numbers not final

10/25/2021

Map 6-1: Areas Susceptible to Wildland Fires



7 Flooding

7.1 INTRODUCTION

Flooding has not been a serious hazard to Pomona in several decades, and the risk of disastrous flooding in the City is considered relatively small when compared to the potential for earthquake or wildfire damage to the City. Pomona does not lie within a 100- or 500-year floodplain, as delineated by the Federal Emergency Management Agency (FEMA). Although bisected by several waterways, these creeks have all been channelized, and remain dry except during storm events. However, the potential for a flood event still exists within Pomona, and it is an important hazard to be addressed in the City's LHMP.

7.2 HAZARD PROFILE

HAZARD DESCRIPTION

Flooding hazards are directly related to precipitation (rainfall) intensity and duration. Topography, type and extent of vegetation coverage, area of impermeable surfaces, local slope characteristics, and available drainage facilities all factor into an area's ability to divert precipitation runoff. However, a key element in safely managing runoff volume is the extent of urbanized area. Urbanization increases the volume and velocity of runoff water via two main processes:

- Areas that would normally absorb rainfall (e.g., soils) have been replaced by impermeable surfaces (e.g., streets, houses); and
- The channelization and accumulation of runoff water adds to the collective whole resulting in increased volumes and velocity.

The size, or magnitude, of a flood is described by a term called a "recurrence interval.'' By studying a long period of flow records for a stream, it is possible to estimate the size of a flood that would have a five-year recurrence interval (also called a five-year flood or five-year flood event). A five-year flood is one that would occur, on the average, once every five years (or has 20 percent of occurring during any year). Although a 100-year flood is expected to happen only once in a century, there is a one-percent chance that a flood of that size could happen during any year. The magnitude of flood events could be altered if changes are made to a drainage basin, such as an increase in the amount of impervious (i.e., paved) surfaces.

FEMA, as part of its statutory responsibilities to carry out the National Flood Insurance Program, has mapped most of the flood risk areas within the United States. In fact, most communities with a one percent chance of a flood occurring in any given year (100-year flood) have a flood way depicted on a Flood Insurance Rate Map (FIRM). However, according to FEMA, Pomona is designated as Flood Zone D, which is an area with "undetermined possible flood hazards". [49]

7.2.1 HISTORIC EVENTS

The history of flooding in Pomona provides an excellent basis to document the effectiveness of existing flood mitigation activities in the City. The flooding hazard is one that has been reduced, through mitigation, from a chronic and damaging natural disaster to a comparatively minor inconvenience to the residents of Pomona.

The City of Pomona is built on the edge of the San Antonio Canyon floodplain, and as a consequence was subjected to regular flooding events throughout its history. Witness reports describe floodwaters to the height of pickup truck beds and floodwaters covering the streets of downtown. In response to a series of particularly disastrous floods in the 1930s, the City developed an extensive network of flood control channels sufficient to provide protection from major flood events (for details on flood channels, refer to the **Section 11.2.4 Existing Flood Mitigation Activities**).[50]

January 1916 Flood

Heavy rainfall during the month of January 1916 resulted in overflowing rivers and streams that devastated much of Southern California. The most significant damage occurred in San Diego County, but San Bernardino, Riverside, Ventura, and Los Angeles Counties were also impacted. Farmlands, dams, bridges, water mains, pipelines, irrigation ditches, wells and pumps, and power plants in these counties were damaged or destroyed. The storms caused the deaths of 22 people in San Diego County, 4 people in Orange County, and 2 people in San Bernardino County. The City of Pomona sustained approximately $15,000 in damage of washes and fills in streets.[51]

March 1938 Flood

A series of almost constant and intense rainfall began during the month of January 1938. By March, much of the terrain in Southern California was already saturated when a slow-moving warm front collided with the Transverse Range resulting in an average of 22.5 inches from February 27 to March 4. The storms resulted in the deaths of 87 people and an estimated $79 million in damage. It was the worst storm on record in nearly 70 years.[52]

January 1969 Flood

Several storms occurred in central and southern California during the months of January and

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[49] *https://msc.fema.gov/portal/advanceSearch#searchresultsancho, accessed December 2021*
[50] *Ibid.*
[51] *https://pubs.usgs.gov/wsp/0426/report.pdf, accessed December 2021*
[52] *https://geochange.er.usgs.gov/sw/impacts/hydrology/state_fd/cawater1.html, accessed December 2021*

February resulting in 60 deaths. Approximately $400 million in damage resulted, in large part due to recent home construction in flood prone areas.[53] Peak discharges were 38% to 78% higher than the previous record in March 1938.

The City of Pomona was not alone in improving its flood control measures following the storms that occurred in 1938. The floods that affected the City were widespread and damaging in many cities in the vicinity; regional flood control structures were constructed as part of the Santa Ana River Basin flood protection program, authorized by the Flood Control Acts of 1936 and 1938.[54] These improvements included the San Antonio Dam, which was constructed and is currently located five miles northeast of the City.

Following construction of the flood control measures-which were collectively completed during the late 1950s and 1960s-the City of Pomona witnessed a drastic reduction in flooding hazards. Flooding hazards are now restricted to localized pockets of inundation, primarily in low-lying areas such as underpasses or locations with deficiencies in the storm drainage system. This local flooding occurs on a seasonal basis, depending on the intensity and duration of precipitation during the wet season.

7.2.2 HAZARD LOCATION AND EXTENT

Although Pomona does not lie within a designated floodplain management area, flooding is still a potential hazard to the community. The two types of flooding that could affect the City of Pomona are storm-related flooding and dam inundation.

Although the City has not experienced large-scale storm-related flooding since the construction of flood control infrastructure, localized inundation remains a concern for Pomona residents. Members of the community have indicated that heavy rainfall results in highly localized areas of minor flooding. This assertion is quantified by data provided by the Federal Emergency Management Agency (FEMA). The City has participated in FEMA's National Flood Insurance Program since 1984.[55] Although exact locations of recorded flood damage were unavailable at the time of publication of this plan, known locations with flooding issues include low-lying underpasses and locations with deficiencies in the storm drainage system. While localized flooding does impede traffic flow, the extent of the flooding hazard in Pomona does not overwhelm the City's resources or result in significant adverse impacts.

DAM INUNDATION

The more widespread and serious flooding risk to Pomona is presented by the hazard of dam

[53] *https://pubs.usgs.gov/wsp/2030/report.pdf, accessed December 2021*
[54] *U.S. Army Corps of Engineers, Los Angeles District Reservoir Regulation Section website. http://www.spl.usace.army.mil/resreg/htdocs/snto.html, accessed October 2021*
[55] *Federal Emergency Management Agency. National Flood Program; website: http://www.fema.gov/nfip/104003 I 2.shtm#06, accessed November 4, 2021. Refers to claims processed through December 31, 2020.*

inundation. There are four impoundments in the vicinity of Pomona, two of which have the potential to flood the City in the event of dam failure. Although this hazard would have the potential to cause greater injury and property damage than the storm-related flood events, the likelihood of occurrence is vastly lower.

San Antonio Dam

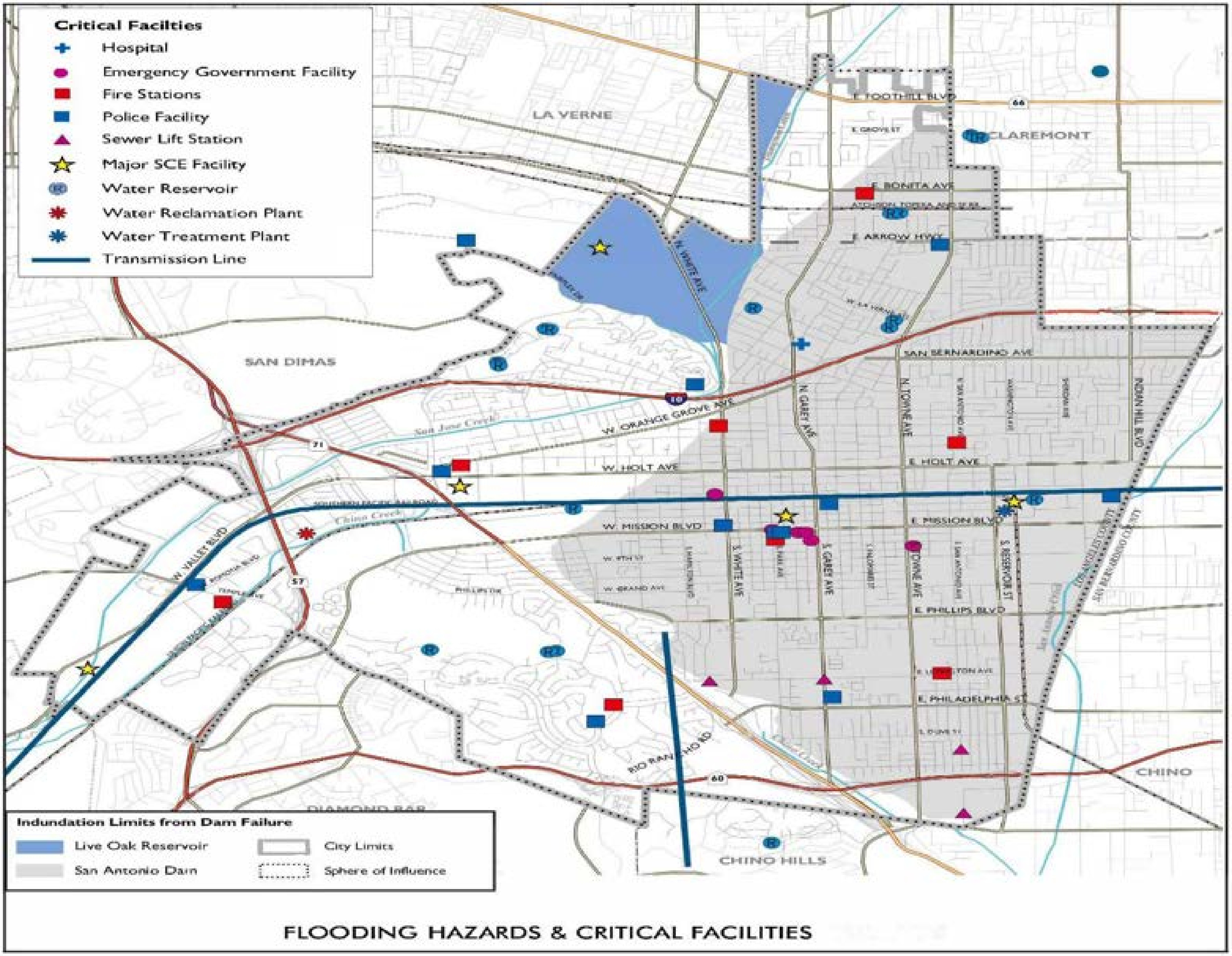
The San Antonio Dam, completed in 1956, is located approximately five miles northeast of the City. The dam is operated by the United States Army Corps of Engineers (USACE). This dam serves primarily as a major flood control structure and therefore does not store large quantities of water except during periods of heavy rain. However, the reservoir has a capacity of 9,350 acre-feet of water and, when full, failure or rupture of the San Antonio Dam would release waters and result in the flooding of areas south of the dam. This area includes large portions of the City, in northern and eastern Pomona. In total, the amount of Pomona at risk to inundation (7,170 acres) equals 48 percent of the City's total land area. The San Antonio Dam inundation boundary is illustrated in **Map 7-1**.

Live Oak Reservoir

The Live Oak Reservoir also poses a flooding threat to Pomona. This reservoir is operated by the Metropolitan Water District of Southern California (MWD) and is utilized for flood control and water conservation purposes. It is located on unincorporated County land between the Cities of La Verne and Claremont, approximately two miles north of Pomona. This reservoir is smaller than the San Antonio Dam and has a maximum capacity of 2,500 acre-feet[56]. In the event of failure of this reservoir, northern portions of the City could be inundated, primarily at the Fairplex. The total amount of land area subject to flooding from this dam is 640 acres, which accounts for four percent of the City. **Map 7-1** illustrates the areas that could be subject to inundation in the event of dam failure.

[56] *City of Pomona Master Environmental Assessment, April 1994, City of Pomona. Materials Recovery Facility Draft Environmental Impact Report. April 1996.*

Map 7-1: Flood Hazards



FLOOD SEVERITY

The following are ways in which floods may vary in severity:

- Flood volume (the total volume of water in the flood) – this contributes to both the level and duration of flooding. Dams and detention basins are less effective at flood mitigation during large volume floods.
- Rate of rise (how fast the flood rises) – a flood that rises quickly provides less time for warning and evacuation.
- Flow velocity (how fast water is flowing) – faster flow causes a higher risk to human life, a higher risk of erosion, and more damage to infrastructure.
- Flood duration – a flood that lasts for a longer time can have a greater impact due to the increased duration of the disruption to transport, business and personal networks.
- Areal extent – flooding that affects a larger area often has a greater impact.[57]

FLOOD MAGNITUDE

The peak level of water at a particular location in a waterway is called flood magnitude with three classifications:

- Minor – Causes inconvenience such as closing of minor roads and the submergence of low-level bridges.
- Moderate – Inundation in low lying areas requiring removal of livestock and/or evacuation of some houses.
- Major – Inundation of large areas, isolating towns and cities. Major disruptions occur to transportation networks. Evacuation of residents and businesses may be required. In rural areas, widespread flooding of farmland is likely.[58]

7.2.3 PROBABILITY OF FUTURE EVENTS

It is unlikely that the City of Pomona will experience significant storm-related flooding in the future comparable to the scale of floods that took place in its early history. The considerable flood control infrastructure that was developed mid-century has been very effective in preventing large-scale flood events. On the other hand, it is anticipated that localized flooding will continue to occur in the City in the absence of appropriate mitigation measures.

The probability of dam inundation is low. For much of the year, the water levels at these dams are very low or empty. Due to the distance between the reservoirs and Pomona, even in the unlikely event of a dam breach, depending on the water level of the reservoirs, the flood may not

[57] *http://www.chiefscientist.qld.gov.au/floods, accessed January 2022.*
[58] *Ibid.*

even reach City limits.

7.3 VULNERABILITY ASSESSMENT

OVERVIEW

The City of Pomona has a low vulnerability to flood hazards. Current flood control measures effectively prevent the types of damaging floods that were experienced in the 1930s. Current flood issues are restricted to localized street inundation during heavy storm events. With the completion of the I-210 freeway the dam inundation was eliminated.

Although localized flooding occurs seasonally, it has minimal impacts on the City due to its limited location and extent. Dam inundation is also considered to be a low impact hazard. Although it would be far more damaging if it took place, the probability of dam failure is very low due to the engineering standards and safety procedures in place at the dams whose failures would impact the City.

Since the City entered the National Flood Insurance Program (NFIP) in 1984, only 6 total losses have been reported resulting in $42,949 in payments, and no structures have reported repetitive losses.

7.3.1 IDENTIFYING VULNERABILITIES

The City of Pomona is quite resilient to storm-related flooding. Due to the limited scope of the hazard, no structures are considered directly vulnerable to flood damage. The greatest impact caused by storm-related flooding is impediments to the circulation of traffic. Motorists are required to make detours when flooding renders streets impassible. This is typically nothing more than an inconvenience; however, flooding at the underpasses at the Southern Pacific Railroad are a greater vulnerability to Pomona than the other flooding locations.

These major north-south arterials are the only transportation routes that have underpasses constructed beneath the railroad. In the event of a train derailment in the City, it would be crucial for these routes to remain open, as they are the only routes that would not be subjected to closure by a train derailment. North-south circulation in Pomona is crucial to be able to maintain access to the City's only hospital, the Pomona Valley Hospital Medical Center. If the underpasses were flooded during such an event, it would seriously hamper the ability of emergency response vehicles to traverse the City and gain access to the hospital. Although a highly improbable series of events would have to occur in order to result in this scenario, "worst case scenario" analysis is essential to address multi-hazard planning challenges and maximize mitigation effectiveness. For this reason, the underpasses of Garey, White, and Towne Avenues are considered vulnerabilities to the City and are specifically addressed in the multi-hazard action plan items.

With the completion of the I-210 Freeway, the waters from the San Antonio Dam would divert around the city. The freeway is below grade through La Verne, Claremont and Upland which would catch the flow and send the water around Pomona. A new study from the Corps of Engineers and the State is needed to address the new inundation area.

There are relatively few critical facilities and vulnerabilities in the inundation limit of Live Oak Reservoir. The majority of the flooding would occur on grounds currently occupied by the Fairplex. However, approximately 700 residences are located within the inundation area and would require significant emergency evacuation and response in the unlikely event of dam failure. Several neighborhoods in the northwest corner of Pomona are also susceptible to inundation due to dam failure at Thompson Creek.

It is important to emphasize that the risk of widespread, damaging floods from dam inundation is very low. If a dam breach were to occur, the floodwaters would take several hours to reach the City, and the scenario of dam failure In Pomona would be that of a slow-moving, shallow body of water, rather than a catastrophic release of damaging water volumes.

7.3.2 ESTIMATING POTENTIAL LOSSES

Quantifying potential losses due to flooding is a complex process. The primary source of potential flooding damage to the City is dam inundation, a hazard that is highly unlikely to happen. In the event of a dam failure, factors such as the amount of water in the reservoir (both of the reservoirs' water levels fluctuate seasonally), rate of water output, and ability to implement emergency notification procedures would significantly influence the amount of loss sustained by the City.

7.3.3 CLIMATE CHANGE IMPACT

While climate change does not directly cause flooding, climate change can affect the intensity and frequency of precipitation, which in turn increases the potential for flooding. Warmer oceans increase the amount of water that evaporates into the air.[59] When more moisture-laden air moves over land or converges into a storm system, it can produce more intense precipitation—for example, heavier rain and snowstorms. The potential impacts of heavy precipitation include an increase in flood risk due to heavy rains, which in turn can lead to injuries, drownings, and other flooding-related effects on health. In addition, runoff from precipitation can impair water quality as pollutants deposited on land wash into water bodies.

[59] *https://www.epa.gov/climate-indicators/climate-change-indicators-heavy-precipitation, accessed December 2021*

8 Windstorms

8.1 INTRODUCTION

Windstorms have not been a serious hazard in Pomona, and the potential risk of widespread damage from wind is not as considerable as the risk from earthquakes or wildfires. Nevertheless, severe windstorms pose a significant risk to life and property by creating conditions that disrupt essential systems such as public utilities, telecommunications, and transportation routes. High winds can and do occasionally cause damage to local homes and businesses. Severe windstorms can present a very destabilizing effect on the dry brush that covers local hillsides and urban wildland interface areas and increase wildfire threat. Destructive impacts to trees, power lines, and utility services also are associated with high winds.

8.2 HAZARD PROFILE

HAZARD DESCRIPTION

Santa Ana Winds

Based on local history, most incidents of high wind in the City of Pomona are the result of Santa Ana wind conditions. While high impact wind incidents are not frequent in the area, significant Santa Ana wind events have been known to negatively impact the local community.

Santa Ana winds are blustery, warm – (often hot) – dry winds that blow

Figure 8-1: Santa Ana Winds

from the east or northeast. These occur below the passes and canyons of the coastal ranges of Southern California and in the Los Angeles basin, and typically occur from October to March when cooler air in the desert increase air pressure and creates the westward winds. Generally speaking, winds must reach 25 knots to be classified as a Santa Ana wind.

The map above (**Figure 8-1**) shows the direction of the Santa Ana winds as they travel from the stable, high-pressure weather system called the Great Basin High through the canyons and towards the low-pressure system off the Pacific. Located between Los Angeles and the San Bernardino Mountains, and south of the San Gabriel Mountains, the City of Pomona is in the direct path of the ocean-bound Santa Ana winds.

8.2.1 HISTORIC EVENTS

In 2003 two deaths were caused by fierce Santa Ana wind conditions. A falling tree struck one woman in San Diego, and the second death occurred when a passenger in a vehicle was hit by a flying pickup truck cover launched by Santa Ana winds. In 2011 the cities west of Pomona suffered millions in damage due to downed trees from the winds over a 2-day period. Power was out for over 1 week in some areas.

In Pomona, the City does not track damage due to windstorms. However, reports of dislodged roofs and fallen trees and power lines are common. These are not considered major widespread threats to population and property but do involve responses from emergency service personnel. Fallen power lines have potential for most widespread consequences of power outages and fire. It should be noted that falling trees can occasionally cause fatalities and serious structural damage. These types of incidents are rare in occurrence as well as localized. Due to their limited impacts, none of the risks associated with windstorm are considered high.

8.2.2 HAZARD LOCATION AND EXTENT

Windstorms that affect Pomona, notably Santa Ana winds, are not location specific but rather impact the entire City area. Passes between hillsides are susceptible to slightly higher wind speeds, although the amount of unsheltered development in hillside passes is not substantial. In the case of a Santa Ana wind - which can last several days - hazards created by wind-fallen trees or utility poles can threaten property and have the potential for personal injury and even death. In Pomona, older neighborhoods generally have larger trees. Although these trees are usually large and well-rooted enough to withstand higher speed winds, tree limbs can create significant hazards.

Various scales for estimating the potential damage caused by wind have been developed. The Beaufort Scale developed by Sir Francis Beaufort in 1805 is commonly used and illustrates the effects that varying wind speeds can have on sea swells and structures.

Table 8-1: Beaufort Scale

BEAUFORT FORCE	SPEED (MHP)	WIND DESCRIPTION – EFFECTS ON LAND
0	< 1	Calm - Smoke rises vertically
1	1 – 3	Light - Air Ripples–look like scales - Smoke drift shows direction of wind, but wind vanes do not
2	4— 7	Light Breeze - Wind vanes move; Leaves rustle; Wind can be felt
3	8 —12	Gentle Breeze - Leaves and small twigs move constantly; Small, light flags are extended
4	13– 18	Moderate Breeze - Wind lifts dust and loose paper; Small branches move
5	19– 24	Fresh Breeze - Small trees with leaves begin to move
6	25–31	Strong Breeze - Large branches move; Telegraph wires whistle; Hard to hold umbrellas
7	32– 38	Near Gale - Whole trees move; Resistance felt walking into wind
8	39– 46	Gale - Twigs and small branches break off trees; Difficult to walk
10	55– 63	Storm - Trees broken or uprooted; Considerable structural damage
11	64–73	Violent Storm - Seldom experienced inland; Considerable structural damage
12	> 74	Hurricane - Widespread damage. Very rarely experienced on land.

8.2.3 PROBABILITY OF FUTURE EVENTS

Strong Santa Ana winds typically occur on an annual basis; although it is unlikely that Pomona will be subject to widespread damage from windstorm activity, there is potential for isolated events, such as damage to property or communication utilities from the Santa Ana winds which occur frequently during the October to March season. However, it must also be noted that although Santa Ana winds are frequent, the occurrence of a wind with enough velocity to cause significant damage is much less frequent.

8.3 VULNERABILITY ASSESSMENT

OVERVIEW

Based on local history, the probability is low for a damaging windstorm. There have been past occurrences of winds strong enough to create damage to property in Pomona. However, there has not been a recorded instance of a windstorm strong enough to create widespread damage in Pomona. Damage is usually restricted to isolated roof and tree damage.

Life and Property

Based on the history of the region, windstorm events can be expected, perhaps annually, across widespread areas of the region that can be adversely impacted during a windstorm event. This can result in the involvement of City emergency response personnel. Both residential and commercial structures with weak reinforcement are susceptible to damage. Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents can create lift suction forces that pull building components and surfaces outward. With extreme wind forces, the roof or entire building can fail causing considerable damage.

Debris carried along by extreme winds can directly contribute to loss of life and indirectly to the failure of protective building envelopes, siding, or walls. When severe windstorms strike a community, downed trees, power lines, and damaged property can be major hindrances to emergency response and disaster recovery.

Utilities

Historically, falling trees have been the major cause of power outages in the region. Windstorms can cause flying debris and downed utility lines. For example, tree limbs breaking in winds of only 45 mph can be thrown over 75 feet. As such, overhead power lines can be damaged even in relatively minor windstorm events. Falling trees can bring electric power lines down to the pavement, creating the possibility of electric shock.

Infrastructure

Windstorms can damage buildings, power lines, and other property and infrastructure due to falling trees and branches. During wet winters, saturated soils cause trees to become less stable and more vulnerable to uprooting from high winds.

Windstorms can result in collapsed or damaged buildings or blocked roads and bridges, damaged traffic signals, streetlights, and parks, among others. Roads blocked by fallen trees during a windstorm may have severe consequences to people who need access to emergency services. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Industry and commerce can suffer losses from interruptions in electric services and from extended road closures. They can also sustain direct losses to buildings, personnel, and other vital equipment. There are direct consequences to the local economy resulting from windstorms related to both physical damages and interrupted services.

Increased Fire Threat

Perhaps the greatest danger from windstorm activity in Southern California comes from the combination of the Santa Ana winds with the major fires that occur regularly in the urban/wildland interface. With the Santa Ana winds driving the flames, the speed and reach of the flames is even greater than in times of calm wind conditions. The higher fire hazard raised by a Santa Ana wind condition requires that even more care and attention be paid to proper brush clearances on property in the wildland/urban interface areas.

Transportation

Windstorm activity can have an impact on local transportation in addition to the problems caused by downed trees and electrical wires blocking streets and highways. During periods of extremely strong Santa Ana winds, major highways can be temporarily closed to truck and vehicular traffic. However, typically these disruptions are not long lasting, nor do they carry a severe long-term economic impact on the region.

8.3.1 IDENTIFYING VULNERABILITIES

The City of Pomona is not prone to widespread damage from wind and there are no critical facilities and vulnerabilities considered at high risk from windstorms.

8.3.2 ESTIMATING POTENTIAL LOSSES

Potential losses from windstorms are expected to be primarily limited to isolated impacts to property such as roof or tree damage. There are no areas of specific risk in Pomona; losses are not expected to be significant to the City.

8.3.3 CLIMATE CHANGE IMPACT

Climate change is contributing to more severe weather events, including unusually hot and cold temperatures, which in turn impact the pressure systems which create wind events and the severity of windstorm events.

9 Pandemic/Infectious Disease

9.1 INTRODUCTION

This LHMP is being prepared in 2021, during a worldwide pandemic created by the COVID-19 virus. As of December 20, 2021, there have been approximately 51.05 million cases and 807,732 deaths in the United States alone attributed to the virus, which has sparked nationwide stay-at-home orders, shuttered schools, caused severe economic distress, stressed the medical system, and taken a toll on the nation's physical, psychological, and economic well-being. More about the current pandemic is covered further below in this report.

9.2 HAZARD PROFILE

Pandemics are defined as large-scale outbreaks of infectious disease for which there is little or no human immunity. Pandemics cause disease and death over a wide geographic area and cause significant economic disruption.

The California Department of Public Health (CDPH) and Los Angeles County Department of Public Health have identified seasonal influenza and viral disease pandemics as specific hazards that would have a significant impact throughout the entire City of Pomona.

9.2.1 HISTORIC EVENTS

There have been five worldwide pandemics over the past 102 years:

1918 "Spanish Flu" (H1N1 Virus)

The 1918-1919 Spanish Flu was estimated to have sickened 20%-40% of the world's population. Over 20 million people lost their lives. Between September 1918 and April 1919, 500,000 Americans died. The flu spread rapidly; many died within a few days of infection; others from secondary complications. The attack rate and mortality were highest among adults 20-50 years old; the reasons for this are uncertain. By late September 1918, over 35,000 people throughout California had contracted the Spanish Flu. According to state officials, influenza was most prevalent in the southern part of California, but the death toll was high across the state.

1957-1958 "Asian Flu" (H2N2 Virus)

This virus was quickly identified due to advances in technology, and a vaccine was produced. Infection rates were highest among school children, young adults, and pregnant women. The elderly had the highest rates of death. A second wave was developed in 1958 and in total, there were about 70,000 deaths in the United States. Worldwide deaths were estimated between roughly 1 and 2 million.

1968-1969 "Hong Kong Flu" (H3N2 Virus)

The strain of the H3N2 Hong Kong Flu caused approximately 34,000 deaths in the United States and more than 700,000 deaths globally. It was first detected in Hong Kon g in early 1968 and spread to the United States later that year. Those over the age of 65 were most likely to die. This virus returned in 1970 and 1972 and still circulates today.

2009 H1N1 Influenza Virus

The first influenza pandemic of the 21st century occurred in 2009–2010 and was caused by an influenza A (H1N1) virus. It was the first pandemic for which many member States had developed comprehensive pandemic plans describing the public health measures to be taken, aimed at reducing illness and fatalities. For the first time, pandemic vaccinations were developed, produced, and deployed in multiple countries during its first year.

While most cases of pandemic H1N1 were mild, globally it is estimated that the 2009 pandemic caused between 100,000–400,000 deaths in the first year alone. Children and young adults were disproportionately affected in comparison to seasonal influenza, which causes severe disease mainly in the elderly, persons with chronic conditions, and pregnant women.

2019-2021 (Ongoing) Covid-19 Coronavirus (SARS-CoV-2)

The world is currently facing a global viral pandemic caused by a novel coronavirus disease, SARS-CoV-2. Coronaviruses are a large family of viruses that usually cause mild respiratory disease, such as the common cold, but can also cause more serious illness. The virus that causes the Covid-19 is passed from person to person through respiratory secretions, such as saliva or discharge from the nose when one coughs or sneezes. Experts currently researching the virus believe that the virus can also be spread when airborne through aerosols.

The severity of Covid-19 symptoms ranges from mild to severe and affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization. Some of the most common symptoms include fever, dry cough, and fatigue. Less common symptoms include aches and pains, nasal congestion, sore throat, diarrhea, conjunctivitis, headache, loss of taste or smell, a rash on skin, or discoloration of fingers or toes. The most serious symptoms include difficulty breathing or shortness of breath, chest pain or pressure, or loss of speech or movement.

9.2.2 PANDEMIC/INFECTIOUS DISEASE LOCATION AND EXTENT

Pandemic/Infectious Diseases are not location specific but rather impact the entire City and/or regional areas. In March of 2020, the World Health Organization characterized the outbreak as a pandemic, the United States declared the novel coronavirus a national emergency, Los Angeles County declared a local state of emergency.

According to Johns Hopkins University Coronavirus Resource Center, as of December 20, 2021, there have been roughly 275.3 million confirmed cases globally, 5.36 million global deaths, 51.05 million confirmed cases in the United States, and 807,732 US deaths. According to the California Department of Public Health, as of December 20, 2021, there have been 4,935,461 confirmed cases in California and 75,167 deaths, with 1,495,082 confirmed cases in Los Angeles County and 27,441 confirmed deaths. According to the Los Angeles County Department of Public Health, there have been 30,763 confirmed cases and 513 deaths in the City of Pomona to date.

At the time that this is being written, a nationwide and worldwide vaccine and booster campaign is currently underway, with vaccines approved in the United States for individuals age 12 and older. As of December 20, 2021, approximately 8,713,305,104 vaccine doses have been administered worldwide, 496,239,573 doses have been administered in the United States, 62,762,797 have been administered in California and approximately 6,835,658 people have been fully vaccinated in Los Angeles County. At the same time, variants of the disease are spreading, and public health officials are continually monitoring these developments.

Pomona, as well as other cities and regions across the world, faced or are facing high levels of illness, mortality, social disruption, political instability, mass unemployment, and economic losses. Recent impacts range from school and business closings to the interruption of basic essential services such as public transportation, health care/first aid, and the delivery of food and essential medicines to those in need.

The extent of a pandemic or infectious disease outbreak can be measured using **Table 9-1** below.

Table 9-1: Level of Community Transmission

LEVEL OF COMMUNITY TRANSMISSION	COMMUNITY CHARACTERISTICS & DESCRIPTION
Substantial, uncontrolled transmission	Large scale, uncontrolled community transmission, including communal settings (e.g., schools, workplaces)
Substantial, controlled transmission	Large scale, controlled transmission, including communal settings (e.g., schools, workplaces)
Minimal to moderate community transmission	Sustained transmission with high likelihood or confirmed exposure within communal settings and potential for rapid increase in cases

No to minimal community transmission	Evidence of isolated cases or limited community transmission, case investigations underway; no evidence of exposure in large communal settings

9.2.3 PROBABILITY OF FUTURE OCCURRENCE

Evidence suggests that the likelihood of pandemics has increased over the past 100 years because of increased global travel and integration, urbanization, changes in land use, and greater exploitation of the natural environment. These trends likely will continue and will intensify.

The precise timing of a pandemic-scale health-related emergency is uncertain. Pandemic occurrences are most likely when a virus makes a dramatic change, or antigenic shift, that results in a new or "novel" virus to which the population has no immunity. Epidemic occurrences are more likely when there are ecological changes, the pathogen mutates, or the pathogen is introduced into an unprepared host population.

According to the World Bank, increased exposure to wildlife increases the risk to health, biosafety and global security. The current SARS-CoV-2 originated in wildlife; the virus managed to break the species barrier into humans, a phenomenon called zoonosis. Numerous other emerging vector-borne diseases also originated in wildlife and were transmitted to humans.

9.3 VULNERABILITY ASSESSMENT

9.3.1 IDENTIFYING VULNERABILITIES

While the entire population of the planning area may be at risk of infectious diseases and pandemics, some portions of the population may be at greater risk, including the very young, the elderly, and immune-compromised individuals. The recent COVID-19 pandemic also illustrated a greater risk for portions of the population living in areas of concentrated pollution and poverty, who may have greater risk of comorbidity factors that can influence immune response, may not have adequate access to shelter, transportation, healthy foods, and health care, and may not have the opportunity to work from home, or to take time off from work if they become ill.

Critical facilities, the natural environment, and structures would not be impacted by an infectious disease outbreak or pandemic. The most vulnerable aspects of the community are loss of life and potentially long-term health impacts, impacts to essential public services due to closure or limited operating hours of facilities, and the economy, which can suffer great losses if businesses are not able to operate at full capacity. The areas of the economy that are most vulnerable are service oriented, recreation and entertainment, and tourist sectors.

9.3.2 ESTIMATING POTENTIAL LOSSES

There is no way to adequately predict the loss of life, impacts to essential public services, or the economy as a result of an infectious disease outbreak or pandemic, particularly in the case of an emerging infectious disease (EID) or novel virus, where no vaccine exists, little is known about how the disease is spread, the virulence of the disease and how quickly it spreads, how to treat it, and who is at greatest risk.

9.3.3 CLIMATE CHANGE IMPACT

Researchers are studying the impacts of climate change on infectious disease. Loss of biodiversity, destruction of wildlands, and warming temperatures may all be contributing to the spread of infectious disease.

According to the CDC, climate change, together with other natural and human-made health stressors, influences human health and disease in numerous ways. Some existing health threats will intensify, and new health threats will emerge. In the U.S., public health can be affected by disruptions of physical, biological, and ecological systems, including disturbances originating here and elsewhere. The health effects of these disruptions include increased respiratory and cardiovascular disease, injuries and premature deaths related to extreme weather events, changes in the prevalence and geographical distribution of food- and water-borne illnesses and other infectious diseases, and threats to mental health.

According to the World Health Organization, climatic conditions strongly affect water-borne diseases and diseases transmitted through insects, snails, or other cold-blooded animals. Changes in climate are likely to lengthen the transmission seasons of important vector-borne diseases and to alter their geographic range. Malaria is strongly influenced by climate. Transmitted by Anopheles mosquitoes, malaria kills over 400,000 people every year – mainly children under 5 years old in certain African countries. The Aedes mosquito vector of dengue is also highly sensitive to climate conditions, and studies suggest that climate change is likely to continue to increase exposure to dengue.

While developing nations are more vulnerable to many of these diseases than the United States or the City of Pomona, all populations will be affected by climate change.

10 Goals and Objectives

10.1 INTRODUCTION

One of the steps in preparing the *Local Hazard Mitigation Plan* pursuant to the Disaster Management Act of 2000 is consideration of the City's mission in hazard planning and related goals and objectives. The mission establishes the overarching guiding principle, whereas goals are broad statements of intent and objectives provide direction on actions to achieve the goal. The mission, goals, and objectives were based on the hazard and risk analysis along with input from the Technical Advisory Committee (TAC) and community members.

10.2 MISSION STATEMENT

The City of Pomona's mission for the LHMP is to:

> *Establish a comprehensive strategy of programs, development regulations, and cost-effective improvement projects to protect citizens, critical facilities, infrastructure, private property, and the environment from local hazards.*

The goals and objectives specified below together serve as the framework for formulating the LHMP mitigation strategy, thereby linking the mission statement to the action plan.

10.3 GOALS AND OBJECTIVES FRAMEWORK

PROTECT LIFE AND PROPERTY

- ***Goal 1.1****:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses.
    - *Objective 1.1.1:* Increase the resilience of institutions, services, and lifeline systems that are essential to Pomona' s functioning.
    - *Objective 1.1.2:* Increase the ability of the City government to serve the community during and after events through response, recovery, and rebuilding.
    - *Objective 1.1.3:* Recognize the potential for greater impacts to vulnerable populations and overcrowded neighborhoods in emergency response and mitigation planning.
    - *Objective 1.1.4:* Continue to utilize the emergency management system to provide

early warning of and response to all life-threatening hazards that can be predicted, such as earthquakes, floods, landslides, severe storms, wildfires, and hazardous materials incidents.

- ***Goal 1.2***: Protect Pomona's unique character and values from being compromised by hazard events.
    - *Objective 1.2.1:* Encourage and support the long-term protection of historic and architecturally significant structures to preserve neighborhood and community character.
    - *Objective 1.2.2:* Implement mitigation that effectively addresses the hazard potential while preserving unique historical values.
    - *Objective 1.2.3:* Support the long-term protection of Pomona's neighborhoods by reducing the potential impact to structures from hazard events.

- ***Goal 1.3***: Minimize losses to existing property and reduce potential for damage to future development.
    - *Objective 1.3.1:* Coordinate land use plans and regulations to direct development away, or buffer development from, area and site-specific hazards.
    - *Objective 1.3.2:* Continue maintenance programs, such as site inspection and trash/debris removal, to reduce the potential for wildfire and other problems.
    - *Objective 1.3.3:* Encourage insurance coverage for earthquake events.
    - *Objective 1.3.4:* Ensure that new buildings and substantial improvements to existing buildings are governed by and incorporate all appropriate building codes and construction measures to protect them against failure of damage.
    - *Objective 1.3.5:* Implement a program to mitigate the hazards posed by older unreinforced masonry buildings largely clustered in the downtown area.
    - *Objective 1.3.6:* Avoid localized hazards and associated risks to property and people by implementing appropriate improvements, such as construction of stormwater drainage improvements for localized flooding and slope stabilization measures for localized landslide conditions.
    - *Objective 1.3.7:* Avoid localized flooding problems by construction of appropriate storm water drainage improvements.

PUBLIC AWARENESS

- ***Goal 2.1***: Develop and implement education and outreach programs to increase public awareness of the risks associated with local hazards.
    - *Objective 2.1.1:* Prioritize community education and outreach in hazard mitigation planning.

- *Objective 2.1.2:* Develop targeted education and outreach programs to segments of the community that are most at-risk to hazards events.
- *Objective 2.1.3:* Encourage the distribution of information to residents, businesses, and public employees on safety and health precautions to take in advance of and during a disaster.
- *Objective 2.1.4:* Utilize local organizations and community partners in preparedness training and post-disaster assistance.
- *Objective 2.1.5:* Advise and assist residents and businesses in taking appropriate mitigation steps to protect their properties.
- *Objective 2.1.6:* Aid both the private and public sectors in understanding the risks they may be exposed to and finding mitigation strategies to reduce those risks.

NATURAL SYSTEMS

- ***Goal 3.1***: Balance natural resource management and land use planning with local hazard mitigation to protect life, property, and the environment.
  - *Objective 3.1.l:* Preserve, rehabilitate, and enhance natural systems to serve hazard mitigation functions where possible, recognizing the built-out character of the City.
  - *Objective 3.1.2:* Minimize potential negative environmental impacts from mitigation efforts.

PARTNERSHIPS AND IMPLEMENTATION

- ***Goal 4.1***: Encourage and support leadership within Pomona to promote and implement local hazard mitigation activities.
  - *Objective 4.1.1:* Strengthen communication and coordination with public agencies, citizens, non-profit organizations, business, and industry to ensure support for implementation.
  - *Objective 4.1.2:* Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.
  - *Objective 4.1.3:* Continue developing and strengthening interjurisdictional coordination and cooperation in the area of emergency services and post-disaster response programs.
  - *Objective 4.1.4:* Maintain partnerships with facilities and institutions with populations that are particularly vulnerable to risks associated with local hazards, including emergency planning and post-disaster contingency plans.
  - *Objective 4.1.5:* Coordinate with utility and transportation providers to establish and maintain early warning systems.
  - *Objective 4.1.6:* Periodically review and update the Local Hazards Mitigation Plan, taking into consideration new hazards in formation, changes in vulnerabilities and critical facilities, and advancements in emergency response and post-disaster

services.

EMERGENCY SERVICES

- ***Goal 5.1***: Ensure continued operations when the City is impacted by local hazard events.
  - *Objective 5.1.1:* Prioritize funding and implementation schedules for improvements needed to ensure continuous and extensive emergency response capabilities.
  - *Objective 5.1.2:* Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.
  - *Objective 5.1.3:* Coordinate and integrate local hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
  - *Objective 5.1.4:* Continue providing emergency services with training and equipment to address all identified hazards.
  - *Objective 5.1.5:* Distribute resources for emergency response around the City to ensure accessibility.
  - *Objective 5.1.6:* Conduct periodic emergency preparedness drills involving City staff and emergency services, other emergency service providers, critical facilities, utility operators, community partners, and institutions with vulnerable populations.

11 Mitigation Action Plan

11.1 INTRODUCTION

Risks associated with natural hazards in Pomona are reduced through a variety of programs implemented by federal, state, and local agencies and governments, including the City of Pomona. This chapter sets forth the mitigation action plan that the City is committed to implementing to reduce the potential for risks in the event of earthquake, landslide, wildfire, flooding, windstorm, or pandemic/infectious disease, and to maximize the effectiveness of the emergency response system to avoid injury, life loss, and property damage.

The mitigation actions represent the culmination of the research, mapping, analysis, and community outreach conducted for the LHMP. More specifically, the mitigation considers:

- Risks associated with critical facilities and community vulnerabilities that have been prioritized and ranked using a FEMA approved method;
- LHMP mission, goals and objectives as outlined in **Chapter 10**; and
- Input from City staff and stakeholders and additional research conducted by the project team.

In the process of formulating the mitigation action plan, the Technical Advisory Committee reviewed a series of draft mitigation measures and provided feedback on cost-effectiveness, political will, technical feasibility, and environmental soundness. During this process the TAC helped to identify additional mitigation as well as improve the feasibility and effectiveness of the proposed mitigation given Pomona's unique needs.

For each mitigation action, the following are documented:

- Local hazards addressed;
- Goals and objectives implemented - it should be noted that many of the mitigation actions are designed to achieve multiple goals and objectives;
- FEMA ranking
- Lead department responsible;
- Funding source; and
- Implementation schedule. Mitigation actions currently underway are noted as appropriate. The City will continue to seek assistance through federal, state, and regional funding programs.

RANKING

The Mitigation Action Items were ranked using an approved FEMA method based upon the following levels:

- *Level 1* - Requires human resources, but not necessarily financial resources
- *Level 2* - Can be accomplished primarily by City staff, but requires financial resources, internal or external
- *Level 3* - Requires external expertise/consultant and financial resources, internal or external
- *Level 4* - Requires multiple entity/agency participation, environmental reviews, and external human and financial resources.

COST-EFFECTIVENESS ANALYSIS FOR MITIGATION

Cost effectiveness analysis is an important tool that the City will use to help prioritize mitigation actions. This process will assist in identifying those actions that maximize risk reduction with efficient expenditure of public funds. Appendix D contains the guidelines for cost effectiveness analysis that the City will follow.

MITIGATION STRATEGY

Pomona uses various City Codes, State Building Codes, State Fire Codes and zoning to promote the best practices in mitigation for the community. The City has already seen that these strategies have had a dramatic reduction in the risk of flooding and wildfire to the community. The City has also seen that a review of building codes after an event and implementing new policies and codes has also reduced the risk to the community for landslides. Recent interest in improving the downtown area has had a significate impact in reducing and mitigating hazards in older historical buildings that populate the downtown area.

The City has designated the Safety & Emergency Management Officer as the Hazard Mitigation Coordinator and a Technical Advisory Committee to steer LHMP implementation. The Coordinator will be responsible for:

- Overseeing implementation of the LHMP.
- Preparing an Annual Report to the City Council in coordination with the Technical Advisory Committee that details mitigation action items to implement in the upcoming year, including cost estimates, cost/benefit or cost-effectiveness analyses (see Appendix D), and recommendations for items to include in the City's Capital Improvement Program.
- Updating the LHMP every five years in coordination with the Technical Advisory Committee by evaluating the cost effectiveness of mitigation implementation, addressing changes in critical facilities and vulnerabilities, incorporating advancements in emergency response and post disaster services, and updating hazard and risk assessments as new information becomes available. This includes incorporating new data from federal, state, or regional hazard mapping and delineation efforts.
- Establishing and maintaining the roster for the Technical Advisory Committee, calling

meetings, and preparing agendas and necessary information materials for meetings.

The Technical Advisory Committee will be comprised of representatives of City departments involved in LHMP implementation, representatives of critical and vulnerable facilities, and community stakeholders involved in emergency preparedness and response. In addition to the roles in the Annual Report and LHMP Five-Year Updates noted above, the Technical Advisory Committee will provide input on community education efforts.

ORGANIZATION OF MITIGATION ACTION ITEMS

The Mitigation Action Items listed in **Section 11.3** are organized by the following purpose categories:

- LHMP Implementation Structure
- Ready Critical Facilities and Emergency Services
- Community Preparedness and Education
- Resilient Housing, Neighborhoods and Commercial Districts
- Risk Reduction for Community Vulnerabilities
- Development Planning and Regulatory Framework
- City Emergency Operation Plan (EOP) and Standardized Emergency Management Systems (SEMS) Planning and Training

11.2 EXISTING MITIGATION ACTIVITIES

11.2.1 EXISTING EARTHQUAKE MITIGATION ACTIVITIES

Existing mitigation activities include current mitigation programs and activities that are being implemented by various levels of government, as well as private and educational organizations.

CITY OF POMONA CODES

Implementation of earthquake mitigation policy most often takes place at the local government level. The City of Pomona Department of Building and Safety enforces building codes pertaining to earthquake hazards. Currently, the City of Pomona uses the California Building Code (CBC) of 2019 as its standard for minimum design and construction standards of new buildings. This most recent code was adopted in 2020 and included the adoption of updated seismic safety standards.

The City of Pomona Planning Department enforces the zoning and land use regulations relating to earthquake hazards. The policy of the City is to reduce unacceptable levels of seismic risk by controlling land use and building design in known fault zones and upon soils that may fail under seismic activity. This policy does not directly regulate specific land uses but leaves final approval of projects to the proper decision-making body, based on information from recommended geologic studies, and environmental impact reports, when required.

CALIFORNIA EARTHQUAKE MITIGATION LEGISLATION

Threats resulting from earthquakes have been well documented in California. Dating back to the 19th century, Californians have been killed, injured, and lost property as a result of earthquakes. As the State's population continues to grow, and urban areas become even more densely built up, the risk will continue to increase. For decades the Legislature has passed laws to strengthen the built environment and protect the citizens. **Table 11-1** provides a sampling of some of the 200 plus laws in the State's codes.

Hospitals

The Alfred E. Alquist Hospital Seismic Safety Act (Hospital Act) was enacted in 1973 in response to the magnitude 6.6 Sylmar Earthquake in 1971, when four major hospital campuses were severely damaged and evacuated. Two hospital buildings collapsed killing 47 people. Three others were killed in another hospital that nearly collapsed.

In approving the Act, the Legislature noted that:

> *"Hospitals, that house patients who have less than the capacity of normally healthy persons to protect themselves, and that must be reasonably capable of providing services to the public after a disaster, shall be designed and constructed to resist, insofar as practical, the forces generated by earthquakes, gravity and winds (Health and Safety Code Section 1 29680)."*

When the Hospital Act was passed in 1973, the State anticipated that, based on the regular and timely replacement of aging hospital facilities, the majority of hospital buildings would be in compliance with the Act's standards within 25 years. However, hospital buildings were not, and are not, being replaced at that anticipated rate. In fact, the great majority of the States urgent care facilities are now more than 40 years old.

Table 11-1: Partial List of California Laws on Earthquake Safety

CODE SECTION	DESCRIPTION
Government Code Section 8870- 8870.95:	Creates Seismic Safety Commission.
Government Code Section 8876.1 - 8776.10:	Established the California Center for Earthquake Engineering Research.
Public Resources Code Section 2800 - 2804.6:	Authorized a prototype earthquake prediction system along the central San Andreas fault near the City of Parkfield.
Public Resources Code Section 2810 – 2815:	Continued the Southern California Earthquake Preparedness Project and the Bay Area Regional Earthquake Preparedness Project.
Health and Safety Code Section 16100 –	The Seismic Safety Commission and State

16110:	Architect will develop a state policy on acceptable levels of earthquake risk for new and existing state-owned buildings.
Government Code Section 8871- 8871.5:	Established the California Earthquake Hazards Reduction Act of 1986.
Health and Safety Code Section 130000-130025:	Defined earthquake performance standards for hospitals.
Public Resources Code Section 2805 – 2808:	Established the California Earthquake Education Project.
Government Code Section 8899.10 - 8899.16:	Established the Earthquake Research Evaluation Conference.
Public Resources Code Section 2621 – 2630 2621:	Established the Alquist-Priolo Earthquake Fault Zoning Act.
Government Code Section Public 8878.50 - 8878.52 8878.50:	Created the Earthquake Safety and Public Buildings Rehabilitation Bond Act of 1990.
Education Code Section 35295 - 35297 35295:	Established emergency procedure systems in kindergarten through grade 12 in all the public or private schools.
Health and Safety Code Section 19160-19169:	Established standards for seismic retrofitting of unreinforced masonry building.
Health and Safety Code Section 1596.80-1596.879:	Required all child day care facilities to include an Earthquake Preparedness Checklist as an attachment to their disaster plan.

The magnitude 6.7 Northridge Earthquake in 1994 caused $3 billion in hospital-related damage and evacuations. Twelve hospital buildings constructed before the Act were cited (red tagged) as unsafe for occupancy after the earthquake. Those hospitals that had been built in accordance with the 1973 Hospital Act were very successful in resisting structural damage. However, nonstructural damage (for example, plumbing and ceiling systems) was still extensive in those post-1973 buildings.

Senate Bill 1953 ("SB 1953"), enacted in 1994 after the Northridge Earthquake, expanded the scope of the 1973 Hospital Act. Under SB 1953, all hospitals are required, as of January 1, 2 008, to survive earthquakes without collapsing or posing the threat of significant loss of life. The 1994 Act further mandates that all existing hospitals be seismically evaluated, and retrofitted, if needed, by 2030, so that they are in substantial compliance with the Act (which requires that the hospital buildings be reasonably capable of providing services to the public after disasters). SB 1953 applies to all urgent care facilities (including those built prior to the 1973 Hospital Act) and affects approximately 2,500 buildings on 475 campuses.

BUSINESSES/PRIVATE SECTOR

Natural hazards have a devastating impact on businesses. In fact, of all businesses which close following a disaster, more than forty-three percent never reopen, and an additional twenty-nine percent close for good within the next two years[60]. The Institute of Business and Home Safety has developed "Open for Business ", which is a disaster planning toolkit to help guide businesses in preparing for and dealing with the adverse effects of natural hazards. The kit integrates protection from natural disasters into the company's risk reduction measures to safeguard employees, customers, and the investment itself. The guide helps businesses secure human and physical resources during disasters and helps to develop strategies to maintain business continuity before, during, and after a disaster occurs.

EARTHQUAKE EDUCATION

Earthquake research and education activities are conducted at several major universities in the Southern California region, including Cal Tech, USC, UCLA, UCI, and UCSB. The local clearing house for earthquake information is the Southern California Earthquake Center (SCEC), located at the University of Southern California, Los Angeles, CA 90089, Telephone: (213) 740-5843, Fax: (213) 740-0011, Email: SCEinfo@usc.edu Website: http://www.scec.org. The SCEC is a community of scientists and specialists who actively coordinate research on earthquake hazards at nine core institutions and communicate earthquake information to the public. The SCEC is a National Science Foundation (NSF) Science and Technology Center and is co-funded by the United States Geological Survey (USGS).

In addition, Los Angeles County along with other Southern California counties sponsors the Emergency Survival Program (ESP), an educational program for learning how to prepare for earthquakes and other disasters. Many school districts have very active emergency preparedness programs that include earthquake drills and periodic disaster response team exercises.

Proposed Earthquake Mitigation Action Items

The earthquake mitigation action items provide guidance on suggesting specific activities that agencies, organizations, and residents in the City of Pomona can undertake to reduce risk and prevent loss from earthquake events. Each action item is followed by ideas for implementation, which can be used by the steering committee and local decision makers in pursuing strategies for implementation. The City of Pomona proposes the following earthquake mitigation action items as detailed in **Section 11.3**:

- Mitigation Action 2.3: Reinforcement of Other City Facilities
- Mitigation Action 2.5: Aging Water and Sewer Infrastructure Replacement

[60] *Institute for Business and Home Safety Resources. August 2021.*

- Mitigation Action 4.1: Unreinforced Masonry Buildings
- Mitigation Action 4.2: Vulnerable Building Reinforcement
- Mitigation Action 4.3: Valuing Heritage
- Mitigation Action 4.5: Expanded Code Enforcement in Overcrowded Neighborhoods

11.2.2 EXISTING LANDSLIDE MITIGATION ACTIVIES

LANDSLIDE BUILDING AND ZONING CODES

The City of Pomona Development Code addresses development on steep slopes in subsection 580I0 concerning development for hillside properties. These sections outline standards for areas with median slopes of 10 percent or more before grading. Generally, the ordinance requires larger lot sizes based on slope percentage, as is indicated in **Table 11-2.** The ordinance also allows for building design to accommodate the site, landscaping to protect against erosion, drainage, and controls for excavations and grading. The Hillside provisions also allow for a Hillside Advisory Review Committee to review development plans in hillside areas.

Table 11-2: Minimum Lot Sizes in Residential Hillside Areas

GRADE OF SLOPE (PERCENT)	MINIMUM LOT SIZE (SQ. FT.)
0 - 10	7,200
10 - 30	10,000
30 - 40	20,000
40 or more	1 acre
Source: City of Pomona Zoning Ordinance, 1971-1972; revised 2010	

Proposed Landslide Mitigation Action Items

The City of Pomona proposes the following landslide mitigation action items as detailed in **Section 11.3**:

- Mitigation Action 4.6: Landslide Prevention
- Mitigation Action 4.7: Landslide Prevention Development Standards

11.2.3 EXISTING WILDFIRE MITIGATION ACTIVITIES

Existing mitigation activities include current mitigation programs and activities that are being implemented by county, regional, state, or federal agencies or organizations.

LOCAL PROGRAMS

In Southern California there are dozens of independent local fire departments as well as large county wide consolidated fire districts. Although each district or department is responsible for fire related issues in specific geographic areas, they work together to keep Southern California residents safe from fire. Although fire agencies work together to fight urban/wildland interface fires, each separate agency may have a somewhat different set of codes to enforce for mitigation activities.

In Pomona, fire protection is provided by the Los Angeles County Fire Department. The Fire Department not only provides response to fire emergencies, but also provides fire prevention, brush clearance, and education programs.

FIRE CODES

Developments within high fire threat are subject to the City of Pomona Zoning Ordinance and the California Building Code. These codes require buildings to incorporate fire resistant materials, maintain setbacks between buildings, and maintain landscaping and clear fire hazard brush. Both the Zoning Ordinance and the Building Code are subject to regular updates.

FEDERAL PROGRAMS

Federal Emergency Management Agency (FEMA) Programs

FEMA is directly responsible for providing fire suppression assistance grants and, in certain cases, major disaster assistance and hazard mitigation grants in response to fires. The role of FEMA in the wildland/urban interface is to encourage comprehensive disaster preparedness plans and programs, increase the capability of state and local governments, and provide for a greater understanding of FEMA programs at the federal, state and local levels.[61]

Fire Suppression Assistance Grants

Fire Suppression Assistance Grants may be provided to a state with an approved hazard mitigation plan for the suppression of a forest or grassland fire that threatens to become a major disaster on public or private lands. These grants are provided to protect life and improved property and encourage the development and implementation of viable multi-hazard mitigation measures and provide training to clarify FEMA's programs. The grant may include funds for equipment, supplies and personnel. A Fire Suppression Assistance Grant is the form of assistance most often provided by FEMA to a state for a fire. The grants are cost-shared with states. FEMA’s US Fire Administration (USFA) provides public education materials addressing wildland/urban interface issues and the USFA’s National Fire Academy provides training programs.

[61] *Source: National Interagency Fire Center. Boise ID and California Division of Forestry, Riverside Fire Lab.*

National Wildland/Urban Interface Fire Protection Program

Federal agencies can use the National Wildland/Urban Interface Fire Protection Program to focus on wildland/urban interface fire protection issues and actions. The Western Governors' Association (WGA) can act as a catalyst to involve state agencies, as well as local and private stakeholders, with the objective of developing an implementation plan to achieve a uniform, integrated national approach to hazard and risk assessment and fire prevention and protection in the wildland/urban interface. The program helps states develop viable and comprehensive wildland fire mitigation plans and performance-based partnerships.

Proposed Wildfire Mitigation Action Items

The City of Pomona proposes the following wildfire mitigation action items as detailed in **Section 11.3**:

- Mitigation Action 2.3: Reinforcement of Other City Facilities
- Mitigation Action 2.5: Aging Water and Sewer Infrastructure Replacement
- Mitigation Action 4.4: Reduced Wildfire Threat

11.2.4 EXISTING FLOOD MITIGATION ACTIVITIES

Flood mitigation activities listed here include current mitigation programs and activities that are implemented by the City of Pomona or other agencies.

FLOOD MANAGEMENT PROJECTS

Flood management structures can assist in regulating flood levels by adjusting water flows upstream of flood-prone areas. There are four dams in the immediate vicinity of the City, holding a total roughly 30,000 acre-feet of water. Releases of water from the impoundments are designed to protect the City of Pomona from high floodwaters. These facilities are:

- San Antonio Dam and Reservoir. 9,350 acre-feet (San Antonio and Chino Creeks);
- Live Oak Reservoir. 2,500 acre-feet (Live Oak)[62]
- Puddingstone Dam and Reservoir. 17,400 acre-feet (Walnut Creek); and
- Thompson Creek Dam and Reservoir. 812 acre-feet (Cobal, Williams, Palmer, Padua, and Thompson Creeks). [63]

[62] *City of Pomona. Materials Recovery Facility Draft Environmental Impact Report. April 1996.*
[63] *Los Angeles County Department of Public Works. Hydrologic Report 1996-1997.*

STORMWATER SYSTEMS

Pomona has an extensive storm drainage network to prevent flooding by conveying water off the streets and into drainage channels. Its existing drainage system is an urban network that generally consists of curbside catch basins, inlet structures, and manholes connected by reinforced concrete laterals and main lines, draining into storm drain channels. The City has approximately 30 miles of drainage pipes and 300 miles of streets that are designed to withstand a 100-year storm event.

Storm water runoff is transported via this network to five major channels. These channels are lined with concrete and designed to accommodate a 200-year storm event: [64]

- *San Antonio Creek and Flood Control Channel*. Located along the westerly and southwesterly limits of the City, it connects to Chino Creek going south;
- *Chino Creek*. Located along the southerly portion of the city in the Puente Hills, it joins to San Antonio Creek further south;
- *Thompson Creek*. Runs from north to south through the northern portion of the City, it bends westward and becomes North San Jose Creek;
- *North San Jose Creek.* Located in the western part of the City, it drains to the Whittier Narrows; and
- *South San Jose Creek*. Parallel to and south of North San Jose Creek in the western portion of the City, stalling from the Corona Expressway and going southwest; drains to the Whittier Narrows.[65]

DAM EMERGENCY PREPAREDNESS

Due to the potential severity of dam failures, FEMA requires that all dam owners develop Emergency Action Plans (EAP) for warning, evacuation, and post-flood actions. Plans have been established by the USACE and MWD to protect residents and businesses of the affected area in case of dam failures.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

The City of Pomona actively promotes the public participation in the National Flood Insurance Program at every opportunity. City Code Section 18-600 Flood Plain Management was enacted in 2006 to address the requirements of the NFIP and to mitigate the Flood Hazard in the City of Pomona.

[64] *City of Pomona. Master Environmental Assessment. 1994.*
[65] *Ahmad Ansaru. City of Pomona P.E., Assistant City Engineer. Written communication. February 6, 2004.*

Proposed Flooding Mitigation Action Items

The City of Pomona proposes the following wildfire mitigation action items as detailed in **Section 11.3**:

- Mitigation Action 2.6: Localized Flood Control Improvements

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11.2.5 EXISTING WINDSTORM MITIGATION ACTIVITIES

As stated, one of the most common problems associated with windstorms is power outage. High winds can cause trees to bend, sag, or fail (tree limbs or entire trees), coming into contact with nearby distribution power lines. Fallen trees can cause short-circuiting and conductor overloading. Wind-induced damage to the power system causes power outages to customers, incurs cost to make repairs, and in some cases can lead to ignitions that start wild land fires.

CALIFORNIA CODE

One of the strongest and most widespread existing mitigation strategies pertains to tree clearance. Currently, California State Law requires utility companies to maintain specific clearances depending on the type of voltage running through the line -between electric power lines and all vegetation.

The following California Public Resource Code Sections establish tree pruning regulations:[66]

- 4293: Power Line Clearance Required 4292: Power Line Hazard Reduction
- 4291: Reduction of Fire Hazards Around Buildings
- 4171: Public Nuisances

The following pertain to tree pruning regulations and are taken from the California Code of Regulations:

- Title 14: Minimum Clearance Provisions
- Sections 1250-1258
- General Industry Safety Orders
- Title 8: Group 3: Articles 12, 13, 36, 37, 38
- California Penal Code Section 385

Finally, the following California Public Utilities Commission section has additional guidance:

- California Public Utilities Commission
- General Order 95: Rule 35

[66] *www.cpuc.ca.gov/js.asp*

Failure to allow a utility company to comply with the law can result in liability to the homeowner for damages or injuries resulting from a vegetation hazard. Many insurance companies do not cover these types of damages if the policy owner has refused to allow the hazard to be eliminated.

The power companies, in compliance with the above regulations, collect data about tree failures and their impact on power lines. This mitigation strategy assists the power company in preventing future tree failure. From the collection of this data, the power company can advise residents as to the most appropriate vegetative planting and pruning procedures.

Proposed Windstorm Mitigation Action Items

The City of Pomona proposes the following windstorm mitigation action items as detailed in **Section 11.3**:

- Mitigation Action 2.8: Build and Retrofit Public Buildings and Critical Facilities
- Mitigation Action 4.2: Vulnerable Building Reinforcement

11.2.6 EXISTING PANDEMIC/INFECTIOUS DISEASE MITIGATION ACTIVITIES

Pandemic/infectious disease outbreaks have the potential to impact not only human lives, but the economic and governing stability of cities. The City of Pomona implemented the following policies in 2007 to protect City staff in the event of an infectious disease outbreak to ensure that City services can be maintained:

- Safety Policy Bloodborne Pathogens
- Safety Policy Respiratory Protection
- Safety Policy Tuberculosis Exposure

These policies were adopted to minimize exposure and outline procedures for reporting and seeking proper treatment following an exposure event.

Proposed Pandemic/Infectious Disease Mitigation Action Items

Due to the COVID 19 pandemic, several measures were adopted in addition to the policies listed above to protect City employees, and additional measures were implemented to protect vulnerable populations, and the economic interests in the City. These mitigations are proposed for inclusion in this LHMP in the event of a future pandemic/infectious disease outbreak:

- Mitigation Action 2.7 City Employee Protection
- Mitigation Action 4.8 Business Community Protection
- Mitigation Action 5.1 Vulnerable Population Services

11.3 MITIGATION ACTION ITEMS

LHMP IMPLEMENTATION STRUCTURE

Mitigation Action 1.1: **Implementation Options for Hazard Mitigation**

Secure necessary funding for implementation of hazard mitigation actions as follows:

- Allocate City resources and assistance for hazard mitigation projects, using available City resources efficiently and with consideration of cost-effectiveness analysis;
- Identify and seek grant programs and foundations that may support mitigation activities; and
- Partner with other government agencies, special districts, utility providers, and organizations involved in hazard mitigation and emergency preparedness and response to pursue grants and special funding programs.

Lead Department: Development Services, Public Works, or Water Resources, depending on the project
Implementation Schedule: Ongoing; apply for grants on an annual basis
Hazards Addressed: All Hazards
Funding Source: General fund, and federal, state, and regional grants
Rank: Level 1
Goals and Objectives Implemented: All

READY CRITICAL FACILITIES AND EMERGENCY SERVICES

Mitigation Action 2.1: **Integrity of Emergency Operation Center**

Maintain the system of the Emergency Operation Center (Brackett Airport in the City of Laverne, at the Pomona Police Department Hanger) with alternative back-up facilities to be activated in the event the central facility is impaired. Because emergency service response times will decrease if back-up locations must be activated, maximize resiliency of the Central Emergency Operations Facility.

Lead Departments: Risk Management
Implementation Schedule: 2022 on schedule
Hazards Addressed: All Hazards
Funding Source: General Fund
Rank: Level 3
Goals and Objectives Implemented:

- ***Goal 1.1**:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses by maximizing emergency preparedness capabilities (Objectives 1.1.1, 1.1.2, 1.1.4).

- ***Goal 5.1:*** Ensure continued operations when the City is impacted by local hazard events (Objectives 5.1.1, 5.1.3, 5.1.4).

Mitigation Action 2.2: **Equip Back-up Emergency Operations Center**

Because the Emergency Operations Center and backup locations were previously clustered in the City center, activating the emergency response system could be impeded if the City center experienced extensive damage during a major earthquake. To ensure response capabilities, the City has designated and will work to equip a backup facility. The Pomona City Yard has been chosen because it is located outside of the City center, south of the I-10 freeway and outside of liquefaction zones.

Lead Department: Risk Management
Implementation Schedule: Complete in 2022
Hazards Addressed: All Hazards
Funding Source: General fund
Rank: Level 2
Goals and Objectives Implemented:

- ***Goal 1.1**:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses by maximizing emergency preparedness capabilities (Objectives 1.1.1, 1.1.2, 1.1.4).
- ***Goal 5.1**:* Ensure continued operations when the City is impacted by local hazard events (Objectives 5.1.1, 5.1. 3, 5.1.4, 5.1.5).

Mitigation Action 2.3: **Reinforcement of Historic City Facilities**

Conduct a structural assessment of City-owned properties that are on or eligible for the National Register of Historic Places, the list of California Historic Landmarks, or Pomona's list of local significance, to identify buildings needing seismic safety improvements. Prioritize improvements according to 1) minimizing injury and life loss, 2) ensuring emergency services and response, 3) ensuring distribution of hazard resistant emergency facilities across the City to maximize emergency response and accessibility.

Lead Department: Development Services
Implementation Schedule: Ongoing; review for available funds annually
Hazards Addressed: Earthquake, Wildfire
Funding Source: General fund and grants
Rank: Level 3
Goals and Objectives Implemented:

- ***Goal 1.1**:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses by maximizing emergency preparedness capabilities (Objectives 1.1.1, 1.1.2, 1.1.3).
- ***Goal 5.1**:* Ensure continued operations when impacted by local hazard events (Objective

5.1.1).

***Mitigation Action 2.4:* Establish " Lifeline" Circulation System**

North-south circulation in Pomona could be significantly diminished in the event a long freight train is stranded on the Southern Pacific Railroad due to an earthquake or other hazard event. North-south circulation could also be impaired by significant flooding in the railroad underpasses at White, Towne, and Garey Avenues or the associated bridge collapses due to an earthquake. These scenarios are of particular concern given the location of the City's only hospital north of these potential obstructions and the majority of City population to the south, and require the following actions:

- In the next update of the *General Plan* Safety Element and the *SEMS Plan,* establish "Life-line" circulation system whereby special protocols are enacted to manage traffic flows on White, Towne, and Garey Avenues to ensure adequate north-south access for emergency vehicles. Establish alternative Life-line streets in the event these streets are obstructed, including completion of bridge if the Metrolink Gold Line is extended to Montclair;
- Continue prioritizing maintenance of the pumps in the underpasses;

Lead Department: Development Services, Public Works

Implementation Schedule: Maintenance of pumps ongoing; update to Safety Element General Plan to address evacuation routes to follow the adoption of this LHMP update

Hazards Addressed: All Hazards

Funding Source: General fund and grants

Rank: Level 4

Goals and Objectives Implemented:

- ***Goal 1.1**:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses by maximizing emergency preparedness capabilities (Objectives 1.1.1, 1.1.2, 1.1.4).
- ***Goal 5.1**:* Ensure continued operations when the City is impacted by local hazard events (Objective 5.1.3).

***Mitigation Action 2.5:* Aging Water and Sewer Infrastructure Replacement**

As an older City with the development in the City center dating back to the late 1800s - including the system of water wells and - pipelines portions of the City' s water and sewer infrastructure are in need of extensive maintenance and /or replacement. Older infrastructure is more prone to damage and service disruptions during earthquake, with potential ramifications for public safety and firefighting capabilities. Continue to fund and prioritize water and sewer infrastructure improvements to reduce the potential for these hazard-related risks. Use the Sewer and Water Master Plans as the basis for the improvement schedule.

Lead Department: Water Resources

Implementation Schedule: Ongoing; review for available funds annually

Hazards Addressed: Earthquake, Wildfire

Funding Source: General funds and grants
Rank: Level 3
Goals and Objectives Implemented:

- ***Goal 1.1****:* Reduce the potential for life loss, injury. and economic damage to Pomona residents and businesses by maximizing emergency preparedness capabilities (Objective 1.1.1).
- ***Goal 5.1****:* Ensure continued operations when the City is impacted by local hazard events (Objective 5.1.1).

Mitigation Action 2.6: **Localized Flood Control Improvements**

While the City has an effective flood control system, several localized areas continue to be subject to storm-related flooding. These include underpasses at the intersections of Garey, Towne, and White Avenues and the Union Pacific Railroad tracks; East End Avenue, between Mission Boulevard and Grand Avenue; Ninth Street, between the Union Pacific Railroad tracks and East End Avenue; and cul-de-sacs bounded by SR-60, County Road, Garey Boulevard, and Reservoir Street.

Conduct a study of these localized flooding hazards and identify needed improvements. Determine priority for implementation in part with cost-effectiveness analysis. Once the improvements are identified, consider options for requiring construction of the improvements as part of development projects if appropriate and feasible.

Lead Department: Public Works and Water Resources
Implementation Schedule: Ongoing; 1 – 2 years to complete study
Hazards Addressed: Flooding
Funding Source: 500k from General fund for pump and electrical improvements at Reservoir and 1st Street grade separation.
Rank: Level 3
Goals and Objectives Implemented:

- ***Goal 1.1****:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses by maximizing emergency preparedness capabilities (Objective 1.1.1).
- ***Goal 5.1****:* Ensure continued operations when the City is impacted by local hazard events (Objective 5.1.1).

Mitigation Action 2.7: **City Employee Protection**

A pandemic or emerging infectious disease has the potential to severely disrupt City services. During the COVID-19 pandemic, the City established protocols for safely continuing City operations during a pandemic or emerging infectious disease incident. Implement the following actions:

- Provide work from home opportunities
- Ensure field staff can work alone or use PPE and social distancing measures
- Provide additional equipment and stagger staff shifts

Lead Department: Public Works, Water Resources
Implementation Schedule: This mitigation was implemented during the COVID19 pandemic and can be implemented as necessary in the event of a surge or a new infectious disease outbreak.
Hazards Addressed: Pandemic/Infectious Disease
Funding Source: General fund and available grant funds
Ranking: Level 2
Goals and Objectives Implemented:

- ***Goal 1.1****:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses (Objectives 1.1.1, 1.1.2).
- ***Goal 5.1****:* Ensure continued operations when the City is impacted by local hazard events (Objectives 5.1.1, 5.1.4).

Mitigation Action 2.8: **Build and Retrofit Public Buildings and Critical Facilities**

Public buildings and critical facilities should be constructed or retrofitted to be to the highest standard that is feasible. Improve roof coverings, anchor roof-mounted equipment, and avoid placing flag poles or antennas near buildings.

Lead Department: Public Works, Neighborhood Services, Development Services
Implementation Plan: Ongoing, case-by-case basis when new facilities are constructed, or deficiencies are found in older facilities
Hazards Addressed: Windstorms
Funding Source: General fund and grant funds
Ranking: Level 3
Goals and Objectives Implemented:

- ***Goal 1.1****:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses (Objectives 1.1.1, 1.1.2).
- ***Goal 5.1****:* Ensure continued operations when the City is impacted by local hazard events (Objectives 5.1.1, 5.1.4).

COMMUNITY PREPAREDNESS AND EDUCATION

Mitigation Action 3.1: **Emergency Preparedness Campaigns**

Continue implementing customized campaigns to educate residents and businesses about appropriate emergency preparedness measures and what to do in the event of a disaster, using the following means of communication:

- Incorporation of special publications and inserts in the City's newsletter and other mailings such as utility bills;
- Traveling booths to set up in shopping centers, community centers, popular athletic fields, schools, and other activity centers;
- Information posted on website and social media;
- Media releases;
- Reports to City Council and City Commissions;
- Presentations to community organizations;
- Events such as the Police Department Open House, Child Safety Fair, and National Night Out; and

When designing and developing campaigns, give special attention to language, demographic, and cultural characteristics of the Pomona population to maximize effectiveness. Target vulnerable populations such as the elderly, poor, disabled, and non-English speakers.

Given the age of many Pomona homes and commercial structures, there should be frequent emphasis on insurance coverage and techniques to secure buildings to avoid seismically induced damage, including information on available assistance programs. Information should be periodically distributed about non-structural improvements to mitigate hazard risks, such as securing bookcases, filing cabinets, light fixtures, and similar objects that can cause injuries and block exits.

Lead Department: Police
Implementation Schedule: Ongoing; events take place quarterly and annually
Hazards Addressed: All Hazards
Funding Source: General fund
Rank: Level 2
Goals and Objectives Implemented:

- ***Goal 2.1**:* Develop and implement education and outreach programs to increase public awareness of the risks associated with local hazards (Objectives 2.1.1 - 2.1.6).

- ***Goal 4.**1:* Encourage and support leadership within Pomona to promote and implement local hazard mitigation activities (Objectives 4.1.1, 4.1.2, 4.1.4).

RESILIENT HOUSING, NEIGHBORHOODS AND COMMERCIAL DISTRICTS

Mitigation Action 4.1: **Unreinforced Masonry Buildings**

Continue requiring improvements to meet seismic safety standards for unreinforced masonry buildings when a change in use is proposed with tenant improvements.

Lead Department: Development Services
Implementation Schedule: Ongoing; case-by-case as change of use projects are submitted to the City with tenant improvement plans.
Hazards Addressed: Earthquake
Funding Source: Development/permit fees
Rank: Level 1
Goals and Objectives Implemented:

- ***Goal 1.2**:* Protect Pomona's unique character and values from being compromised by hazard events (Objectives 1.2.1, 1.2.2, 1.2.3).
- ***Goal 1.3**:* Minimize losses to existing property and reduce potential for damage to future development (Objectives 1.3.4, 1.3.5).

Mitigation Action 4.2: **Vulnerable Building Reinforcement**

Much of the City was developed prior to current seismic standards. Older homes and buildings may require structural intervention to avoid significant damage in the event of a major earthquake or severe windstorm. In addition, the clusters of mobile homes in the City may need reinforcements such as foundation strappings. Structural interventions are often straightforward and cost-effective, such as bolting structures to foundations. Through community education campaigns, educate property owners about areas with structures potentially needing reinforcement, and provide technical assistance to property owners with vulnerable buildings to implement retrofit standards.

This action will be most effective when City building inspection staff are directed to prioritize identification and reinforcement of vulnerable buildings, are appropriately trained to detect vulnerable buildings and make reasonable, cost-efficient recommendations, and are consulted during formulation of community education campaigns.

Lead Department: Development Services
Implementation Schedule: Ongoing; case-by-case as improvement plans are submitted to the City, and educational materials provided at the Development Services Department counter.
Hazards Addressed: Earthquake, Windstorm
Funding Source: General fund
Rank: Level 2
Goals and Objectives Implemented:

- ***Goal 1.3**:* Minimize losses to existing property and reduce potential for damage to future development (Objectives 1.3.3, 1.3.4).
- ***Goal 2.1**:* Develop and implement education and outreach programs to increase

public awareness of the risks associated with natural hazards (Objectives 2.1.5, 2.1.6).

Mitigation Action 4.3: **Valuing Heritage**

Many of Pomona's designated historic buildings, as well as homes within the designated historic districts, do not meet seismic safety codes. Pomona's historic resources contribute greatly to local environment and culture and are tremendously valued by the community. Prioritize retrofitting City-owned historic structures and avoid demolition for the purpose of public safety. Explore opportunities for federal and state grants for structural improvements to make City-owned buildings safer in lieu of demolition.

Lead Department: Development Services
Priority: Ongoing; annually review department budget and pursue grants
Hazards Addressed: Earthquake
Funding Source: General fund and grants
Ranking: Level 3
Goals and Objectives Implemented:

- ***Goal 1.2****:* Protect Pomona's unique character and values from being compromised by hazard events (Objectives 1.2.1, 1.2.2, 1.2.3).

Mitigation Action 4.4: **Reduce Wildfire Threat**

Continue existing programs to reduce risk of property damage and injury from wildfire, including:

- Citywide prohibition of new wood and wood shake roofing materials, and requirement of fire-resistant materials for re-roofing projects.
- Requirement of tile roofs in Phillips Ranch;
- Development of fire-resistant landscape program in coordination with Ganesha Hills homeowners; and
- County Fire Department weed abatement and brush clearance program.

Further measures to reduce the risks of wildfire include:

- Exploring options for further decreasing fire hazards through requirements established by ordinance in Ganesha Hills; and
- Limiting any increases in residential densities in wildfire hazard areas through appropriate land use policy applications in the General Plan Update.

Lead Department: Development Services, Fire Department
Implementation Schedule: Ongoing; review department funds and resources for development of new ordinances. Review of re-roofing projects occur on case-by-case basis as projects are

submitted to the City.
Hazards Addressed: Wildfire
Funding Source: General fund and grants
Ranking: Level 4
Goals and Objectives Implemented:

- ***Goal 1.3****:* Minimize losses to existing property and reduce potential for damage to future development (Objective 1.3.1).
- ***Goal 3.1****:* Balance natural resource management, and land use planning with local hazard mitigation to protect life, property, and the environment (Objective s 3.1.1, 3.1.2).

Mitigation Action 4.5: **Expanded Code Enforcement in Overcrowded Neighborhoods**

In Pomona's overcrowded neighborhoods:

- Step up code enforcement efforts, with particular emphasis on remediation of illegally inhabited building spaces that increase risks of injury or life loss in the event of a major earthquake.
- Significantly increase fees for code violations pertinent to public health and safety, so that the fees serve as a deterrent; and
- Continue enforcing stiff fines imposed on homeowners and contractors implementing structural modifications without appropriate permits.

Lead Department: Development Services
Implementation Schedule: Implemented, and ongoing as regular inspections are conducted, or complaints received
Hazards Addressed: Earthquakes
Funding Source: General fund and code violation fees
Ranking: Level 1
Goals and Objectives Implemented:

- ***Goal 1.1****:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses by maximizing emergency preparedness capabilities. (Objective 1.1.3).
- ***Goal 1.3****:* Minimize losses to existing property and reduce potential for damage to future development (Objective 1.3.4).

Mitigation Action 4.6: **Landslide Prevention**

Prioritize routine maintenance and repairs of water, sewer, and irrigation lines in and around landslide prone areas to avoid long-term leaks that saturate and de-stabilize earth materials to point of dangerous and destructive landslides.

Lead Department: Water Resources, Community Services, Public Works
Implementation Schedule: Ongoing**;** irrigation lines inspected on quarterly basis
Hazards Addressed: Landslide
Funding Source: General fund
Ranking: Level 2
Goals and Objectives Implemented:

- ***Goal 3.1****:* Balance natural resource management, and land use planning with local hazard mitigation to protect life, property, and the environment (Objectives 3.1.1, 3.1.2).

Mitigation Action 4.7: **Landslide Prevention Development Standards**

Revise the City Grading Ordinance and development standards for hillside properties implemented through the " H" Overlay Zone to include best management practices for landslide prevention. Review the extent of property subject to the overlay to ensure that all landslide potential areas are included and also continue applying the standards to all property meeting the requirements of "Hillside Area" as defined in Development Code Section 58010.

Lead Department: Development Services
Implementation Schedule: Zoning and Development Code currently undergoing update; completion expected by 2023.
Hazards Addressed: Landslide
Funding Source: General fund and grants
Ranking: Level 3
Goals and Objectives Implemented:

- ***Goal 1.2****:* Protect Pomona's unique character and values from being compromised by hazard events (Objective 1.2.3).
- ***Goal 3.1****:* Balance natural resource management, and land use planning with local hazard mitigation to protect life, property, and the environment (Objectives 3.1.1, 3. 1.2).

Mitigation Action 4.8: **Business Community Protection**

During an infectious disease outbreak, businesses can become severely impacted and may require modified operations from what would normally be permitted. Additionally, the city may need to modify normal operations to ensure development applications can continue. To protect the local economy, the following actions should be taken to ensure business operations and development can continue:

- Wave temporary use/special event permit fees,
- Work with businesses to modify operations for social distancing,
- Establish protocol for electronic submission of applications,

- Teleconferencing should be used in place of in person meetings whenever possible.
- Provide information to businesses about grants for PPE.

Lead Department: Development Services
Implementation Schedule: This mitigation was implemented during the COVID19 pandemic and can be implemented as necessary in the event of a surge or a new infectious disease outbreak.
Hazards Addressed: Pandemic/Infectious Disease
Funding Source: General fund and available grant funds
Ranking: Level 1
Goals and Objectives Implemented:

- ***Goal 1.1****:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses (Objectives 1.1.1, 1.1.2).
- ***Goal 5.1****:* Ensure continued operations when the City is impacted by local hazard events (Objectives 5.1.2, 5.1.3, 5.1.4).

RISK REDUCTION FOR COMMUNITY VULNERABILITIES

Mitigation Action 5.1: **Vulnerable Population Services**
Vulnerable populations may be particularly impacted by a pandemic or infectious disease outbreak. The following mitigation can be implemented to reduce those impacts to the most vulnerable populations in the city:

- Employ eviction prevention programs,
- Provide emergency housing vouchers, rental assistance, and legal services,
- Hold vaccination events in areas easily accessible by vulnerable populations,
- Host zoom events for underprivileged children in the community.

Lead Department: Neighborhood Services
Implementation Schedule: This mitigation was implemented during the COVID19 pandemic and can be implemented as necessary in the event of a surge or a new infectious disease outbreak.
Hazards Addressed: Pandemic/Infectious Disease
Funding Source: General fund, and available grant funding including homeless prevention grants
Ranking: Level 4
Goals and Objectives Implemented:

- ***Goal 1.1****:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses (Objectives 1.1.1, 1.1.2, 1.1.3).
- ***Goal 2.1****:* Develop and implement education and outreach programs to increase public awareness of the risks associated with local hazards (Objectives 5.1.1, 5.1.2, 5.1.5).

DEVELOPMENT PLANNING AND REGULATORY FRAMEWORK

***Mitigation Action 6.1:* General Plan and Development Code Update**

In the General Plan Update and associated Zoning Code amendments, integrate the hazards and risk assessment and mitigation in the new policy framework, with special attention to avoidance of new risks from proposed development, protection of environmental resources, appropriate level of public services and facilities, and circulation system effectiveness. As indicated in **Section 1.4**, the Safety Element of the General Plan will be updated to address evacuation routes following the adoption of this LHMP update. Establish development policies that encourage and support redevelopment of aging building stock, consistent with community vision and goals.

Lead Department: Development Services
Implementation Schedule: Development Code update currently underway with completion expected in 2023. Complete General Plan update in the next 4-5 years.
Hazards Addressed: All Hazards
Funding Source: SB 2 grant and general fund
Ranking: Level 3
Goals and Objectives Implemented:

- ***Goal 1.1****:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses (Objective 1.1.3).
- ***Goal 1.2***: Protect Pomona's unique character and values from being compromised by hazard events (Objectives 1.2.2, 1.2.3).
- ***Goal 1.3****:* Minimize losses to existing property and reduce potential for damage to future development (Objectives 1.3.1, 1.3 .4, 1.3.5,1.3.6).
- ***Goal 3.1****:* Balance natural resource management and land use planning with local hazard mitigation to protect life, property, and the environment (Objectives 3.1.1, 3.1.2).

***Mitigation Action 6.2:* Development Project Review for Natural Hazards Risks**

When reviewing proposals for new development and infrastructure improvement projects, identify any natural hazards that have the potential to impact the property. If current building and development codes do not adequately address identified natural hazard impacts associated with a specific project, require additional mitigation to be incorporated into the project. Include this requirement in all project review procedures.

Lead Department: Development Services
Implementation Schedule: Ongoing; case-by-case basis as development projects are submitted to the City.
Hazards Addressed: All Hazards
Funding Source: User fees, permit fees, and environmental review fees
Ranking: Level 1
Goals and Objectives Implemented:

- ***Goal 1.1**:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses (Objective 1.1.3).
- ***Goal 1.2***: Protect Pomona's unique character and values from being compromised by hazard events (Objectives 1.2.2, 1.2.3).
- ***Goal 1.3**:* Minimize losses to existing property and reduce potential for damage to future development (Objectives 1.3.1, 1.3 .4, 1.3.5,1.3.6).
- ***Goal 3.1**:* Balance natural resource management and land use planning with local hazard mitigation to protect life, property, and the environment (Objectives 3.1.1, 3.1.2).

CITY EMERGENCY OPERATION PLAN (EOP) AND STANDARDIZED EMERGENCY MANAGEMENT SYSTEMS (SEMS) PLANNING AND TRAINING

Mitigation Action 7.1: **Pomona SEMS Plan**

Continue to implement the Pomona SEMS Plan contained within the City's EOP*,* which functions as the City's manual for communications protocol in the event of a disaster. Update as needed for consistency with the State SEMS Plan involving interagency communication protocols, and this LHMP. Mobile command center system recently purchased for the Emergency Operation Center.

Lead Department: Risk Management
Implementation Schedule: Ongoing; review SEMS plan annually for consistency with State SEMS Plan.
Hazards Addressed: All Hazards
Funding Source: General plan and grants
Ranking: Level 1
Goals and Objectives Implemented:

- ***Goal 1.1**:* Reduce the potential injury, and economic damage residents and businesses by Emergency preparedness for life loss, to Pomona maximizing capabilities. (Objectives 1.1.2, 1.1.3, 1.1.4).
- ***Goal 2.1**:* Develop and implement education and outreach programs to increase public awareness of the risks associated with local hazards (Objectives 2.1.1, 2.1.2, 2.1.3, 2.1.4).
- ***Goal 4.1**:* Encourage and support leadership within Pomona to promote and implement local hazard mitigation activities (Objectives 4.1.1, 4.1.3, 4.1.4, 4.1.5).
- ***Goal 5.1**:* Ensure continued operations when the City is impacted by local hazard events (Objectives 5.1.2, 5.1.3).

Mitigation Action 7.2: **Emergency Preparedness Drills**

Pursuant to the City's Emergency Operations Plan (EOP)*,* conduct emergency preparedness and response drills for mock major earthquake events, the natural hazard with the greatest potential for injury, loss life, property damage, and service interruptions. Drills should test disaster response systems and communication protocols. When preparing the drills, consider the wide range of potential risks associated with critical facilities and vulnerabilities, such as interrupted service at Pomona Valley Hospital Medical Center, street blockages from paused trains, major power service disruption, etc. Include representatives of City officials and staff, utility providers and the railroad operators, as well as trained community emergency response volunteers and emergency response stakeholders, and representatives of vulnerable facilities.

After the drill, analyze the strengths and weaknesses of the response effort and identify facility and infrastructure deficiencies contributing to response concerns. Use this information to inform priorities established in the LHMP Annual Report.

Lead Department: Risk Management
Implementation Schedule: Ongoing, on annual basis
Hazards Addressed: All Hazards
Funding Source: General plan and grants
Ranking: Level 4
Goals and Objectives Implemented:

- ***Goal 1.1****:* Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses by maximizing emergency preparedness capabilities (Objectives 1.1.1, 1.1.2, 1.1.3, 1.1.4).
- ***Goal 2.1****:* Develop and implement education and outreach programs to increase public awareness of the risks associated with local hazards (Objectives 2.1.1, 2.1.2, 2.1.3, 2.1.4).
- ***Goal 4.1****:* Encourage and support leadership within Pomona to promote and implement local hazard mitigation activities (Objectives 4.1.1, 4.1. 3, 4.1.4, 4.1.5, 5.1.2, 5.1.3, 5.1.4, 5.1.6).

Mitigation Action 7.3: **City Hall Life Safety Planning**

Immediately following a disaster, community members will rely on City staff for assistance and direction. Part of the City's plan for maximizing emergency services must include taking care of staff's emergency needs so that they can function and serve the community. Without the ready services of City staff, the likelihood of hazard impacts to the community could increase.

Update City Hall Life Safety Preparedness Plan, conduct employee training, ensure that each department has complete first-aid kit, and hold emergency evacuation drills at City Hall on an annual basis. In addition, help staff establish reserve of personal emergency supplies, by buying kits at discounted prices and selling at-cost to staff or designating a team captain in each department to help individuals bring in appropriate kit.

Lead Department: Risk Management
Implementation Schedule: Ongoing; drills conducted annually and updates to Life Safety

Preparedness Plan to occur as needed
Hazards Addressed: All Hazards
Funding Source: General fund and grants
Ranking: Level 2
Goals and Objectives Implemented:

- ***Goal 1.1***: Reduce the potential for life loss, injury, and economic damage to Pomona residents and businesses by maximizing emergency preparedness capabilities (Objectives 1.1.1, 1.1. 2).
- ***Goal 5.1***: Ensure continued operations when the City is impacted by local hazard events (Objectives 5.1.4, 5.1.6).

11.4 PROGRESS IN LOCAL MITIGATION EFFORTS

Several Mitigation Actions included in **Section 11.3**, reflect actions that are ongoing as part of regular operations conducted by the City in an effort to mitigate or reduce the impacts of local hazards on the community. Some of these Mitigation Actions have been recently completed but may include some ongoing effort or additional component to complete in entirety. Additionally, some of the Mitigation Actions have been included that were implemented during the COVID 19 pandemic, that may be implemented if a future pandemic or infectious disease outbreak occurs in the City as necessary and based on relevance in a novel situation. The following Mitigation Actions reflect efforts that are ongoing as part of regular City operations:

- Mitigation Action 1.1: Implementation Options for Hazard Mitigation
- Mitigation Action 2.3: Reinforcement of Historic City Facilities
- Mitigation Action 2.4: Establish " Lifeline" Circulation System (component of this action is ongoing)
- Mitigation Action 2.5: Aging Water and Sewer Infrastructure Replacement
- Mitigation Action 2.8: Build and Retrofit Public Buildings and Critical Facilities
- Mitigation Action 3.1: Emergency Preparedness Campaigns
- Mitigation Action 4.1: Unreinforced Masonry Buildings
- Mitigation Action 4.2: Vulnerable Building Reinforcement
- Mitigation Action 4.3: Valuing Heritage
- Mitigation Action 4.4: Reduce Wildfire Threat
- Mitigation Action 4.5: Expanded Code Enforcement in Overcrowded Neighborhoods
- Mitigation Action 4.6: Landslide Prevention
- Mitigation Action 6.2: Development Project Review for Natural Hazards Risks
- Mitigation Action 7.1: Pomona SEMS Plan
- Mitigation Action 7.2: Emergency Preparedness Drills

- Mitigation Action 7.3: City Hall Life Safety Planning

The following Mitigation Action was completed during the preparation of this LHMP update:

- Mitigation Action 2.1: Integrity of Emergency Operation Center

The following Mitigation Actions were implemented during the COVID 19 pandemic and can be reinstated as necessary or relevant:

- Mitigation Action 2.7: City Employee Protection
- Mitigation Action 4.8: Business Community Protection
- Mitigation Action 5.1: Vulnerable Population Services

Appendix A:

Public Participation Survey Materials & TAC Meeting Agendas

PUBLIC SURVEY FLYER – ENGLISH AND SPANISH

PUBLIC SURVEY SOCIAL MEDIA POST

cityofpomona
Pomona, California

Liked by **pomonapd** and **32 others**

cityofpomona Are you prepared for when disaster strikes? We need your feedback! Complete our 2021 Local Hazard Mitigation Plan Survey. Your opinion matters to us. Survey ➡️ bit.ly/PomonaLHMP1

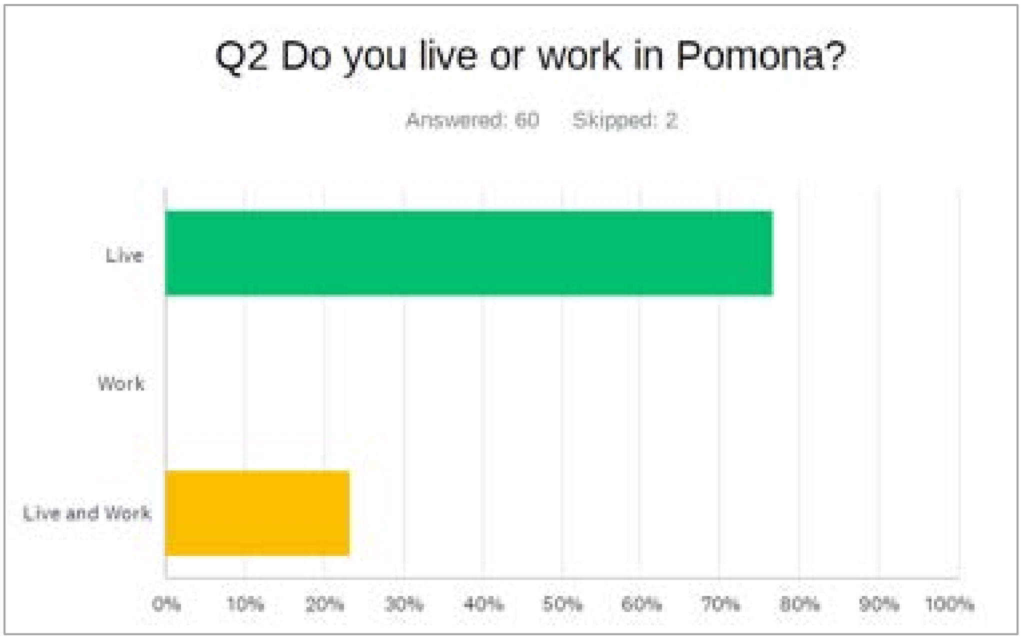
¿Está usted preparado para cuando ocurra un desastre? Necesitamos sus comentarios. Completa nuestra encuesta de actualización del plan de mitigación de peligros locales de 2021. Tu opinión nos importa. Encuesta ➡️ bit.ly/PomonaLHMP2

View 1 comment

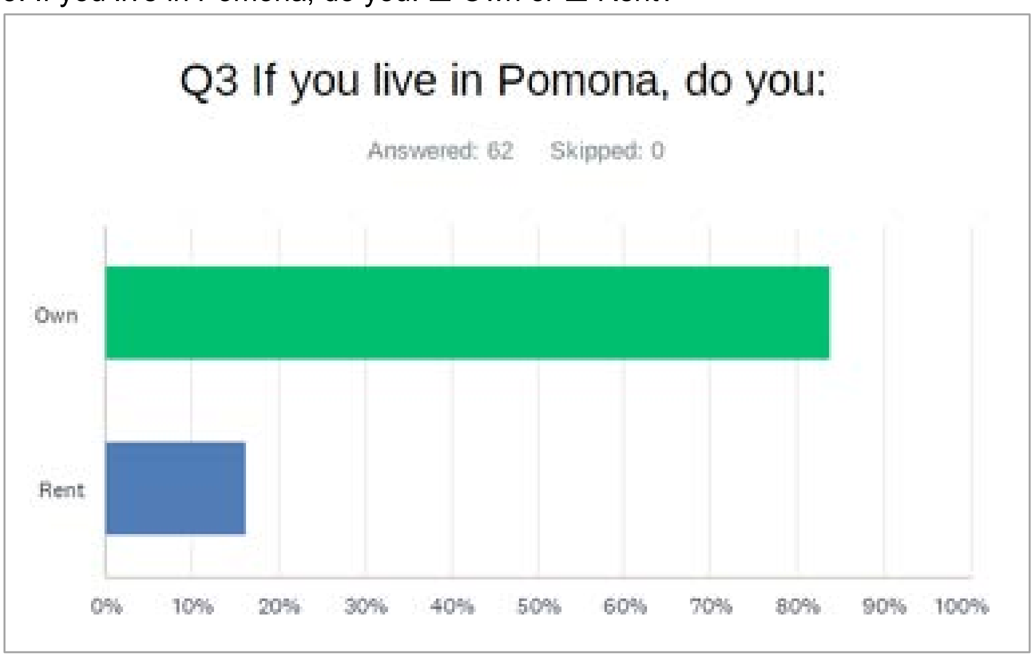
2021 Pomona Local Hazard Mitigation Plan Update Survey

1. Your Zip Code Answers varied and Community Name or Location Answers varied

2. Do you: ☐ Live or ☐ Work in Pomona?



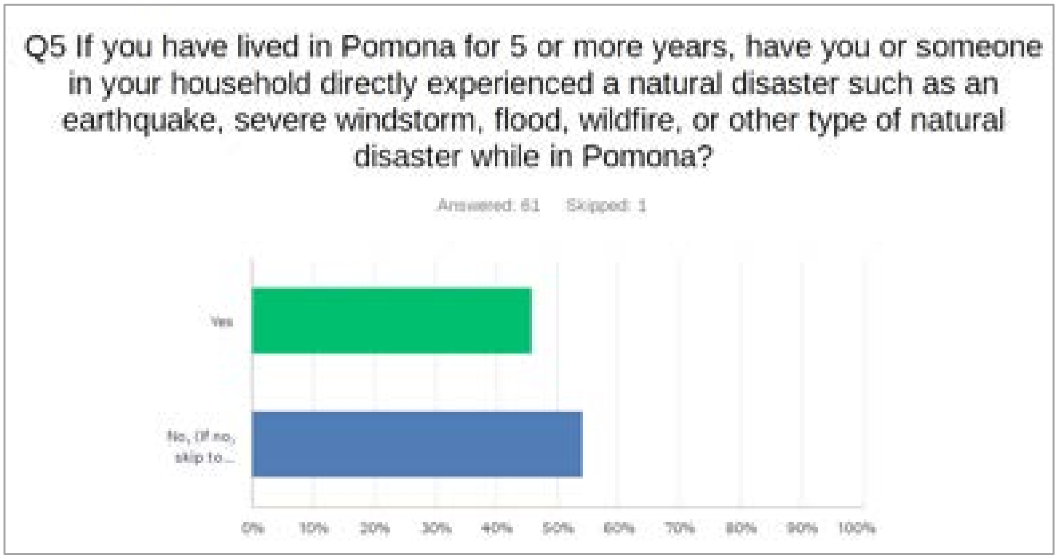
3. If you live in Pomona, do you: ☐ Own or ☐ Rent?



4. If you live in Pomona, how many years? Answers varied from 1 to 50 years.

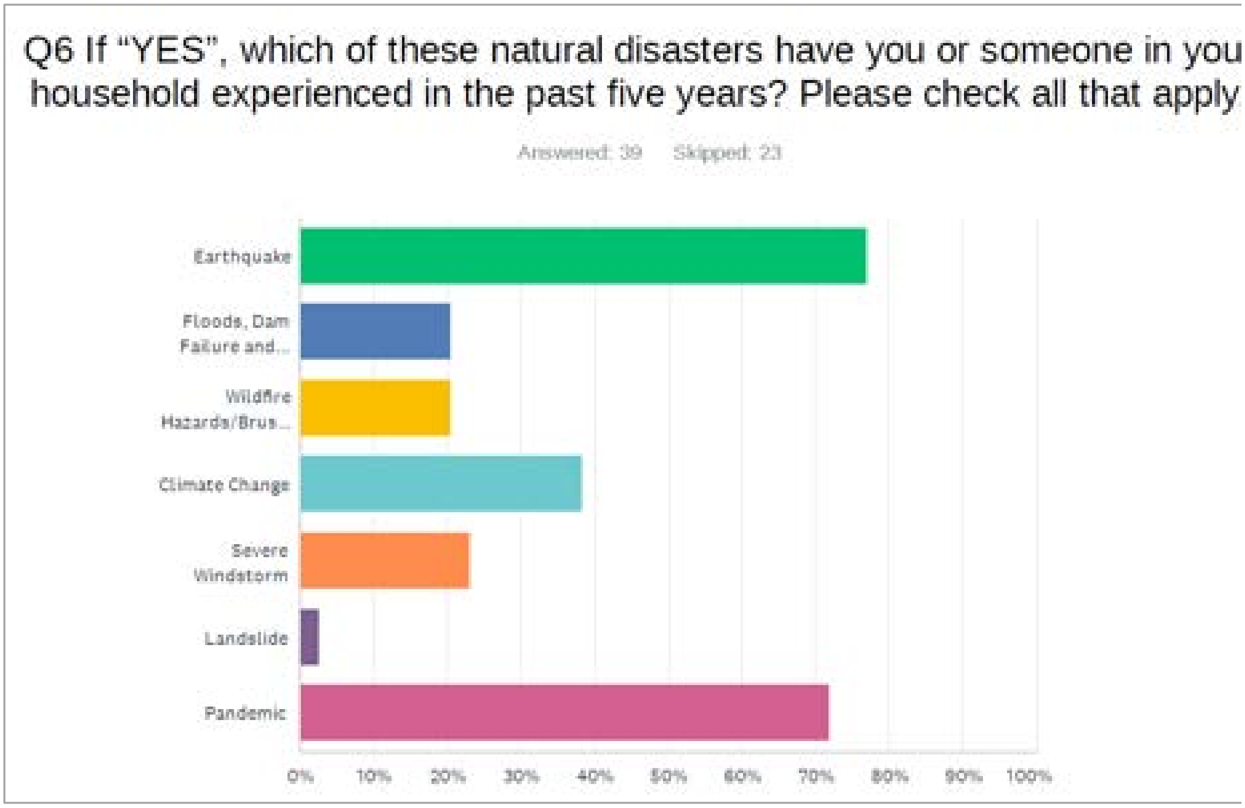
5. If you have lived in Pomona for 5 years or more, have you or someone in your household directly experienced a natural disaster such as an earthquake, severe windstorm, flood, wildfire, or other type of natural disaster while in Pomona?

☐ Yes ☐ No (**IF NO, skip to question 7**)



6. **If "YES"**, which of these natural disasters have you or someone in your household experienced in the past five years? (**Please check all that apply**)

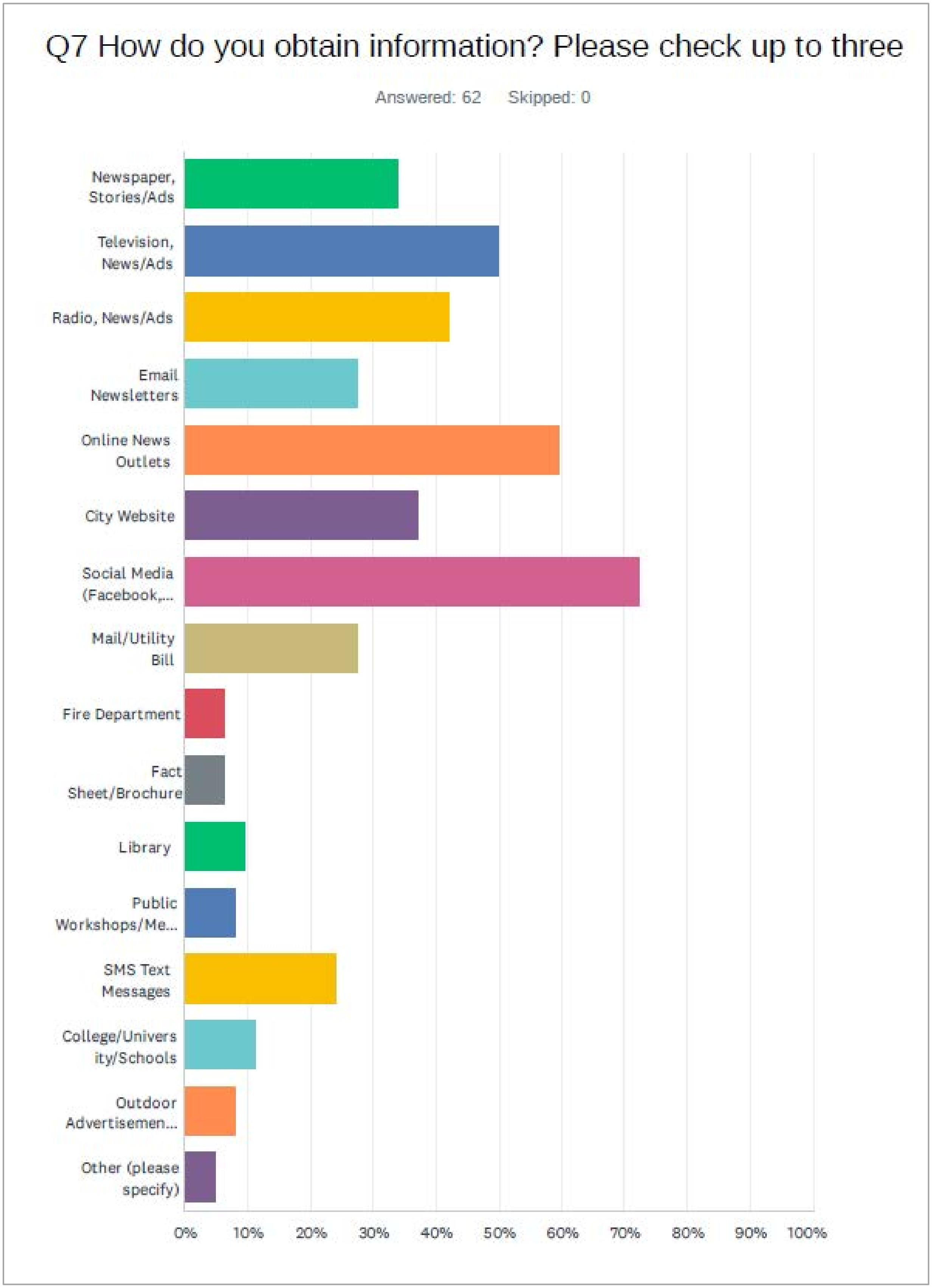
☐ Earthquake
☐ Floods, Dam Failure and Inundation Hazards
☐ Wildfire Hazards/Brush Fire
☐ Climate Change
☐ Severe Windstorm
☐ Landslide
☐ Pandemic



7. How do you get information? (**Please check up to three**)

☐ Newspaper stories/ads
☐ Television news/ads
☐ Radio News/ads
Internet:
☐ Email newsletters
☐ Online news outlets
☐ City web site
☐ Social media (e.g. Facebook, Twitter, Instagram, etc.)

☐ Mail/Utility Bill
☐ Fire Department
☐ Fact sheet/Brochure
☐ Library
☐ Public workshops/Meetings
☐ SMS text message
☐ College/University/Schools
☐ Outdoor advertisements (billboards)
☐ Other: ____________________


Q7 How do you obtain information? Please check up to three
Answered: 62 Skipped: 0
Newspaper, Stories/Ads
Television, News/Ads
Radio, News/Ads
Email Newsletters
Online News Outlets
City Website
Social Media (Facebook,...
Mail/Utility Bill
Fire Department
Fact Sheet/Brochure
Library
Public Workshops/Me...
SMS Text Messages
College/University/Schools
Outdoor Advertisemen...
Other (please specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

#	OTHER (PLEASE SPECIFY)	DATE
1	Nixle	12/18/2021 11:21 AM
2	Nextdoor.com	7/15/2021 10:48 AM
3	People in the community reach out to me for information and to place their articles and ads in our paper to help get the word out.	7/15/2021 10:29 AM

8. How concerned are you about the following hazards?

Natural Disaster	Very Concerned	Somewhat Concerned	Neutral	Not Very Concerned	Not Concerned
Climate Change	☐	☐	☐	☐	☐
Severe Windstorm	☐	☐	☐	☐	☐
Flood, Dam Failure and Inundation Hazards	☐	☐	☐	☐	☐
Wildfire Hazards/Brush Fire	☐	☐	☐	☐	☐
Landslides	☐	☐	☐	☐	☐
Pandemic	☐	☐	☐	☐	☐
Earthquake	☐	☐	☐	☐	☐

2021 Pomona Local Hazard Mitigation Plan Update Survey

	NOT CONCERNED	NOT VERY CONCERNED	NEUTRAL	SOMEWHAT CONCERNED	VERY CONCERNED	TOTAL
Climate Change	1.61% 1	1.61% 1	8.06% 5	17.74% 11	70.97% 44	62
Severe Windstorm	11.67% 7	8.33% 5	35.00% 21	26.67% 16	18.33% 11	60
Flood, Dam Failure and Inundation Hazards	11.29% 7	11.29% 7	40.32% 25	19.35% 12	17.74% 11	62
Wildfire Hazards/Brush Fire	1.64% 1	3.28% 2	14.75% 9	37.70% 23	42.62% 26	61
Landslides	13.33% 8	20.00% 12	35.00% 21	21.67% 13	10.00% 6	60
Pandemic	1.64% 1	6.56% 4	13.11% 8	24.59% 15	54.10% 33	61
Earthquake	0.00% 0	1.64% 1	6.56% 4	36.07% 22	55.74% 34	61

9. Planning ahead for responding to disasters can help lessen their impact. To help the City prioritize its disaster preparedness efforts, please tell us how important each of the following goals is to you.

Goal	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	☐	☐	☐	☐	☐
Protecting critical facilities (hospitals, fire stations, etc.)	☐	☐	☐	☐	☐
Preventing development in hazard areas	☐	☐	☐	☐	☐
Protecting the natural environment	☐	☐	☐	☐	☐
Protecting historical/cultural landmarks, museums, etc.	☐	☐	☐	☐	☐
Promoting cooperation among public and private organizations and citizens	☐	☐	☐	☐	☐
Protecting and reducing damage to utilities	☐	☐	☐	☐	☐
Strengthening emergency services (police, fire, ambulance)	☐	☐	☐	☐	☐
Protecting major employers	☐	☐	☐	☐	☐
Protecting small businesses	☐	☐	☐	☐	☐
Protecting K-12 schools	☐	☐	☐	☐	☐
Protecting Colleges/Universities	☐	☐	☐	☐	☐

	NOT IMPORTANT	NOT VERY IMPORTANT	NEUTRAL	SOMEWHAT IMPORTANT	VERY IMPORTANT	TOTAL
Protecting Private Property	1.64% 1	3.28% 2	4.92% 3	16.39% 10	73.77% 45	61
Protecting Critical Facilities (hospitals, fire stations, etc.)	1.67% 1	1.67% 1	0.00% 0	8.33% 5	88.33% 53	60
Preventing Development in Hazard Areas	4.92% 3	1.64% 1	6.56% 4	29.51% 18	57.38% 35	61
Protecting the Natural Environment	1.67% 1	1.67% 1	6.67% 4	25.00% 15	65.00% 39	60
Protecting Historical/Cultural Landmarks, Museums, etc.	4.92% 3	4.92% 3	16.39% 10	36.07% 22	37.70% 23	61
Promoting Cooperation among Public and Private Organizations and Citizens	3.28% 2	1.64% 1	14.75% 9	21.31% 13	59.02% 36	61
Protecting and Reducing Damage to Utilities	1.64% 1	1.64% 1	1.64% 1	14.75% 9	80.33% 49	61
Strengthening Emergency Services (police, fire, ambulance, etc.)	1.64% 1	1.64% 1	1.64% 1	19.67% 12	75.41% 46	61
Protecting Major Employers	3.28% 2	6.56% 4	39.34% 24	26.23% 16	24.59% 15	61
Protecting Small Businesses	3.28% 2	3.28% 2	21.31% 13	26.23% 16	45.90% 28	61
Protecting K-12 schools	1.67% 1	1.67% 1	20.00% 12	15.00% 9	61.67% 37	60
Protecting Colleges/Universities	3.39% 2	6.78% 4	23.73% 14	18.64% 11	47.46% 28	59

10. Community assets are features, characteristics, or resources that either make a community unique or allow the community to function. Please rank the importance of protecting the following community assets:

Community Assets: **Potential Disaster Impact**	**Very Important**	**Somewhat Important**	**Neutral**	**Not Very Important**	**Not Important**
Human**:** Loss of life and/or injuries	☐	☐	☐	☐	☐
Economic**:** Business closures and/or job losses	☐	☐	☐	☐	☐
Infrastructure**:** Damage or loss of bridges, utilities, schools, etc.	☐	☐	☐	☐	☐
Cultural Historic**:** Damage or loss of libraries, museums, fairgrounds, etc.	☐	☐	☐	☐	☐
Environmental**:** Damage or loss of forests, rangeland, waterways, etc.	☐	☐	☐	☐	☐
Governance**:** Ability to maintain order and/or provide public amenities and services	☐	☐	☐	☐	☐

	NOT IMPORTANT	NOT VERY IMPORTANT	NEUTRAL	SOMEWHAT IMPORTANT	VERY IMPORTANT	TOTAL
Human: Loss of Life and/or Injuries	0.00% 0	1.61% 1	1.61% 1	6.45% 4	90.32% 56	62
Economic: Business Closures and/or Job Losses	1.61% 1	0.00% 0	12.90% 8	29.03% 18	56.45% 35	62
Infrastructure: Damage or Loss of Bridges, Utilities, Schools, etc.	1.61% 1	1.61% 1	3.23% 2	17.74% 11	75.81% 47	62
Cultural Historic: Damage or Loss of Libraries, Museums, Fairgrounds, etc.	3.23% 2	4.84% 3	27.42% 17	22.58% 14	41.94% 26	62
Environmental: Damage or Loss of Forests, Rangeland, Waterways, etc.	1.61% 1	3.23% 2	9.68% 6	25.81% 16	59.68% 37	62
Governance: Ability to Maintain Order and/or Provide Public Amenities and Services	1.64% 1	1.64% 1	6.56% 4	13.11% 8	77.05% 47	61

11. Have you taken any of the following steps to prepare for your household for potential disasters? Check all that apply.

☐ Purchased homeowners/renters insurance
☐ Purchased flood insurance

☐ Floodproofing (elevating furnace, water heaters, electric panels
☐ Installed retrofits such as high impact windows or doors to withstand high winds; fire resistant siding roofing or window

☐ Attended meetings or received written information on natural disasters or emergency preparedness
☐ Talked with family members about what to do in case of a disaster or emergency
☐ Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster

screens, etc.
☐ Installed/maintained firebreaks around the home

☐ Prepared a "Disaster Supply Kit" (extra food, water, batteries, medications, first aid, etc.)

	NOT IMPORTANT	NOT VERY IMPORTANT	NEUTRAL	SOMEWHAT IMPORTANT	VERY IMPORTANT	TOTAL
Human: Loss of Life and/or Injuries	0.00% 0	1.61% 1	1.61% 1	6.45% 4	90.32% 56	62
Economic: Business Closures and/or Job Losses	1.61% 1	0.00% 0	12.90% 8	29.03% 18	56.45% 35	62
Infrastructure: Damage or Loss of Bridges, Utilities, Schools, etc.	1.61% 1	1.61% 1	3.23% 2	17.74% 11	75.81% 47	62
Cultural Historic: Damage or Loss of Libraries, Museums, Fairgrounds, etc.	3.23% 2	4.84% 3	27.42% 17	22.58% 14	41.94% 26	62
Environmental: Damage or Loss of Forests, Rangeland, Waterways, etc.	1.61% 1	3.23% 2	9.68% 6	25.81% 16	59.68% 37	62
Governance: Ability to Maintain Order and/or Provide Public Amenities and Services	1.64% 1	1.64% 1	6.56% 4	13.11% 8	77.05% 47	61

12. How would you rank the following strategies to address pre- and post-disaster damage?

Strategy	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Retrofit and strengthen essential facilities such as police, fire, emergency medical services, hospitals, schools, etc.	☐	☐	☐	☐	☐
Replace inadequate or vulnerable bridges and causeways	☐	☐	☐	☐	☐
Install or improve protective structures, such as floodwalls or levees	☐	☐	☐	☐	☐
Government buys flood-prone properties and returns them to a natural condition	☐	☐	☐	☐	☐
Assist property owners with securing funding to mitigate impacts to their property caused by disasters	☐	☐	☐	☐	☐
Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities, etc.	☐	☐	☐	☐	☐

Strengthen City codes, ordinances, and plans to require high risk management standards	☐	☐	☐	☐	☒
Provide better information about hazard risk and high-hazard areas	☐	☐	☐	☐	☐
Inform property owners of ways they can prevent damage to their properties	☐	☐	☐	☐	☐

	NOT IMPORTANT	NOT VERY IMPORTANT	NEUTRAL	SOMEWHAT IMPORTANT	VERY IMPORTANT	TOTAL
Retrofit and strengthen essential facilities such as police, fire, emergency medical services, hospitals, schools, etc.	1.61% 1	3.23% 2	6.45% 4	24.19% 15	64.52% 40	62
Replace inadequate or vulnerable bridges and causeways	1.61% 1	1.61% 1	3.23% 2	24.19% 15	69.35% 43	62
Install or improve protective structures, such as floodwalls or levees	6.45% 4	6.45% 4	16.13% 10	27.42% 17	43.55% 27	62
Government buys flood-prone properties and returns them to a natural condition	8.06% 5	8.06% 5	30.65% 19	24.19% 15	29.03% 18	62
Assist property owners with securing funding to mitigate impacts to their property caused by disasters	0.00% 0	3.23% 2	14.52% 9	20.97% 13	61.29% 38	62
Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities, etc.)	1.61% 1	1.61% 1	4.84% 3	22.58% 14	69.35% 43	62
Strengthen City codes, ordinances, and plans to require high risk management standards	1.64% 1	6.56% 4	19.67% 12	22.95% 14	49.18% 30	61
Provide better information about hazard risk and high-hazard areas	0.00% 0	1.64% 1	8.20% 5	31.15% 19	59.02% 36	61
Inform property owners of ways they can prevent damage to their properties	0.00% 0	1.61% 1	4.84% 3	24.19% 15	69.35% 43	62

13. Please feel free to provide any additional comments:

Interwest Consulting Group

Contact: Chantal Power, AICP
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E-mail: cpower@interwestgrp.com

Technical Advisory Committee Interview Agenda—Neighborhood Services
January 27, 2022

1. Discuss outstanding questions:
   - A. List of transitional housing and senior care facilities
   - B. Information about Housing Division rental and mortgage assistance, housing and rehab and façade improvement programs
   - C. List of community centers and City Parks
   - D. YMCA

2. Discuss mitigation actions from previous Hazard Mitigation Plan
   - A. Landslide prevention (5.6) - Community Services?
   - B. Stabilizing Ganesha Park slopes (5.8) - Community Services?
   - C. Vulnerable population services (6.2) - New; this was added to the pandemic section of the update

3. Discuss any new mitigation actions that should be included in update, considering the following:
   - A. Projects already planned for—studies, funding, commencement, completion in the next 5 years (implementation schedule)
   - C. Funding
   - D. Hazard(s) addressed
   - E. Goals and objectives addressed

Interwest Consulting Group

Contact: Chantal Power, AICP
Phone: 909-754-1653
E-mail: cpower@interwestgrp.com

Technical Advisory Committee Interview Agenda—Water Resources
February 3, 2022

1. Discuss outstanding questions:
   - A. Retrofits since last HMP update
   - B. Mitigations implemented following 2003 report regarding structural stability of city reservoirs
   - C. City ground water wells
   - D. City reservoirs, and retrofits

2. Discuss mitigation actions from previous Hazard Mitigation Plan
   - A. Implementation options for hazard mitigation (1.2)
   - B. Water reservoir seismic retrofit completion (2.5)
   - C. Aging water and sewer infrastructure replacement (2.6)
   - D. City employee protection (2.9) - New; added for new pandemic section
   - E. Landslide prevention (5.6)

3. Discuss any new mitigation actions that should be included in update, considering the following:
   - A. Projects already planned for studies, funding, commencement, completion in the next 5 years (implementation schedule)
   - C. Funding
   - D. Hazard(s) addressed
   - E. Goals and objectives addressed

Interwest Consulting Group

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E-mail: cpower@interwestgrp.com

Technical Advisory Committee Interview Agenda—Public Works
February 3, 2022

1. Discuss outstanding questions:
   - A. Retrofits since last HMP update
   - B. Mitigations implemented following 2003 Ganesha Park landslide report
   - C. Wastewater diverted to JWPCP in Carson
   - D. Areas of flood concern

2. Discuss mitigation actions from previous Hazard Mitigation Plan
   - A. Implementation options for hazard mitigation (1.2)
   - B. Establish "Lifeline" circulation system (2.4)
   - C. Localized flood control improvements (2.7)
   - D. City employee protection (2.9) - New; added for new pandemic section
   - E. Landslide prevention (5.6)

3. Discuss any new mitigation actions that should be included in update, considering the following:
   - A. Completion of Goldline
   - B. Public Works/CIP projects already planned for studies, funding, commencement, completion in the next 5 years (implementation schedule)
   - C. Funding
   - D. Hazard(s) addressed
   - E. Goals and objectives addressed

Interwest Consulting Group

Contact: Chantal Power, AICP
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Technical Advisory Committee Interview Agenda—Water Resources
February 7, 2022

1. Discuss outstanding questions:
   - A. Copy of SEMS Plan

2. Discuss mitigation actions from previous Hazard Mitigation Plan
   - A. Mitigation Actions under outside agency authority (2.8 & 4.2)
     - 1) Back-up medical services (2.8)
     - 2) Community emergency volunteers
   - B. Coordinator and LHMP committee (1.1)
   - C. Integrity of emergency operation center system (2.1)
   - D. Back-up emergency operations center (2.2)
   - E. Hazard mitigation partners (4.3)
   - F. Pomona SEMS Plan (8.1)
   - G. Emergency preparedness drills (8.2)
   - H. Decentralized emergency supplies and equipment (8.3)
   - I. City Hall life safety planning (8.4)

3. Discuss any new mitigation actions that should be included in update, considering the following:
   - A. Projects already planned for studies, funding, commencement, completion in the next 5 years (implementation schedule)
   - C. Funding
   - D. Hazard(s) addressed
   - E. Goals and objectives addressed

Interwest Consulting Group

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Technical Advisory Committee Interview Agenda—Development Services
February 14, 2022

1. Discuss outstanding questions:
   - A. URM buildings in the City
   - B. URM City owned facilities
   - C. List of Historic Resources
   - D. Housing Element—overcrowded neighborhoods and soft-story multi-family housing
   - E. Safety Element update pursuant to SB 99 and AB 747
   - F. Housing vs population growth number, percent of housing types, and vacancy rates
   - G. Properties on National Register of Historic Places, Historic Landmarks, Pomona's Landmark Register
   - H. Percent of City located in liquefaction zones
   - I. Construction date of facilities used during emergencies

2. Discuss mitigation actions from previous Hazard Mitigation Plan
   - A. Implementation options for hazard mitigation (1.2)
   - B. Reinforcement of other City facilities (2.3)
   - C. Establish "Lifeline" circulation system (2.4)
   - D. Unreinforced masonry buildings (5.1)
   - E. Vulnerable buildings reinforced (5.2)
   - F. Valuing heritage (5.3)
   - G. Reduce wildfire threat (5.4)
   - H. Expanded Code Enforcement in overcrowded neighborhoods (5.5)
   - I. Landslide prevention development standards (5.7)
   - J. Business community protection (5.9); New, added for pandemic hazards
   - K. General Plan and Development Code update (7.1)
   - L. Development project review for natural hazards risks (7.2)

3. Discuss any new mitigation actions that should be included in update.

Interwest Consulting Group

Contact: Chantal Power, AICP
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Technical Advisory Committee Interview Agenda—Police Department
March 7, 2022

1. Discuss mitigation actions from previous Hazard Mitigation Plan
   A. Early Warning Systems and Local Consideration (3.1)
   B. Emergency Preparedness Campaigns (4.1)
   C. Accelerated Emergency Response for Vulnerable Populations (6.1)

2. Discuss any new mitigation actions that should be included in update.

Appendix B:

HAZUS Report

RiskMAP
Increasing Resilience Together

Hazus: Earthquake Global Risk Report

Region Name: Pomona

Earthquake Scenario: M6.7-San Jose v10

Print Date: May 28, 2021

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

California

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.91 square miles and contains 30 census tracts. There are over 38 thousand households in the region which has a total population of 150,389 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 33 thousand buildings in the region with a total building replacement value (excluding contents) of 12,985 (millions of dollars). Approximately 93.00 % of the buildings (and 75.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,147 and 562 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 33 thousand buildings in the region which have an aggregate total replacement value of 12,985 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 87% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 555 beds. There are 50 schools, 8 fire stations, 2 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 6 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 2,709.00 (millions of dollars). This inventory includes over 108.12 miles of highways, 67 bridges, 1,121.57 miles of pipes.

Table 1: Transportation System Lifeline Inventory

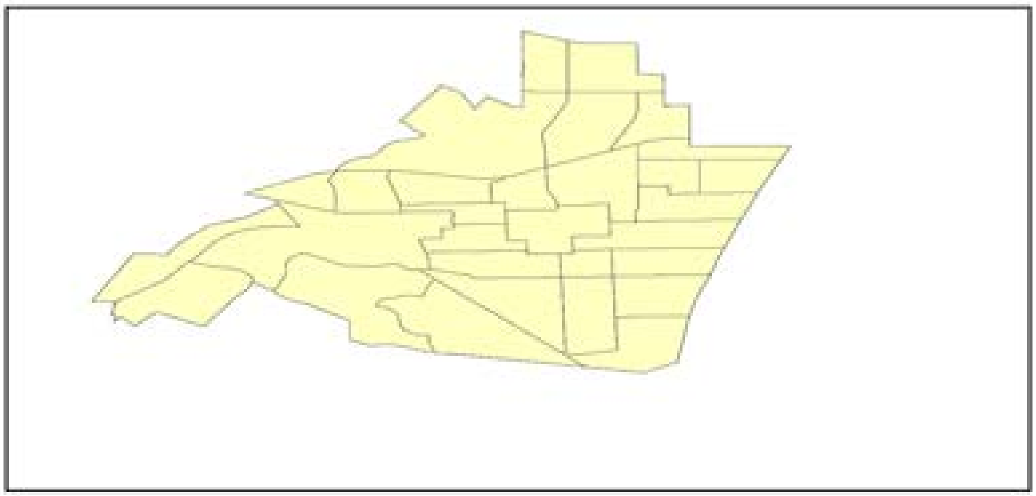
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	67	460.9871
	Segments	113	1454.3228
	Tunnels	0	0.0000
		Subtotal	**1915.3099**
Railways	Bridges	7	40.0446
	Facilities	2	5.3260
	Segments	64	114.5126
	Tunnels	0	0.0000
		Subtotal	**159.8833**
Light Rail	Bridges	0	0.0000
	Facilities	2	7.3224
	Segments	4	50.5316
	Tunnels	0	0.0000
		Subtotal	**57.8540**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	1	14.4161
	Runways	0	0.0000
		Subtotal	**14.4161**
		Total	**2,147.50**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	18.0546
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**18.0546**
Waste Water	Distribution Lines	NA	10.8328
	Facilities	2	327.2234
	Pipelines	0	0.0000
		Subtotal	**338.0562**
Natural Gas	Distribution Lines	NA	7.2218
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**7.2218**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	1	199.0800
		Subtotal	**199.0800**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**562.40**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	M6.7-San Jose v10
Type of Earthquake	
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	0.00
Latitude of Epicenter	0.00
Earthquake Magnitude	6.66
Depth (km)	0.00
Rupture Length (Km)	0.00
Rupture Orientation (degrees)	0.00
Attenuation Function	

HAZUS EARTHQUAKE · WIND · FLOOD · TSUNAMI

FEMA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 11,492 buildings will be at least moderately damaged. This is over 34.00 % of the buildings in the region. There are an estimated 899 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

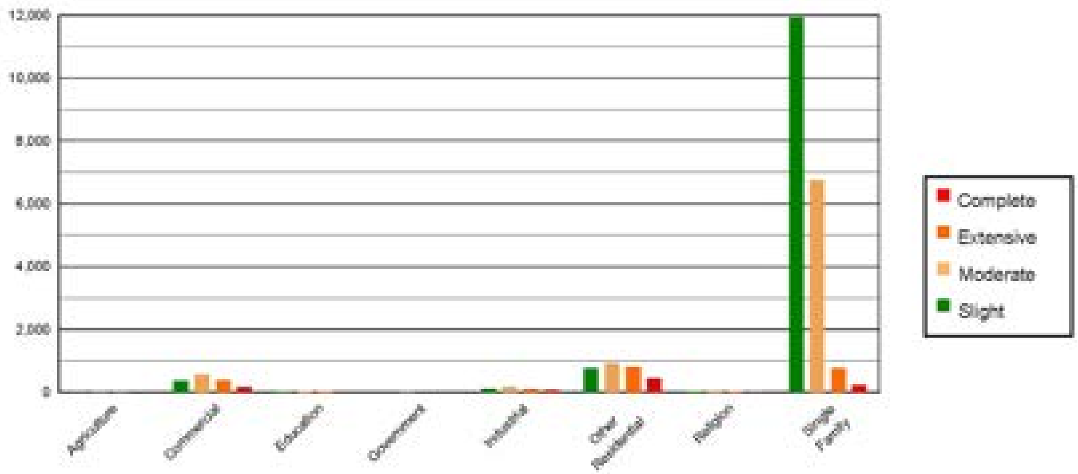


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	7.29	0.08	10.73	0.08	11.67	0.14	6.10	0.29	3.01	0.33
Commercial	238.98	2.77	360.95	2.73	566.60	6.67	365.56	17.39	162.91	18.10
Education	18.99	0.22	24.78	0.19	27.19	0.32	13.38	0.64	4.66	0.52
Government	2.37	0.03	3.52	0.03	5.50	0.06	3.86	0.18	1.75	0.19
Industrial	60.74	0.71	93.99	0.71	164.91	1.94	113.17	5.38	54.19	6.02
Other Residential	452.06	5.25	768.73	5.81	925.52	10.90	798.66	38.00	447.04	49.68
Religion	24.94	0.29	35.75	0.27	44.41	0.52	27.58	1.31	12.32	1.37
Single Family	7807.31	90.65	11926.17	90.18	6745.15	79.44	773.37	36.80	213.99	23.78
Total	**8,613**		**13,225**		**8,491**		**2,102**		**900**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	8205.56	95.27	12606.14	95.32	7130.26	83.97	800.43	38.09	231.46	25.72
Steel	62.62	0.73	90.96	0.69	200.70	2.36	155.27	7.39	68.88	7.65
Concrete	80.75	0.94	130.03	0.98	164.70	1.94	111.84	5.32	50.49	5.61
Precast	52.56	0.61	87.56	0.66	179.38	2.11	126.32	6.01	55.88	6.21
RM	181.73	2.11	176.17	1.33	292.93	3.45	197.65	9.40	59.08	6.57
URM	10.74	0.12	22.89	0.17	48.54	0.57	39.45	1.88	35.68	3.96
MH	18.73	0.22	111.89	0.85	474.64	5.59	670.72	31.91	398.41	44.27
Total	**8,613**		**13,225**		**8,491**		**2,102**		**900**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 555 hospital beds available for use. On the day of the earthquake, the model estimates that only 59 hospital beds (11.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 26.00% of the beds will be back in service. By 30 days, 63.00% will be operational.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	3	3	0	0
Schools	50	43	0	0
EOCs	1	1	0	0
PoliceStations	2	2	0	0
FireStations	8	6	0	0

Transportation Lifeline Damage

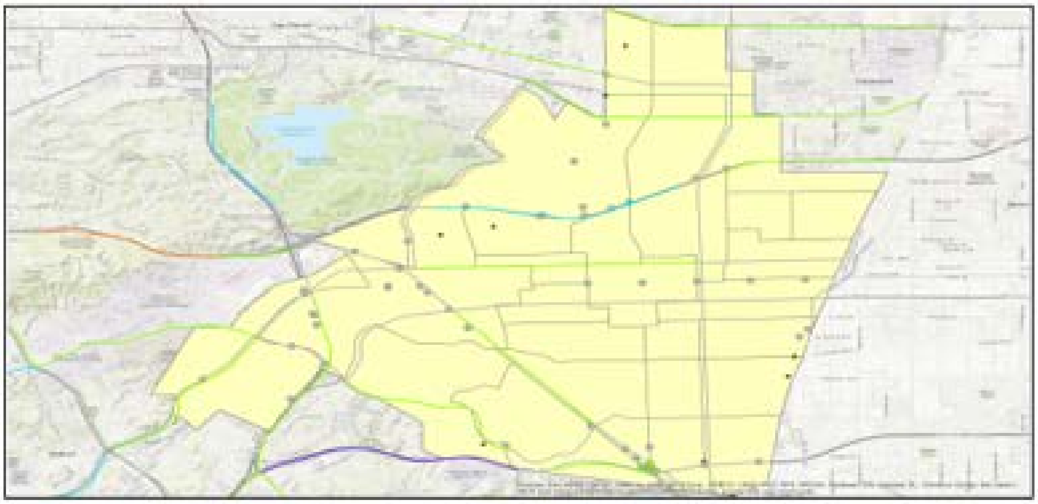


Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	113	0	0	113	113
	Bridges	67	5	0	62	65
	Tunnels	0	0	0	0	0
Railways	Segments	64	0	0	64	64
	Bridges	7	0	0	7	7
	Tunnels	0	0	0	0	0
	Facilities	2	2	0	2	2
Light Rail	Segments	4	0	0	3	3
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	2	2	0	2	2
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	1	1	0	1	1
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	2	2	0	0	2
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	1	1	0	0	1
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	561	520	130
Waste Water	337	261	65
Natural Gas	224	89	22
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	38,360	21,882	10,734	0	0	0
Electric Power		21,580	12,759	4,889	881	31

Induced Earthquake Damage

Fire Following Earthquake

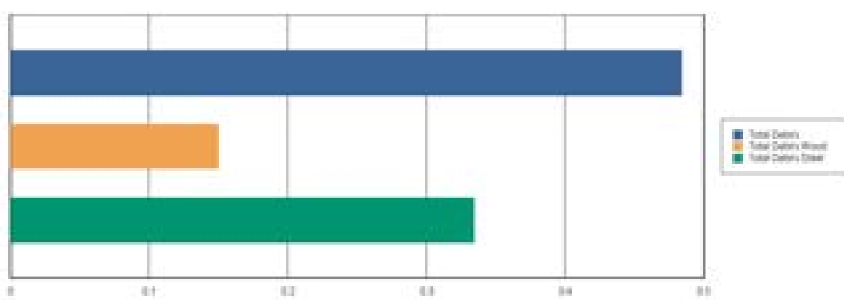
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 3 ignitions that will burn about 0.04 sq. mi 0.18 % of the region's total area.) The model also estimates that the fires will displace about 506 people and burn about 31 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 484,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 31.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 19,360 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



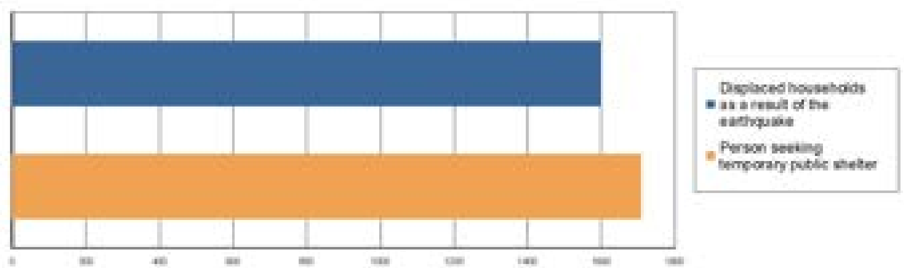
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.15	0.33	0.48	19,360 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1,599 households to be displaced due to the earthquake. Of these, 1,708 people (out of a total population of 150,389) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
1,599	1,708

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	10.60	3.03	0.49	0.96
	Commuting	0.03	0.07	0.08	0.02
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	20.04	5.48	0.83	1.64
	Other-Residential	221.85	53.32	6.12	11.60
	Single Family	165.69	24.49	1.21	2.10
	Total	**418**	**86**	**9**	**16**
2 PM	Commercial	640.02	179.18	28.92	56.83
	Commuting	0.30	0.59	0.76	0.16
	Educational	239.88	65.88	10.65	20.83
	Hotels	0.00	0.00	0.00	0.00
	Industrial	147.67	40.29	6.16	11.99
	Other-Residential	48.69	11.75	1.39	2.56
	Single Family	35.87	5.36	0.31	0.46
	Total	**1,112**	**303**	**48**	**93**
5 PM	Commercial	458.61	128.01	20.72	40.22
	Commuting	4.87	9.41	12.03	2.52
	Educational	23.33	6.44	1.05	2.05
	Hotels	0.00	0.00	0.00	0.00
	Industrial	92.29	25.18	3.85	7.49
	Other-Residential	83.22	20.07	2.37	4.38
	Single Family	64.27	9.60	0.56	0.81
	Total	**726**	**199**	**41**	**57**

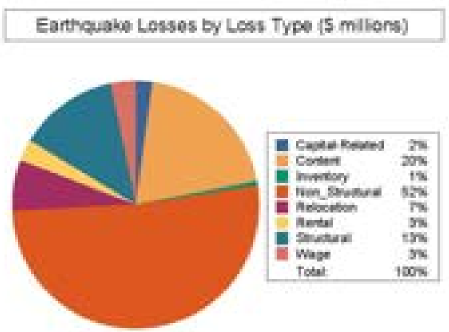
Economic Loss

The total economic loss estimated for the earthquake is 2,487.94 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 2,278.18 (millions of dollars); 15 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 51 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.



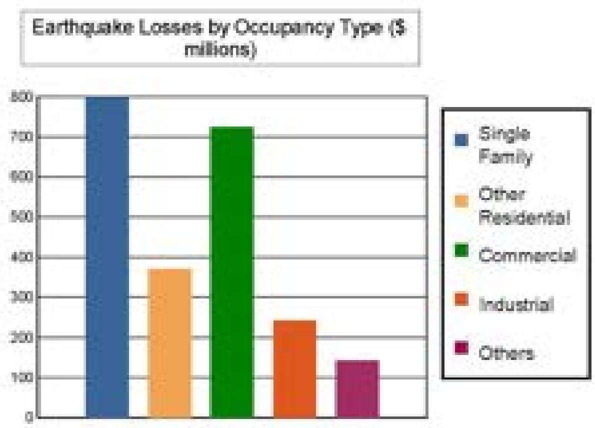


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	4.0557	66.2671	4.1600	3.4403	77.9231
	Capital-Related	0.0000	1.7220	47.3160	2.5948	1.3086	52.9414
	Rental	15.9428	17.0835	28.5176	1.5857	1.9733	65.1029
	Relocation	58.1384	14.7344	50.3301	7.3132	18.5282	149.0443
	Subtotal	**74.0812**	**37.5956**	**192.4308**	**15.6537**	**25.2504**	**345.0117**
Capital Stock Losses							
	Structural	96.9492	44.6101	105.5313	31.5851	16.9782	295.6539
	Non_Structural	480.5309	234.2282	284.3100	109.6361	67.8937	1,176.5989
	Content	147.7758	54.2318	137.6300	73.6736	32.4963	445.8075
	Inventory	0.0000	0.0000	4.2226	10.7916	0.0965	15.1107
	Subtotal	**725.2559**	**333.0701**	**531.6939**	**225.6864**	**117.4647**	**1933.1710**
	Total	**799.34**	**370.67**	**724.12**	**241.34**	**142.72**	**2278.18**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1454.3228	0.0000	0.00
	Bridges	460.9871	32.2888	7.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**1915.3099**	**32.2888**	
Railways	Segments	114.5125	0.0000	0.00
	Bridges	40.0448	2.8890	7.21
	Tunnels	0.0000	0.0000	0.00
	Facilities	5.3260	2.2704	42.63
	Subtotal	**159.8833**	**5.1594**	
Light Rail	Segments	50.5316	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	7.3224	3.1301	42.75
	Subtotal	**57.8540**	**3.1301**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	14.4161	5.7830	40.11
	Runways	0.0000	0.0000	0.00
	Subtotal	**14.4161**	**5.7830**	
	Total	**2,147.46**	**46.36**	

Table 13: Utility System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	18.0546	2.3395	12.96
	Subtotal	**18.0546**	**2.3395**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	327.2234	98.0345	29.96
	Distribution Lines	10.8328	1.1752	10.85
	Subtotal	**338.0562**	**99.2097**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	7.2218	0.4026	5.57
	Subtotal	**7.2218**	**0.4026**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	199.0800	61.4431	30.86
	Subtotal	**199.0800**	**61.4431**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**562.41**	**163.39**	

Appendix A: County Listing for the Region

Los Angeles,CA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
California					
	Los Angeles	150,389	9,731	3,254	12,985
Total Region		**150,389**	**9,731**	**3,254**	**12,985**

Appendix C:

Resource Directory &

Pomona Organizational Charts

APPENDIX C: RESOURCE DIRECTORY

The Resource Directory, provided by the Disaster Management Area D Coordinator, provides contact information for local, regional, state, and federal programs that are currently involved in hazard mitigation activities. The Hazard Mitigation Action Committee may refer to the organizations on the following pages for resources and technical assistance. The Resource Directory provides a foundation for potential partners in action item implementation.

American Public Works Association

Level: National
Hazard: Multi
http://www.apwa.net
2345 Grand Boulevard, Suite 500, Kansas City, MO 64108-2641
Ph: 816.472.1610

Notes: The American Public Works Association is an international educational and professional association of public agencies, private sector companies, and individuals dedicated to providing high quality public works goods and services.

Association of State Floodplain Manager

Level: Federal
Hazard: Flood
www.floods.org
2809 Fish Hatchery Road, Madison WI 53713
Ph: 608.274.0123

Notes: The Association of State Floodplain Managers is an organization of professionals involved in floodplain management, flood hazard mitigation, the National Flood Insurance Program, and flood preparedness, warning and recovery

Building Seismic Safety Council (BSSC)

Level: National
Hazard: Earthquake
www.bssconline.org
1090 Vermont Avenue NW, Suite 700, Washington DC, 20005
Ph: 202.289.7800

Notes: The Building Seismic Safety Council (BSSC) develops and promotes building earthquake risk mitigation regulatory provisions for the nation.

California Department of Transportation (Cal-Trans)

Level: State
Hazard: Multi
http://www.dot.ca.gov/
120 S. Spring Street, Los Angeles, CA 90012
Ph: 213.897.3656

Notes: CalTrans is responsible for the design, construction, maintenance, and operation of the California State Highway System, as well as that portion of the Interstate Highway System within the state's boundaries. Alone and in partnership with Amtrak, Caltrans is also involved in the support of intercity passenger rail service in California.

California Resources Agency

Level: State
Hazard: Multi
http://resources.ca.gov/
1416 Ninth Street, Suite 1331, Sacramento, CA 95814
Ph: 916.653.5656

Notes: The California Resources Agency restores, protects and manages the state's natural, historical and cultural resources for current and future generations using solutions based on science, collaboration and respect for all the communities and interests involved.

California Division of Forestry (CDF)

Level: State
Hazard: Multi
http://www.fire.ca.gov/php/index.php
210 W. San Jacinto, Perris, CA 92570
Ph: 909.940.6900

Notes: The California Department of Forestry and Fire Protection protects over 31 million acres of California's privately-owned wildlands. CDF emphasizes the management and protection of California's natural resources.

California Division of Mines and Geology (DMG)

Level: State
Hazard: Multi
www.consrv.ca.gov/cgs/index.htm
801 K Street, MS 12-30, Sacramento, CA 95814
Ph: 916.445.1825

Notes: The California Geological Survey devel-ops and disseminates technical information and advice on California's geology, geologic hazards, and mineral resources.

California Environmental Resources Evaluation System (CERES)

Level: State
Hazard: Multi
http://ceres.ca.gov/
900 N. Street, Suite 250, Sacramento, CA 95814
Ph: 916.653.2238

Notes: CERES is an excellent website for access to environmental information and websites.

California Department of Water Resources (DWR)

Level: State
Hazard: Flood
http://www.dwr.water.ca.gov
1416 9th Street, Sacramento, CA 95814

Ph: 916.653.6192

Notes: The Department of Water Resources manages the water resources of California in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments.

California Department of Conservation: Southern California Regional Office

Level: State
Hazard: Multi
www.consrv.ca.gov
655 S. Hope Street, #700, Los Angeles, CA 90017-2321
Ph: 213.239.0878

Notes: The Department of Conservation provides services and information that promote environmental health, economic vitality, informed land-use decisions and sound management of our state's natural resources.

EPA, Region 9

Level: Regional
Hazard: Multi
http://epa.gov/region09
75 Hawthorne Street, San Francisco, CA 94105
Ph: 415.947.8000

Notes: The mission of the U.S. Environmental Protection Agency is to protect human health and to safeguard the natural environment through the themes of air and global climate change, water, land, communities and ecosystems, and compliance and environmental stewardship.

Federal Emergency Management Agency, Region IX

Level: Federal
Hazard: Multi
www.fema.gov
1111 Broadway, Suite 1200, Oakland, CA 94607
Ph: 510.627.7100

Notes: The Federal Emergency Management Agency is tasked with responding to, planning for, recovering from and mitigating against disasters.

Federal Emergency Management Agency, Mitigation Division

Level: Federal
Hazard: Multi
www.fema.gov/fima/planhowto.shtm
500 C. Street, SQ, Washington, DC 20472
Ph: 202.566.1600

Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities of which provide citizens Protection, with flood insurance, Prevention, with mitigation measures and Partnerships, with communities throughout the country.

Floodplain Management Association

Level: Federal
Hazard: Flood
www.floodplain.org
P.O. Box 50891, Sparks, NV 89435-0891
Ph: 775.626.6389

Notes: The Floodplain Management Association is a nonprofit educational association. It was established in 1990 to promote the reduction of flood losses and to encourage the protection and enhancement of natural floodplain values. Members include representatives of federal, state and local government agencies as well as private firms.

Gateway Cities Partnership

Level: Regional
Hazard: Multi
www.gatewaycities.org
7300 Alondra Blvd., Suite 202, Paramount, CA 90723
Ph: 562.817.0820

Notes: Gateway Cities Partnership is a 501-C3 non-profit Community Development Corporation for the Gateway Cities region of southeast LA County. The region comprises 27 cities that roughly speaking extends from Montebello on the north to Long Beach on the South, the Alameda Corridor on the west to the Orange County line on the east.

Governor's Office of Emergency Services (OES)

Level: State
Hazard: Multi
www .oes.ca.gov
P.O. Box 419047, Rancho Cordova, CA 95741-9047
Ph: 916.845.8911

Notes: The Governor's Office of Emergency Services coordinates overall state agency response to major disasters in support of local government. The office is responsible for assuring the state's readiness to respond to and recover from natural, manmade, and war-caused emergencies, and for assisting local governments in their emergency preparedness, response and recovery efforts.

Governor's Office of Planning and Research

Level: State
Hazard: Multi
https://www.opr.ca.gov/about/contact-us.html
1400 Tenth Street, Sacramento, CA 95814
Ph: 916.322.2318

Notes: The Governor's Office of Planning and Research studies future research and planning needs, fosters goal-driven collaboration, and delivers guidance to state partners and local communities, with a focus on land use and community development, climate risk and resilience, and high road economic development.

Landslide Hazards Program, USGS

Level: Federal
Hazard: Landslide
http:// lands I ides.usgs.gov/index.htmI

12201 Sunrise Valley Drive, Reston, VA 20192
Ph: 703.648.4000

Notes: The NLIC website provides good information on the rograms and resources regarding landslides. The page includes information on the National Landslide Hazards Program Information Center, a bibliography, publications, and current projects. USGS scientists are working to reduce long-term losses and casualties from landslide hazards through better understanding of the causes and mechanisms of ground failure both nationally and worldwide.

Los Angeles County Economic Development Corporation

Level: Regional
Hazard: Multi
www.laedc.org
444 S. Flower Street, Los Angeles, CA 90071
Ph: 213.236.4813

Notes: The LAEDC is a private, non-profit 501 (c) 3 organization established in 1981 with the mission to attract, retain and grow businesses and jobs in the Los Angeles region. The LAEDC is widely relied upon for its Southern California Economic Forecasts and Industry Trend Reports. Lead by the renowned Jack Kyser (Sr. Vice President, Chief Economist) his team of re-searchers produces numerous publications to help business, media and government navigate the LA region's diverse economy.

Los Angeles County Public Works Department

Level: County
Hazard: Multi
http://ladpw.org
900 S. Fremont Ave., Alhambra, CA 91803
Ph: 626.458.5100

Notes: The Los Angeles County Department of Public Works protects property and promotes public safety through Flood Control, Water Conservation, Road Maintenance, Bridges, Buses and Bicycle Trails, Building and Safety, Land Development, Waterworks, Sewers, Engineering, Capital Projects and Airports.

National Wildland/Urban Interface Fire Program

Level: Federal
Hazard: Wildfire
www.firewise.org/
1 Batterymarch Park, Quincy, MA 02169-7471
Ph: 617.770.3000

Notes: Firewise maintains a Website designed for people who live in wildfire-prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire protection information and checklists, as well as listings of other publications, videos, and conferences.

National Resources Conservation Service

Level: Federal
Hazard: Multi
http://www.nrcs.usda.gov/
14th and Independ-ence Ave., SW, Washington, DC 20250
Ph: 202.720.7246

Notes: NRCS assists owners of America's private land with conserving their soil, water, and other natural resources, by delivering technical assistance based on sound science and suited to a customer's specific needs. Cost shares and financial incentives are available in some cases.

National lnteragency Fire Center (NIFC)

Level: Federal
Hazard: Wildfire
www.nifc.gov
3833 S. Development Ave., Boise, Idaho 83705-5354
Ph: 208.387.5512

Notes: The NIFC in Boise, Idaho is the nation's support center for wildland firefighting. Seven federal agencies work together to coordinate and support wildland fire and disaster operations.

National Fire Protection Association (NFPA)

Level: National

Hazard: Wildfire
http://www.nfpa.org/catalog/home/index.asp
1 Batterymarch Park, Quincy, MA 02 I 69-7471
Ph: 617.770.3000

Notes: The mission of the international non-profit NFPA is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating scientifically based consensus codes and standards, research, training and education.

National Floodplain Insurance Program (NFIP)

Level: Federal
Hazard: Flood
www.fema.gov/nfip/
500 C Street, S. W., Washington, O.C. 20472
Ph: 202.566.1600

Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities of which provide citizens Protection, with flood insurance, Prevention, with mitigation measures and Partnerships, with communities throughout the country.

National Oceanic /Atmospheric Administration

Level: Federal
Hazard: Multi
www.noaa.gov
14th Street & Constitution Ave NW, Washington, DC 20230
Ph: 202.482.6090

Notes: NOAA's historical role has been to predict environmental changes, protect life and property, provide decision makers with reliable scientific information, and foster global environmental stewardship.

National Weather Service, Office of Hydrologic Development

Level: Federal
Hazard: Flood
http://www.nws.noaa.gov/

1325 East West Highway, SSMC2, Silver Spring, MD 20910
Ph: 301.713.1658

Notes: The Office of Hydrologic Development (OHO) enhances National Weather Service products by infusing new hydrologic science, developing hydrologic techniques for operational use, managing hydrologic development by NWS field office, providing advanced hydrologic products to meet needs identified by NWS customers.

National Weather Service

Level: Federal
Hazard: Multi
http://www.nws.noaa.gov/
520 North Elevar Street, Oxnard, CA 93030
Ph: 805.988.6615

Notes: The National Weather Service is responsible for providing weather service to the nation. It is charged with the responsibility of observing and reporting the weather and with issuing forecasts and warnings of weather and floods in the interest of national safety and economy. Briefly, the priorities for service to the nation are: 1. protection of life, 2. protection of property, and 3. promotion of the nation's welfare and economy.

San Gabriel Valley Economic Partnership

Level: Regional
Hazard: Multi
www.valleynet.org
4900 Rivergrade Road, Irwindale, CA 91706
Ph: 626.856.3400

Notes: The San Gabriel Valley Economic Partnership is a non-profit corporation representing both public and private sectors. The Partnership is the exclusive source for San Gabriel Valley specific information, expertise, consulting, products, services, and events. It is the single organization in the Valley with the mission to sustain and build the regional economy for the mutual benefit of all thirty cities, chambers of commerce, academic institutions, businesses, and residents.

Sanitation Districts of Los Angeles County

Level: County
Hazard: Flood
http://www.lacsd.ora/
1955 Workman Mill Road, Whittier, CA 90607
Ph: 562.699.7411 x 2301

Notes: The South Bay Economic Development Partnership is a collaboration of business, labor, education and government. Its primary goal is to plan and implement an economic development and marketing strategy designed to retain and create jobs and stimulate economic growth in the South Bay of Los Angeles County.

South Coast Air Quality Management District (AQMD)

Level: Regional
Hazard: Multi
www.aqmd.gov
21865 E. Copley Drive, Diamond Bar, CA 91765
Ph: 800.CUT.SMOG

Notes: AQMD is a regional government agency that seeks to achieve and maintain healthful air quality through a comprehensive program of research, regulations, enforcement, and communication. The AQMD covers Los Angeles and Orange Counties and parts of Riverside and San Bernardino Counties.

Southern California Earthquake Center (SCEC)

Level: Regional
Hazard: Earthquake
www.scec.org
3651 Trousdale Parkway, Suite 169, Los Angeles, CA 90089-0742
Ph: 213.740.5843

Notes: The Southern California Earthquake Center (SCEC) gathers new information about earthquakes in Southern California, integrates this information into a comprehensive and predictive understanding of earthquake phenomena, and communicates this understanding to end-users and the general public in order to increase earthquake awareness, reduce economic losses, and save lives.

Southern California Association of Governments (SCAG)

Level: Regional
Hazard: Multi
www.scag.ca.gov
818 W. Seventh Street, 12^{th} floor, Los Angeles, CA 90017
Ph: 213.236.1800

Notes: The Southern California Association of Governments functions as the Metropolitan Planning Organization for six counties: Los Angeles, Orange, San Bernardino, Riverside, Ventura and Imperial. As the designated Metropolitan Planning Organization, the Association of Governments is mandated by the federal government to research and draw up plans for transportation, growth management, hazardous waste management, and air quality.

State Fire Marshal (SFM)

Level: State
Hazard: Wildfire
http://osfm.fire.ca.gov
1131 "S" Street, Sacramento, CA 95814
Ph: 916.445.8200

Notes: The Office of the State Fire Marshal (SFM) supports the mission of the California Department of Forestry and Fire Protection (CDF) by focusing on fire prevention. SFM regulates buildings in which people live, controls substances which may, cause injuries, death and destruction by fire; provides statewide direction for fire prevention within wildland areas; regulates hazardous liquid pipelines; reviews regulations and building standards; and trains and educates in fire protection methods and responsibilities.

The Community Rating System (CRS)

Level: Federal
Hazard: Flood
http://www.fema.gov/nfip/crs.shtm
500 C Street, S. W., Washington, D.C. 20472
Ph: 202.566.1600

Notes: The Community Rating System (CRS) recognizes community floodplain management efforts that go beyond the minimum requirements of the NFlP. Property owners within the County would receive reduced NFIP flood insurance premiums if the County implements floodplain management practices that qualify it for a CRS rating. For further information on the CRS, visit FEMA's website.

United States Geological Survey

Level: Federal
Hazard: Multi
http://www.usgs.gov/
345 Middlefield Road, Menlo Park, CA 94025
Ph: 650.853.8300

Notes: The USGS provides reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

US Army Corps of Engineers

Level: Federal
Hazard: Multi
http://www.usaace.army.mil
P.O. Box 532711, Los Angeles CA 90053- 2325
Ph: 213.452.3921

Notes: The United States Army Corps of Engineers work in engineering and environmental matters. A workforce of biologists, engineers, geologists, hydrologists, natural resource managers and other professionals provide engineering services to the nation including planning, designing, building and operating water resources and other civil works projects.

USDA Forest Service

Level: Federal
Hazard: Wildfire

http://www.fs.fed.us
1400 Independence Ave. SW, Washington, D.C. 20250-0002
Ph: 202.205.8333

Notes: The Forest Service is an agency of the U.S. Department of Agriculture. The Forest Service manages public lands in national forests and grasslands.

USGS Water Resources

Level: Federal
Hazard: Multi
www.water.usgs.gov
6000 J Street, Sacramento, CA 95819-6129
Ph: 916.278.3000

Notes: The USGS Water Resources mission is to provide water information that benefits the Nation's citizens: publications, data, maps, and applications software.

Western States Seismic Policy Council (WSSPC)

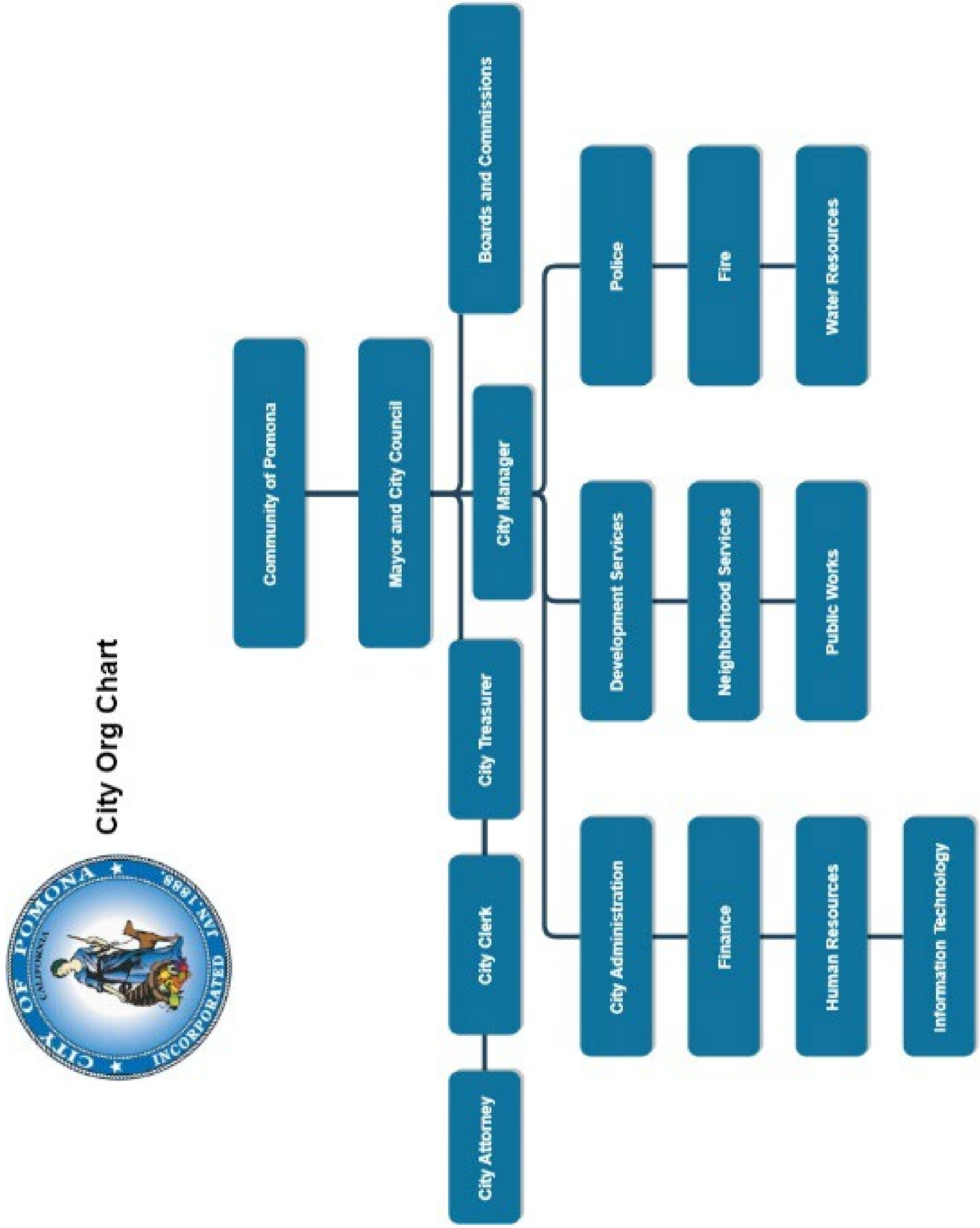
Level: Regional
Hazard: Earthquake
www.wsspc.org/home.html
125 California Avenue, Palo Alto, CA 94306
Ph: 650.330.1101

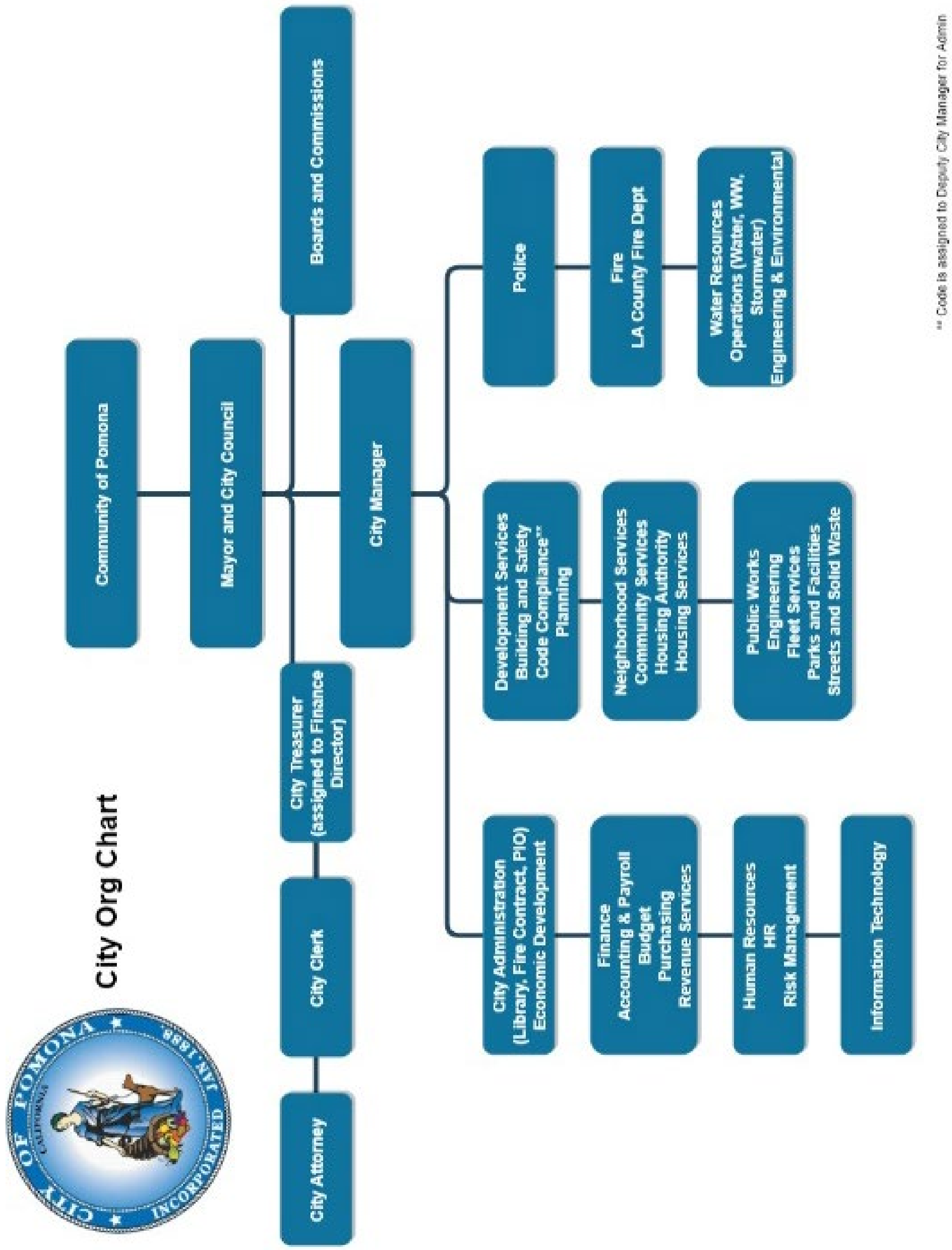
Notes: WSSPC is a regional earthquake consortium funded mainly by FEMA. Its website is a great resource, with information clearly categorized - from policy to engineering to education.

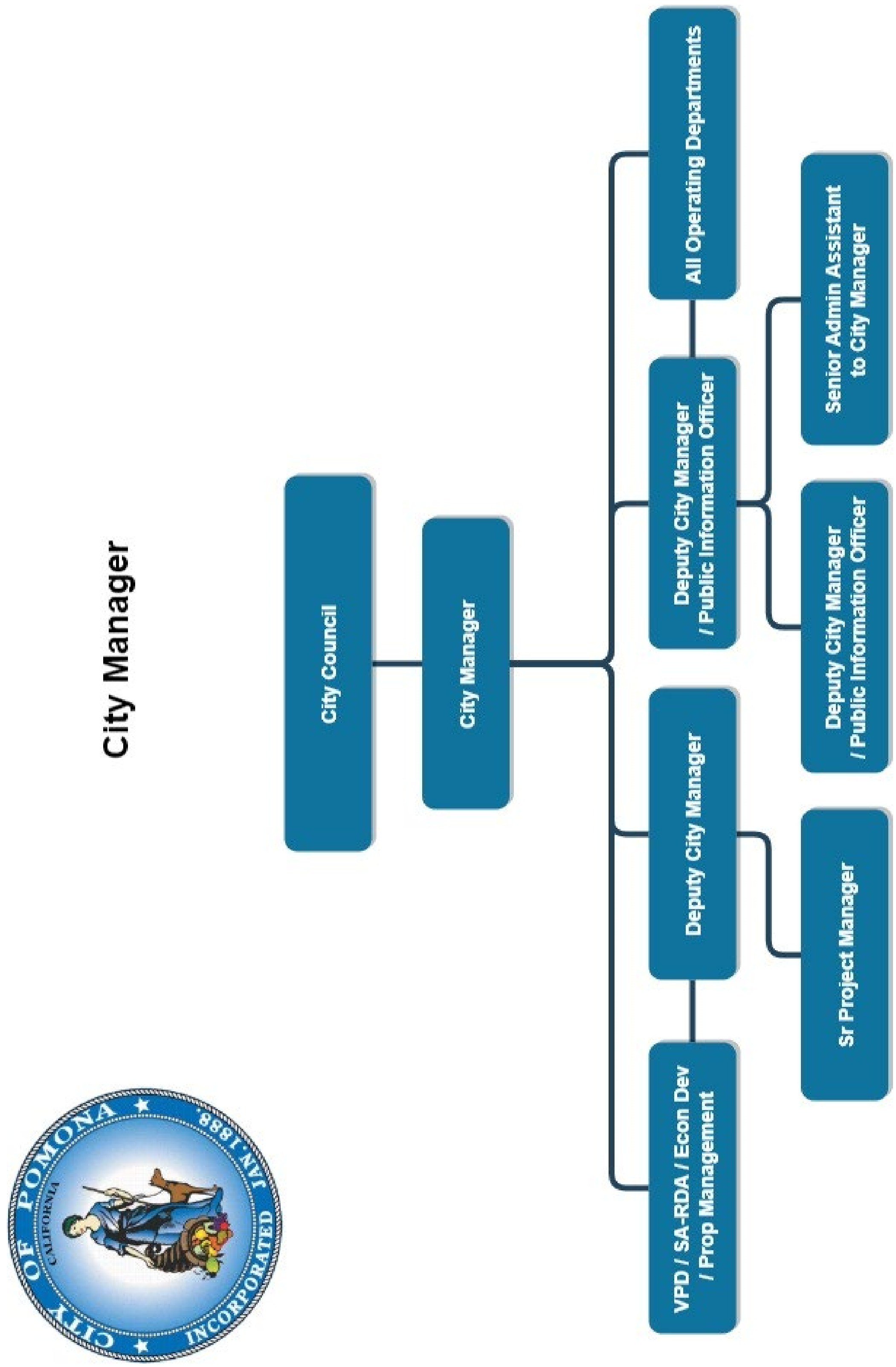
Westside Economic Collaborative C/O Pacific Western Bank

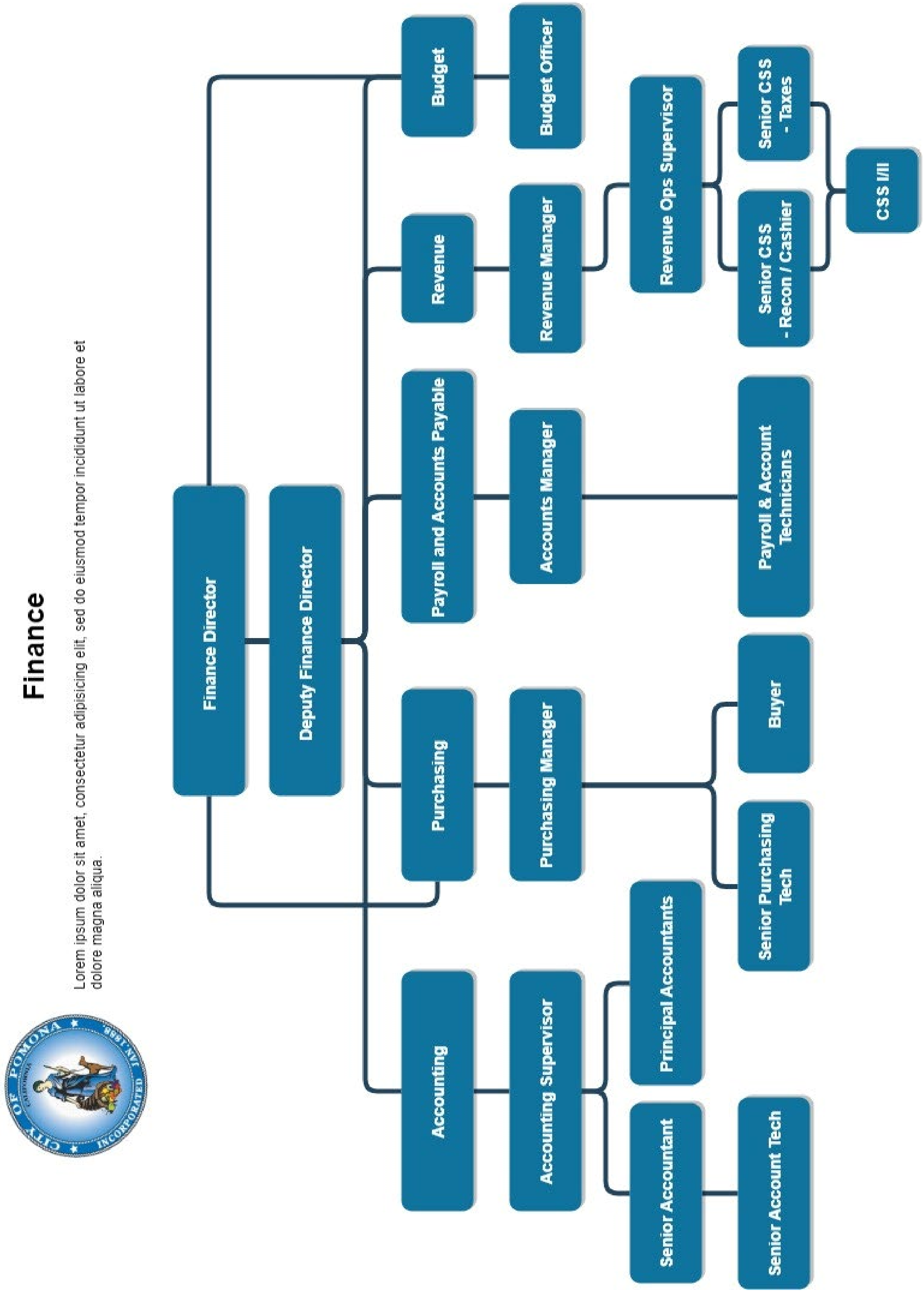
Level: Regional
Hazard: Multi
http://www.westside-la.or
120 Wilshire Boulevard, Santa Monica, CA 90401
Ph: 310.458.1521

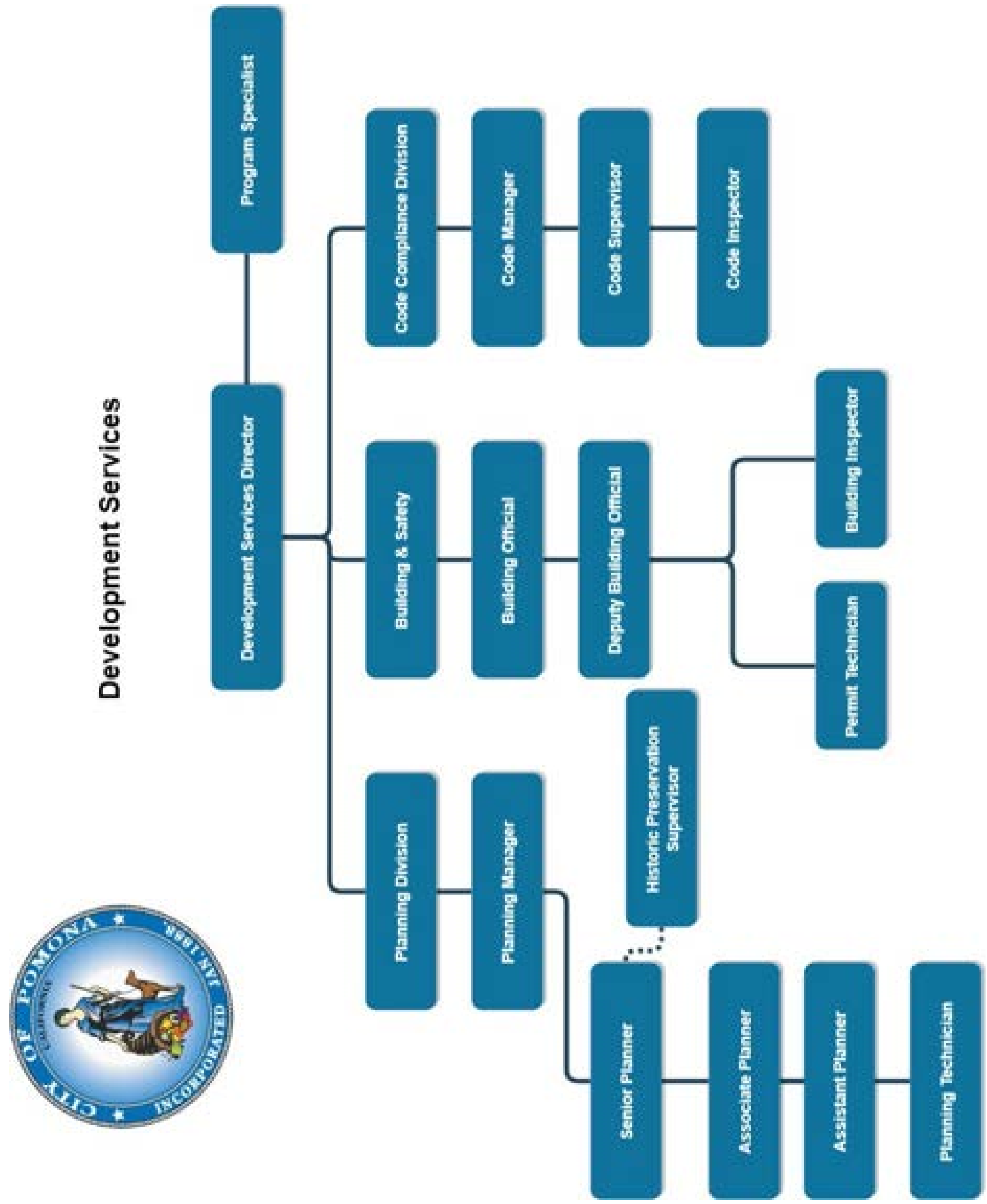
Notes: The Westside Economic Development Collaborative is the first Westside regional economic development corporation. The Westside EDC functions as an information gatherer and resource center, as well as a forum, through bringing business, government, and residents together to address issues affecting the region: Economic Diversity, Transportation, Housing, Workforce Training and Retraining, Lifelong Learning, Tourism, and Embracing Diversity.

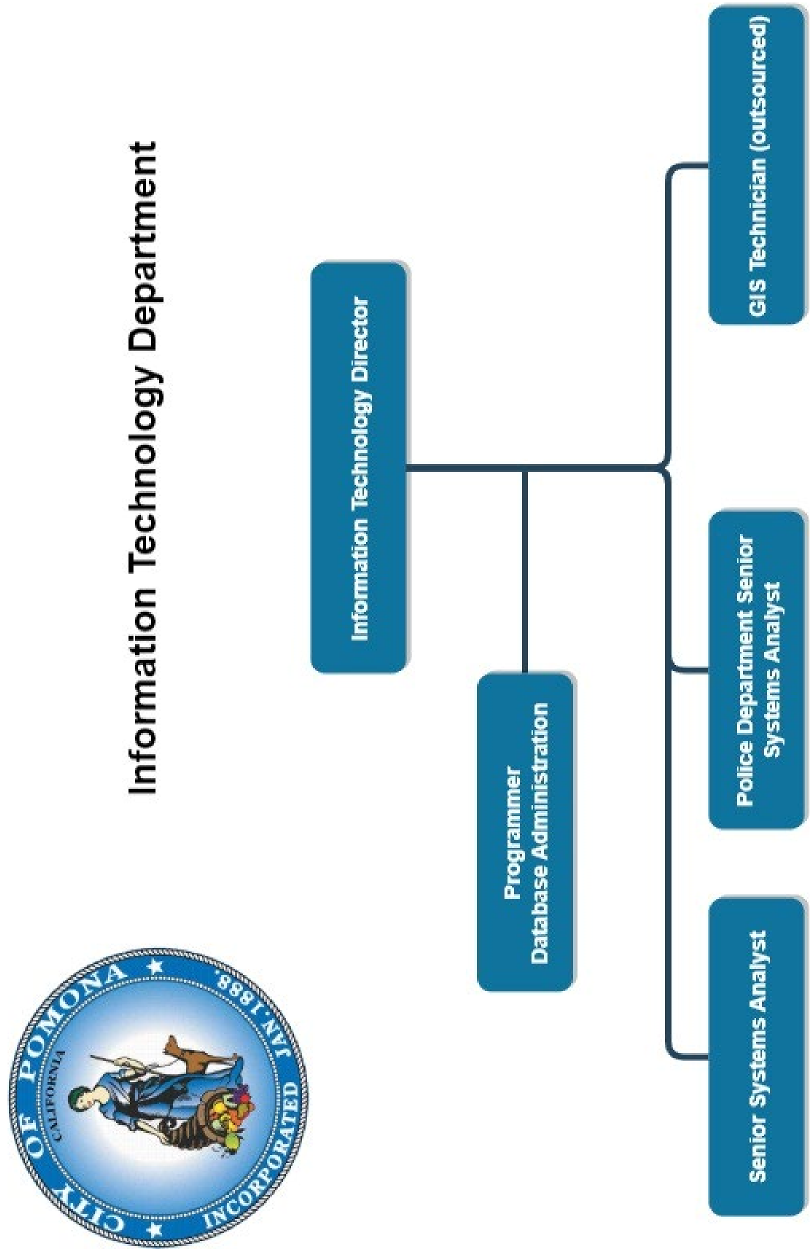

City Org Chart
Community of Pomona
Mayor and City Council
Boards and Commissions
City Manager
City Treasurer
City Clerk
City Attorney
Police
Fire
Water Resources
Development Services
Neighborhood Services
Public Works
City Administration
Finance
Human Resources
Information Technology

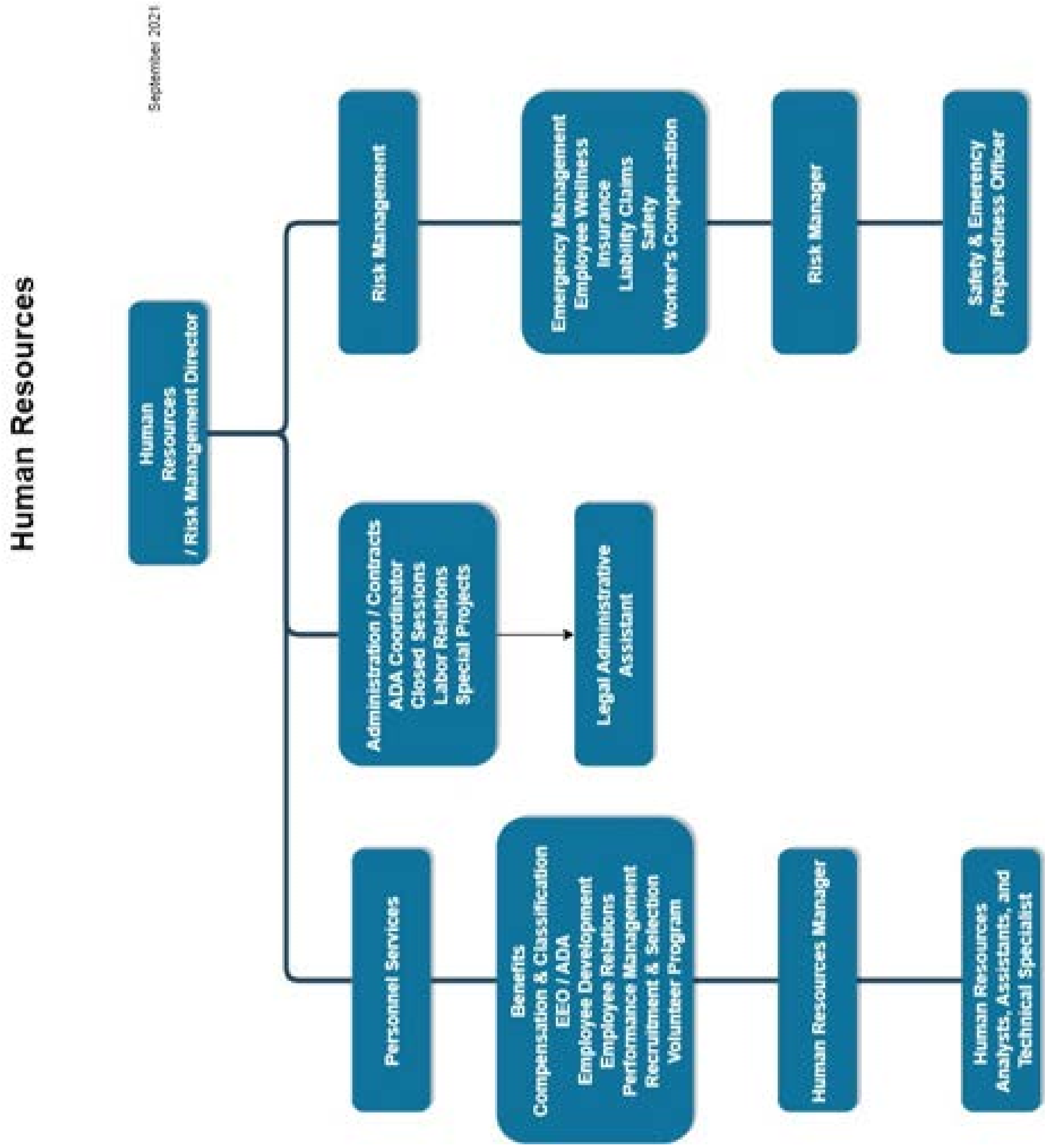

City Org Chart
CITY OF POMONA
CALIFORNIA
INCORPORATED JAN. 1888
Community of Pomona
Mayor and City Council
Boards and Commissions
City Manager
City Attorney
City Clerk
City Treasurer (assigned to Finance Director)
Police
Fire
LA County Fire Dept
Water Resources
Operations (Water, WW, Stormwater)
Engineering & Environmental
Development Services
Building and Safety
Code Compliance**
Planning
Neighborhood Services
Community Services
Housing Authority
Housing Services
Public Works
Engineering
Fleet Services
Parks and Facilities
Streets and Solid Waste
City Administration
(Library, Fire Contract, PIO)
Economic Development
Finance
Accounting & Payroll
Budget
Purchasing
Revenue Services
Human Resources
HR
Risk Management
Information Technology
** Code is assigned to Deputy City Manager for Admin

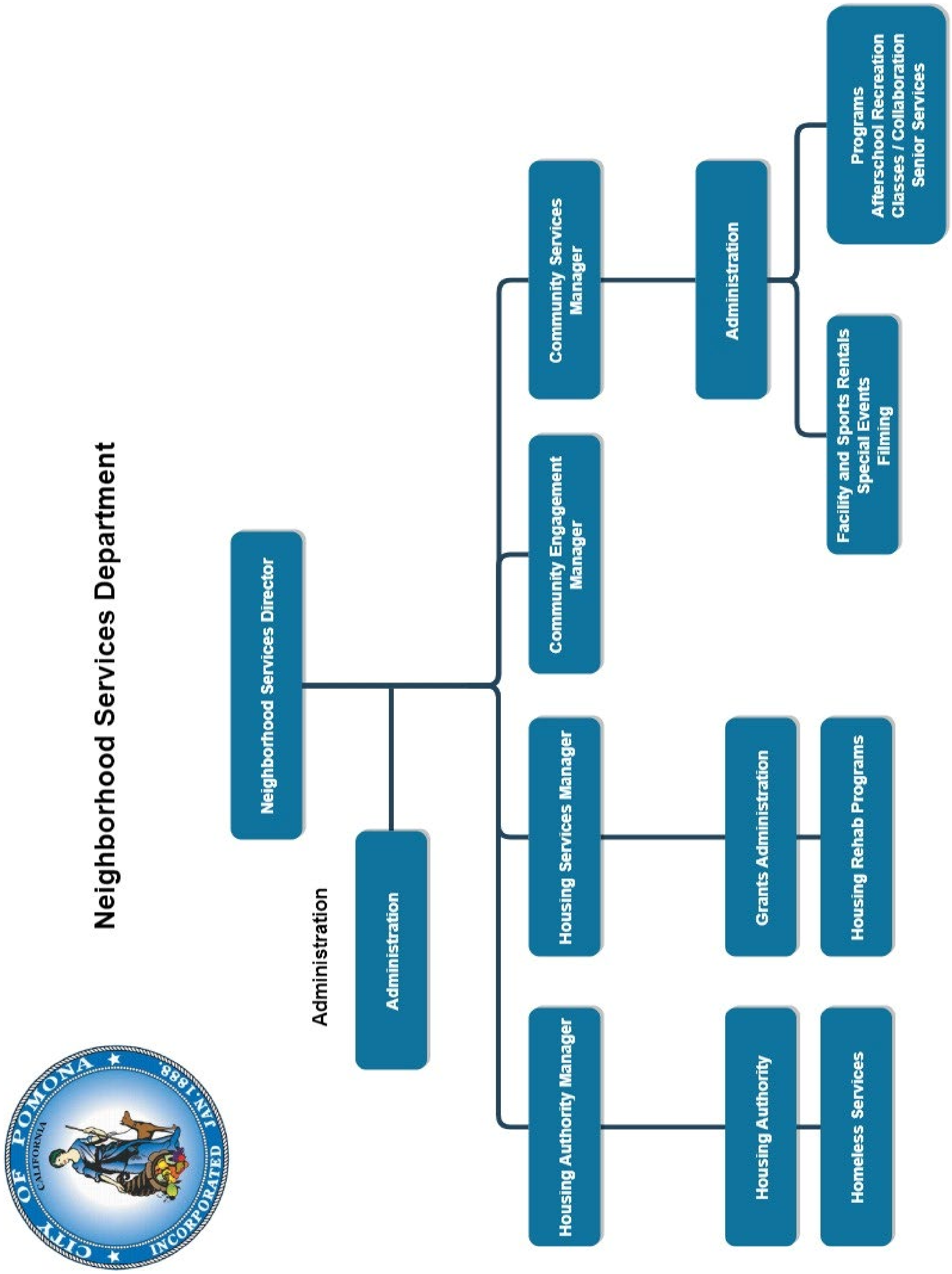

City Manager
City Council
City Manager
VPD / SA-RDA / Econ Dev / Prop Management
Deputy City Manager
Deputy City Manager / Public Information Officer
All Operating Departments
Sr Project Manager
Deputy City Manager / Public Information Officer
Senior Admin Assistant to City Manager

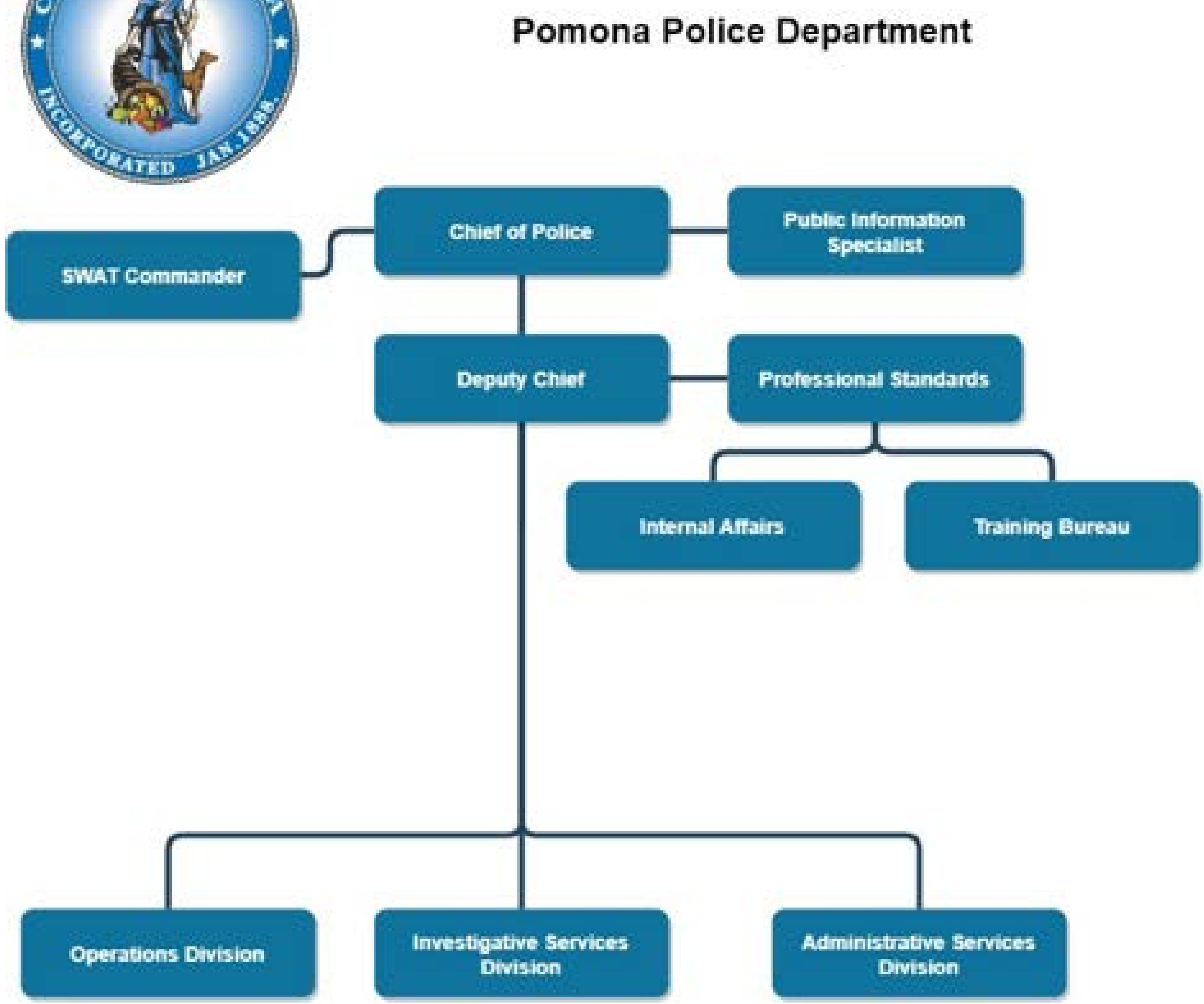

Finance
Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
Finance Director
Deputy Finance Director
Budget
Budget Officer
Revenue
Revenue Manager
Revenue Ops Supervisor
Senior CSS - Taxes
Senior CSS - Recon / Cashier
CSS I/II
Payroll and Accounts Payable
Accounts Manager
Payroll & Account Technicians
Purchasing
Purchasing Manager
Buyer
Senior Purchasing Tech
Accounting
Accounting Supervisor
Principal Accountants
Senior Accountant
Senior Account Tech


Development Services
Development Services Director
Program Specialist
Code Compliance Division
Code Manager
Code Supervisor
Code Inspector
Building & Safety
Building Official
Deputy Building Official
Building Inspector
Permit Technician
Planning Division
Planning Manager
Historic Preservation Supervisor
Senior Planner
Associate Planner
Assistant Planner
Planning Technician

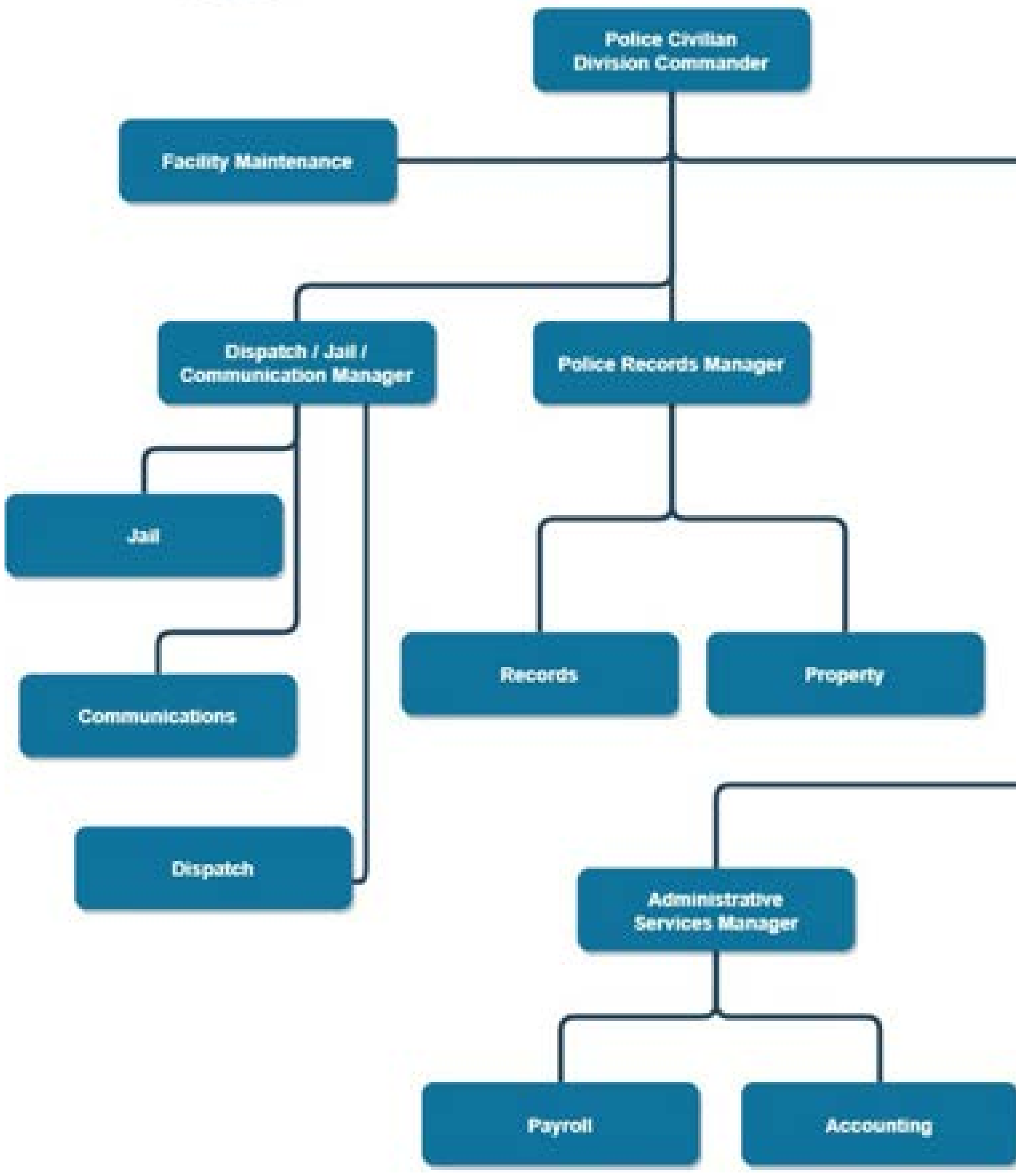

Information Technology Department
Information Technology Director
Programmer
Database Administration
Senior Systems Analyst
Police Department Senior
Systems Analyst
GIS Technician (outsourced)

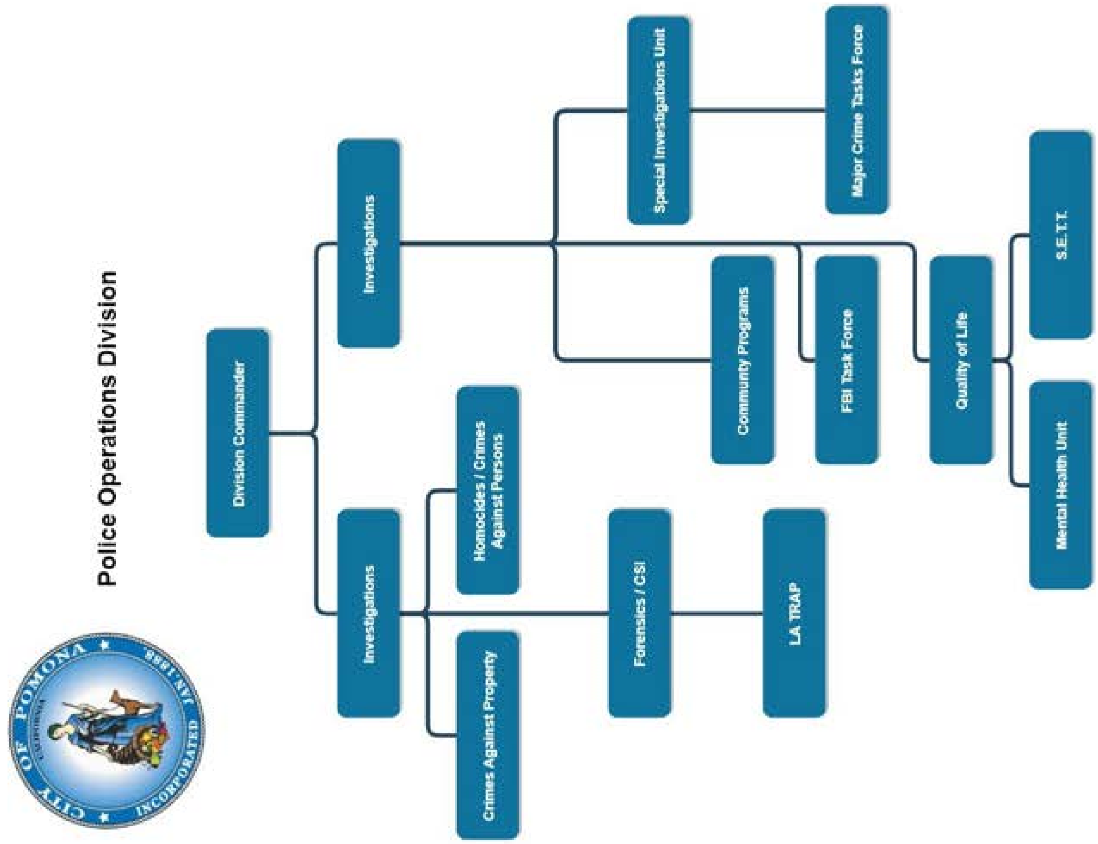

Human Resources
September 2021
Human Resources / Risk Management Director
Risk Management
Emergency Management
Employee Wellness
Insurance
Liability Claims
Safety
Worker's Compensation
Risk Manager
Safety & Emerency Preparedness Officer
Administration / Contracts
ADA Coordinator
Closed Sessions
Labor Relations
Special Projects
Legal Administrative Assistant
Personnel Services
Benefits
Compensation & Classification
EEO / ADA
Employee Development
Employee Relations
Performance Management
Recruitment & Selection
Volunteer Program
Human Resources Manager
Human Resources Analysts, Assistants, and Technical Specialist

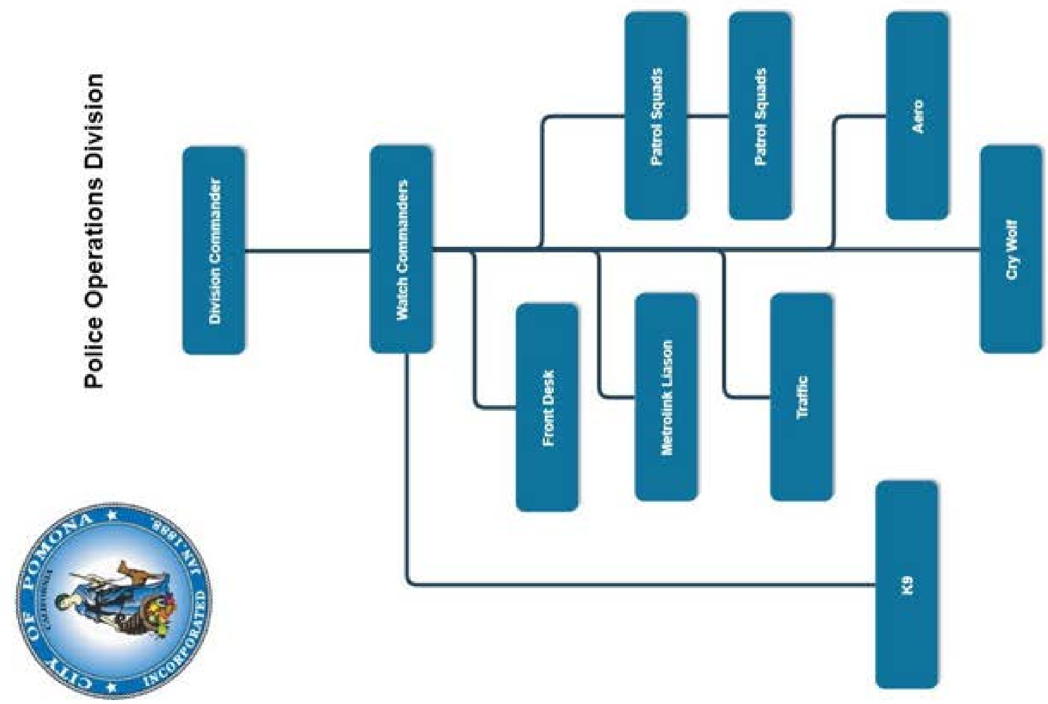

Neighborhood Services Department
Neighborhood Services Director
Administration
Administration
Housing Authority Manager
Housing Authority
Homeless Services
Housing Services Manager
Grants Administration
Housing Rehab Programs
Community Engagement Manager
Community Services Manager
Administration
Facility and Sports Rentals
Special Events
Filming
Programs
Afterschool Recreation
Classes / Collaboration
Senior Services

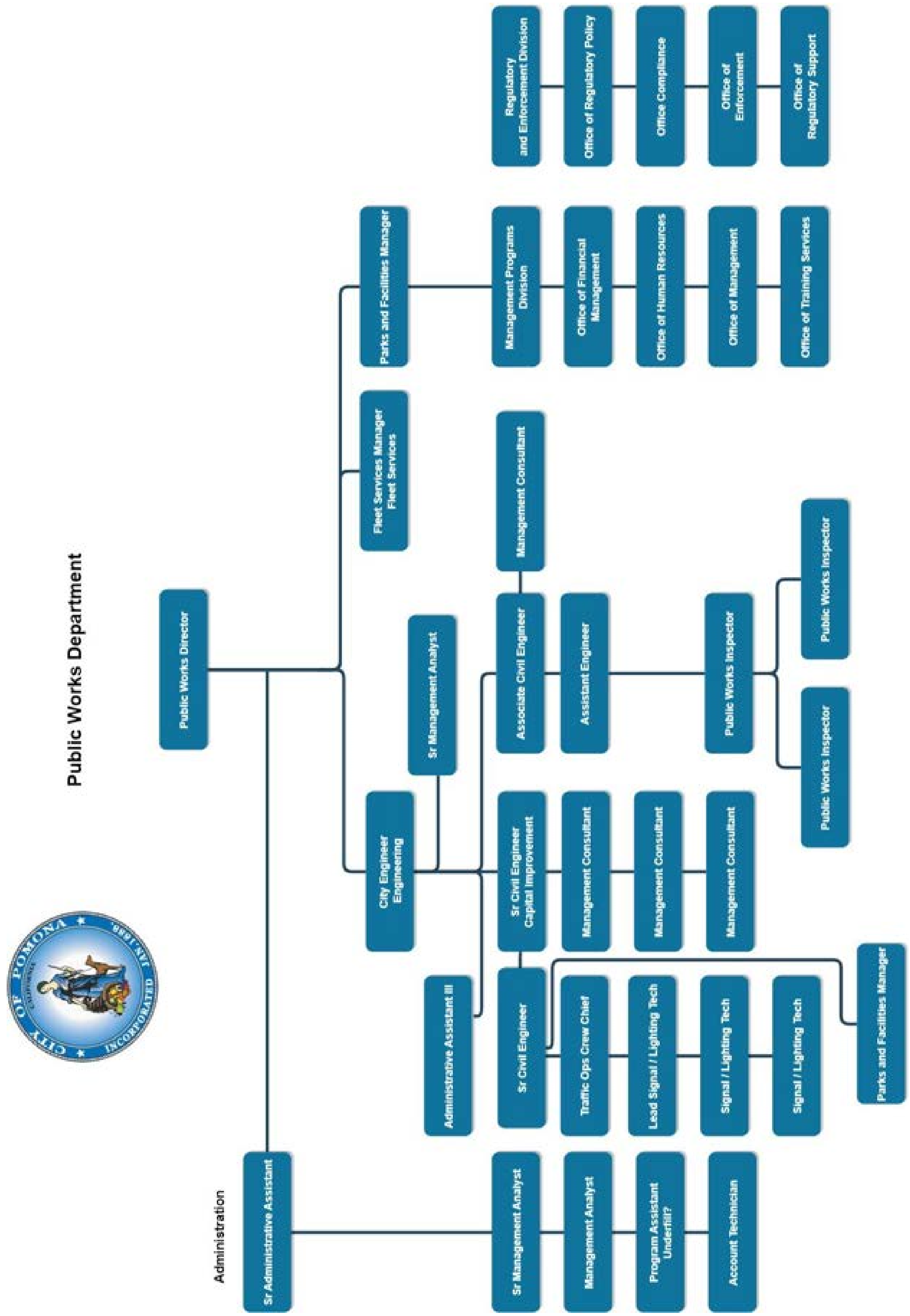

Pomona Police Department
Chief of Police
Public Information Specialist
SWAT Commander
Deputy Chief
Professional Standards
Internal Affairs
Training Bureau
Operations Division
Investigative Services Division
Administrative Services Division

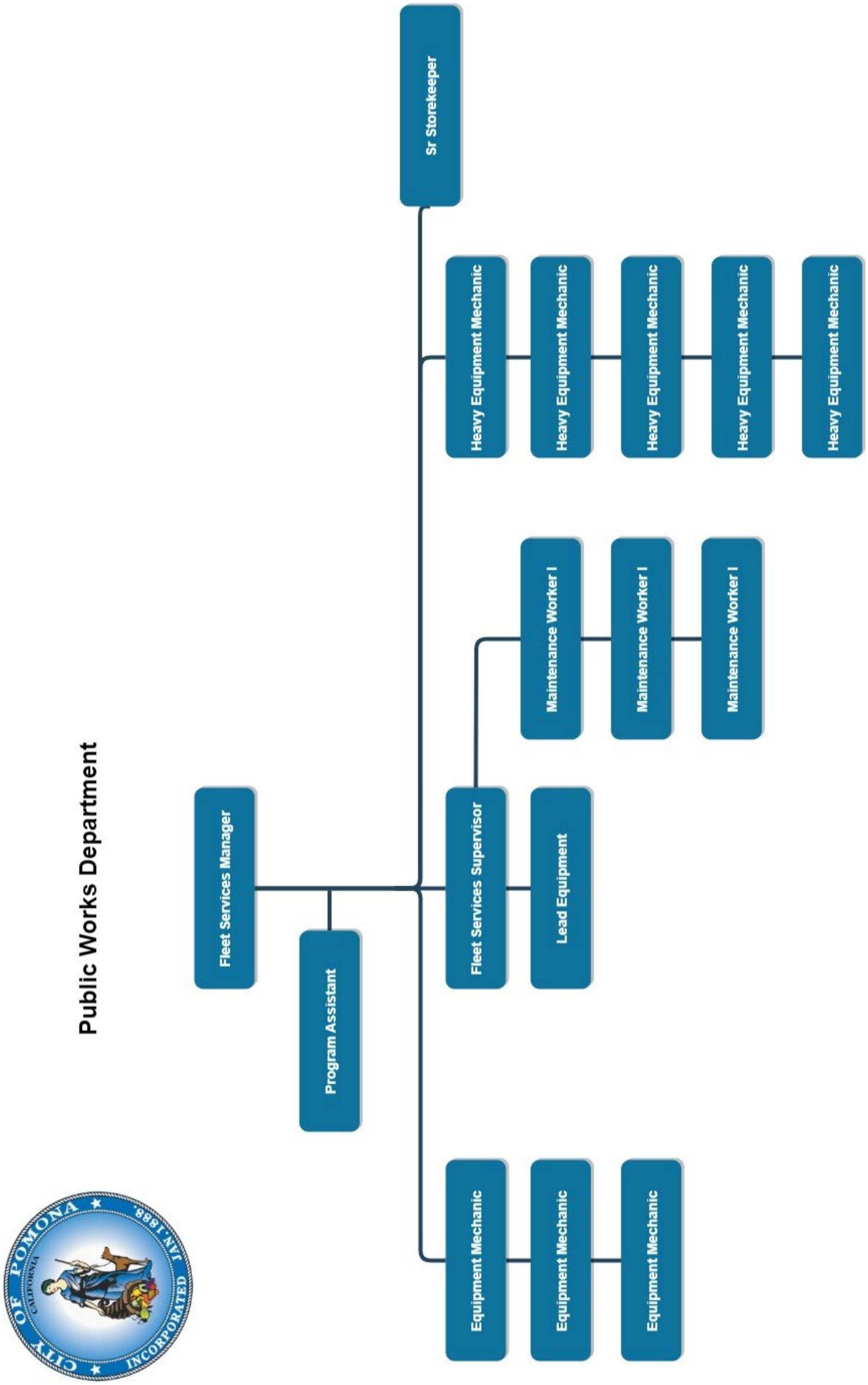
Police Administrative Services Department

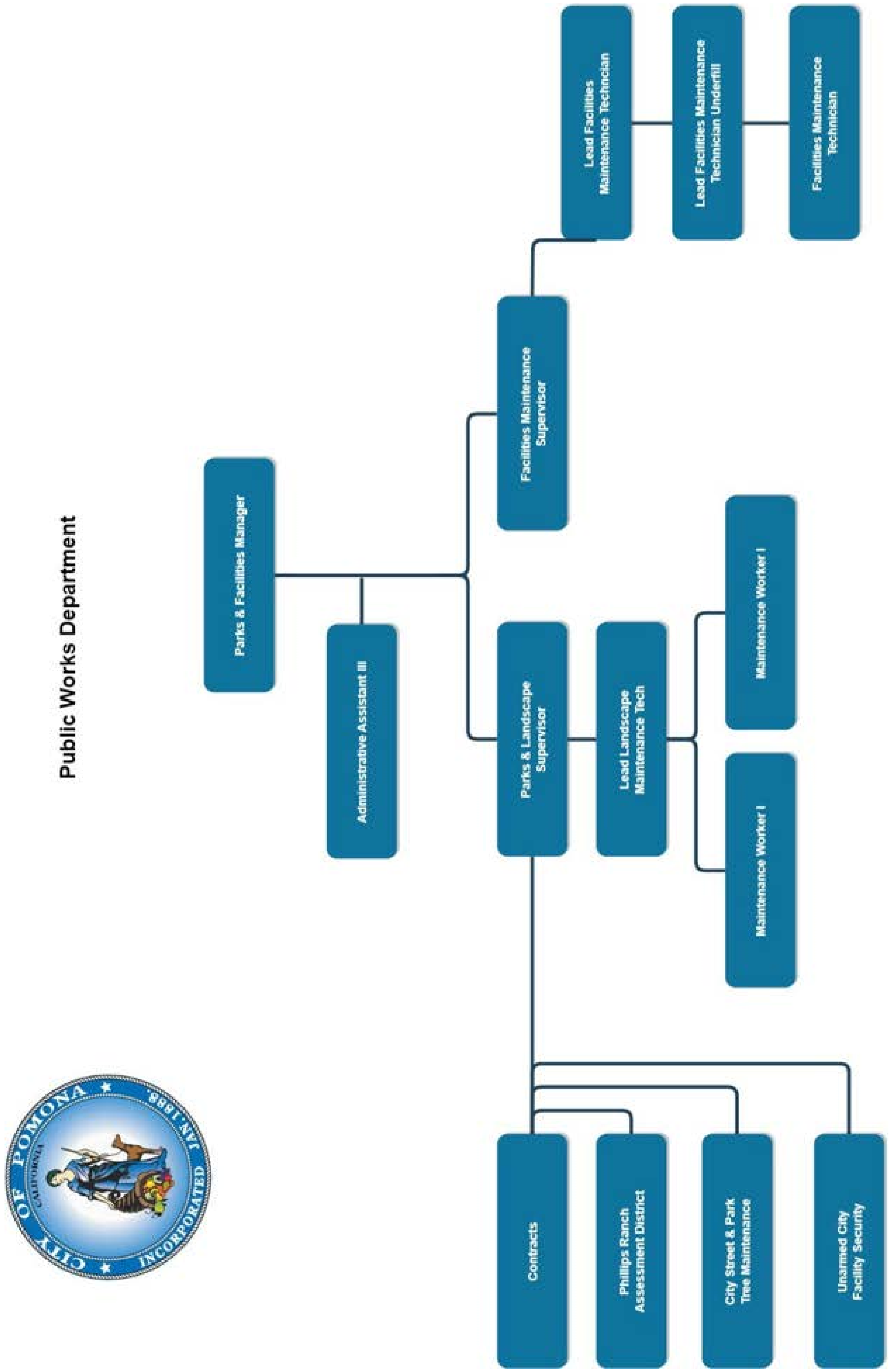


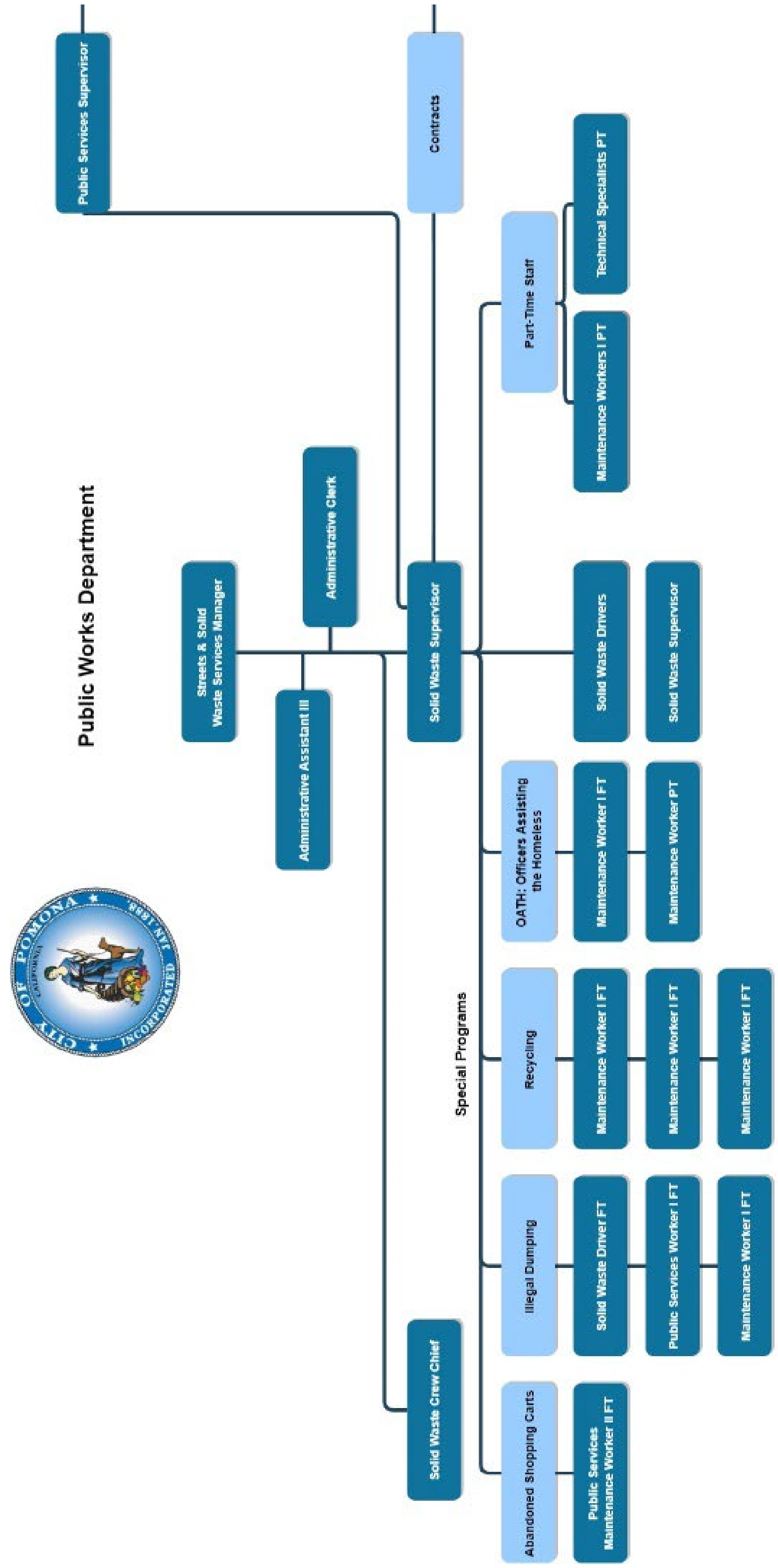

Police Operations Division
Division Commander
Investigations
Special Investigations Unit
Major Crime Tasks Force
Community Programs
FBI Task Force
Quality of Life
S.E.T.T.
Mental Health Unit
Investigations
Homocides / Crimes Against Persons
Crimes Against Property
Forensics / CSI
LA TRAP

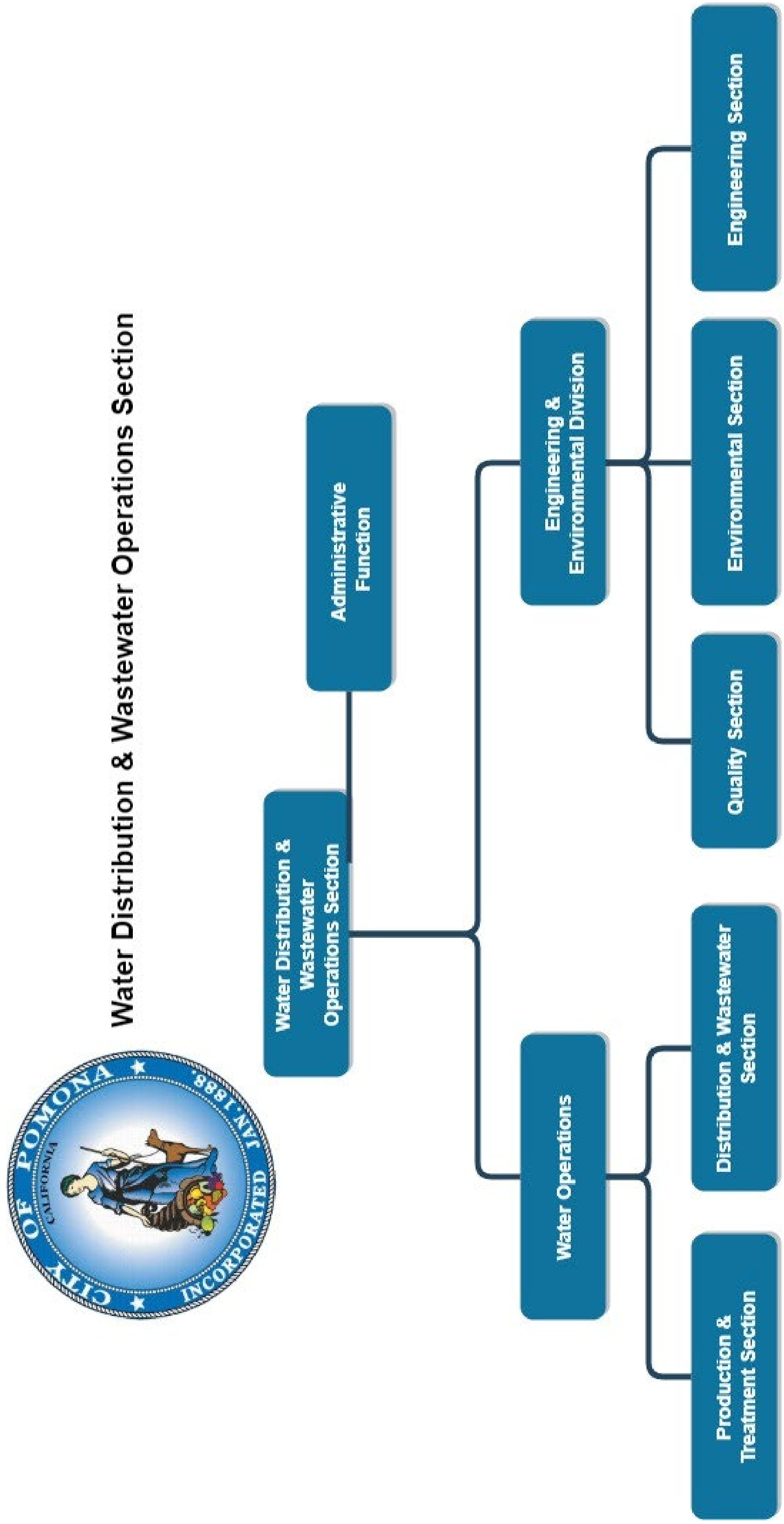

Police Operations Division
Division Commander
Watch Commanders
Patrol Squads
Patrol Squads
Aero
Cry Wolf
Front Desk
Metrolink Liason
Traffic
K9


Public Works Department
Public Works Director
Administration
Sr Administrative Assistant
Sr Management Analyst
Management Analyst
Program Assistant Underfill?
Account Technician
Administrative Assistant III
Sr Civil Engineer
Traffic Ops Crew Chief
Lead Signal / Lighting Tech
Signal / Lighting Tech
Signal / Lighting Tech
Parks and Facilities Manager
City Engineer Engineering
Sr Civil Engineer Capital Improvement
Management Consultant
Management Consultant
Management Consultant
Sr Management Analyst
Associate Civil Engineer
Management Consultant
Assistant Engineer
Public Works Inspector
Public Works Inspector
Public Works Inspector
Fleet Services Manager Fleet Services
Parks and Facilities Manager
Management Programs Division
Office of Financial Management
Office of Human Resources
Office of Management
Office of Training Services
Regulatory and Enforcement Division
Office of Regulatory Policy
Office Compliance
Office of Enforcement
Office of Regulatory Support


Public Works Department
Fleet Services Manager
Program Assistant
Fleet Services Supervisor
Lead Equipment
Maintenance Worker I
Maintenance Worker I
Maintenance Worker I
Sr Storekeeper
Heavy Equipment Mechanic
Heavy Equipment Mechanic
Heavy Equipment Mechanic
Heavy Equipment Mechanic
Heavy Equipment Mechanic
Equipment Mechanic
Equipment Mechanic
Equipment Mechanic


Public Works Department
CITY OF POMONA
CALIFORNIA
INCORPORATED
JAN. 1888
Parks & Facilities Manager
Administrative Assistant III
Facilities Maintenance Supervisor
Lead Facilities Maintenance Technician
Lead Facilities Maintenance Technician Underfill
Facilities Maintenance Technician
Parks & Landscape Supervisor
Lead Landscape Maintenance Tech
Maintenance Worker I
Maintenance Worker I
Contracts
Phillips Ranch Assessment District
City Street & Park Tree Maintenance
Unarmed City Facility Security


Public Works Department
CITY OF POMONA
INCORPORATED
Streets & Solid Waste Services Manager
Administrative Assistant III
Administrative Clerk
Public Services Supervisor
Contracts
Solid Waste Supervisor
Part-Time Staff
Maintenance Workers I PT
Technical Specialists PT
Solid Waste Drivers
Solid Waste Supervisor
OATH: Officers Assisting the Homeless
Maintenance Worker I FT
Maintenance Worker PT
Special Programs
Recycling
Maintenance Worker I FT
Maintenance Worker I FT
Maintenance Worker I FT
Illegal Dumping
Solid Waste Driver FT
Public Services Worker I FT
Maintenance Worker I FT
Abandoned Shopping Carts
Public Services Maintenance Worker II FT
Solid Waste Crew Chief


Water Distribution & Wastewater Operations Section
CITY OF POMONA CALIFORNIA INCORPORATED JAN. 1888
Water Distribution & Wastewater Operations Section
Administrative Function
Water Operations
Engineering & Environmental Division
Production & Treatment Section
Distribution & Wastewater Section
Quality Section
Environmental Section
Engineering Section

Appendix D:

Economic Analysis Guidelines for Natural Hazard Mitigation Projects

APPENDIX D: ECONOMIC ANALYSIS GUIDELINES FOR NATURAL HAZARD MITIGATION PROJECTS

Benefit/cost analysis is a key mechanism used by the state Office of Emergency Services (OES), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

This appendix outlines several approaches for conducting economic analysis of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, State Hazard Mitigation Plan, (Oregon State Police - Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, Report on Costs and Benefits of Natural Hazard Mitigation.

This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (I) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

PURPOSE

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred.

Evaluating natural hazard mitigation provides decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools.

Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce "ripple-effects" throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

ECONOMIC ANALYSIS APPROACHES FOR MITIGATION STRATEGIES

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. The distinction between the two methods is the way in which the relative costs and benefits are measured. Additionally, there are varying approaches to assessing the value of mitigation for public sector and private sector activities.

Benefit/Cost Analysis

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented (i.e., if net benefits exceed net costs, the project is worth pursuing). A project must have a benefit/cost ratio greater than 1 in order to be funded.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in public sector mitigation activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions that involve a diverse set of beneficiaries and non-market benefits.

Investing in private sector mitigation activities

Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

- Request cost sharing from public agencies;
- Dispose of the building or land either by sale or demolition;
- Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
- Evaluate the most feasible alternatives and initiate the most cost-effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

CONDUCTING AN ECONOMIC ANALYSIS

Benefit/cost analysis and cost-effectiveness analysis are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating alternative mitigation activities is outlined below:

1. Identify the Alternatives. Alternatives for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation project can assist in minimizing risk to natural hazards but do so at varying economic costs.

2. Calculate the Costs and Benefits. Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate alternative. Potential economic criteria to evaluate alternatives include:

   - *Determine the project cost*. This may include initial project development costs, and repair and operating costs of maintaining projects over time.
   - *Estimate the benefits*. Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.
   - *Consider costs and benefits to society and the environment.* These are not easily measured but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
   - *Determine the correct discount rate*. Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Alternatives. Once costs and benefits have been quantified, economic analysis tools can rank the alternatives. Two methods for determining the best alternative given varying costs and benefits include net present value and internal rate of return.

   - *Net present value*. Net present value is the value of the expected future returns of an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for implementation. Selecting the discount rate and identifying the present and future costs and benefits of the project calculates the net present value of projects.
   - *Internal Rate of Return*. Using the internal rate of return method to evaluate mitigation

projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project.

Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can

consider other factors, such as risk; project effectiveness; and economic, environmental, and social returns in choosing the appropriate project for implementation.

ECONOMIC RETURNS OF NATURAL HAZARD MITIGATION

The estimation of economic returns, which accrue to building or landowner as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

ADDITIONAL COSTS FROM NATURAL HAZARDS

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure

- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

ADDITIONAL CONSIDERATIONS

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

RESOURCES

The following resources for economic analysis have been provided by the Disaster Management Area D Coordinator.

CUREe Kajima Project, Methodologies For Evaluating The Socio-Economic Consequences Of

Large Earthquakes, Task 7.2 Economic Impact Analysis, Prepared by University of California,

Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eidinger, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates lnc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997.

Federal Emergency Management Agency, Benefit/Cost Analysis of Hazard Mitigation Projects, Riverine Flood, Version 1.05, Hazard Mitigation Economics Inc., 1996.

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Appendix E:

List of Acronyms

APPENDIX E: LIST OF ACRONYMS

FEDERAL ACRONYMS	
AASHTO	American Association of State Highway and Transportation Officials
ATC	Applied Technology Council
BCA	Benefit/Cost Analysis
BFE	Base Flood Elevation
BLM	Bureau of Land Management
BSSC	Building Seismic Safety Council
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CRS	Community Rating System
EDA	Economic Development
Mitigation EDA	Environmental Protection Agency
ER	Emergency Relief
EWP	Emergency Watershed Protection (NRCS Program)
FAS	Federal Aid System
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
FTE	(FEMA Program)
GIS	Geographic Information System
GNS	Institute of Geological and Nuclear Sciences (International)
GSA	General Services Administration
HAZUS	Hazards U.S.
HMGP	Hazard Mitigation Grant Program
HMST	Hazard Mitigation Survey Team
HUD	Housing and Urban Development (United States, Department of)
IBHS	Institute for Business and Home Safety
ICC	Increased Cost of Compliance
IHMT	Interagency Hazard Mitigation Team
NCDC	National Climate Data Center
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NHMP	Natural Hazard Mitigation Plan (also known as "409 Plan")
NIBS	National Institute of Building Sciences
NIFC	National Interagency Fire Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
SBA	Small Business Administration
SEAO	Structural Engineers Association of Oregon
SHMO	State Hazard Mitigation Officer

TOR	Transfer of Development Rights
UGB	Urban Growth Boundary
URM	Unreinforced Masonry
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFA	United States Fire Administration
USFS	United States Forest Service
USGS	United States Geological Survey
WSSPC	Western States Seismic Policy

CALIFORNIA ACRONYMS

A&W	Alert and Warning
AA	Administering Areas
AAR	After Action Report
ARC	American Red Cross
ARP	Accidental Risk Prevention
ATC20	Applied Technology Council 20
ATC21	Applied Technology Council 21
BCP	Budget Change Proposal
BSA	California Bureau of State Audits
CAER	Community Awareness & Emergency Response
CalARP	California Accidental Release Prevention
CalBO	California Building Officials
CalEPA	California Environmental Protection Agency
CalREP	California Radiological Emergency Plan
CALSTARS	California State Accounting Reporting System
CalTrans	California Department of Transportation
CBO	Community Based Organization
CD	Civil Defense
CDF	California Department of Forestry and Fire Protection
CDMG	California Division of Mines and Geology
CEC	California Energy Commission
CEPEC	California Earthquake Prediction Evaluation Council
CESRS	California Emergency Services Radio System
CHIP	California Hazardous Identification Program
CHMIRS	California Hazardous Materials Incident Reporting System
CHP	California Highway Patrol
CLETS	California Law Enforcement Telecommunications System
CSTI	California Specialized Training Institute
CUEA	California Utilities Emergency Association
CUPA	Certified Unified Program Agency
DAD	Disaster Assistance Division (of the state Office of Emergency Svcs)
DFO	Disaster Field Office

DGS	California Department of General Services
DHSRHB	California Department of Health Services, Radiological Health Branch
DO	Duty Officer
DOC	Department Operations Center
DOE	Department of Energy (U.S.)
DOF	California Department of Finance
DOJ	California Department of Justice
DPA	California Department of Personnel Administration
DPIG	Disaster Preparedness Improvement Grant
DR	Disaster Response
DSA	Division of the State Architect
DSR	Damage Survey Report
DSW	Disaster Service Worker
DWR	California Department of Water Resources
EAS	Emergency Alerting System
EDIS	Emergency Digital Information System
EERI	Earthquake Engineering Research Institute
EMA	Emergency Management Assistance
EMI	Emergency Management Institute
EMMA	Emergency Managers Mutual Aid
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency (U.S.)
EPEDAT	Early Post Earthquake Damage Assessment Tool
EPI	Emergency Public Information
EPIC	Emergency Public Information Council
ESC	Emergency Services Coordinator
FAY	Federal Award Year
FDAA	Federal Disaster Assistance Administration
FEAT	Governor's Flood Emergency Action Team
FEMA	Federal Emergency Management Agency
FFY	Federal Fiscal Year
FIR	Final Inspection Reports
FIRESCOPE	Firefighting Resources of So. Calif Organized for Potential Emergencies
FMA	Flood Management Assistance
FSR	Feasibility Study Report
FY	Fiscal Year
GIS	Geographical Information System
HAZMAT	Hazardous Materials
HAZMIT	Hazardous Mitigation
HAZUS	Hazards United States (an earthquake damage assessment prediction tool)
HAD	Housing and Community Development
HEICS	Hospital Emergency Incident Command System
HEPG	Hospital Emergency Planning Guidance

HIA	Hazard Identification and Analysis Unit
HMEP	Hazardous Materials Emergency Preparedness
HMGP	Hazard Mitigation Grant Program
IDE	Initial Damage Estimate
IA	Individual Assistance
IFG	Individual & Family Grant (program)
IRG	Incident Response Geographic Information System
IPA	Information and Public Affairs (of state Office of Emergency Services)
LAN	Local Area Network
LEMMA	Law Enforcement Master Mutual Aid
LEPC	Local Emergency Planning Committee
MARAC	Mutual Aid Regional Advisory Council
MHID	Multi-hazard Identification
MOU	Memorandum of Understanding
NBC	Nuclear, Biological, Chemical
NEMA	National Emergency Management Agency
NEMIS	National Emergency Management Information System
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Association
NPP	Nuclear Power Plant
NSF	National Science Foundation
NWS	National Weather Service
OA	Operational Area
OASIS	Operational Area Satellite Information System
OCC	Operations Coordination Center
OCD	Office of Civil Defense
OEP	Office of Emergency Planning
OES	California Governor's Office of Emergency Services
OSHPD	Office of Statewide Health Planning and Development
OSPR	Oil Spill Prevention and Response
PA	Public Assistance
PC	Personal Computer
PDA	Preliminary Damage Assessment
PIO	Public Information Office
POST	Police Officer Standards and Training
PPA/CA	Performance Partnership Agreement/Cooperative Agreement/Cooperative Agreement (FEMA)
PSA	Public Service Announcement
PTAB	Planning and Technological Assistance Branch
PTR	Project Time Report
RA	Regional Administrator (OES)
RADEF	Radiological Defense (program)
RAMP	Regional Assessment of Mitigation Priorities
RAPID	Railroad Accident Prevention & Immediate Deployment
RDO	Radiological Defense Officer

RDMHC	Regional Disaster Medical Health Coordinator
REOC	Regional Emergency Operations Center
REPI	Reserve Emergency Public Information
RES	Regional Emergency Staff
RIMS	Response Information Management System
RMP	Risk Management Plan
RPU	Radiological Preparedness Unit (OES)
RRT	Regional Response Team
SAM	State Administrative Manual
SARA	Superfund Amendments & Reauthorization Act
SAVP	Safety Assessment Volunteer Program
SBA	Small Business Administration
SCO	California State Controller's Office
SEMS	Standardized Emergency Management System
SEPIC	State Emergency Public Information Committee
SLA	State and Local Assistance
SONGS	San Onofre Nuclear Generating Station
SOP	Standard Operating Procedure
SWEPC	Statewide Emergency Planning Committee
TEC	Travel Expense Claim
TRU	Transuranic
TTT	Train the Trainer
UPA	Unified Program Account
UPS	Uninterrupted Power Source
USAR	Urban Search and Rescue
USGS	United States Geological Survey California State
WC	Warning Center
WAN	Wide Area Network
WIPP	Waste Isolation Pilot Project

Source: Disaster Management Area D Coordinator, 2004.

Appendix F:

Glossary

APPENDIX F: GLOSSARY

Acceleration	The rate of change of velocity with respect to time. Acceleration due to gravity at the earth's surface is 9.8 meters per second squared. That means that every second that something falls toward the surface of earth its velocity increases by 9.8 meters per second.
Asset	Any manmade or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wet-lands, or landmarks.
Base Flood	Flood that has a I percent probability of being equaled or exceeded in any given year. Also known as the 100-year flood.
Base Flood Elevation (BFE)	Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as the standard for the National Flood In-surance Program.
Bedrock	The solid rock that underlies loose material, such as soil, sand, clay, or gravel.
Building	A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.
Coastal High Hazard Area	Area, usually along an open coast, bay, or inlet, that is subject to inundation by storm surge and, in some instances, wave action caused by storms or seismic sources.
Coastal Zones	The area along the shore where the ocean meets the land as the surface of the land rises above the ocean. This land/water interface includes barrier islands, estuaries, beaches, coastal wetlands, and land areas having direct drainage to the ocean.
Community Rating System (CRS)	An NFIP program that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of policyholders in these communities are reduced.
Computer-Aided Design and Drafting (CADD)	A computerized system enabling quick and accurate electronic 2-D and 3-D drawings, topographic mapping, site plans, and profile/cross-section drawings.
Contour	A line of equal ground elevation on a topographic (contour) map.
Critical Facility	Facilities that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.
Debris	The scattered remains of assets broken or destroyed in a hazard event. Debris caused by a wind or water hazard event can cause additional damage to other assets.
Digitalize	To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates (e.g., latitude and longitude, universal transverse mercator (UTM), or table coordinates) for use in computer

	applications.
Displacement Time	The average time (in days) which the building's occupants typically must operate from a temporary location to while repairs are made to the original building due to damages resulting from a hazard event.
Duration	How long a hazard event lasts.
Earthquake	A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of earth's tectonic plates.
Erosion	Wearing away of the land surface by detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.
Erosion Hazard Area	Area anticipated to be lost to shoreline retreat over a given period of time. The projected inland extent of the area is measured by multiplying the average annual long-term recession rate by the number of years desired.
Essential Facility	Elements that are important to ensure a full recovery of a community or state following a hazard event. These would include: government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.
Extent	The size of an area affected by a hazard or hazard event.
Extratropical Cyclone	Cyclonic storm events like Nor'easters and severe winter low-pressure systems. Both West and East coasts can experience these non-tropical storms that produce gale-force winds and precipitation in the form of heavy rain or snow. These cyclonic storms, commonly called nor'easters on the East Coast because of the direction of the storm winds, can last for several days and can be very large -1,000-mile wide storms are not uncommon.
Fault	A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are differentially displaced parallel to the plane of fracture.
Federal Emergency Management Agency (FEMA)	Independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery.
Fire Potential Index (FPI)	Developed by USGS and USFS to assess and map fire hazard potential over broad areas. Based on such geo-graphic information, national policy makers and on-the-ground fire managers established priorities for prevention activities in the defined area to reduce the risk of managed and wildfire ignition and spread. Prediction of fire hazard shortens the time between fire ignition and initial attack by enabling fire managers to pre-allocate and stage sup-pression forces to high fire risk areas.
Flash Flood	A flood event occurring with little or no warning where water levels rise at an extremely fast rate.
Flood	A general and temporary condition of partial or complete inundation of nor-mally dry land areas from (I) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from

	any source, or (3) mudflows or the sudden collapse of shoreline land.
Flood Depth	Height of the floodwater surface above the ground surface.
Flood Elevation	Elevation of the water sur-face above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Ver-tical Datum of 1988, or Mean Sea Level.
Flood Hazard Area	The area shown to be inundated by a flood of a given magnitude on a map.
Flood Insurance Rate Map (FIRM)	Map of a community, pre-pared by the Federal Emergency Management Agency that shows both the special flood hazard areas and the risk premium zones applicable to the community.
Flood Insurance Study (FIS)	A study that provides an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations in a community or communities.
Floodplain	Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.
Frequency	A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance -its probability-of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered.
Fujita Scale of Tornado Intensity	Rates tornadoes with numeric values from F0 to F5 based on tornado wind-speed and damage sustained. An F0 indicates minimal damage such as broken tree limbs or signs, while and F5 indicated severe damage sustained.
Functional Downtime	The average time (in days) during which a function (business or service) is unable to provide its services due to a hazard event.
Geographic Area Impacted	The physical area in which the effects of the hazard are experienced.
Geographic Information Systems (GIS)	A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.
Ground Motion	The vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions.
Hazard	A source of potential danger or adverse condition. Hazards in this how-to series will include naturally occurring events such as floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.
Hazard Event	A specific occurrence of a particular type of hazard.
Hazard Identification	The process of identifying hazards that threaten an area.
Hazard Mitigation	Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.

Hazard Profile	A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.
HAZUS (Hazards US)	A GIS-based nationally standardized earthquake loss estimation tool developed by FEMA
Hurricane	An intense tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74- miles-per-hour or more and blow in a large spiral around a relatively calm center or "eye." Hurricanes develop over the north Atlantic Ocean, northeast Pacific Ocean, or the south Pacific Ocean east of 160°E longitude. Hurricane circulation is counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.
Hydrology	The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.
Infrastructure	Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treat-ment facilities, and includes an area's transportation sys-tem such as airports, heliports; highways, bridges, tunnels, roadbeds, over-passes, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, drydocks, piers and regional dams.
Intensity	A measure of the effects of a hazard event at a particular place.
Landslide	Downward movement of a slope and materials under the force of gravity.
Lateral Spreads	Develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies in a seismic event. The phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.
Liquefaction	Results when the soil supporting structures liquefies. This can cause structures to tip and topple.
Lowest Floor	Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure.
Magnitude	A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.
Mitigation Plan	A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in the state and includes a description of actions to minimize future vulnerability to hazards.
National Flood Insurance Program (NFIP)	Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3.
National Geodetic Vertical	Datum established in 1929 and used in the NFIP as a basis for

Datum of 1929 (NGVD)	measuring flood, ground, and structural ele-vations, previously referred to as Sea Level Datum or Mean Sea Level. The Base Flood Elevations shown on most of the Flood Insurance Rate Maps issued by the Federal Emergency Management Agency are referenced to NGVD.
National Weather Service (NWS)	Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to Federal and state entities in preparing weather and flood warning plans.
Nor'easter	An extra-tropical cyclone producing gale-force winds and precipitation in the form of heavy snow or rain.
Outflow	Follows water inundation creating strong currents that rip at structures and pound them with debris and erode beaches and coastal structures.
Planimetric	Describes maps that indicate only man-made features like buildings.
Planning	The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit.
Probability	A statistical measure of the likelihood that a hazard event will occur.
Recurrence Interval	The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.
Repetitive Loss Property	A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1,000 each have been paid within any 10-year period since 1978.
Replacement Value	The cost of rebuilding a structure. This is usually expressed in terms of cost per square foot and reflects the present-day cost of labor and materials to construct a building of a particular size, type and quality.
Richter Scale	A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.
Risk	The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.
Riverine	Of or produced by a river.
Scale	A proportion used in determining a dimensional relationship; the ratio of the distance between two points on a map and the actual distance between the two points on the earth's surface.
Scarp	A steep slope.
Scour	Removal of soil or fill material by the flow of floodwaters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence.
Seismicity	Describes the likelihood of an area being subject to earthquakes.
Special Flood Hazard Area (SFHA)	An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year (100-year floodplain); represented

	on Flood Insurance Rate Maps by darkly shaded areas with zone designations that include the letter A or V.
Stafford Act	The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs.
State Hazard Mitigation Officer (SHMO)	The representative of state government who is the primary point of contact with FEMA, other state and Federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.
Storm Surge	Rise in the water surface above normal water level on the open coast due to the action of wind stress and atmospheric pressure on the water surface.
Structure	Something constructed. (See also Building)
Substantial Damage	Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage.
Super Typhoon	A typhoon with maximum sustained winds of 150 mph or more.
Surface Faulting	The differential movement of two sides of a fracture - in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.
Tectonic Plate	Torsionally rigid, thin seg-ments of the earth's lithosphere that may be assumed to move horizontally and adjoin other plates. It is the friction between plate boundaries that cause seismic activity.
Topographic	Characterizes maps that show natural features and indicate the physical shape of the land using contour lines. These maps may also include manmade features.
Tornado	A violently rotating column of air extending from a thunderstorm to the ground.
Tropical Cyclone	A generic term for a cyclonic, low-pressure system over tropical or subtropical waters.
Tropical Depression	A tropical cyclone with maximum sustained winds of less than 39 mph.
Tropical Storm	A tropical cyclone with maximum sustained winds greater than 39 mph and less than 74 mph.
Tsunami	Great sea wave produced by submarine earth movement or volcanic eruption.
Typhoon	A special category of tropical cyclone peculiar to the western North Pacific Basin, frequently affecting areas in the vicinity of Guam and the North Mariana Islands. Typhoons whose maximum sustained winds attain or exceed 150 mph are called super typhoons.
Vulnerability	Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of

	another. For example, many businesses depend on uninterrupted electrical power -if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.
Vulnerability Assessment	The extent of injury and damage that may result from a hazard event of a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.
Water Displacement	When a large mass of earth on the ocean bottom sinks or uplifts, the column of water directly above it is displaced, forming the tsunami wave. The rate of displacement, motion of the ocean floor at the epicenter, the amount of displacement of the rupture zone, and the depth of water above the rupture zone all contribute to the intensity of the tsunami.
Wave Runup	The height that the wave extends up to on steep shorelines, measured above a reference level (the normal height of the sea, corrected to the state of the tide at the time of wave arrival).
Wildfire	An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.
Zone	A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area

Source: Disaster Management Area D Coordinator, 2004.