HAZARD MITIGATION PLAN

April 10, 2018
FINAL PLAN

Prepared by:
Emergency Planning Consultants

Credits

Special Thanks

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Acknowledgements

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- ✓ Violeta Lewis, Mayor
- ✓ Dan Holloway, Mayor Pro Tem
- ✓ David Argudo, Councilmember
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Mapping

The maps in this plan were provided by the City of La Puente, County of Los Angeles, Federal Emergency Management Agency (FEMA), or were acquired from public Internet sources. Care was taken in the creation of the maps contained in this Plan, however they are provided "as is". The City of La Puente cannot accept any responsibility for any errors, omissions or positional accuracy, and therefore, there are no warranties that accompany these products (the maps). Although information from land surveys may have been used in the creation of these products, in no way does this product represent or constitute a land survey. Users are cautioned to field verify information on this product before making any decisions.

Mandated Content

In an effort to assist the readers and reviewers of this document, the jurisdiction has inserted "markers" emphasizing mandated content as identified in the Disaster Mitigation Act of 2000 (Public Law – 390). Following is a sample marker:

EXAMPLE

Q&A | ELEMENT A: PLANNING PROCESS | A1
Q A1: Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))
A:

Table of Contents

Part I: PLANNING PROCESS

Introduction

The Hazard Mitigation Plan (Mitigation Plan) was prepared in response to Disaster Mitigation Act of 2000 (DMA 2000). DMA 2000 (also known as Public Law 106-390) requires state and local governments to prepare mitigation plans to document their mitigation planning process, and identify hazards, potential losses, mitigation needs, goals, and strategies. This type of planning supplements the City's comprehensive land use planning and emergency management planning programs. The City of La Puente created a Planning Team charged with the responsibility of creating a Hazard Mitigation Plan. The Team submitted a draft plan to City Council and FEMA back in 2007 however, the plan was not approved and the project's completion significantly postponed. This document is the City's first Hazard Mitigation Plan.

DMA 2000 was designed to establish a national program for pre-disaster mitigation, streamline disaster relief at the federal and state levels, and control federal disaster assistance costs. Congress believed these requirements would produce the following benefits:

- ✓ Reduce loss of life and property, human suffering, economic disruption, and disaster costs.
- ✓ Prioritize hazard mitigation at the local level with increased emphasis on planning and public involvement, assessing risks, implementing loss reduction measures, and ensuring critical facilities/services survive a disaster.
- ✓ Promote education and economic incentives to form community-based partnerships and leverage non-federal resources to commit to and implement long-term hazard mitigation activities.

The following FEMA definitions are used throughout this plan (Source: FEMA, 2002, *Getting Started, Building Support for Mitigation Planning*, FEMA 386-1):

Hazard Mitigation – "Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards".

Planning – "The act or process of making or carrying out plans; specifically, the establishment of goals, policies, and procedures for a social or economic unit."

Planning Approach

The four-step planning approach outlined in the FEMA publication, *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies* (FEMA 386-3) was used to develop this plan:

- ✓ **Develop mitigation goals and objectives -** The risk assessment (hazard characteristics, inventory, and findings), along with municipal policy documents, were utilized to develop mitigation goals and objectives.
- ✓ **Identify and prioritize mitigation actions -** Based on the risk assessment, goals and objectives, existing literature/resources, and input from participating entities, mitigation activities were identified for each hazard. Activities were 1) qualitatively evaluated

against the goals and objectives, and other criteria; 2) identified as high, medium, or low priority; and 3) presented in a series of hazard-specific tables.

- ✓ **Prepare implementation strategy -** Generally, high priority activities are recommended for implementation first. However, based on community needs and goals, project costs, and available funding, some medium or low priority activities may be implemented before some high priority items.
- ✓ **Document mitigation planning process -** The mitigation planning process is documented throughout this plan.

Hazard Land Use Policy in California

Planning for hazards should be an integral element of any City's land use planning program. All California cities and counties have General Plans (also known as Comprehensive Plans) and the implementing ordinances that are required to comply with the statewide land use planning regulations.

The continuing challenge faced by local officials and state government is to keep the network of local plans effective in responding to the changing conditions and needs of California's diverse communities, particularly in light of the very active seismic region in which we live.

Planning for hazards requires a thorough understanding of the various hazards facing the City and region as a whole. Additionally, it's important to take an inventory of the structures and contents of various City holdings. These inventories should include the compendium of hazards facing the City, the built environment at risk, the personal property that may be damaged by hazard events and most of all, the people who live in the shadow of these hazards. Such an analysis is found in this hazard mitigation plan.

State and Federal Partners in Hazard Mitigation

All mitigation is local and the primary responsibility for development and implementation of risk reduction strategies and policies lies with each local jurisdiction. Local jurisdictions, however, are not alone. Partners and resources exist at the regional, state and federal levels. Numerous California state agencies have a role in hazards and hazard mitigation.

Some of the key agencies include:

- ✓ California Office of Emergency Services (Cal OES) is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds after a major disaster declaration;
- ✓ Southern California Earthquake Center (SCEC) gathers information about earthquakes, integrates information on earthquake phenomena, and communicates this to end-users and the general public to increase earthquake awareness, reduce economic losses, and save lives.
- ✓ California Department of Forestry and Fire Protection (CAL FIRE) is responsible for all aspects of wildland fire protection on private and state properties, and administers forest practices regulations, including landslide mitigation, on non-federal lands.
- ✓ California Division of Mines and Geology (DMG) is responsible for geologic hazard characterization, public education, and the development of partnerships aimed at reducing risk.

- ✓ 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, serves local water needs by providing technical assistance
- ✓ FEMA provides hazard mitigation guidance, resource materials, and educational materials to support implementation of the capitalized DMA 2000.
- ✓ United States Census Bureau (USCB) provides demographic data on the populations affected by natural disasters.
- ✓ United States Department of Agriculture (USDA) provides data on matters pertaining to land management.

Q&A | ELEMENT A: PLANNING PROCESS | A3

Q: A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

A: See **Stakeholders** below.

Stakeholders

A Hazard Mitigation Planning Team (Planning Team) consisting of department representatives from City of La Puente staff worked with Emergency Planning Consultants to create the first Plan. **The Planning Team served as the primary stakeholders throughout the planning process.**

As required by DMA 2000, the Planning Team involved "the public" in a variety of forums. The Planning Team was dedicated to including as many perspectives and external stakeholders (public and external agencies) as possible in the plan-writing phase. The availability of the Plan during the writing phase was announced to the public (citizens and businesses) through a media release, the City's website, City's Facebook page, and a hard copy at the City Library located at 15920 E. Central Avenue.

External agencies were informed via email of the opportunity to participate during the plan writing phase. An email to external agency representatives included a link to the City's website containing the PDF of the Plan. Also, an announcement was sent to the Planning Department's "CEQA List" used with all development-related projects. The list is located in the **Attachments Section**.

The general public and external agencies all served as secondary stakeholders with opportunity to contribute to the plan during the Plan Writing Phase of the planning process.

Hazard Mitigation Legislation

Hazard Mitigation Grant Program

In 1974, Congress enacted the Robert T. Stafford Disaster Relief and Emergency Act, commonly referred to as the Stafford Act. In 1988, Congress established the Hazard Mitigation Grant Program (HMGP) via Section 404 of the Stafford Act. Regulations regarding HMGP implementation based on the DMA 2000 were initially changed by an Interim Final Rule (44

CFR Part 206, Subpart N) published in the Federal Register on February 26, 2002. A second Interim Final Rule was issued on October 1, 2002.

The HMGP helps states and local governments implement long-term hazard mitigation measures for natural hazards by providing federal funding following a federal disaster declaration. Eligible applicants include state and local agencies, Indian tribes or other tribal organizations, and certain nonprofit organizations.

In California, the HMGP is administered by Cal OES. Examples of typical HMGP projects include:

- ✓ Property acquisition and relocation projects
- ✓ Structural retrofitting to minimize damages from earthquake, flood, high wind, wildfire, or other natural hazards
- ✓ Elevation of flood-prone structures
- ✓ Vegetative management programs, such as:
  - o Brush control and maintenance
  - o Fuel break lines in shrubbery
  - o Fire-resistant vegetation in potential wildland fire areas

Pre-Disaster Mitigation Program

The Pre-Disaster Mitigation Program (PDM) was authorized by §203 of the Stafford Act, 42 United States Code, as amended by §102 of the DMA 2000. Funding is provided through the National Pre-Disaster Mitigation Fund to help state and local governments (including tribal governments) implement cost-effective hazard mitigation activities that complement a comprehensive mitigation program.

In Fiscal Year 2009, two types of grants (planning and competitive) were offered under the PDM Program. Planning grants allocate funds to each state for Mitigation Plan development. Competitive grants distribute funds to states, local governments, and federally recognized Indian tribal governments via a competitive application process. FEMA reviews and ranks the submittals based on pre-determined criteria. The minimum eligibility requirements for competitive grants include participation in good standing in the National Flood Insurance Program (NFIP) and a FEMA-approved Mitigation Plan. (Source: http://www.fema.gov/fima/pdm.shtm)

"Floods and hurricanes happen. The hazard itself is not the disaster – it's our habits, it's how we build and live in those areas…that's the disaster."

Craig Fugate,
Former FEMA Director

Flood Mitigation Assistance Program

The Flood Mitigation Assistance (FMA) Program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101). Financial support is provided through the National Flood Insurance Fund to help states and communities implement measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP.

Three types of grants are available under FMA: planning, project, and technical assistance. Planning grants are available to states and communities to prepare Flood Mitigation Plans. NFIP-participating communities with approved Flood Mitigation Plans can apply for project grants to implement measures to reduce flood losses. Technical assistance grants in the amount of 10 percent of the project grant are available to the state for program administration. Communities that receive planning and/or project grants must participate in the NFIP. Examples of eligible projects include elevation, acquisition, and relocation of NFIP-insured structures. (Source: http://www.fema.gov/fima/fma.shtm)

Q&A | ELEMENT C. MITIGATION STRATEGY | C2

Q: C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))

A: See **NFIP Participation** below.

National Flood Insurance Program

Established in 1968, the NFIP provides federally-backed flood insurance to homeowners, renters, and businesses in communities that adopt and enforce floodplain management ordinances to reduce future flood damage.

NFIP Participation

The FEMA FIRM map panels for the City of La Puente were last updated September 26, 2008. According to the Federal Emergency Management Agency, the City is designated as Zone "X" by the National Flood Insurance Program. Zone X is an area determined to be outside the 500-year flood zone and protected by levee from 100-year flood. In light of the FIRM Zone X Floodplain designation, the flood threat to the City is considered to be moderate due to local, urban flooding.

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B4

Q: B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))

A: See **Repetitive Loss Properties** below.

Repetitive Loss Properties

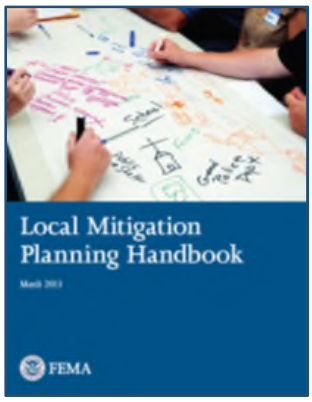
Repetitive Loss Properties (RLPs) are most susceptible to flood damages; therefore, they have been the focus of flood hazard mitigation programs. Unlike a Countywide program, the Floodplain Management Plan (FMP) for repetitive loss properties involves highly diversified property profiles, drainage issues, and property owner's interest. It also requires public involvement processes unique to each RLP area. The objective of an FMP is to provide specific potential mitigation measures and activities to best address the problems and needs of communities with repetitive loss properties. A repetitive loss property is one for which two or more claims of $1,000 or more have been paid by the National Flood Insurance Program (NFIP) within any given ten-year period. According to FEMA resources, there are no Repetitive Loss Properties (RLPs) within the City of La Puente.

State and Federal Guidance in Hazard Mitigation

While local jurisdictions have primary responsibility for developing and implementing hazard mitigation strategies, they are not alone. Various state and federal partners and resources can help local agencies with mitigation planning.

The Mitigation Plan was prepared in accordance with the following regulations and guidance documents:

- ✓ DMA 2000 (Public Law 106-390, October 10, 2000)
- ✓ 44 CFR Parts 201 and 206, Mitigation Planning and Hazard Mitigation Grant Program, Interim Final Rule, October 1, 2002
- ✓ 44 CFR Parts 201 and 206, Mitigation Planning and Hazard Mitigation Grant Program, Interim Final Rule, February 26, 2002
- ✓ How-To Guide for Using HAZUS-MH for Risk Assessment, (FEMA 433), February 2004
- ✓ Mitigation Planning "How-to" Series (FEMA 386-1 through 9 available at: http://www.fema.gov/fima/planhowto.shtm)
- ✓ Getting Started: Building Support for Mitigation Planning (FEMA 386-1)
- ✓ Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA 386-2)
- ✓ Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies (FEMA 386-3)
- ✓ Bringing the Plan to Life: Implementing the Mitigation Plan (FEMA 386-4)
- ✓ Using Benefit-Cost Review in Mitigation Planning (FEMA 386-5)
- ✓ Integrating Historic Property and Cultural Resource Considerations into Mitigation Planning (FEMA 386-6)



- ✓ Integrating Manmade Hazards into Mitigation Planning (FEMA 386-7)
- ✓ Multi-Jurisdictional Mitigation Planning (FEMA 386-8)
- ✓ Using the Mitigation Plan to Prepare Successful Mitigation Projects (FEMA 386-9)
- ✓ State and Local Plan Interim Criteria Under the DMA 2000, July 11, 2002, FEMA
- ✓ Mitigation Planning Workshop for Local Governments-Instructor Guide, July 2002, FEMA
- ✓ Report on Costs and Benefits of Natural Hazard Mitigation, Document #294, FEMA
- ✓ LHMP Development Guide – Appendix A - Resource, Document, and Tool List for Local Mitigation Planning, December 2, 2003, Cal OES
- ✓ Local Mitigation Plan Review Guide (FEMA 2011)
- ✓ Local Mitigation Planning Handbook (FEMA 2013)

How is the Plan Organized?

The structure of the plan enables the reader to use a section of interest to them and allows the City to review and update sections when new data is available. The ease of incorporating new data into the plan will result in a Mitigation Plan that remains current and relevant.

Following is a description of each section of the plan:

Part I: Planning Process

Introduction

Describes the background and purpose of developing a mitigation plan.

Planning Process

Describes the mitigation planning process including: stakeholders and integration of existing data and plans.

Part II: Risk Assessment

Community Profile

Summarizes the history, geography, demographics, and socioeconomics of the City.

Risk Assessment

This section provides information on hazard identification, vulnerability and risk associated with hazards in the City.

City-Specific Hazard Analysis

Describes the hazards posing a significant threat to the City including:

Earthquake | Flooding | Dam Failure | Landslide | Windstorm

Drought | Human-Caused & Technological Hazards

Each City-Specific Hazard Analysis includes information on previous occurrences, local conditions, hazard assessment, and local impacts.

Part III: Mitigation Strategies

Mitigation Strategies

Documents the goals, community capabilities, and priority setting methods supporting the Plan. Also highlights the Mitigation Actions Matrix: 1) goals met; 2) identification, assignment, timing, and funding of mitigation activities; 3) benefit/cost/priorities; 4) plan implementation method; and 5) activity status.

Plan Maintenance

Establishes tools and guidelines for maintaining and implementing the Mitigation Plan.

Part IV: Appendix

The plan appendices are designed to provide users of the Mitigation Plan with additional information to assist them in understanding the contents of the mitigation plan, and potential resources to assist them with implementation.

General Hazard Overviews

Generalized subject matter information discussing the science and background associated with the identified hazards.

Attachments

FEMA Letter of Approval
City Council Staff Report
City Council Resolution
Planning Team sign-in sheets
General public web postings and notices

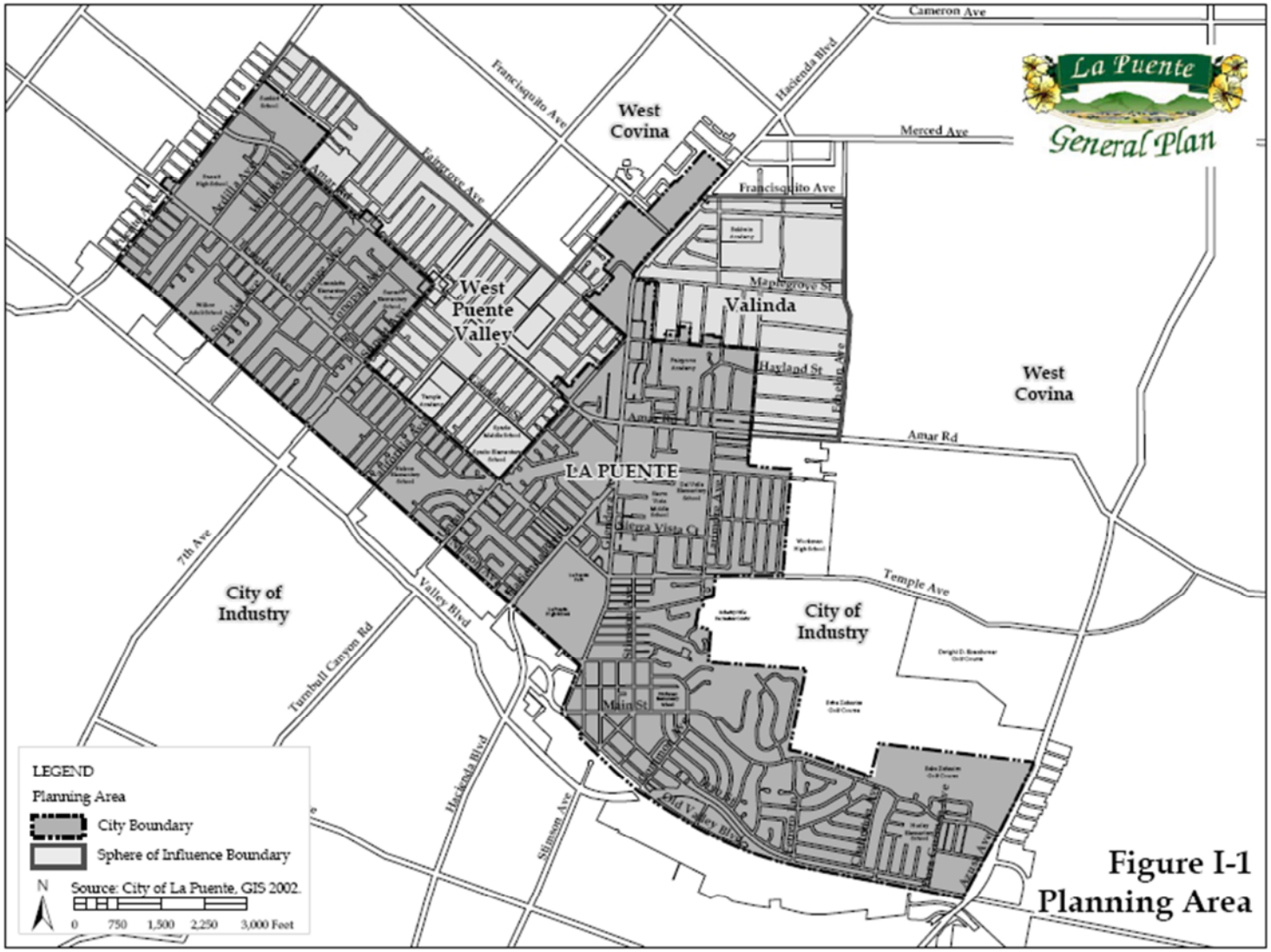
Plan Adoption and Approval

As per DMA 2000 and supporting Federal regulations, the Mitigation Plan is required to be adopted by the City Council and approved by FEMA. See the **Planning Process Section** for details.

Who Does the Mitigation Plan Affect?

This plan provides a framework for planning for natural and human-caused hazards. The resources and background information in the plan are applicable City-wide and to City-owned facilities outside of the City boundaries, and the goals and recommendations provide groundwork for local mitigation plans and partnerships. **Map: Base Map of City of La Puente** shows major roads in the City of La Puente.

Map: Base Map of City of the La Puente
(Source: City of La Puente General Plan)



Planning Process

As mentioned above, the planning process began back in 2004 including Planning Team meetings, development of a Plan and adoption by City Council. However, the Plan was set aside due to budget and staffing limitation and was resurrected with a new planning process beginning in 2016. The discussion that follows on the "planning process" refers to the efforts begun in 2016 however documentation of the earlier plan writing efforts were included in the Planning Process Section.

Throughout the project, the City followed its traditional approach to developing policy documents, including preparation of the First Draft Plan, then making the First Draft Plan available to the Planning Team, public and external agencies to encourage a broad spectrum of participation. The Second Draft Plan incorporated documentation on the process of soliciting comments as well as input gathered from the public, external agencies. The Second Draft Plan was submitted to Cal OES and FEMA for review and approval. Next, the Final Plan, incorporating any federally mandated revisions, was presented to the City Council for adoption. Proof of adoption was forwarded to FEMA resulting in FEMA's issuance of Final Approval. The planning process described above is portrayed below in a timeline:

Q&A | ELEMENT A: PLANNING PROCESS | A1

Q: A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

A: See **Planning Phases Timeline** below.

Q&A | ELEMENT A: PLANNING PROCESS | A2

Q: A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))

A: See **Planning Phases Timeline** below.

Q&A | ELEMENT A: PLANNING PROCESS | A3

Q: A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

A: See **Planning Phases Timeline** below.

Q&A | ELEMENT E: PLAN ADOPTION | E1

Q: E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))

A: See **Planning Phases Timeline** below.

Figure: Planning Phases Timeline

PLANNING PHASES TIMELINE				
Plan Writing Phase (First Draft Plan)	**Plan Review Phase (Second Draft Plan)**	**Plan Adoption Phase (Final Plan)**	**Plan Approval Phase (Final Plan)**	**Plan Implementation Phase (Final Plan)**
• Planning Team input – research, meetings, writing, review of the Working Draft Plan • Incorporating amendments, post the First Draft Plan on City's website encouraging questions and comments • Invite outside agencies to review First Draft Plan • Invite City department heads to review the First Draft Plan • First Draft Plan reviewed by Planning Team, external agencies, and public • Comments gathered incorporated into Second Draft Plan	• Second Draft Plan submitted to Cal OES and FEMA for review and approval • Amend Plan as required by FEMA regulations • Receive FEMA APA (Approval Pending Adoption)	• Public notice of upcoming City Council public meeting • Distribute Final Plan and staff report to the City Council in advance of the public meeting • Present Final Plan to the City Council for adoption • Incorporate input from the City Council public meeting into Final Plan	• Submit proof of Adoption to FEMA • FEMA issues Final Approval • FEMA Letter of Approval incorporated into Final Plan.	• Conduct Planning Team meetings to integrate mitigation action items into budget, CIP and other planning mechanisms (funding and strategic documents)

Plan Methodology

The Planning Team discussed knowledge of natural hazards and past historical events, as well as planning and zoning codes, ordinances, and recent planning decisions.

The rest of this section describes the mitigation planning process including 1) Planning Team involvement, 2) extended Planning Team support (department heads), 3) public and external agency involvement; and 4) integration of existing data and plans.

Planning Team Involvement

The Planning Team consisted of representatives from City of La Puente departments related to hazard mitigation processes. The Planning Team served as the primary stakeholders throughout the planning process. Citizens and businesses ("the public") along with external agencies served as secondary stakeholders in the planning process.

The Planning Team was responsible for the following tasks:

- ✓ Confirming planning goals
- ✓ Prepare timeline for plan update
- ✓ Ensure plan meets DMA 2000 requirements
- ✓ Organize and solicit involvement of public and external agencies
- ✓ Analyze existing data and reports
- ✓ Update hazard information
- ✓ Review HAZUS loss projection estimates
- ✓ Create Mitigation Action Items
- ✓ Participate in Planning Team meetings and City Council public meeting
- ✓ Provide existing resources including maps and data

As mentioned earlier, the planning effort began back in 2004. Since that time, the makeup of the Planning Team has changed considerably. The current Planning Team is listed in the **Credits**.

Following is a brief description of each of the Planning Team meetings dating back to the beginning of the project:

Meeting #1: October 5, 2007 – *Hazard Assessment and Community Profile Review*

The Planning Team presented information from research on hazards and their associated risks. After reviewing the requirements of the Community Profile, potential resources were identified. Research responsibilities for the sections were delegated within the Planning Team.

Meeting #2: October 19, 2007 – *Drafting Action Items and Identifying Critical Facilities*

After the assignments from the last meeting were presented, the Planning Team brainstormed and discussed a set of draft mitigation items for each hazard. These action items were built on specialized knowledge within the Planning Team and would be further defined by community

input. The Planning Team identified current mitigation action items that have been implemented locally. There was also discussion regarding the difficulty of proper risk assessment.

Meeting #3: November 2, 2007 – *Refined Action Items*

The Planning Team refined the action items discussed during the previous meeting and developed evaluation criteria. After reviewing numerous samples from other local cities, a survey was drafted in order to incorporate resident feedback into the plan. The survey can be found in the public forum section of this appendix.

Meeting #4: March 22, 2016 – *Kick-Off Meeting – Research Collection*

The Kick-Off meeting with the Planning Team was made up of key departmental representatives. The purpose of the Kick-Off Meeting was to review project expectations and timeline, gather pertinent documents, role and membership of Planning Team, review updates to DMA 2000 regulations, discuss availability of mapping resources, and discuss opportunities for public involvement. The meeting included a review of the hazards and impacts since the writing of the original draft Mitigation Plan. Additionally, the status of Mitigation Actions identified in the draft plan were reviewed. The review included gathering information as to status, assignment and scheduling.

Meeting #5: April 27, 2016 – *Develop Additional Mitigation Measures*

The Planning Team developed new Mitigation action measures that were previously unidentified in the previous writing of the updated plan.

Meeting #6: June 13, 2016 – *Review Updated Plan*

The Planning Team reviewed the County of Los Angeles All-Hazard Mitigation Plan – Appendix A: Jurisdictional Guide to Updating Hazard Mitigation Plans for additional ideas for mitigation action items. Several items were captured for inclusion in La Puente's plan either because it identified a previously unidentified ongoing activity or it's an action item for the future.

The Planning Team, with assistance from Emergency Planning Consultants, identified and profiled hazards; determined hazard rankings; estimated potential exposure or losses; evaluated development trends and specific risks; and developed mitigation goals and action items.

Q&A | ELEMENT A: PLANNING PROCESS | A1

Q: A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

A: See **Table: Planning Team Involvement and Level of Participation** below.

Table: Planning Team Level of Participation

Name	Issue Request for Proposal	Contract with EPC	Kickoff Meeting with EPC	Research and Writing of 2017 Plan	Planning Team Meeting (4/27/16)	Planning Team Meeting (6/13/16)	Planning Team Reviews and Comments on First Draft Plan	Invite Input on First Draft Plan – External Agencies and Public	Submit Second Draft Plan to Cal OES/FEMA Review and Approval Pending Adoption	Attend City Council Public Meeting
City of La Puente										
John DiMario, Chair			X		X	X	X	X	X	X
David Carmany			X		X	X	X			
Vince Mastrosimone			X		X	X	X	X	X	
Reina Schaetzl			X		X	X	X			
County of Los Angeles										
Lt. Pete Cacheiro						X	X			
Emergency Planning Consultants										
Carolyn J. Harshman			X	X	X	X			X	

Table: Planning Team Timeline

	January 2016	February	March	April	May	June	July	August	September	October	November-December	January 2017	February	March	April	May-December	January 2018	February	March	April
Research and Writing of Mitigation Plan	X	X	X	X	X	X	X	X	X	X	X	X	X							
Planning Team Meetings			X	X		X														
Review and Comment on First Draft Plan by Planning Team, External Agencies, and Public											X	X								
Incorporate Comments and Revisions into the Second Draft Plan													X							
Submit Second Draft Plan to Cal OES and FEMA for review. Address any mandated amendments.											X					X	X	X		
Public Notice of City Council Public Meeting																				X
Present Final Plan to City Council																				X
Provide Proof of Adoption to FEMA																				X
FEMA Issues Final Approval																				X

Q&A | ELEMENT A: PLANNING PROCESS | A2

Q: A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))

A: See **Secondary Stakeholder Involvement** below.

Q&A | ELEMENT A: PLANNING PROCESS | A3

Q: A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

A: See **Secondary Stakeholder Involvement** below.

Secondary Stakeholder Involvement

In addition to the Planning Team, the secondary stakeholders were invited to provide information, expertise, and other resources during plan writing phase. The secondary stakeholders included: general public and external agencies (utilities, special districts, and adjoining jurisdictions). All gathered input was directed to the Chair of the Planning Team who worked with the consultant to incorporate the information into the Second Draft Plan. Following is a specific accounting of the date, source, and information gathered:

Table: Invited Individuals and Comments

General Public or External Agency	Name	Job Title	Comments
General Public was invited via news release and City's website to participate during the plan writing phase. Following are comments received from the General Public:			
No respondents.	N/A	N/A	No comments received.
External Agencies were invited via email to participate during the plan writing phase. Following are comments received from the External Agencies:			
Bassett Unified School District	Robert Jenkins	Director of Facilities	No comments received.
City of Industry	Brian James	Planning Director	No comments received.
City of West Covina	Jeff Anderson	Planning Director	No comments received.
Department of Fish & Game	Leslee Read	Regional Manager	No comments received.

General Public or External Agency	Name	Job Title	Comments
Gabrieleno Band of Mission Indians	Andrew Salas	Chairman	No comments received.
Gabrieleno/Tongua Tribal Council	Berni Acuna	Chairperson	No comments received.
Hacienda/La Puente School District	Mark Hansberger	Facilities Director	No comments received.
LA County Department of Public Works	Fabricio Pachano	Subdivision Mapping Section Chief	No comments received.
LA County MTA (Metro)	Wayne Wassell	Planning Manager, San Gabriel Valley	No comments received.
La Puente Valley County Water District	Greg Galindo	General Manager	No comments received.
La Puente Water Company	Michael Berlien	General Manager	No comments received.
LACDPW Environmental Programs	David Lobato	Environmental Programs Manager	No comments received.
Los Aneles County Department of Regional Planning	James Cuevas	Planner	No comments received.
Los Angeles County Fire Department	Claudia Soiza	Fire Inspector	No comments received.
Los Angeles County Sheriff's Department	Tim Murakami	Captain	No comments received.
Rowland Unified School District	Julie Mitchell	Superintendent	No comments received.
San Gabriel Valley Water Company	Francis M. DeLach	Interim General Manager	No comments received.
Sanitation District of Los Angeles County	Ruth Frazen	Planner	No comments received.
South Coast Air Quality Management District	Wayne Nastri	Executive Officer	No comments received.
Southern California Edison	Karen Cadavona	Environmental Review Manager	No comments received.

General Public or External Agency	Name	Job Title	Comments
Southern California Edison	Mike Perez	Logistics Manager	No comments received.
Southern California Edison	Ahmad Solomon	Region Manager	No comments received.
Suburban Water Systems	George Lopez	Director of Engineering	No comments received.
The Gas Company	Tony Maldonado	Service Planner	No comments received.
Time Warner Cable	Jeff Flaco	Planner	No comments received.
Torrez Martiez Desert Cahuilla Indians	Michael Mirelez	Cultural Resource Coordinator	No comments received.
Verizon	Chris Thorpe	Engineer	No comments received.

External agencies listed below were invited via email and provided with an electronic link to the City's website. Following is the attachment that was emailed along with the invitation to comments:

Figure: External Agencies Email Invite

City of La Puente

Notice of Availability
HAZARD MITIGATION PLAN

The Disaster Mitigation Act of 2000 (DMA 2000) requires that all local agencies have a local Hazard Mitigation Plan in place to be eligible for both pre and post disaster federal funding. A Natural Hazards Mitigation Plan is a comprehensive document that identifies potential natural hazards, the extent of risk posed by these hazards, the vulnerabilities of the City to these hazards, and the actions the City may take to mitigate or reduce the potential impact of the hazards.

The City of La Puente has undertaken completion of the Plan in order to meet a mandate set forth by the Federal Emergency Management Agency (FEMA). The local mitigation plan is the representation of La Puente's commitment to reduce risks from natural hazards and serves as a guide for decision makers as they commit resources toward reducing the effects of natural hazards.

The City of La Puente has identified earthquakes, flooding, dam failure, landslides, droughts, windstorms and other human caused and technological hazards as natural disasters that could impact the City and surrounding areas. Working with input from citizens, local community partners, and surrounding cities, staff has recognized areas that may be affected by the identified hazards and developed action plans to address efforts at minimizing the impact on the community.

Failure to implement an approved Natural Hazard Mitigation Plan could have a devastating impact on the City in the event of a natural disaster. The plan provides a comprehensive review of the potential impacts and identifies remedies for various natural disasters that could occur within the East San Gabriel Valley region. But more importantly, without the City proceeding with the development and adoption of a comprehensive plan, federal financial assistance could be jeopardized.

The City is required to include the public and other public agencies in the planning process giving them a chance to review and comment on the draft plan. The City has established a 30 day comment period which will end on March 30, 2017. The first draft plan is available for review on the City web-site at http://lapuente.org/Home/Components/News/News/1240/108?backlist=%2fhome

If you wish to participate in the process, please submit your written comments to John Di Mario, Development Services Director at jdimario@lapuente.org by the deadline.

Following the comment period, the draft plan will be presented to the public at a public meeting. The plan will then be presented to the City Council for adoption and then submitted to FEMA for review and approval.

Also, in advance of the City Council public meeting at which the plan is presented for adoption, the general public and external agencies (via public noticing) were informed of the availability of the Third Draft Plan and encouraged to provide input prior to or during the public meeting. Gathered comments from the public and external agencies will be noted in the City Council Staff Report and added to the Final Plan.

Q&A | ELEMENT C. MITIGATION STRATEGY | C1

Q: C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

A: See **Capability Assessment – Existing Processes and Programs** below.

Capability Assessment – Existing Processes and Programs

The City will incorporate mitigation planning as an integral component of daily operations. This will be accomplished by the Planning Team working with their respective departments to integrate mitigation strategies into the planning documents and operational guidelines within the City. In addition to the Capability Assessment below, the Planning Team will strive to identify additional policies, programs, practices, and procedures that could be created or modified to address mitigation activities.

Table: Capability Assessment - Existing Processes and Programs

Process	Action	Implementation of Plan
Hazard Mitigation	Ensure representation on Planning Team includes all departments responsible for the existing processes and programs identified in this table.	✓ *Planning Team's effectiveness in implementing Plan and creating a culture of mitigation* ✓ *Planning Team members become "ambassadors" in the various departments charged with influencing development, infrastructure, and future planning* ✓ *Involve Hazard Mitigation Planning Team in review of future updates of the City General Plan or Zoning Ordinance to ensure consideration of threats posed by hazards (See Mitigation Actions Matrix)*
Administrative	Departmental or organizational work plans, policies, and procedural changes	✓ *City Manager's Office* ✓ *Development Services Department* ✓ *Other departments as appropriate* ✓ *Continue training staff for all aspects of Emergency Management and ensure adequate staffing levels by cross-training staff for each identified capability/task*
Administrative	Other plans	✓ *Emergency Operations Plan* ✓ *Address plan findings and incorporate mitigation activities in General Plan*
Budgetary	Capital and operational budgets	✓ *Include line item mitigation measures in budget as appropriate*
Regulatory	Executive orders, ordinances, and other directives	✓ *Building Code* ✓ *Capital Improvement Plan (Require hazard mitigation in design of new construction)* ✓ *Comprehensive Planning (Institutionalize hazard mitigation in land use and new construction)* ✓ *National Flood Insurance Program* ✓ *Storm Water Management Plan* ✓ *Zoning Ordinance*
Funding	Traditional and nontraditional sources	✓ *Once plan is approved, seek authority to use bonds, fees, loans, and taxes to finance projects* ✓ *Seek assistance from federal and state government, foundation, nonprofit, and private sources, such as Hazard Mitigation Grant Program* ✓ *Research and grant opportunities through U.S. Department of Housing and Urban Development, Community Development Block Grant*
Partnerships	Creative funding and initiatives	✓ *Community volunteers* ✓ *In-kind resources* ✓ *Public-private partnerships* ✓ *State support*
Partnerships	Advisory bodies and committees	✓ *Disaster Council* ✓ *Disaster Management Area Coordinator*

Q&A | ELEMENT A: PLANNING PROCESS | A4

Q: A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))

A: See **Use of Existing Data** below.

Use of Existing Data

The Planning Team gathered and reviewed existing data and plans during plan writing and specifically noted as "sources". Numerous electronic and hard copy documents were used to support the planning process:

City of La Puente General Plan Elements (2004) and Draft La Puente Hazard Mitigation Plan (2007)
www.lapuente.org
Applicable Incorporation: Land Use map, Community Profile section – geography, environmental, population, housing, transportation and demographic data, Safety Element - Hazard information

County of Los Angeles All-Hazards Mitigation Plan (2014)
www.lacounty.gov
Applicable Incorporation: Information about hazards in the County contributed to the hazard-specific sections in the City's Mitigation Plan.

California State Hazard Mitigation Plan (2013)
http://www.caloes.ca.gov/
Applicable Incorporation: Used to identify hazards posing greatest hazard to State.

HAZUS maps and reports
Created by Emergency Planning Consultants
Applicable Incorporation: Numerous HAZUS results have been included for earthquake and flood scenarios to determine specific risk to City of La Puente.

California Department of Finance
www.dof.ca.gov/
Applicable Incorporation: Community Profile section – demographic and population data

FEMA "How To" Mitigation Series (386-1 to 386-9)
www.fema.gov/media
Applicable Incorporation: Mitigation Measures Categories and 4-Step Planning Process are quoted in the Executive Summary.

National Flood Insurance Program
www.fema.gov/national-flood-insurance-program
Applicable Incorporation: Used to confirm there are no repetitive loss properties within the City

Local Flood Insurance Rate Maps
www.msc.fema.gov
Applicable Incorporation: Provided by FEMA and included in Flood Hazard section.

California Department of Conservation
www.conservation.ca.gov/cgs
Applicable Incorporation: Seismic hazards mapping

U.S. Geological Survey (USGS)
www.usgs.gov
Applicable Incorporation: Earthquake records and statistics

The City of La Puente staff identified current mitigation activities, resources and programs, and potential action items from research materials and stakeholder interviews

Q&A | ELEMENT E: PLAN ADOPTION | E1

Q: E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))

A: See **Plan Adoption Process** below.

Plan Adoption Process

Adoption of the plan by the local governing body demonstrates the City's commitment to meeting mitigation goals and objectives. Governing body approval legitimizes the plan and authorizes responsible agencies to execute their responsibilities.

FEMA will review and approve the Second Draft Plan before the City Council will consider the plan for adoption.

In preparation for the public meeting with the City Council, the Planning Team prepared (will prepare) a Staff Report including an overview of the Planning Process, Risk Assessment, Mitigation Goals, and Mitigation Actions. The staff presentation concluded with a summary of the input received during the public review of the document. The meeting participants were encouraged to present their views and make suggestions on possible mitigation actions.

The City Council heard the item on _____. The City Council voted _____ to adopt the updated Mitigation Plan. The Resolution of adoption by the City Council is in the **Appendix**.

Plan Approval

FEMA issued an Approval Pending Adoption on February 27, 2018. Following City Council's adoption of the Plan on _____, FEMA issued a final approval on _____. A copy of the FEMA Letter of Approval is in the **Appendix**.

Part II: RISK ASSESSMENT

Community Profile

The City of La Puente is one of the oldest cities in Los Angeles County and is rich in history. The area comprising the City of La Puente was first settled in 1841 as an agricultural region and the City itself incorporated in 1956.

The City is served by the nearby Interstate 10, Interstate 605 and CA 60 freeways. The major arterial roads are Puente, Orange, Sunset, Hacienda, Glendora and Azusa Avenues which run north-to-south, and Valley Boulevard., Amar Road, Temple Avenue and Nelson Avenue which run east-to-west.

Passenger transportation is provided by Foothill Transit, Metropolitan Transportation Authority (MTA), and La Puente's "Link" Shuttle services. In addition, two (2) Metrolink stations in adjacent cities serve the city further expanding accessibility in and out of La Puente.

Geography and the Environment

According to the General Plan, the City of La Puente includes an area of 3.48 square miles and is located in eastern Los Angeles County in the San Gabriel Valley. The City of La Puente borders Hacienda Heights to the south, West Covina to the north, Unincorporated Los Angeles County (Bassett) to the west, and Unincorporated Los Angeles County (Valinda) to the east. The average elevation of the City of La Puente is 360 feet.

Major Rivers

The nearest major river is the San Gabriel River. This river may have an impact on the City of La Puente. Normally, this river channel is dry and only carries a significant water flow during a major rainstorm. The river channel is part of the County Flood Control District and La Puente is protected by the Army Corps of Engineer Santa Fe Dam project. Portions of the northwest corner of the City would be impacted if this dam or the Puddingstone Dam in San Dimas failed while holding a significant amount of water.

Climate

Temperatures in the City of La Puente average approximately 60 degrees in the winter months and 72 degrees in the summer months (Source: www.city-data.com). However, the temperatures can vary over a wide range, particularly when the Santa Ana winds blow, bringing higher temperatures and very low humidity.

Rainfall in the city averages approximately 14 inches of rain per year (Source: www.city-data.com). However, the term "average rainfall" is misleading because over the recorded history of rain fall in the City of La Puente rainfall amounts have ranged dramatically from dry to 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 regular intervals. In short, rainfall in Southern California might be characterized as feast or famine within a single year.

Because the metropolitan basin is largely built out, water originating in higher elevation communities can have a sudden impact on communities at lower elevations.

Minerals and Soils

Understanding the geologic characteristics of City of La Puente is an important step in hazard mitigation and avoiding at-risk development. The surface material includes unconsolidated, fine-grained deposits of silt, sand, gravel, and recent flood plain deposits. Historic, torrential flood events can introduce large deposits of sand and gravel. Sandy silt and silt containing clay are moderately dense and firm, and are primarily considered to be prone to liquefaction, an earthquake related hazard. Basaltic lava consists mainly of weathered and non-weathered, dense, fine-grained basalt. Though the characteristics of this lava may offer solid foundation support, landslides are common in many of these areas where weathered residual soil overlies the basalt.

According to the City's General Plan, expansive type soils are prevalent in La Puente. Expansive soils act much like a sponge. As they absorb water, they swell and as they lose water, they shrink. Expansive soils may become unstable during ground shaking, and are one of the most prevalent causes of earthquake damage to buildings. Damage caused by expansive soils includes disfiguring and structural damage due to cracking walls, ceilings, driveways sidewalks, and basement floors. Minor damage to doors and windows may cause them to function erratically. To minimize damage to wood frame structures foundations can be made more flexible, through the use of reinforced or post-tensioned slabs. See the Earthquake Section for additional information about expansive soils.

Other Significant Geologic Features

The City of La Puente, lies within a region of several active faults. According to the General Plan, several major faults within a 5-mile radius of La Puente are capable of producing substantial effects from ground shaking. These faults include the:

- San Andreas
- Chino
- Whittier-Elsinore
- Sierra Madre-Cucamonga
- San Fernando
- Puente Hills

The Puente Hills fault system was discovered in 2003 and is comprised of three sections that run under downtown Los Angeles, through La Puente, and into the Coyote Hills of north Orange County.

The Los Angeles Basin has a history of powerful and relatively frequent earthquakes, dating back to the powerful 8.0+ San Andreas earthquake of 1857, which did substantial damage to the relatively few buildings that existed at the time. Paleoseismological research indicates that large (8.0+) earthquakes occur on the San Andreas Fault at intervals between 45 and 332 years with an average interval of 140 years. Other lesser faults have also caused very damaging earthquakes since 1857. Notable earthquakes include the Long Beach earthquake of 1933, the San Fernando Earthquake of 1971, the 1987 Whittier Narrows Earthquake and the 1994 Northridge Earthquake.

In addition, many areas in the Los Angeles Basin have sandy soils that are subject to

liquefaction. The City of La Puente has liquefaction zones throughout portions of the City as shown on USGS Seismic Hazard Maps.

The City of La Puente also has areas with earthquake-induced landslide. These limited hillside areas could potentially pose landslide and erosion hazards.

Population and Demographics

According to the 2010 U.S. Census, the City of La Puente has a population of approximately 40,000 in an area of 3.48 square miles. The population of the City of La Puente has steadily increased from the mid 1800's through the present. The increased population in the City of La Puente creates more exposure to hazards, and changes how agencies prepare for and respond to hazards. An earthquake is not the only hazard to potentially threaten the City of La Puente. In the 1987 publication, Fire Following Earthquake issued by the All Industry Research Advisory Council, Charles Scawthorn explains how a post-earthquake urban conflagration would develop. The conflagration would be started by fires resulting from earthquake damage, but made much worse by the loss of pressure in the fire mains, caused by either lack of electricity to power water pumps, and /or loss of water pressure resulting from broken fire mains.

Furthermore, increased density can affect risk. For example, narrower streets are more difficult for emergency service vehicles to navigate, the higher ratio of residents to emergency responders affects response times, and homes located closer together increase the chances of fires spreading.

According to Community Development Department members of the Planning Team, the City of La Puente has experiencing a fair amount of in-fill building and multi-family units replacing older, single-family home stocks, which is increasing the population density and creating greater service loads on the built infrastructure, including roads, water supply, sewer services and storm drains.

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 upon special needs groups: women, children, minorities, and the poor.

According to the La Puente General Plan – Housing Element (2008-2014), the demographic makeup of the City is as follows:

Racial/Ethnic Group	%
White	15%
Hispanic/Latino	74%
Black	3%
Asian/Pacific Islander	7%
Other	1%
Total	**100%**

The ethnic and cultural diversity suggests a need to address multi-cultural needs and services.

The per capita income for the City was $15,509 according to the 2010 Census. About 13.4% of families and 14.9% of the population were below the poverty line, including 21.9% of those under age 18 and 17.3% of those age 65 or over. Vulnerable populations, including seniors, disabled citizens, women, and children, as well as those people living in poverty, may be disproportionately impacted by hazards.

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 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 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.

Historic Resources

La Puente has a variety of cultural resources including a few historic structures such as the La Puente Women's Club.

The "Old Town La Puente" or downtown business district is La Puente's traditional city center. It includes a number of older buildings, including unreinforced masonry structures.

In California, unreinforced masonry buildings, often called URMs or UMBs, are generally brick buildings constructed prior to 1933, predating modern earthquake-resistant design. The brick is not strengthened with embedded steel bars and is therefore called "unreinforced."

In earthquakes, the brick walls (especially parapets) tend to disconnect from the building and fall outward, creating a hazard for people below and sometimes causing the building to collapse. URM failures have been responsible for deaths in California earthquakes since at least 1868, and as recently as Loma Prieta in 1989 and San Simeon in 2003.

Land Use and Development

Development in Southern California from the earliest days was a cycle of boom and bust. The Second World War however dramatically changed that cycle. Military personnel and defense workers came to Southern California to fill the logistical needs created by the war effort. The available

housing was rapidly exhausted and existing commercial centers proved inadequate for the influx of people. Immediately after the war, construction began on the freeway system, and the face of Southern California was forever changed. Home developments and shopping centers sprung up everywhere and within a few decades the La Puente area was virtually built out. This pushed new development further and further away from the urban center.

The City of La Puente General Plan addresses the use and development of private land, including residential and commercial areas. This plan is one of the City's most important tools in addressing environmental challenges including transportation and air quality; growth management; conservation of natural resources such as clean water.

The environment of most Los Angeles County cities is nearly identical with that of their immediate neighbors and the transition from one incorporated municipality to another is seamless to most people. Seamless too are the exposures to the hazards that affect all of Southern California.

Housing and Community Development

In the City of La Puente the demand for housing outstrips the available supply, and the recent low interest rates have further fueled a pent-up demand. Currently there are 9,447 housing units in the City of La Puente; homeowner ship rate is 60.2% (Source: 2010 U.S. Census). Multiple unit buildings account for a quarter of the housing inventory. Like most of Los Angeles County and the region, home prices in La Puente have risen to unprecedented levels since the last Census in 2010.

Employment and Industry

According to the 2010 Census, sales and office positions (26.6%), production, transportation, and material moving occupations (23.6%), and service positions (21.4%), are the City of La Puente's principal employment activities. Manufacturing (17.8%) and Educational, health and social services (17.4%) and retail trade (14.6%) represent the top three industries in the City of La Puente. The City of La Puente has a labor force of approximately 17,000 persons age 16 and over and a daytime population estimated at 30,100.

Mitigation activities are needed at the business level to ensure the safety and welfare of workers and limit damage to industrial infrastructure. Employees are highly mobile, commuting from surrounding areas to industrial and business centers. This creates a greater dependency on roads, communications, accessibility and emergency plans to reunite people with their families. Before a natural hazard event, large and small businesses can develop strategies to prepare for hazards, respond efficiently, and prevent loss of life and property.

Transportation and Commuting Patterns

Private automobiles are the dominant means of transportation in Southern California and in the City of La Puente. According to the City's General Plan, the City of La Puente meets its public transportation needs through dial-a-ride, La Puente Transit "Link" shuttles, links to light rail transit, MTA buses, Foothill Transit stations, and nearby Metrolink stations. In addition to these services, the City promotes alternative transportation activities including park-and-rides.

The City of La Puente is located between the 60 Freeway and the I-10 freeway, with Hacienda Boulevard running perpendicular between the two through the City. The I-605 freeway, to the

west, is connected to the city via Temple Avenue. The City's road system includes 74.02 miles of local roads, and two bridges. As daily transit rises, there is an increased risk that a natural hazard event will disrupt travel patterns across the region, as well as local, regional and national commercial traffic.

Localized flooding can render roads unusable. A severe winter storm has the potential to disrupt the daily driving routine of hundreds of thousands of people in the Los Angeles Basin. Hazards can disrupt automobile traffic and shut down local and regional transit systems.

The inevitability of hazards, coupled with 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 hazards, and developing strategies to reduce the impact of an event can assist in protecting life and property of citizens and communities. These risks are addressed in the following section of the Hazard Mitigation Plan.

Risk Assessment

What is a Risk Assessment?

Conducting a risk assessment can provide information regarding: the location of hazards; the value of existing land and property in hazard locations; and an analysis of risk to life, property, and the environment that may result from natural hazard events. Specifically, the five levels of a risk assessment are as follows:

1. *Hazard Identification*
2. *Profiling Hazard Events*
3. *Vulnerability Assessment/Inventory of Existing Assets*
4. *Risk Analysis*
5. *Assessing Vulnerability/Analyzing Development Trends*

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B1

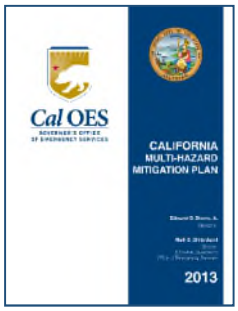
Q: B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))

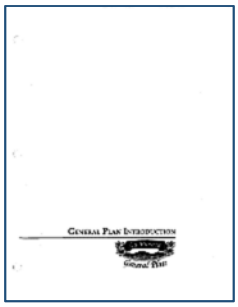
A: See **Hazard Identification** below.

1) Hazard Identification

This section is the description of the geographic extent, potential intensity, and the probability of occurrence of a given hazard. Maps are used in this plan to display hazard identification data. ***The City of La Puente utilized the categorization of hazards as identified in California's State Hazard Mitigation Plan, including: Earthquakes, Floods, Levee failures, Wildfires, Landslides and earth movements, Tsunami, Climate-related hazards, Volcanoes, and Other hazards***.

Next, the Planning Team reviewed existing documents to determine which of these hazards posed the most significant threat to the City. In other words, which hazard would likely result in a local declaration of emergency.





The geographic extent of each of the identified hazards was identified by the Planning Team utilizing maps and data contained in the City's General Plan and City's Emergency Operations Plan. In addition, numerous internet resources and the County of Los Angeles All-Hazards Mitigation Plan served as valuable resources. Utilizing the Calculated Priority Risk Index (CPRI)

ranking technique, the Planning Team concluded the following hazards posed a significant threat against the City:

Earthquake | Flooding | Dam Failure | Landslide | Windstorm

Drought | Human-Caused & Technological Hazards

The hazard ranking system is described in **Table: Calculated Priority Risk Index**, while the actual ranking is shown in **Table: Calculated Priority Risk Index Ranking for City of La Puente**.

Table: Calculated Priority Risk Index
(Source: Federal Emergency Management Agency)

CPRI Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index Value	
Probability	Unlikely	Extremely rare with no documented history of occurrences or events. Annual probability of less than 1 in 1,000 years.	1	45%
	Possibly	Rare occurrences. Annual probability of between 1 in 100 years and 1 in 1,000 years.	2	
	Likely	Occasional occurrences with at least 2 or more documented historic events. Annual probability of between 1 in 10 years and 1 in 100 years.	3	
	Highly Likely	Frequent events with a well-documented history of occurrence. Annual probability of greater than 1 every year.	4	
Magnitude/ Severity	Negligible	Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure. Injuries or illnesses are treatable with first aid and there are no deaths. Negligible loss of quality of life. Shut down of critical public facilities for less than 24 hours.	1	30%
	Limited	Slight property damage (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). Injuries or illnesses do not result in permanent disability, and there are no deaths. Moderate loss of quality of life. Shut down of critical public facilities for more than 1 day and less than 1 week.	2	
	Critical	Moderate property damage (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). Injuries or illnesses result in permanent disability and at least 1 death. Shut down of critical public facilities for more than 1 week and less than 1 month.	3	
	Catastrophic	Severe property damage (greater than 50% of critical and non-critical facilities and infrastructure). Injuries and illnesses result in permanent disability and multiple deaths. Shut down of critical public facilities for more than 1 month.	4	
Warning Time	> 24 hours	Population will receive greater than 24 hours of warning.	1	15%
	12–24 hours	Population will receive between 12-24 hours of warning.	2	
	6-12 hours	Population will receive between 6-12 hours of warning.	3	
	< 6 hours	Population will receive less than 6 hours of warning.	4	
Duration	< 6 hours	Disaster event will last less than 6 hours	1	10%
	< 24 hours	Disaster event will last less than 6-24 hours	2	
	< 1 week	Disaster event will last between 24 hours and 1 week.	3	
	> 1 week	Disaster event will last more than 1 week	4	

Table: Calculated Priority Risk Index Ranking for City of La Puente

Hazard	Probability	Weighted 45% (x.45)	Magnitude Severity	Weighted 30% (x.3)	Warning Time	Weighted 15% (x.15)	Duration	Weighted 10% (x.1)	CPRI Ranking
Earthquake – San Andreas M7.8	3	1.35	4	1.2	4	0.6	1	0.1	**3.25**
Earthquake – Puente Hills M7.1	3	1.35	4	1.2	4	0.6	1	0.1	**3.25**
Urban Flooding	3	1.35	2	0.6	3	0.45	3	0.3	**2.70**
Dam Failure	2	0.9	4	1.2	4	0.6	4	0.4	**3.10**
Landslide	2	0.9	3	0.9	1	0.15	1	0.1	**2.05**
Windstorm	4	1.8	2	0.6	1	0.15	2	0.2	**2.75**
Drought	2	0.9	1	0.3	1	0.15	4	0.4	**1.75**
Human-Caused & Technological	2	0.9	2	0.6	4	0.6	2	0.2	**2.30**

2) Profiling Hazard Events

This process describes the causes and characteristics of each hazard and what part of the City's facilities, infrastructure, and environment may be vulnerable to each specific hazard. A profile of each hazard discussed in this plan is provided in the City-Specific Hazard Analysis. **Table: Vulnerability: Location, Extent, and Probability for City of La Puente** indicates a generalized perspective of the community's vulnerability of the various hazards according to extent (or degree), location, and probability.

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B1

Q: B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))

A: See **Table: Vulnerability: Location, Extent, and Probability for City of La Puente** below.

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

Q: B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

A: See **Table: Vulnerability: Location, Extent, and Probability for City of La Puente** below.

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

Q: B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

A: See **Table: Vulnerability: Location, Extent, and Probability for City of La Puente** below.

Table: Vulnerability: Location, Extent, and Probability for City of La Puente

Hazard	Location (Where)	Extent (How Big an Event)	Probability (How Often) *	Previous Occurrences
Earthquake	Entire Project Area	The Southern California Earthquake Center (SCEC) in 2007 concluded that there is a 99.7 % probability that an earthquake of M6.7 or greater will hit California within 30 years. Earthquake would most likely originate from the San Andreas fault.	High	1994 – Northridge Earthquake
Flood	Isolated Portions of the Project Area	Urban Flooding resulting from Severe Weather – extent varies on weather.	Moderate	2014 – Localized Flooding
Dam Failure	Isolated Portions of the Project Area	The Santa Fe Dam's downstream floodplain includes a very small portion of the West Puente Valley area. In the unlikely event of a dam failure, floodwaters would extend to the northwest corner of this area within one and one-half hours	Low-Moderate	None
Landslide	South Eastern Portion of the Project Area	Major property damage and significant impact to City residents.	Low-Moderate	2005 – near Dwight D. Eisenhower Golf Course
Windstorm	Entire Project Area	50 miles per hour or greater.	High	2001 – strong Santa Ana windstorm
Drought	Entire Project Area	Extent varies greatly depending on the speed of onset (e.g. post-earthquake).	Moderate	None
Human-Caused & Technological	Entire Project Area	Extent varies greatly depending on the scope, scale, and speed of onset.	Moderate	None

* Probability is defined as: Low = 1:1,000 years, Moderate = 1:100 years, High = 1:10 years

[1] Uniform California Earthquake Rupture Forecast

3) Vulnerability Assessment/Inventory of Existing Assets

A Vulnerability Assessment in its simplest form is a simultaneous look at the geographical location of hazards and an inventory of the underlying land uses (populations, structures, etc.). Facilities that provide critical and essential services following a major emergency are of particular concern because these locations house staff and equipment necessary to provide important public safety, emergency response, and/or disaster recovery functions.

Critical Facilities

FEMA separates critical buildings and facilities into the five categories shown below based on their loss potential. All of the following elements are considered critical facilities:

Essential Facilities are essential to the health and welfare of the whole population and are especially important following hazard events. Essential facilities include hospitals and other medical facilities, police and fire stations, emergency operations centers and evacuation shelters, and schools.

Transportation Systems include airways – airports, heliports; highways – bridges, tunnels, roadbeds, overpasses, transfer centers; railways – trackage, tunnels, bridges, rail yards, depots; and waterways – canals, locks, seaports, ferries, harbors, drydocks, piers.

Lifeline Utility Systems such as potable water, wastewater, oil, natural gas, electric power and communication systems.

High Potential Loss Facilities are facilities that would have a high loss associated with them, such as nuclear power plants, dams, and military installations.

Hazardous Material Facilities include facilities housing industrial/hazardous materials, such as corrosives, explosives, flammable materials, radioactive materials, and toxins.

Table: Critical Facilities Vulnerable to Hazards illustrates the hazards with potential to impact critical facilities owned by or providing services to the City of La Puente.

Table: Critical Facilities Vulnerable to Hazards

Name of Facility	Address	Earthquake	Flood	Dam Failure	Landslide	Windstorm	Drought	Human-Caused & Technological
Fire Station 26	15536 E. Elliott Avenue	X		X		X	X	X
La Puente Public Works Maintenance Yard	501 Glendora Avenue	X				X	X	X
City Hall	15900 E. Main Street	X				X	X	X
La Puente Community Center	501 Glendora Avenue	X				X	X	X
La Puente Senior Center	16001 E. Main Street	X				X	X	X
County Department of Health Services	15930 E. Central	X				X	X	X
Suburban Water Systems Pumping Station	14501 Temple Avenue	X		X		X	X	X
Bassett Adult School	760 Puente Avenue	X	X	X		X	X	X
Bassett High School	755 N. Ardilla Avenue	X	X	X		X	X	X
Del Valle Elementary School	801 N. Del Valle Avenue	X		X		X	X	X
Hurley Elementary School	535 Dora Guzman Avenue	X				X	X	X
La Puente High School	15615 E. Nelson Avenue	X				X	X	X
La Puente Valley County Water District	112 N. First St.	X				X	X	X
La Puente Valley County Water District Tanks	16300 East Main Street	X		X		X	X	X
La Puente Valley County Water District Pumping Station	850 North Glendora Avenue	X		X		X	X	X

Name of Facility	Address	Earthquake	Flood	Dam Failure	Landslide	Windstorm	Drought	Human-Caused & Technological
Lassalette Elementary	14333 Lassalette Street	X		X		X	X	X
Nelson Elementary School	330 N. California Avenue	X		X		X	X	X
Sierra Vista Middle School	15801 Sierra Vista Court	X		X		X	X	X
St. Joseph's Catholic School	15650 Temple Avenue	X				X	X	X
Sunset Elementary School	800 N. Tonopah Avenue	X		X		X	X	X
Sheriff's Station	150 North Hudson Avenue, City of Industry	X				X	X	X
Saint Lewis of France School	13901 Temple Avenue	X				X	X	X
Workman Elementary School	16000 Workman Street	X				X	X	X
Fairgrove Academy	15540 Fairgrove Avenue	X				X	X	X

4) Risk Analysis

Estimating potential losses involves assessing the damage, injuries, and financial costs likely to be sustained in a geographic area over a given period of time. This level of analysis involves using mathematical models. The two measurable components of risk analysis are magnitude of the harm that may result and the likelihood of the harm occurring. Describing vulnerability in terms of dollar losses provides the community and the state with a common framework in which to measure the effects of hazards on assets. For each hazard where data was available, quantitative estimates for potential losses have been included in the hazard assessment. Data was not available to make vulnerability determinations in terms of dollar losses for all of the identified hazards. The **Mitigation Actions Matrix** includes an action item to conduct such an assessment in the future.

5) Assessing Vulnerability/ Analyzing Development Trends

This step provides a general description of City facilities and contents in relation to the identified hazards so that mitigation options can be considered in land use planning and future land use decisions. This Mitigation Plan provides comprehensive description of the character of the City of La Puente in the **Community Profile Section**. This description includes the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns. Analyzing these components of the City of La Puente can help in identifying potential problem areas and can serve as a guide for incorporating the goals and ideas contained in this mitigation plan into other community development plans.

Hazard assessments are subject to the availability of hazard-specific data. Gathering data for a hazard assessment requires a commitment of resources on the part of participating organizations and agencies. Each hazard-specific section of the plan includes a section on hazard identification using data and information from City, County, state, or federal sources.

Regardless of the data available for hazard assessments, there are numerous strategies the City can take to reduce risk. These strategies are described in the action items detailed in the Mitigation Actions Matrix in the **Mitigation Strategies Section**. Mitigation strategies can further reduce disruption to critical services, reduce the risk to human life, and alleviate damage to personal and public property and infrastructure.

Land and Development

The City's General Plan addresses the use and development of private land, including residential and commercial areas. This plan is one of the City's most important tools in addressing environmental challenges including transportation and air quality; growth management; conservation of natural resources; clean water and open spaces

The environment of most Los Angeles County cities is nearly identical with that of their immediate neighbors and the transition from one incorporated municipality to another is seamless to most people. Seamless too are the exposures to the hazards that affect all of Southern California.

Impacts to Types of Land Uses

City of La Puente's General Plan identifies a broad range of land uses as indicated in **Map: Land Use Policy**. In general terms, land uses are categorized as residential, commercial, open space, and other (public, business, institutional, etc.).

Table: Impacts to Existing and Future Land Uses in the City of La Puente
(Source: EPC Analysis Based on City of La Puente General Plan – Land Use Element)

Category of Land Use Designation	Earthquake	Wildfire	Flooding	Landslide	Windstorm	Drought	Human-Caused & Technological
Low Density Residential	X	X	X	X	X	X	X
Medium Density Residential	X	X	X		X	X	X
Medium-High Density Residential	X	X	X		X	X	X
High Density Residential	X	X	X		X	X	X
Neighborhood Commercial	X	X	X		X	X	X
General Commercial	X	X	X		X	X	X
Business/Employment	X	X	X		X	X	X
Mixed Use	X	X			X	X	X
Public/Institutional	X	X	X		X	X	X
Public Open Space	X	X			X	X	X
Private Open Space	X	X		X	X	X	X

Map: Land Use Policy
(Source: City of La Puente General Plan – Land Use Element)

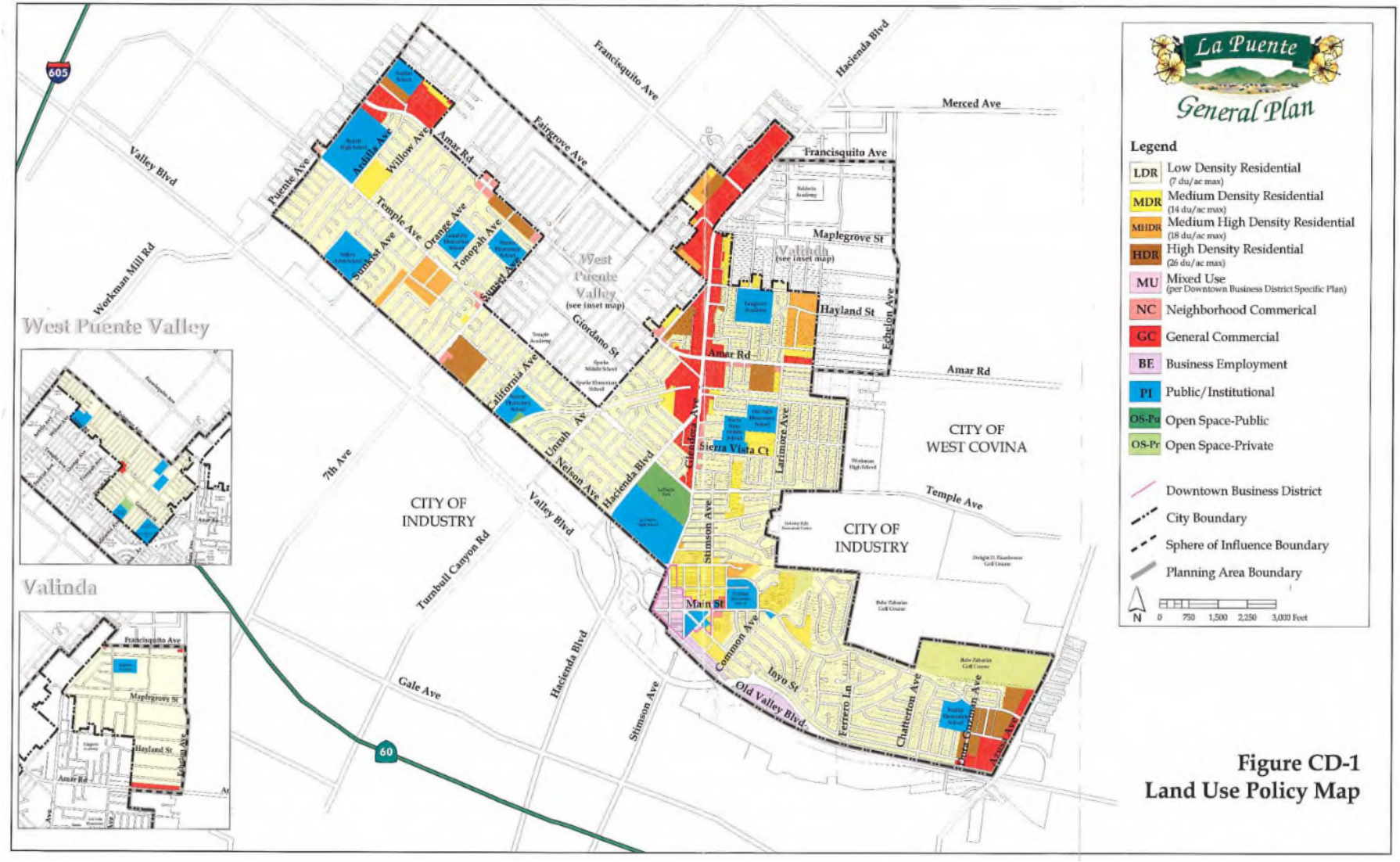


Figure CD-1
Land Use Policy Map

Earthquake Hazards

Previous Occurrences of Earthquakes in the City of La Puente

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

Q: B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

A: See **Previous Occurrences of Earthquakes in the City of La Puente** below.

Previous Occurrences of Earthquakes in La Puente

Recent earthquakes impacting La Puente include the Northridge Earthquake of 1994 (Magnitude 6.7), Whittier Earthquake of 1987 (Magnitude 5.9); and Landers Earthquake of 1992 (Magnitude 7.3).

In 2014, the La Habra Earthquake (Magnitude 5.1) was on the Puente Hills Fault. Many members of the La Puente Planning Team reported feeling strong shaking within the City.

Although there have been smaller incidents, La Puente has never been severely impacted by an earthquake.

Local Conditions

Southern California has a history of powerful and relatively frequent earthquakes, dating back to the powerful magnitude 8.0+ 1857 San Andreas Earthquake which did substantial damage to the relatively few buildings that existed at the time.

Paleoseismological research indicates that large magnitude (8.0+) earthquakes occur on the San Andreas Fault at intervals between 45 and 332 years with an average interval of 140 years. Other lesser faults have also caused very damaging earthquakes since 1857. Notable earthquakes include the 1933 Long Beach Earthquake, the 1971 San Fernando Earthquake, the 1987 Whittier Earthquake and the 1994 Northridge Earthquake.

The City of La Puente, like most of the Los Angeles Basin, lies over the area of one or more known earthquake faults, and potentially many more unknown faults, particularly so-called lateral or blind thrust faults. Several major faults within a 50-mile radius of La Puente are capable of producing substantial effects from ground shaking. These faults include the San Andreas, Whittier-Elsinore, Chino, Sierra Madre-Cucamonga, and San Fernando faults. A major earthquake produced along any of these faults has the potential to produce strong ground shaking in La Puente.

Discovered in 2003, the Puente Hills fault system is comprised of three sections that run under downtown Los Angeles through La Puente, and into the Coyote Hills of north Orange County. No active faults have been identified at the ground surface within the City limits, nor have any Alquist-Priolo Earthquake Fault zones been designated. However, the City overlies the Puente

Hills segment of the Elysian Park blind thrust fault. The fault is referred to as blind thrust because it does not intercept the ground surface and therefore cannot be detected visually. These faults are all capable of movement that could produce substantial ground shaking.

The Los Angeles Basin has a history of powerful and relatively frequent earthquakes, dating back to the powerful 8.0+ 1857 San Andreas Earthquake, which did substantial damage to the relatively few buildings that existed at the time. Paleoseismological research indicates that large (8.0+) earthquakes occur on the San Andreas fault at intervals between 45 and 332 years with an average interval of 140 years. Other lesser faults have also caused very damaging earthquakes since 1857. Notable earthquakes include the 1933 Long Beach Earthquake, the 1971 San Fernando Earthquake, the 1987 Whittier Narrows Earthquake, and the 1994 Northridge Earthquake.

In addition, many areas in the Los Angeles Basin have sandy soils that are subject to liquefaction. The City of La Puente has liquefaction zones throughout portions of the City as shown on USGS Seismic Hazard Maps.

The City of La Puente also has areas with land movement potential; these limited hillside areas could potentially pose landslide and erosion hazards.

Following are descriptions of the various faults in the region.

Table: Major Active Faults in the La Puente Region
(Source: La Puente General Plan – Safety Element and Emergency Planning Consultants)

Fault Name	Distance from City	MCR[1]	Fault Type	Most Recent Activity
Whittier / Elsinore	10 miles northeast	7.0	Strike Slip	1987
San Andreas	42 miles north	8.0	Strike Slip	1857
San Fernando	31 miles north	6.0-6.8	Left Reverse	1971
Sierra Madre-Cucamonga	9 miles north	7.0	Thrust	Unknown
Puente Hills	11 miles east	5.1	Blind Thrust	2014 (Brea)
Chino	16 miles southeast	7.0	Right Reverse	Unknown

[1] MCR refers to a potential earthquake's maximum credible magnitude as measured by Richter Scale.

Map: Earthquake Fault Map
(Source: La Puente General Plan)

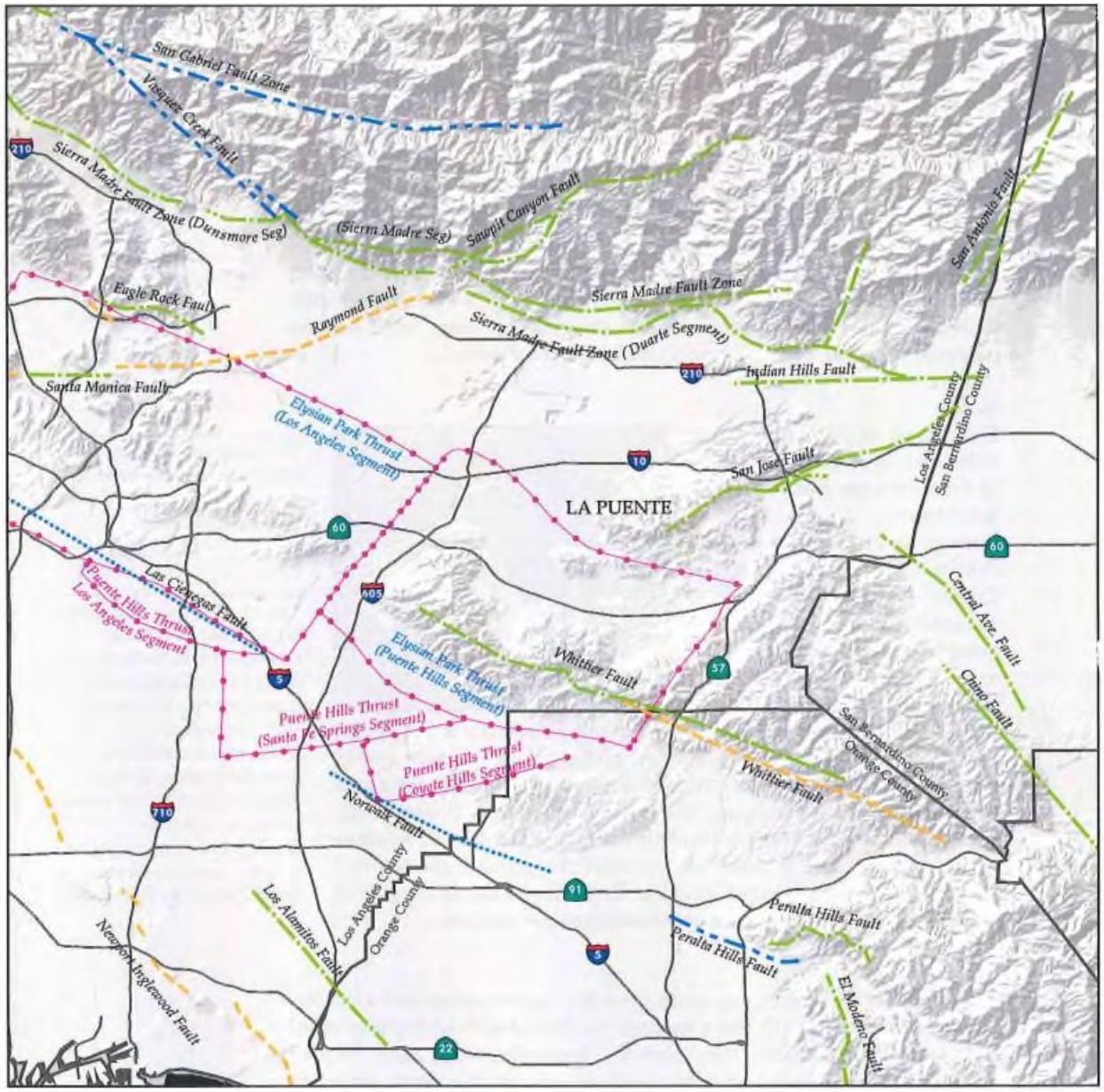


Figure CS-1
Earthquake Faults

HAZUS Results

The data in this section was generated using the HAZUS-MH program for earthquakes. Once the location and size of a hypothetical earthquake are identified, HAZUS-MH estimates the intensity of the ground shaking, the number of buildings damaged, the number of casualties, the amount of damage to transportation systems and utilities, the number of people displaced from their homes, and the estimated cost of repair and clean up.

Building Inventory

HAZUS estimates approximately 94% of the building stock within the City of La Puente is residential housing. In term of building construction types found in the region, wood frame construction makes up 94% of the building inventory.

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.

Table: Critical Facility Inventory – HAZUS

Essential Facilities	Count
Hospitals	0
Schools	18
Fire Stations	1
Police Stations	0
Emergency Operations Facilities	1

High Potential Loss (HPL) Facilities	Count
Dams	0
Levees	0
Military Installations	0
Nuclear Power Plants	0
Hazardous Material Sites	2

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. Transportation systems include highways, railways, light rail, bus, ports, ferry and airports. Utility systems include potable water, wastewater, natural gas, crude & refined oil, electric power and communications.

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.

Building-Related Losses

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.

HAZUS Summary Report

Sierra Madre M7.2 Earthquake Scenario

Building Damage

Table: Expected Building Damage by Occupancy – Sierra Madre M7.2

	None	Slight	Moderate	Extensive	Complete
	Count	Count	Count	Count	Count
Agriculture	3	1	1	0	0
Commercial	186	97	76	21	3
Education	7	3	2	0	0
Government	3	1	1	0	0
Industrial	41	22	19	5	1
Other Residential	137	80	41	12	1
Religion	18	9	6	2	0
Single Family	5,005	2,881	748	39	10
Total	**5,401**	**3,095**	**893**	**79**	**15**

Table: Expected Building Damage by Building Type – Sierra Madre M7.2

	None	Slight	Moderate	Extensive	Complete
	Count	Count	Count	Count	Count
Wood	5,110	2,956	762	37	10
Steel	52	26	26	7	1
Concrete	50	27	19	6	1
Precast	44	24	25	8	1
RM	124	40	36	11	1
URM	12	8	7	3	1
MH	9	13	18	8	1
Total	**5,401**	**3,095**	**893**	**79**	**15**

Transportation and Utility Lifeline Damage

Table: Expected Utility System Pipeline Damage – Sierra Madre M7.2

System	Total Pipelines (Length km)	Number of Leaks	Number of Breaks
Potable Water	1,732	166	41
Waste Water	1,039	119	30
Natural Gas	693	34	9
Oil	0	0	0

Table: Potable Water and Electric Power System Performance – Sierra Madre M7.2

	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	**11,029**	32	0	0	0	0
Electric Power		0	0	0	0	0

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 77 households to be displaced due to the earthquake. Of these, 87 people (out of a total population of 46,978) will seek temporary shelter in public shelters.

Casualties

The table below represents a summary of casualties estimated for Sierra Madre M7.2 earthquake scenario.

Table: Casualty Estimates – Sierra Madre M7.2

Time	Sector	Level 1	Level 2	Level 3	Level 4
2AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	1	0	0	0
	Other-Residential	6	1	0	0
	Single-Family	18	2	0	0
	TOTAL	**26**	**3**	**0**	**0**
2PM	Commercial	29	6	1	1
	Commuting	0	0	0	0
	Educational	11	2	0	0
	Hotels	0	0	0	0
	Industrial	9	2	0	0
	Other-Residential	1	0	0	0
	Single-Family	4	0	0	0
	TOTAL	**54**	**10**	**1**	**2**
5PM	Commercial	21	4	0	1
	Commuting	1	1	3	0
	Educational	1	0	0	0
	Hotels	0	0	0	0
	Industrial	5	1	0	0
	Other-Residential	2	0	0	0
	Single-Family	7	1	0	0
	TOTAL	**37**	**8**	**3**	**2**

Economic Losses

The total economic loss estimated for the Sierra Madre M7.2 earthquake scenario is **$137.75 million dollars** which includes building and lifeline related losses based on the region's available inventory. The following tables provide more detailed information about these losses.

Table: Building-Related Economic Losses ($ Dollars) – Sierra Madre M7.2

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	$0	$118,400	$2,530,900	$143,300	$82,300	$2,874,900
	Capital-Related	$0	$49,400	$2,044,600	$86,700	$24,600	$2,205,300
	Rental	$1,025,900	$854,100	$1,339,400	$50,700	$45,600	$3,315,700
	Relocation	$3,795,000	$664,100	$1,986,500	$187,300	$365,000	$6,997,900
	Subtotal	**$4,820,900**	**$1,686,000**	**$7,901,400**	**$468,000**	**$517,500**	**$15,393,800**
Capital Stock Losses	Structural	$8,419,700	$1,716,000	$3,211,800	$803,500	$472,400	$14,623,400
	Non-Structural	$47,191,600	$12,920,800	$10,393,900	$3,120,700	$1,794,800	$75,421,800
	Content	$16,170,400	$3,504,000	$5,520,200	$2,251,300	$932,300	$28,378,200
	Inventory	$0	$0	$155,600	$467,700	$3,100	$626,400
	Subtotal	**$71,781,700**	**$18,140,800**	**$19,281,500**	**$6,643,200**	**$3,202,600**	**$119,049,800**
	TOTAL	**$76,602,600**	**$19,826,800**	**$27,182,900**	**$7,111,200**	**$3,720,100**	**$134,443,600**

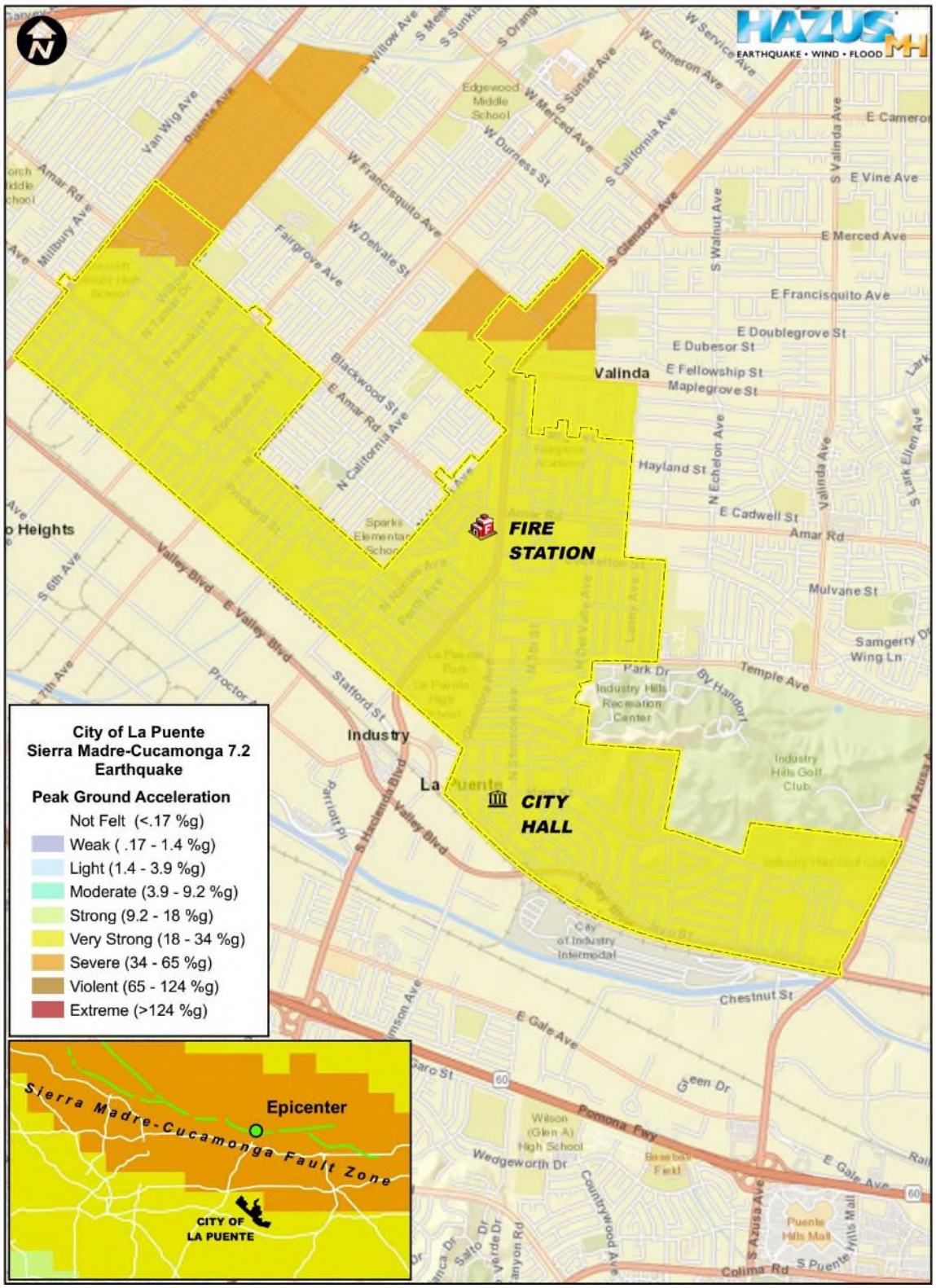
Table: Transportation System Economic Losses ($ Dollars) – Sierra Madre M7.2

System	Component	Total Inventory Value	Economic Loss	Loss Ratio %
Highway	Segments	$136,210,200	$0	0%
	Bridges	$6,550,000	$500,100	8%
	Tunnels	$0	$0	0%
Railways	Segments	$713,100	$0	0%
	Bridges	$0	$0	0%
	Tunnels	$0	$0	0%
	Facilities	$5,326,000	$1,370,400	26%
Light Rail	Segments	$0	$0	0%
	Bridges	$0	$0	0%
	Tunnels	$0	$0	0%
	Facilities	$0	$0	0%
Bus	Facilities	$0	$0	0%
Ferry	Facilities	$0	$0	0%
Port	Facilities	$0	$0	0%
Airport	Facilities	$0	$0	0%
	TOTAL	**$148,299,300**	**$1,870,500**	

Table: Utility System Economic Losses ($ Dollars) – Sierra Madre M7.2

System	Component	Total Inventory Value	Economic Loss	Loss Ratio %
Potable Water	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
	Distribution Lines	$34,648,100	$746,900	2%
Waste Water	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
	Distribution Lines	$20,788,900	$535,300	3%
Natural Gas	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
	Distribution Lines	$13,859,200	$153,500	1%
Oil Systems	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
Electrical Power	Facilities	$0	$0	0%
Communication	Facilities	$0	$0	0%
	TOTAL	**$69,296,200**	**$1,435,700**	

Map: Shake Intensity Map – Sierra Madre M7.2
(Source: Emergency Planning Consultants)



Puente Hills M7.1 Earthquake Scenario

Building Damage

Table: Expected Building Damage by Occupancy – Puente Hills M7.1

	None	Slight	Moderate	Extensive	Complete
	Count	Count	Count	Count	Count
Agriculture	2	1	1	0	0
Commercial	161	102	88	27	4
Education	6	4	2	1	0
Government	2	1	1	0	0
Industrial	34	23	23	8	1
Other Residential	116	89	50	15	2
Religion	15	10	7	2	0
Single Family	4,504	3,162	946	56	14
Total	**4,841**	**3,392**	**1,119**	**109**	**22**

Table: Expected Building Damage by Building Type – Puente Hills M7.1

	None	Slight	Moderate	Extensive	Complete
	Count	Count	Count	Count	Count
Wood	4,592	3,247	967	54	14
Steel	44	27	30	10	2
Concrete	42	29	22	8	1
Precast	36	25	29	10	1
RM	109	44	43	14	1
URM	9	8	9	4	2
MH	8	12	19	10	1
Total	**4,841**	**3,392**	**1,119**	**109**	**22**

Transportation and Utility Lifeline Damage

Table: Expected Utility System Pipeline Damage – Puente Hills M7.1

System	Total Pipelines (Length km)	Number of Leaks	Number of Breaks
Potable Water	1,732	196	49
Waste Water	1,039	140	35
Natural Gas	693	40	10
Oil	0	0	0

Table: Potable Water and Electric Power System Performance – Puente Hills M7.1

	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	**11,029**	111	0	0	0	0
Electric Power		0	0	0	0	0

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 105 households to be displaced due to the earthquake. Of these, 120 people (out of a total population of 46,978) will seek temporary shelter in public shelters.

Casualties

The table below represents a summary of casualties estimated for Puente Hills M7.1 earthquake scenario.

Table: Casualty Estimates – Puente Hills M7.1

Time	Sector	Level 1	Level 2	Level 3	Level 4
2AM	Commercial	1	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	2	0	0	0
	Other-Residential	8	1	0	0
	Single-Family	23	2	0	0
	TOTAL	**34**	**4**	**0**	**1**
2PM	Commercial	39	8	1	2
	Commuting	0	0	0	0
	Educational	14	2	0	1
	Hotels	0	0	0	0
	Industrial	11	2	0	1
	Other-Residential	2	0	0	0
	Single-Family	5	1	0	0
	TOTAL	**71**	**14**	**1**	**4**
5PM	Commercial	28	6	1	1
	Commuting	2	3	5	1
	Educational	1	0	0	0
	Hotels	0	0	0	0
	Industrial	7	1	0	0
	Other-Residential	3	1	0	0
	Single-Family	9	1	0	0
	TOTAL	**56**	**11**	**6**	**3**

Economic Losses

The total economic loss estimated for the Puente Hills M7.1 earthquake scenario is **$171.80 million dollars** which includes building and lifeline related losses based on the region's available inventory. The following tables provide more detailed information about these losses.

Table: Building-Related Economic Losses ($ Dollars) – Puente Hills M7.1

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	$0	$141,000	$3,055,300	$255,900	$112,900	$3,565,100
	Capital-Related	$0	$58,700	$2,459,700	$155,200	$31,200	$2,704,800
	Rental	$1,310,200	$1,074,300	$1,581,500	$87,500	$67,200	$4,120,700
	Relocation	$4,909,900	$839,500	$2,361,000	$308,900	$489,400	$8,908,700
	Subtotal	**$6,220,100**	**$2,113,500**	**$9,457,500**	**$807,500**	**$700,700**	**$19,299,300**
Capital Stock Losses	Structural	$10,408,400	$2,111,800	$3,925,200	$1,424,500	$623,200	$18,493,100
	Non-Structural	$57,717,600	$15,760,600	$12,421,000	$5,193,600	$2,303,400	$93,396,200
	Content	$19,784,200	$4,273,500	$6,541,400	$3,772,300	$1,179,900	$35,551,300
	Inventory	$0	$0	$187,000	$804,700	$3,700	$995,400
	Subtotal	**$87,910,200**	**$22,145,900**	**$23,074,600**	**$11,195,100**	**$4,110,200**	**$148,436,000**
	TOTAL	**$94,130,300**	**$24,259,400**	**$32,532,100**	**$12,002,600**	**$4,810,900**	**$167,735,300**

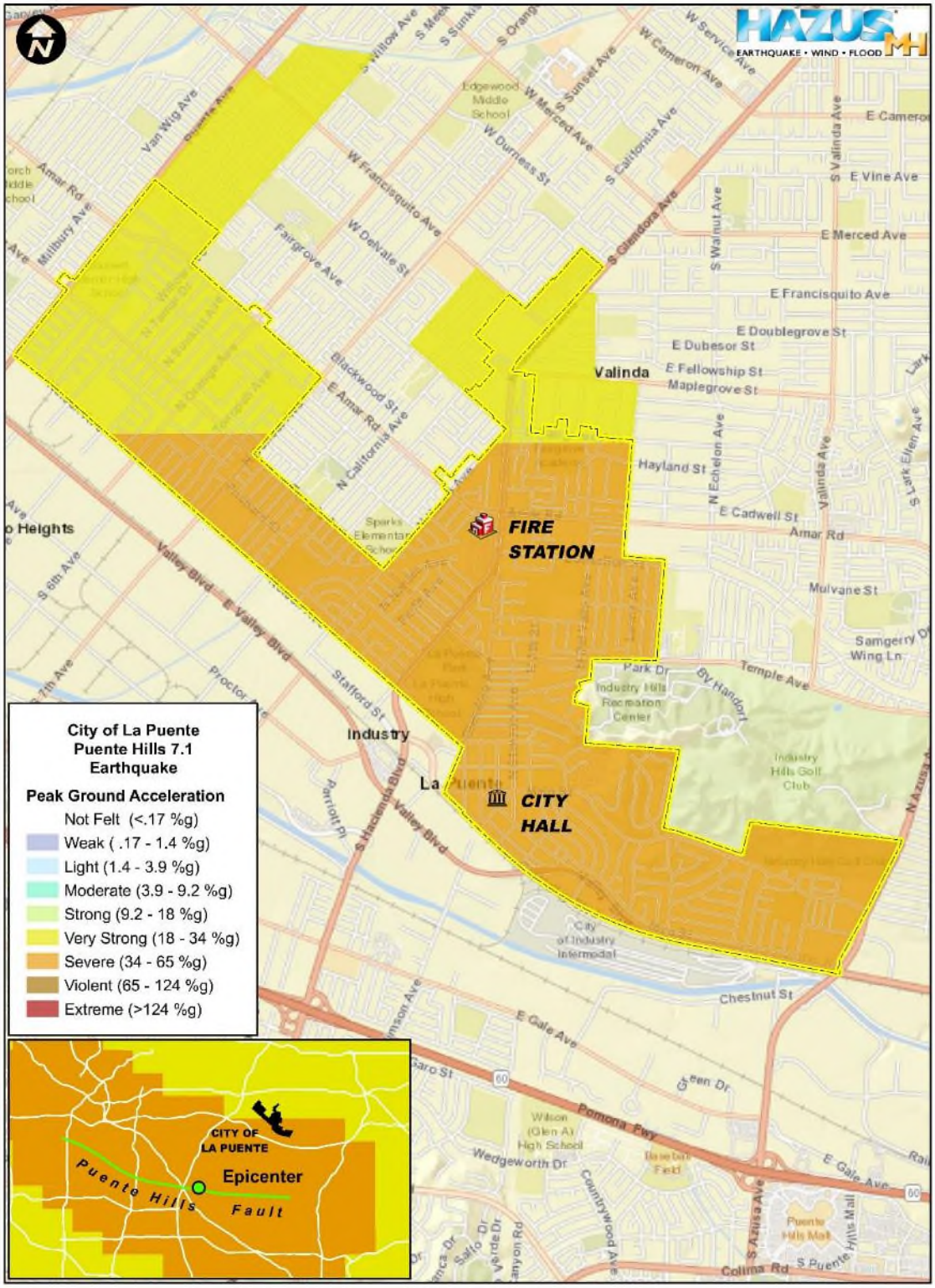
Table: Transportation System Economic Losses ($ Dollars) – Puente Hills M7.1

System	Component	Total Inventory Value	Economic Loss	Loss Ratio %
Highway	Segments	$136,210,200	$0	0%
	Bridges	$6,550,000	$742,700	11%
	Tunnels	$0	$0	0%
Railways	Segments	$713,100	$0	0%
	Bridges	$0	$0	0%
	Tunnels	$0	$0	0%
	Facilities	$5,326,000	$1,625,300	31%
Light Rail	Segments	$0	$0	0%
	Bridges	$0	$0	0%
	Tunnels	$0	$0	0%
	Facilities	$0	$0	0%
Bus	Facilities	$0	$0	0%
Ferry	Facilities	$0	$0	0%
Port	Facilities	$0	$0	0%
Airport	Facilities	$0	$0	0%
	TOTAL	**$148,299,300**	**$2,368,000**	

Table: Utility System Economic Losses ($ Dollars) – Puente Hills M7.1

System	Component	Total Inventory Value	Economic Loss	Loss Ratio %
Potable Water	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
	Distribution Lines	$34,648,100	$880,800	3%
Waste Water	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
	Distribution Lines	$20,788,900	$631,200	3%
Natural Gas	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
	Distribution Lines	$13,859,200	$181,000	1%
Oil Systems	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
Electrical Power	Facilities	$0	$0	0%
Communication	Facilities	$0	$0	0%
	TOTAL	**$69,296,200**	**$1,693,000**	

Map: Shake Intensity Map – Puente Hills M7.1
(Source: Emergency Planning Consultants)



San Andreas M8.0 Earthquake Scenario

Building Damage

Table: Expected Building Damage by Occupancy – San Andreas M8.0

	None	Slight	Moderate	Extensive	Complete
	Count	Count	Count	Count	Count
Agriculture	1	2	1	1	0
Commercial	75	102	100	60	45
Education	4	4	2	1	1
Government	1	1	1	1	1
Industrial	16	22	24	15	12
Other Residential	100	91	27	26	28
Religion	9	10	7	5	3
Single Family	4,000	4,208	469	5	0
Total	**4,208**	**4,440**	**632**	**114**	**89**

Table: Expected Building Damage by Building Type – San Andreas M8.0

	None	Slight	Moderate	Extensive	Complete
	Count	Count	Count	Count	Count
Wood	4,089	4,298	469	13	6
Steel	10	16	34	34	19
Concrete	21	30	24	14	14
Precast	16	28	36	13	9
RM	68	62	54	16	11
URM	3	7	8	6	7
MH	0	0	8	19	23
Total	**4,208**	**4,440**	**632**	**114**	**89**

Transportation and Utility Lifeline Damage

Table: Expected Utility System Pipeline Damage – San Andreas M8.0

System	Total Pipelines (Length km)	Number of Leaks	Number of Breaks
Potable Water	1,732	23,429	5,857
Waste Water	1,039	16,791	4,198
Natural Gas	693	4,816	1,204
Oil	0	0	0

Table: Potable Water and Electric Power System Performance – San Andreas M8.0

	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	**11,029**	11,029	11,029	11,029	11,028	11,026
Electric Power		0	0	0	0	0

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 240 households to be displaced due to the earthquake. Of these, 272 people (out of a total population of 46,978) will seek temporary shelter in public shelters.

Casualties

The table below represents a summary of casualties estimated for the San Andreas M8.0 earthquake scenario.

Table: Casualty Estimates – San Andreas M8.0

Time	Sector	Level 1	Level 2	Level 3	Level 4
2AM	Commercial	3	1	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	8	2	0	1
	Other-Residential	30	8	1	3
	Single-Family	17	2	0	0
	TOTAL	**59**	**13**	**2**	**4**
2PM	Commercial	200	59	10	19
	Commuting	0	0	0	0
	Educational	75	22	4	7
	Hotels	0	0	0	0
	Industrial	62	18	3	5
	Other-Residential	7	2	0	1
	Single-Family	4	0	0	0
	TOTAL	**347**	**102**	**17**	**32**
5PM	Commercial	143	42	7	13
	Commuting	3	4	6	1
	Educational	5	1	0	0
	Hotels	0	0	0	0
	Industrial	38	11	2	3
	Other-Residential	12	3	1	1
	Single-Family	6	1	0	0
	TOTAL	**207**	**62**	**16**	**20**

Economic Losses

The total economic loss estimated for the San Andreas M8.0 scenario earthquake is **$436.09 million dollars** which includes building and lifeline related losses based on the region's available inventory. The following tables provide more detailed information about these losses.

Table: Building-Related Economic Losses ($ Dollars) – San Andreas M8.0

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	$0	$340,400	$8,867,300	$418,500	$262,800	$9,889,000
	Capital-Related	$0	$142,700	$7,303,500	$252,300	$78,300	$7,776,800
	Rental	$649,200	$1,939,300	$4,004,700	$138,000	$159,500	$6,890,700
	Relocation	$2,067,400	$1,337,800	$5,845,300	$491,600	$1,207,700	$10,949,800
	Subtotal	**$2,716,600**	**$3,760,200**	**$26,020,800**	**$1,300,400**	**$1,708,300**	**$35,506,300**
Capital Stock Losses	Structural	$7,113,400	$4,147,400	$12,341,300	$2,706,000	$1,741,800	$28,049,900
	Non-Structural	$44,326,600	$24,035,000	$37,277,600	$8,323,400	$5,608,100	$119,570,700
	Content	$17,598,600	$5,599,500	$16,067,800	$5,159,100	$2,277,400	$46,702,400
	Inventory	$0	$0	$446,800	$1,041,300	$7,800	$1,495,900
	Subtotal	**$69,038,600**	**$33,781,900**	**$66,133,500**	**$17,229,800**	**$9,635,100**	**$195,818,900**
	TOTAL	**$71,755,200**	**$37,542,100**	**$92,154,300**	**$18,530,200**	**$11,343,400**	**$231,325,200**

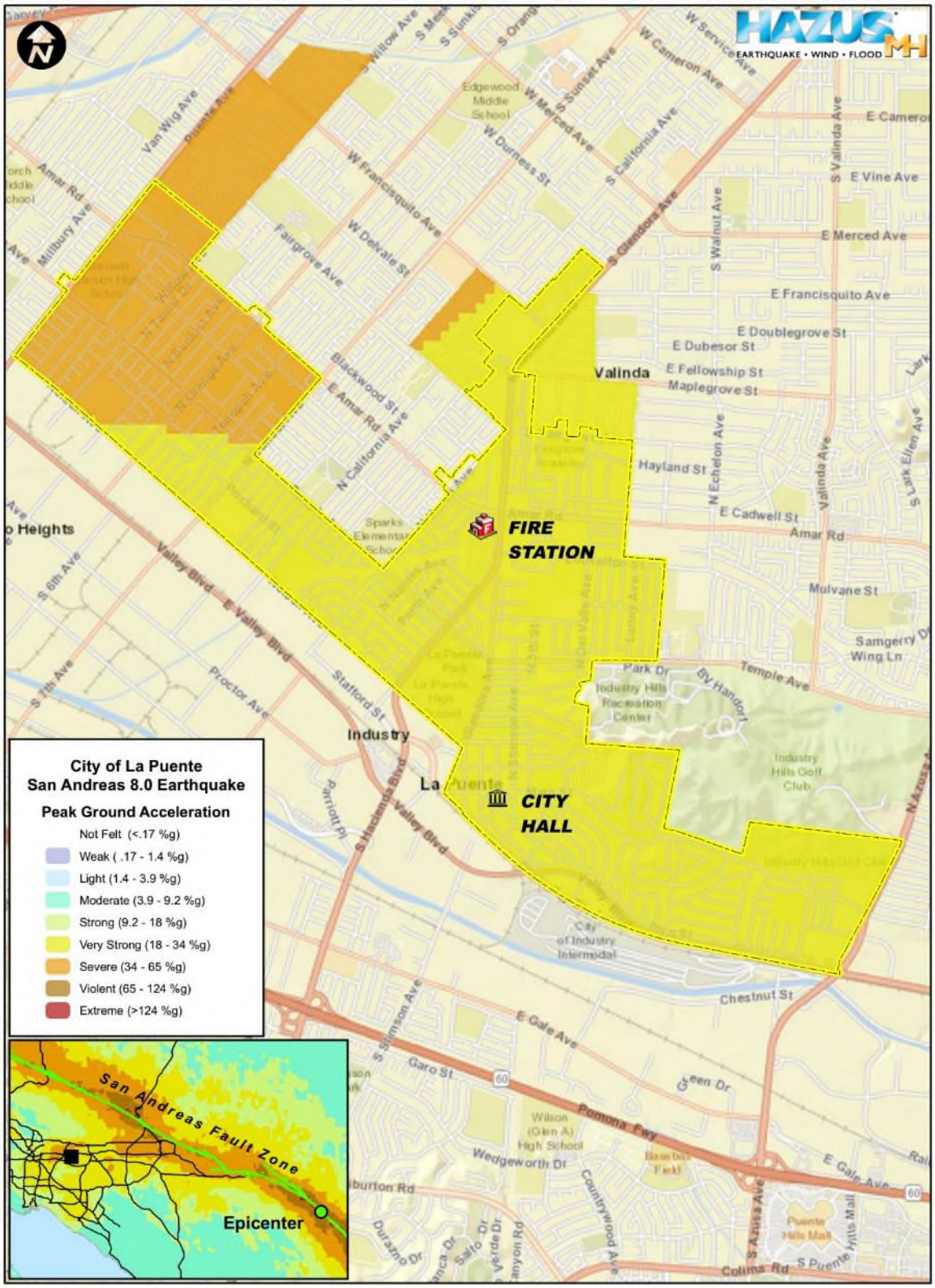
Table: Transportation System Economic Losses ($ Dollars) – San Andreas M8.0

System	Component	Total Inventory Value	Economic Loss	Loss Ratio %
Highway	Segments	$136,210,200	$0	0%
	Bridges	$6,550,000	$900,700	14%
	Tunnels	$0	$0	0%
Railways	Segments	$713,100	$0	0%
	Bridges	$0	$0	0%
	Tunnels	$0	$0	0%
	Facilities	$5,326,000	$1,205,500	23%
Light Rail	Segments	$0	$0	0%
	Bridges	$0	$0	0%
	Tunnels	$0	$0	0%
	Facilities	$0	$0	0%
Bus	Facilities	$0	$0	0%
Ferry	Facilities	$0	$0	0%
Port	Facilities	$0	$0	0%
Airport	Facilities	$0	$0	0%
	TOTAL	**$148,299,300**	**$2,106,200**	

Table: Utility System Economic Losses ($ Dollars) – San Andreas M8.0

System	Component	Total Inventory Value	Economic Loss	Loss Ratio %
Potable Water	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
	Distribution Lines	$34,648,100	$105,430,000	304%
Waste Water	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
	Distribution Lines	$20,788,900	$75,558,200	363%
Natural Gas	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
	Distribution Lines	$13,859,200	$21,671,700	156%
Oil Systems	Pipelines	$0	$0	0%
	Facilities	$0	$0	0%
Electrical Power	Facilities	$0	$0	0%
Communication	Facilities	$0	$0	0%
	TOTAL	**$69,296,200**	**$202,659,900**	

Map: Shake Intensity Map – San Andreas M8.0
(Source: Emergency Planning Consultants)



Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

Q: B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

A: See **Impacts of Earthquakes in the City of La Puente** below.

Impacts of Earthquakes in the City of La Puente

Based on the risk assessment, it is evident that earthquakes will continue to have potentially devastating economic impacts to certain areas of the City. Impacts that are not quantified, but can be anticipated in future events, include:

- ✓ Injury and loss of life;
- ✓ Commercial and residential structural damage;
- ✓ Disruption of and damage to public infrastructure;
- ✓ Secondary health hazards e.g. mold and mildew;
- ✓ Damage to roads/bridges resulting in loss of mobility;
- ✓ Significant economic impact (jobs, sales, tax revenue) upon the community;
- ✓ Negative impact on commercial and residential property values; and
- ✓ Significant disruption to students and teachers as temporary facilities and relocations would likely be needed.

Earthquake-Induced Landslides

Generally, these types of failures consist of rock falls, disrupted soil slides, rock slides, soil lateral spreads, soil slumps, soil block slides, and soil avalanches. Areas having the potential for earthquake-induced landslides generally occur in areas of previous landslide movement, or where local topographic, geological, geotechnical, and subsurface water conditions indicate a potential for permanent ground displacements.

Areas considered for earthquake-induced landslides are generally found in the hill and canyon area of the City and are shown on **Map: Liquefaction and Earthquake-Induced Landslide Potential**. Those areas at greatest risk in the City include the areas in and surrounding the Dwight D. Eisenhower Golf Course. The landslide potential zones were compiled from USGS. Mapped earthquake-induced landslide potential zones are intended to prompt more detailed, site specific geotechnical studies as required by the Seismic Hazard Mapping Act.

Liquefaction

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. Liquefaction generally occurs during significant earthquake activity, and structures located on soils such as silt or sand may experience significant damage during an earthquake due to the instability of structural foundations and the moving earth. Many communities in Southern California are built on ancient river bottoms and have sandy soil. In some cases, this ground may be subject to liquefaction, depending on the depth of the water table.

In accordance with the Seismic Hazard Mapping Act, the California Division of Mines and Geology has evaluated liquefaction susceptibility for most of the La Puente area. **Map: Liquefaction and Earthquake-Induced Landslide Potential** shows the results of these studies. Except the southeastern portion, the entire City has been identified as having a potential for liquefaction.

Map: Liquefaction and Earthquake-Induced Landslide Potential
(Source: City of La Puente General Plan – Safety Element)

Structures and Building Code

The built environment is susceptible to damage from earthquakes. Buildings that collapse can trap and bury people. Lives are at risk, and the cost to clean up the damages is great. In most California communities, including the City of La Puente, many buildings were built before 1993 when building codes were not as strict. In addition, retrofitting is not required except under certain conditions and can be expensive. Therefore, the number of buildings at risk remains high. The California Seismic Safety Commission makes annual reports on the progress of the retrofitting of unreinforced masonry buildings. All URM buildings within the City have been identified and upgraded to meet current requirements.

Implementation of earthquake mitigation policy most often takes place at the local government level. The City of La Puente Building & Safety Division enforces building codes pertaining to earthquake hazards.

Additionally, the City has implemented basic building requirements that are above and beyond what the State demands for hazard mitigation. Newly constructed buildings in La Puente that are built in an area subject to Earthquake-induced landslide or liquefaction are typically built with extra foundation support. Such support is found in the post-tension reinforced concrete foundation; this same technique is used by coastal cities to prevent home destruction during cases of liquefaction.

Generally, these codes seek to discourage development in areas that could be prone to flooding, landslide, wildfire and/or seismic hazards; and where development is permitted, that the applicable construction standards are met. Developers in hazard-prone areas may be required to retain a qualified professional engineer to evaluate level of risk on the site and recommend appropriate mitigation measures.

Flood Hazards

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

Q: B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

A: See **Previous Occurrences of Flooding in the City of La Puente** below.

Previous Occurrences of Flooding in the City of La Puente

In spite of the region's semi-arid climate, it has experienced flood episodes throughout its history. In recent history, the City has experienced urban/localized flooding as recent as 2014 but has not encountered any significant flooding events. Specific urban/localized flooding includes Valley Boulevard between Old Valley Boulevard and Ferero Lane and Nelson Avenue between N. California Avenue and N. Hacienda Boulevard.

Local Conditions

Los Angeles County records reveal since 1861, the Los Angeles River has flooded 30 times, on average once every 6.1 years. But averages are deceiving, for the Los Angeles basin goes through periods of drought and then periods of above average rainfall. Between 1889 and 1891 the river flooded every year, from 1941 to 1945, the river flooded 5 times. Conversely, from 1896 to 1914, and again from 1944 to 1969, a period of 25 years, the river did not have serious floods.

Average annual precipitation in Los Angeles County ranges from 13 inches on the coast to approximately 40 inches on the highest point of the Peninsular Mountain Range that transects the County. Several factors determine the severity of floods, including rainfall intensity and duration. A large amount of rainfall over a short time span can result in flash flood conditions. A sudden thunderstorm or heavy rain, dam failure, or sudden spills can cause flash flooding. The National Weather Service's definition of a flash flood is a flood occurring in a watershed where the time of travel of the peak of flow from one end of the watershed to the other is less than six hours.

The towering mountains that give the Los Angeles region its spectacular views also wring a great deal of rain out of the storm clouds that pass through. Because the mountains are so steep, the rainwater moves rapidly down the slopes and across the coastal plains on its way to the ocean.

Naturally, this rainfall moves rapidly downstream, often with severe consequences for anything in its path. In extreme cases, flood-generated debris flows will roar down a canyon at speeds near 40 miles per hour with a wall of mud, debris and water, tens of feet high. Flooding occurs when climate, geology, and hydrology combine to create conditions where water flows outside of its usual course.

The Federal Emergency Management Agency (FEMA) establishes base flood heights and inundation areas for 100-year and 500-year flood zones. The 100-year flood zone is defined as the area that could be inundated by the flood that has a one percent probability of occurring in any given year. The 500-year flood is defined as the flood that has a 0.2 percent probability of occurring in any given year.

According to FEMA, the City participates in the National Flood Insurance Program (NFIP). Created by Congress in 1968, the NFIP makes flood insurance available in communities that enact minimum floodplain management rules consistent with the Code of Federal Regulations §60.3.

Q&A | ELEMENT C. MITIGATION STRATEGY | C2

Q: C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))

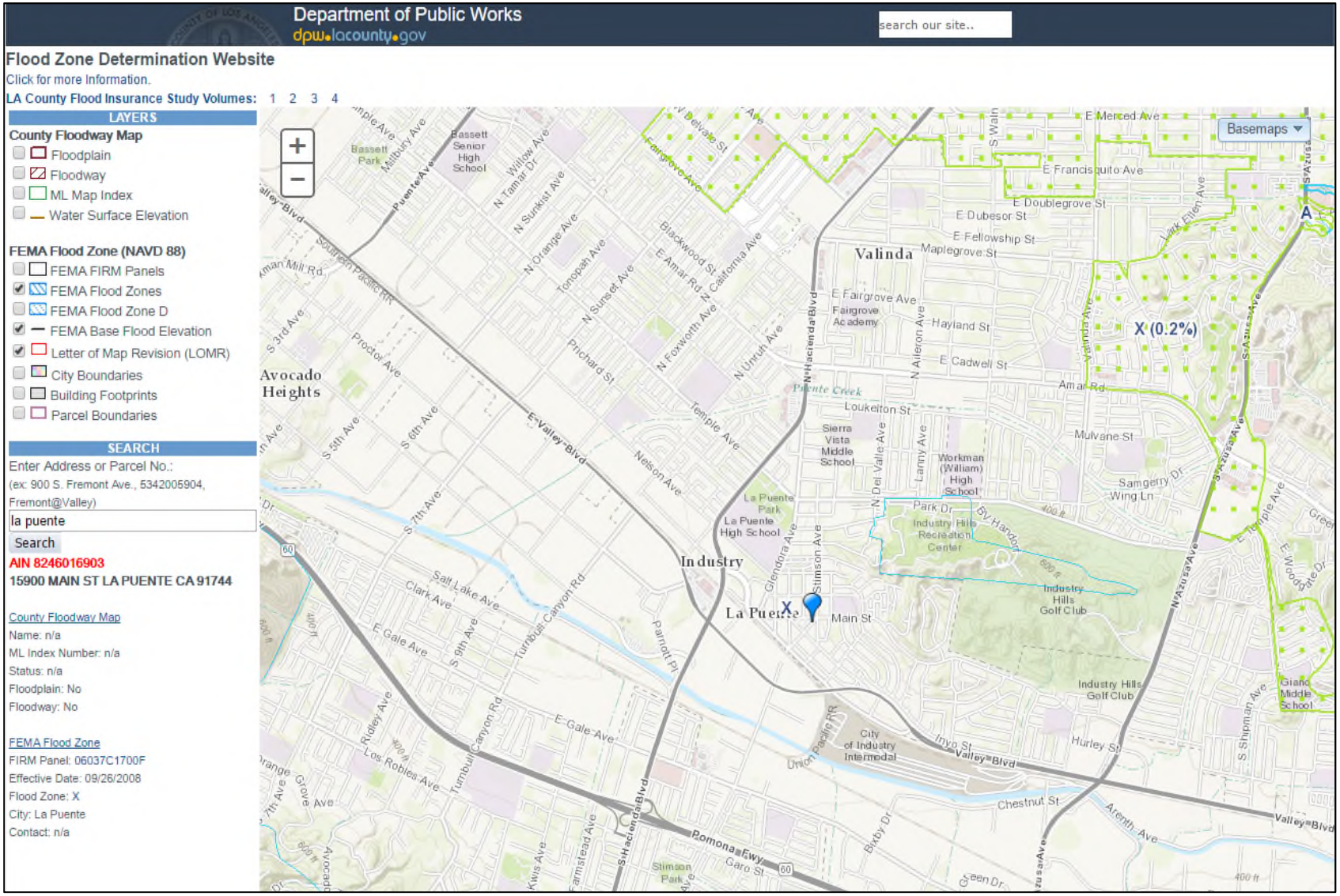
A: See **National Flood Insurance Program** below.

National Flood Insurance Program

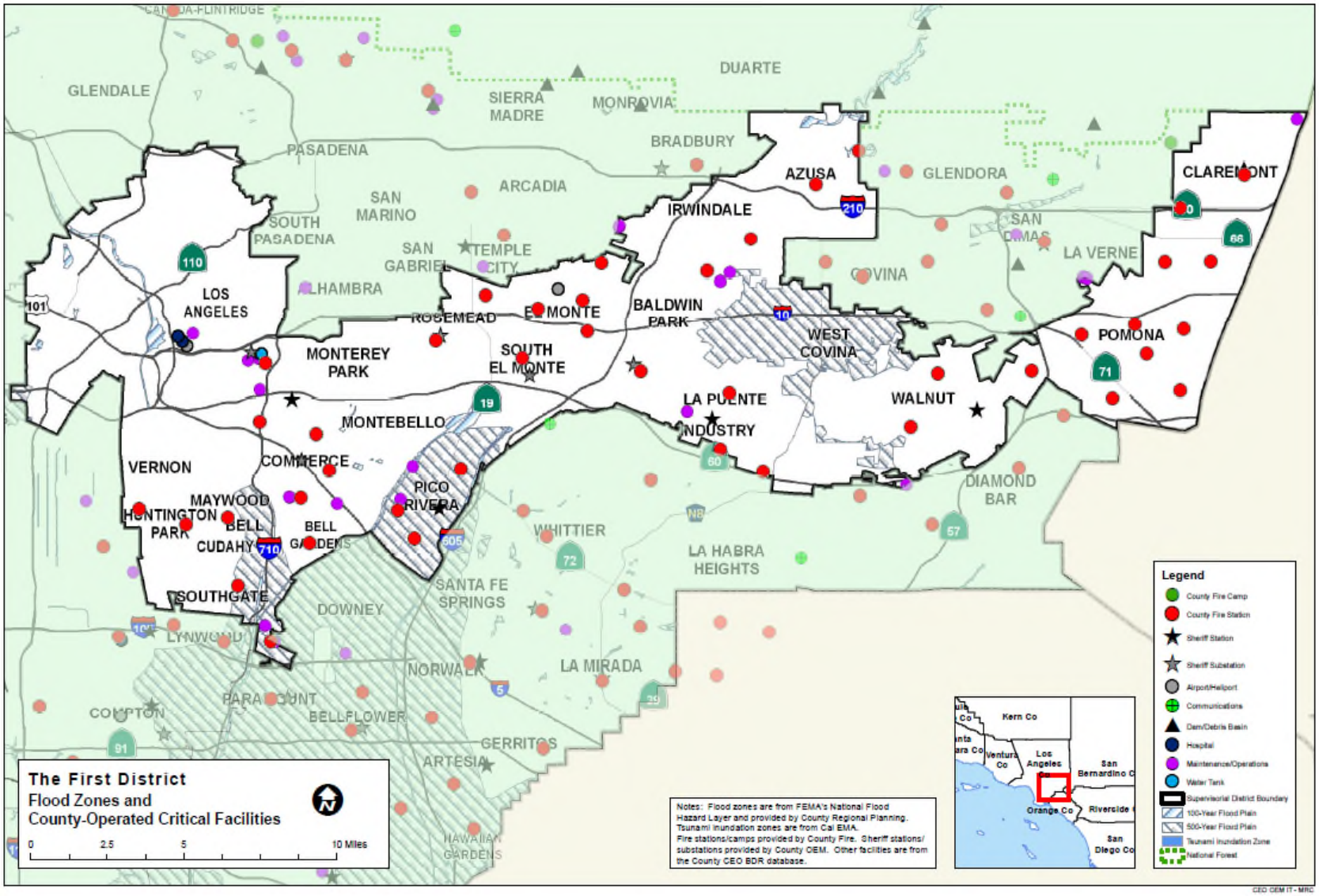
The City participates in the National Flood Insurance Program (NFIP). Created by Congress in 1968, the NFIP makes flood insurance available in communities that enact minimum floodplain management rules consistent with the Code of Federal Regulations §60.3. The City's Development Services Department looks up the location of every proposed project in proximity to its flood potential. Flyers on NFIP are available at the DSD Service Counter and applicants are actively encouraged to purchase insurance through NFIP if there is any possibility of the project being vulnerable to flooding.

According to **Map: Flood Zone Determination Website**, the built areas of the City are in "Flood Zone X". Zone X is defined as the area outside the 500-year flood and protected by levee from 100-year flood.

Map: Flood Zone Determination Website
(Source: Los Angeles County Department of Public Works)



Map: Flood Zones and County-Operated Critical Facilities
(Source: County of Los Angeles All-Hazards Mitigation Plan)



Rainfall

As mentioned earlier in the Community Profile, the average rainfall in the City of La Puente is approximately 14" per year (Source: www.city-data.com). However, large storms can cause quick bursts of rapid rainfall in a very short period of time. The soil in the City is generally not able to effectively absorb water quickly, nor is it able to absorb a large volume of water. Therefore, when the region does experience heavy rain, or rain over a period of days or weeks, flash flooding is a common problem.

Local drainage problems occur within the City of La Puente and City staff are aware of local drainage threats. The problems are present where storm water runoff enters culverts or goes underground into storm drains. Inadequate maintenance can also contribute to the flood hazard in urban areas.

El Niño

El Niño is a disruption of the ocean-atmosphere system in the tropical Pacific having important consequences. Among these consequences is increased rainfall across the southern tier of the United States, which has caused destructive flooding, and drought in the West Pacific. Observations of conditions in the tropical Pacific are considered essential for the prediction of short-term (a few months to 1 year) climate variations.

El Niño (Spanish name for the male child), initially referred to a weak, warm current appearing annually around Christmas time along the coast of Ecuador and Peru, and lasting only a few weeks, to a month or more. Every three to seven years, an El Niño event can last for many months, having significant economic and atmospheric consequences worldwide. During the past forty years, ten of these major El Niño events have been recorded, the worst of which occurred in 1997-1998. Previous to this, the El Niño event in 1982-1983 was the strongest. Some of the El Niño events have persisted more than one year.

Repetitive Loss Properties

Repetitive Loss Properties (RLPs) are most susceptible to flood damages; therefore, they have been the focus of flood hazard mitigation programs. Unlike a countywide program, the Floodplain Management Plan (FMP) for repetitive loss properties involves highly diversified property profiles, drainage issues, and property owner's interest. It also requires public involvement processes unique to each RLP area. The objective of an FMP is to provide specific potential mitigation measures and activities to best address the problems and needs of communities with repetitive loss properties. A repetitive loss property is one for which two or more claims of $1,000 or more have been paid by the National Flood Insurance Program (NFIP) within any given ten-year period. According to FEMA resources, there are no Repetitive Loss Properties (RLPs) within the City of La Puente.

Roads

During hazard events, or any type of emergency or disaster, dependable road connections are critical for providing emergency services. Federal, state, county, and city governments all have a stake in protecting roads from flood damage. Road networks often traverse floodplain and floodway areas. Transportation agencies responsible for road maintenance are typically aware of roads at risk from flooding.

Storm Water Systems

Local drainage problems are common throughout the City of La Puente. The problems are often present where storm water runoff enters culverts or goes underground into storm sewers. Inadequate maintenance can also contribute to the flood hazard in urban areas.

Water/Wastewater Treatment Facilities

There are twenty-five sanitary districts that serve Los Angeles County. There are no wastewater treatment facilities directly in La Puente. The Districts operate a comprehensive solid waste management system serving the needs of a large portion of the County.

The Sanitation Districts construct, operate, and maintain facilities to collect, treat, recycle, and dispose of sewage and industrial wastes and provide for the management of solid wastes, including disposal, transfer operations, and materials recovery. Local sewers and laterals that connect to the Sanitation Districts' trunk sewer lines are the responsibility of the local jurisdictions, as is the collection of solid wastes.

The agency's 1,300 miles of main trunk sewers and eleven wastewater treatment plants convey and treat approximately 530 million gallons per day (MGD), 190 MGD of which are available for reuse in the dry Southern California climate. Three active sanitary landfills handle approximately 22,000 tons per day (TPD) of trash (approximately 40% of the countywide disposal capacity), of which 14,000 TPD are disposed and 8,000 TPD are recycled.

Water Quality

The Suburban Water Company, La Puente Valley Water Company, and San Gabriel Water provides water to La Puente and the surrounding area. Drinking water, including bottle water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily mean water may be a health risk.

All ten wells sources are vulnerable to one or more of the following possible contaminating activities. Contaminants associated with these activities have not been detected in the water supply: dry cleaners, above ground storage tanks, drinking water treatment plants, managed forests, transportation corridors, freeways, state highways, high-density housing, gas stations, confirmed leaking underground storage tanks.

The water companies routinely test the water for substances and shows that the water meets all existing federal and state standards for safety. During flood events, these wells are subject to contamination. The water companies take extra precaution after such an event to secure the quality of our water.

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

Q: B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

A: See **Impacts of Flooding in the City of La Puente** below.

Impacts of Flooding in the City of La Puente

Floods and their impacts vary by location and severity of any given flood event, and likely only affect certain areas of the County during specific times. Based on the risk assessment, it is evident that floods will continue to have devastating economic impact to certain areas of the City.

Impact that is not quantified, but anticipated in future events includes:

- ✓ Injury and loss of life;
- ✓ Commercial and residential structural damage;
- ✓ Disruption of and damage to public infrastructure;
- ✓ Secondary health hazards e.g. mold and mildew
- ✓ Damage to roads/bridges resulting in loss of mobility
- ✓ Significant economic impact (jobs, sales, tax revenue) upon the community
- ✓ Negative impact on commercial and residential property values and
- ✓ Significant disruption to students and teachers as temporary facilities and relocations would likely be needed.

Dam Failure Hazards

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

Q: B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

A: See **Previous Occurrences of Dam Failure in the City of La Puente** below.

Previous Occurrences of Dam Failure in the City of La Puente

The City of La Puente has not been recently affected by a release/failure of any of the dam facilities identified in the table below.

Table: Dams Near City of La Puente

Name of Facility	Owner	Primary Purpose
Santa Fe Dam	*U.S. Army Corps of Engineers (ACOE)*	*Flood Control*
Whittier Narrows Dam	*U.S. Army Corps of Engineers (ACOE)*	*Flood Control*
Puddingstone Reservoir	*LA Department of Public Works*	*Flood Control*

Previous Occurrences of Dam Failure in Los Angeles County

There is a total of 103 dams in Los Angeles County, owned by 23 agencies or organizations, ranging from the Federal government to Homeowner Associations. These dams hold billions of gallons of water in reservoirs. Releases of water from the major reservoirs are designed to protect Southern California from flood waters and to store domestic water. Seismic activity can compromise the dam structures, and the resultant flooding could cause catastrophic flooding. Following the 1971 Sylmar earthquake the Lower Van Norman Dam showed signs of structural compromise, and tens of thousands of persons had to be evacuated until the dam could be drained. The dam has never been refilled.

Local Conditions

Loss of life and damage to structures, roads, and utilities may result from a dam failure. Economic losses can also result from a lowered tax base and lack of utility profits. These effects would certainly accompany the failure of one of the major dams near the City of La Puente. As identified in the City's General Plan, the Santa Fe Dam and Reservoir, Whittier Narrows Dam and Legg Lake, and Puddingstone Reservoir are subject to inundation flooding if they were to fail.

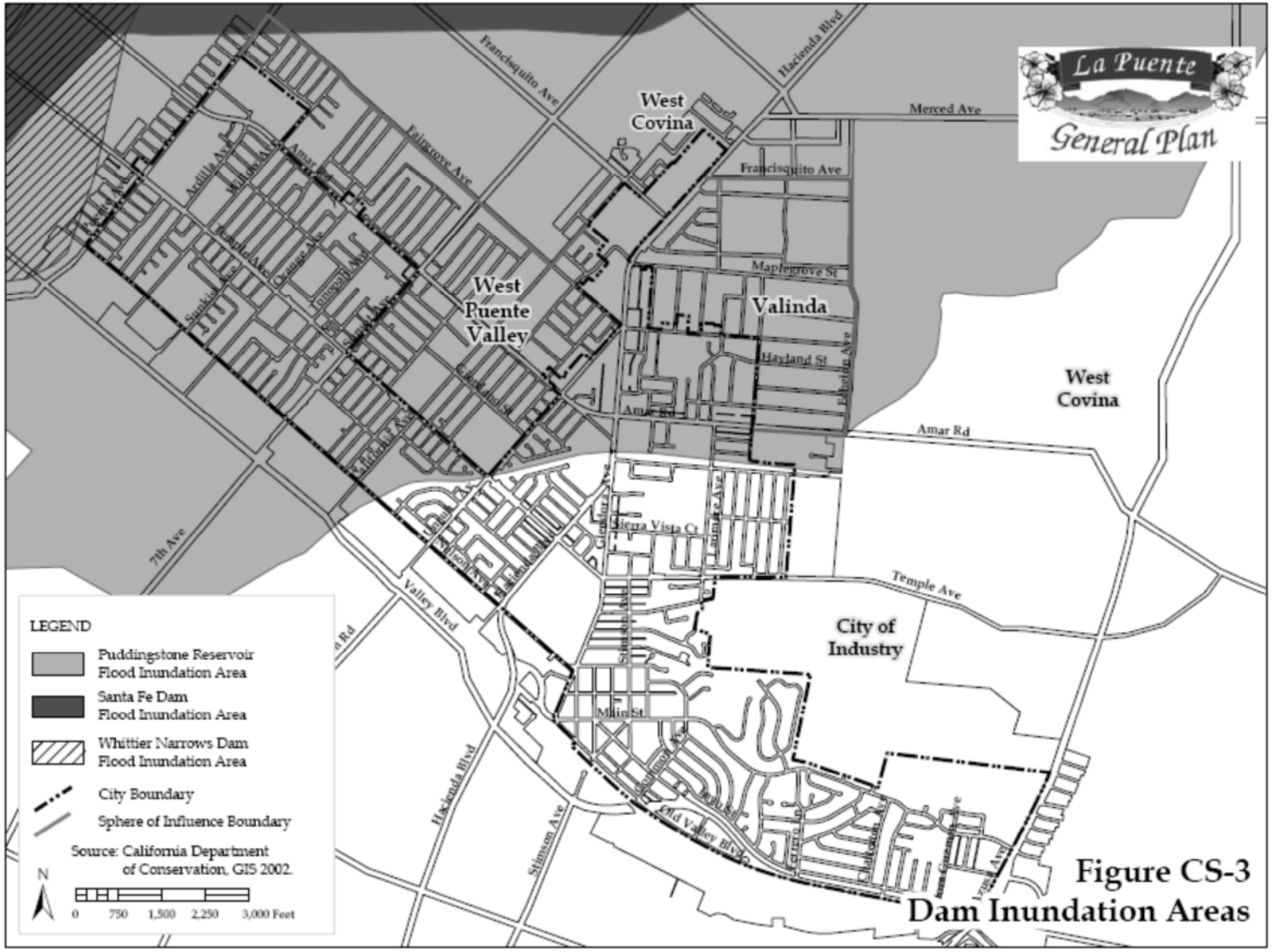
The Santa Fe Dam and Reservoir are located on the San Gabriel River east of La Puente, and the Whittier Narrows Dam and Legg Lake are located near the intersection of the Pomona Freeway (SR-60) and Interstate 605 in South El Monte. Both are owned and operated by the Los Angeles District Army Corps of Engineers.

The Santa Fe Dam would be the downstream control if there were to be any problems with the Morris or San Gabriel Dam in Azusa Canyon. Any overflow from failure of these dams is projected to spill out into the San Gabriel River wash and the secondary control area to the west of the 210/605 freeway interchange. The Santa Fe Dam's downstream floodplain includes a very small portion of the West Puente Valley area. In the unlikely event of a dam failure, floodwaters would extend to the northwest corner of this area within one and one-half hours.

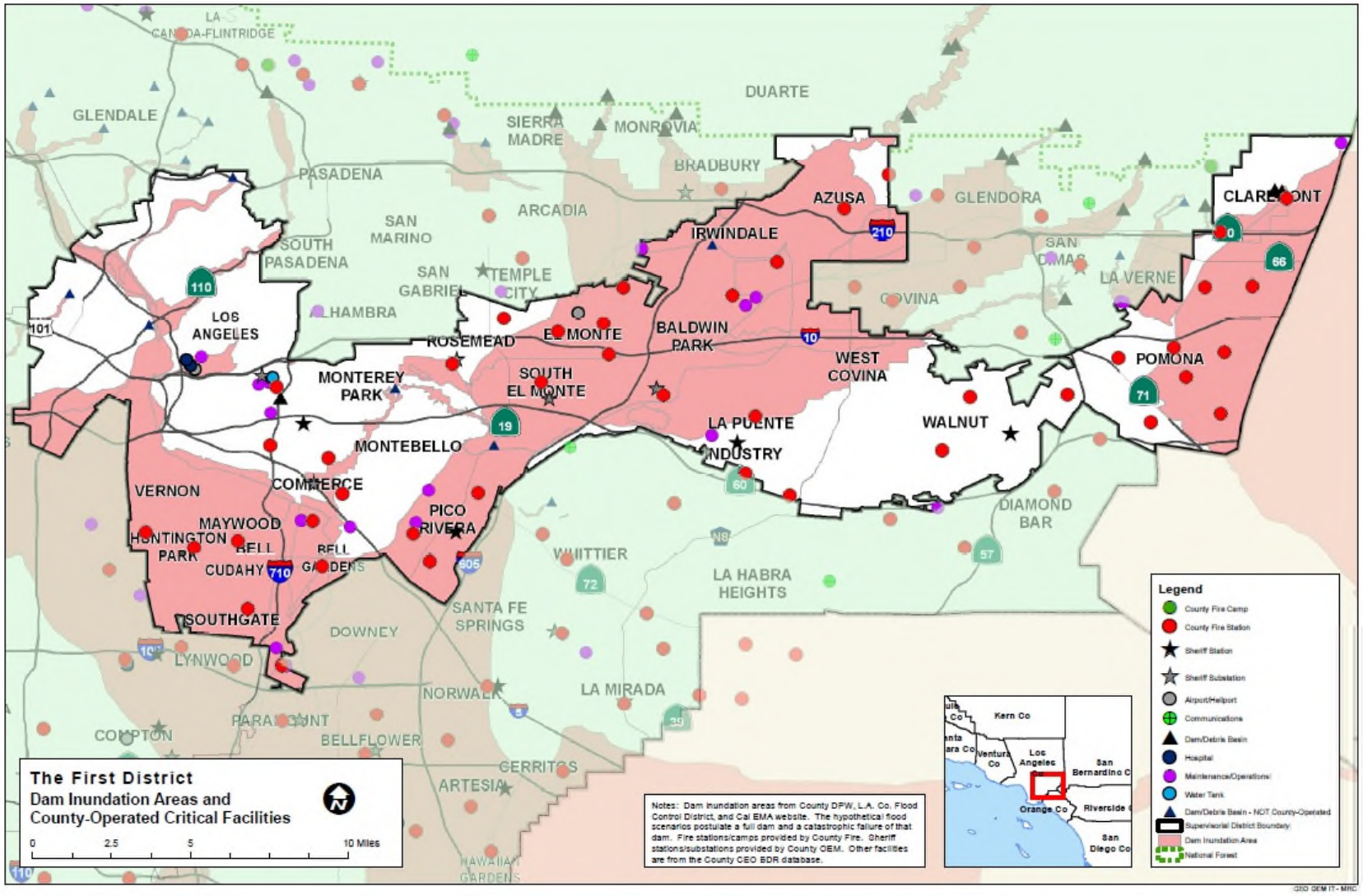
In the event of a dam failure at Whittier Narrows Dam, upstream floodwaters are expected to reach portions of unincorporated Los Angeles County adjacent to the City, just west of Puente Avenue. Due to high inflows to the Whittier Narrows dam, widespread flooding in areas west of La Puente would be expected.

The Puddingstone Reservoir, located in the Frank G. Bonelli County Park in the City of San Dimas, near the junction of SR-57 and I-10, also presents potential for dam inundation in La Puente. Because of the recreational use of the area, a contract with Los Angeles County Parks and Recreation limits the Capacity to 6,083 AFOW. In the event of a catastrophic failure or breach of the Puddingstone Dam, floodwaters would extend throughout most of north and west La Puente within two to three hours.

Map: City of La Puente Dam Inundation Areas
(Source: City of La Puente General Plan – Safety Element)



Map: Dam Inundation Areas and County-Operated Critical Facilities (Source: Los Angeles County GIS)



Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

Q: B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

A: See **Impacts of Dam Failure in the City of La Puente** below.

Impacts of Dam Failure in the City of La Puente

Based on the risk assessment, it is evident that dam failures will continue to have potentially devastating economic impacts to certain areas of the City.

Impacts that are not quantified, but can be anticipated in future events, include:

- ✓ Injury and loss of life
- ✓ Commercial and residential structural damage
- ✓ Disruption of and damage to public infrastructure
- ✓ Secondary health hazards e.g. mold and mildew
- ✓ Damage to roads/bridges resulting in loss of mobility
- ✓ Significant economic impact (jobs, sales, tax revenue) upon the community
- ✓ Negative impact on commercial and residential property values
- ✓ Significant disruption to students and teachers as temporary facilities and relocations are needed

Landslide Hazards

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

Q: B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

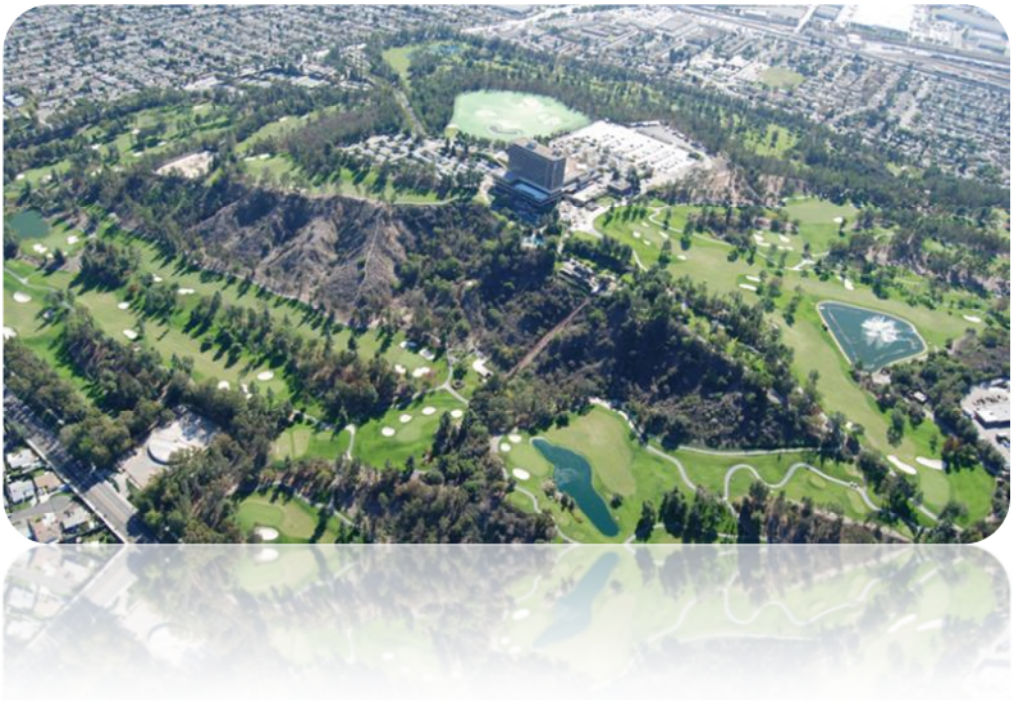
A: See **Previous Occurrences of Landslides in the City of La Puente** below.

Previous Occurrences of Landslides in the City of La Puente

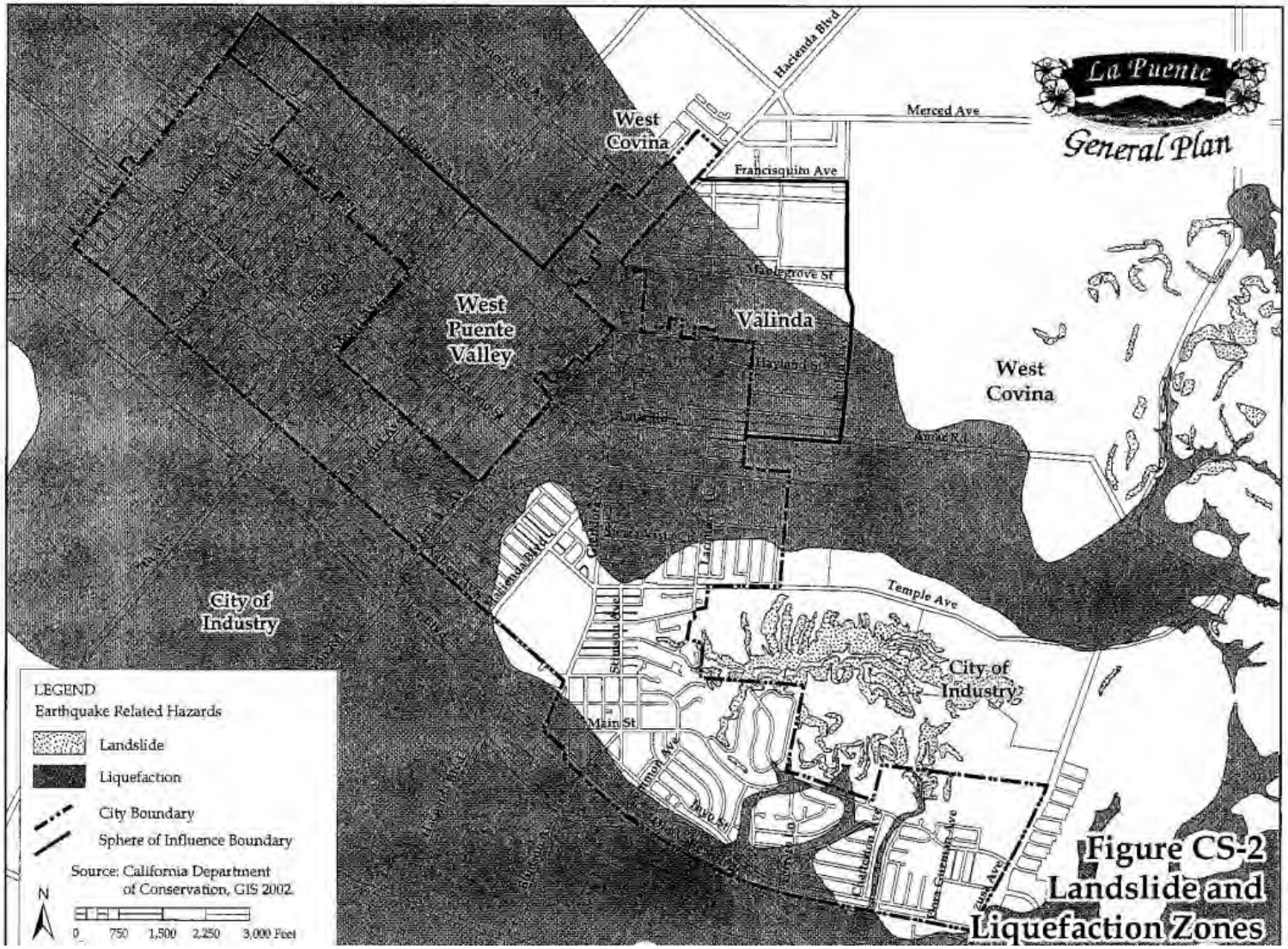
The City of La Puente has not been significantly impacted by a landslide, however several homes near the Dwight D. Eisenhower Golf Course were impacted by a hillside landslide in 2005. The golf course including Pacific Palms Resort was built on top of a landfill. Following rain, the likelihood of erosion and/or landslides increases along the southeastern edge of the golf course.

Local Conditions

In City of La Puente, homes built on sloping terrain, near the Industry Hills Recreation Center/ Golf course, are subject earthquake induced landsides. As indicated on **Map: Landslide and Liquefaction Zones**, this terrain may be susceptible to movement during an earthquake. Additional areas have been identified as historical slides. Improvements to the slope stability may be made by engineered structures or proper grading.



Map: Landslide and Liquefaction Zones
(Source: City of La Puente General Plan – Safety Element)



Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

Q: B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

A: See **Impacts of Landslides in the City of La Puente** below.

Impacts of Landslides in the City of La Puente

Based on the risk assessment, it is evident that landslides continue to have potentially devastating economic impact to certain areas of the City.

Impacts that is not quantified, but can be anticipated in future events, include:

- ✓ Injury and loss of life
- ✓ Commercial and residential structural damage
- ✓ Disruption of and damage to public infrastructure
- ✓ Secondary health hazards e.g. mold and mildew
- ✓ Damage to roads/bridges resulting in loss of mobility
- ✓ Significant economic impact (jobs, sales, tax revenue) upon the community
- ✓ Negative impact on commercial and residential property values
- ✓ Significant disruption to students and teachers as temporary facilities and relocations would likely be needed

Windstorm Hazards

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

Q: B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

A: See **Previous Occurrences of Windstorms in the City of La Puente** below.

Previous Occurrences of Windstorms in the City of La Puente

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

In 2001, a windstorm caused a street light lamp to loosen, striking and killing a pedestrian. 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.

Local Conditions

Regional severe windstorms pose a significant risk to life and property within the City by creating conditions that disrupt essential systems such as public utilities, telecommunications, and transportation routes. High winds can and do occasionally cause tornado-like damage to local homes and businesses. High winds have destructive impact, especially to trees, power lines, and utility services. The region surrounding the City was most recently and severely impacted in November 2011. Beginning on November 30, 2011, powerful windstorms blew through Los Angeles County including much of the San Gabriel Valley, toppling trees, downing power lines, slowing traffic, damaging homes and vehicles, and knocking out electricity for over 350,000 customers. The cleanup in Los Angeles County alone topped $17 million.

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

Q: B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

A: See **Impacts of Windstorms in the City of La Puente** below.

Impacts of Windstorms in the City of La Puente

Based on the risk assessment, it is evident that Windstorms continue to have potentially devastating economic impact to certain areas of the City.

Impacts that is not quantified, but can be anticipated in future events, include:

- ✓ Injury and loss of life
- ✓ Commercial and residential structural damage
- ✓ Disruption of and damage to public infrastructure
- ✓ Secondary Health hazards e.g. mold and mildew
- ✓ Damage to roads/bridges resulting in loss of mobility
- ✓ Significant economic impact (jobs, sales, tax revenue) upon the community
- ✓ Negative impact on commercial and residential property values
- ✓ Significant disruption to students and teachers as temporary facilities and relocations would likely be needed.

Drought Hazards

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

Q: B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

A: See **Previous Occurrences of Drought in the City of La Puente** below.

Previous Occurrences of Drought in the City of La Puente

Fortunately, there is no severe history of drought within the City of La Puente. There is no evidence of a drought having a significant impact on the City at the current time.

Previous Occurrences of Drought in Los Angeles County

The region's Mediterranean climate makes it especially susceptible to variations in rainfall. Though the potential risk to the City of La Puente is in no way unique, severe water shortages could have a bearing on the economic well-being of the community. Comparison of climate (rainfall) records from Los Angeles with water well records beginning in 1930 from the San Gabriel Valley indicates the existence of wet and dry cycles on a 10-year scale as well as for much longer periods. The climate record for the Los Angeles region beginning in 1890 suggests drying conditions over the last century. With respect to the present day, climate data also suggests that the last significant wet period was the 1940s. Well level data and other sources seem to indicate the historic high groundwater levels (reflecting recharge from rainfall) occurred in the same decade. Since that time, rainfall (and groundwater level trends) appears to be in decline. This slight declining trend, however, is not believed to be significant. Climatologists compiled rainfall data from 96 stations in the State that spanned a 100-year period between 1890 and 1990. An interesting note is that during the first 50 years of the reporting period, there was only one year (1890) that had more than 35 inches of rainfall, whereas the second 50-year period recording of 5 year intervals (1941, 1958, 1978, 1982, and 1983) that exceeded 35 inches of rainfall in a single year. The year of maximum rainfall was 1890 when the average annual rainfall was 43.11 inches. The second wettest year on record occurred in 1983 when the State's average was 42.75 inches.

The driest year of the 100-year reported in the study was 1924 when the State's average rainfall was only 10.50 inches. The region with the most stations reporting the driest year in 1924 was the San Francisco Bay area. The second driest year was 1977 when the average was 11.57 inches. The most recent major drought (1987 to 1990) occurred at the end of a sequence of very wet years (1978 to 1983). The debate continues whether "global warming" is occurring, and the degree to which global climate change will have an effect on local micro-climates. The semi-arid southwest is particularly susceptible to variations in rainfall. A study that documented annual precipitation for California since 1600 from reconstructed tree ring data indicates that there was a prolonged dry spell from about 1755 to 1820 in California. Fluctuations in precipitation could contribute indirectly to a number of hazards including wildfire and the availability of water supplies.

Local Conditions

A significant drought has hit the state of California since 2012. The drought has depleted reservoir levels all across the state. In January of 2014, Governor Brown declared a state of emergency and directed state officials to take all necessary actions to prepare for water shortages. As the drought prolonged into 2015, to help cope with the drought, Governor Brown gave an executive order in April 2015 which mandated a statewide 25 percent reduction in water use. In January of 2016, the DWR and the U.S. Bureau of Reclamation have finalized the 2016 Drought Contingency Plan that outlines State Water Project and Central Valley Project operations for February 2016 to November 2016. The plan was developed in coordination with staff from State and federal agencies. Although the drought has more significantly impacted surfaces waters and other agencies that use water for agriculture, the City of La Puente is still affected by the drought, primarily due to reduced reliability of imported water.

Recent Mitigation

Local water and imported water supplies continue to be stressed like never before. The Main San Gabriel Groundwater Basin water reached a new all-time low in 2015, which forces water purveyors that rely on the Basin for water supply to look to imported water supplies which are less reliable and much more expensive.

The La Puente Valley County Water District (LPVCWD) continues to work on developing a system to replace treated, potable drinking water used for irrigation with recycled water. By incorporating recycled water into the overall supply, the District will reduce the dependence on more expensive and less reliable source of water.

The proposed recycled water system project consists of three (3) construction phases that will collectively provide over 190 acre feet of recycled water. The construction of Phase 1 started in the summer of 2016.

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

Q: B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

A: See **Impacts of Drought in the City of La Puente** below.

Impacts of Drought in the City of La Puente

Based on the risk assessment, it is evident that drought events continue to have potentially devastating economic impacts to certain areas of the City.

Impacts that are not quantified, but can be anticipated in future events, include:

- ✓ Injury and loss of life
- ✓ Disruption of and damage to public infrastructure
- ✓ Significant economic impact (jobs, sales, tax revenue) upon the community
- ✓ Negative impact on commercial and residential property values
- ✓ Uncontrolled fires and associated injuries and damage

Rail Incidents

Train derailments are so localized that the incidents themselves would not constitute a disaster. However, if there are volatile or flammable substances on the train and the train is in a highly populated or densely forested area, death, injuries, damage to homes, or wildfires could occur. The following table shows rail accidents within Los Angeles County from 2011-2015.

Table: Train Accidents – Los Angeles County (2011-2015)
(Source: Federal Railroad Administration – Office of Safety Analysis)

Year	2011	2012	2013	2014	2015
Total Accidents	151	195	176	156	167
Derailments	17	16	15	8	11
Fatalities	10	13	15	15	14

Glendale Derailment

On January 26, 2005, a southbound Metrolink commuter train collided with a sport utility vehicle (SUV) that had been abandoned on the near the Glendale-Los Angeles city boundary. The train jackknifed and struck trains on both sides of it, one a stationary freight train and the other a northbound Metrolink train traveling in the opposite direction. The collisions resulted in 11 deaths and 100 to 200 injuries. The driver of the SUV left the vehicle prior to the crash and was later charged and convicted of 11 deaths and arson.

Subsequent criticism focused on the issue of train configuration. Many commuter trains use a "pusher configuration" to avoid turnaround maneuvers and facilities required to reverse a train's direction. This means the trains are pushed from the back by the locomotive. There were assertions that this type of configuration made the accident worse and claims that if the engine had been in the front, the train might not have jackknifed and caused the second Metrolink train to derail.

To increase rider safety, Metrolink temporarily roped off the first cars in all of their trains and allowed passenger seating in the second car and beyond. Metrolink gradually modified this policy. As of 2007, the line permitted passengers to sit in a portion of the first car when in "push mode," but did not allow seating in the forward-most section of the first car.

Chatsworth Derailment

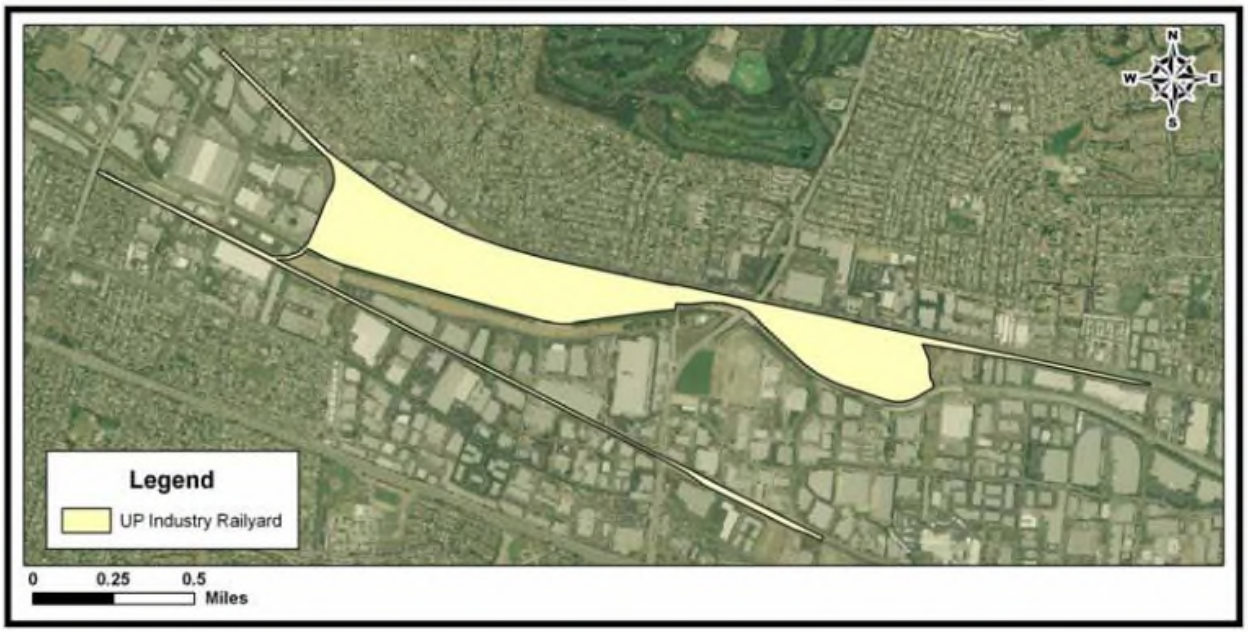
The September 12, 2008 Chatsworth train accident, resulting in 25 deaths and injuring more than half the train's passengers, spawned significant changes to national rail safety standards. The head-on collision occurred in Chatsworth, a neighborhood of Los Angeles located at the western edge of the San Fernando Valley, involving a Metrolink commuter train and a Union Pacific freight train. All three locomotives, the leading Metrolink passenger car, and seven freight cars derailed. According to the National Transportation Safety Board (NTSB), the Metrolink train engineer most likely caused the collision because he was distracted by sending text messages while on duty. He failed to obey a red stop signal that indicated it was not safe to proceed from the double track into the single-track section and, thus, collided head-on with the freight train that was traveling on the same single-track section from the opposite direction.

The NTSB also believed that deployment of a positive train control (PTC), which is a safety back up system that can automatically stop a train and prevent train collisions, could have avoided the disastrous collision and derailment. Although not required at the time of the Chatsworth accident, PTCs have been a high priority for the NTSB following similar collisions since the mid-1980s, and voluntary implementation has been uneven and incremental across the country since that time, primarily due to the high costs associated with installation and maintenance. Following the Chatsworth collision, Metrolink expanded the existing automated train stop system used on 30 miles of Metrolink track in Orange County across its 350-mile system. Metrolink's automated train stop system will automatically apply the brakes to stop a train if the engineer fails to respond to a warning within eight seconds.

Local Conditions

The Union Pacific railyard is located south of the City of La Puente in the City of Industry and parallels Old Valley Boulevard. The north side of Valley Boulevard is mainly residential with the nearest housing about 55 feet away from the railyard. There are a number of truck distribution centers located nearby and other commercial/industrial facilities. There is no locomotive servicing facility at this railyard, but some activities that occur include receiving inbound trains, switching cars, loading and unloading intermodal trains, storing intermodal containers and chassis, building outbound trains by destination and repairing freight cars and intermodal containers.

Map: Union Pacific Industry Railyard
(Source: California Environmental Protection Agency – Air Resources Board)



Hazardous Materials

Hazardous materials are substances that are flammable, combustible, explosive, toxic, noxious, and corrosive, an oxidizer, an irritant, or radioactive. A hazardous material spill or release can pose a risk to life, health, or property. An incident can result in the evacuation of a few people, a section of a facility, or an entire neighborhood.

Hazardous Materials Transportation

Federal emergency planning requirements include the formation of local emergency planning committees (LEPCs). The LEPC is required to evaluate facilities using threshold quantities of extremely hazardous substances (EHS), and determine which facilities are at risk of a release or subject to additional risk due to their proximity to another facility using EHS. The LEPC is also required to identify hazardous materials transportation routes. This requirement has led Region I LEPC to develop a specific transportation element to its plan. The following represents the Region I transportation element:

Transportation of hazardous materials by air, land, or water poses a significant need to plan and coordinate emergency resources necessary to respond to hazardous materials spills and releases. These types of incidents could affect several million Californians and are potentially hazardous to both the local community, and those traveling near the incident site. First, we will discuss the different modes of transportation and the unique challenges presented for planners and emergency responders.

Air

The southern California region has several major air transportation facilities. In some instances, there may be hazardous materials incidents involving air cargo either on the aircraft or on the ground. Initial response to these incidents would be provided by airport emergency response personnel. The need may arise for additional resources to respond. Response efforts must be coordinated to ensure all personnel are made aware of the material involved and of the potential hazards. In the event of a crash of an aircraft, the major hazardous materials concerns will be fuel from the aircraft, hydraulic fluid, and oxygen systems. The threat posed by onboard hazardous cargo will be minimal. Regulations on hazardous materials shipments by air are found in 49 CFR section 175.

Water

Two major ports serve the southern California region. These are the Port of Los Angeles and the Port of Long Beach. The prime concern for these two major ports

would be releases of petroleum products from both oil tankers and other large ocean going vessels. Not only is there a significant potential from fire and explosion, the environmental effects could be catastrophic. Additionally, many other types of hazardous materials may be shipped by bulk or containerized cargo. Planners must recognize potential risks associated with vessels and port facilities in their hazard assessment. Response to water related incidents is coordinated through the Coast Guard and the California Department of Fish and Game.

Ground

Ground transportation provides the largest movement of hazardous materials and will generate the majority of incidents which will be confronted by local emergency response personnel. The three modes of ground transportation are rail, highway, and pipeline.

Rail is unique in both the quantity and types of hazardous materials which can be involved in one incident. Collisions, derailments, and mechanical failure, as well as loading and unloading, can all result in very serious hazardous materials incidents. A critical consideration for planners is a careful evaluation of the rail traffic in their jurisdiction. Rail companies as well as product manufacturers have emergency response teams available to assist local emergency responders. The United States Department of Transportation governs the transportation of hazardous materials by rail.

Highway-related hazardous materials incidents account for the vast majority of situations faced by local responders. Highway incidents range from minor releases of diesel fuel, to multiple vehicle accidents involving large quantities of multiple types of hazardous materials. A concern for planners is the fact that these incidents can occur anyplace throughout the region. Multiple agency coordination is essential for successful control and mitigation of these incidents. Section 2454 of the California Vehicle Code mandates authority for incident command at the scene of an on-highway hazardous substance incident in the appropriate law enforcement agency having primary traffic investigative authority on the highway where the incident occurs. The local governing body of the city may assign the authority to the local fire protection agency.

Pipeline incidents will typically involve compressed natural gas, or petroleum products. An important aspect for planners to consider is that pipelines are frequently out of sight and out of mind. Southern California region is honeycombed with underground pipelines ranging from a few inches to several feet in diameter. Pipelines transport products from as far away as Texas for use by local consumers. An important source of information on underground pipelines is Dig Alert. Regulation of pipeline activity is governed by the U.S. Department of Transportation and the California Public Utilities Commission.

Potential Effects of a Hazardous Materials Incident

As previously mentioned, highway accidents and incidents will constitute the majority of emergency response situations. There are two distinct facets which must be addressed in a local emergency action plan. Planners must consider the local community with fixed facilities and those individuals in transit. The following is illustrative of typical concerns which planners will encounter in addressing hazardous material occurrences.

Residential and Business Community

Chemical spills on streets and highways can impact the public in one or more of the following ways:

- ✓ Shelter-in-place
- ✓ Evacuations
- ✓ Restriction or detour of local traffic
- ✓ Damage to homes and businesses
- ✓ Injury, illness or death

Because of these potentially dangerous situations, it is necessary for emergency responders to be familiar with requirements for hazmat spill notification and to obtain and direct the resources necessary to protect public health and the environment.

Commuter/Delivery Traffic

In addition to the surrounding locale, travelers going through or near transportation incidents may be impacted in several ways:

- ✓ Exposure to harmful or flammable chemicals resulting in injury or illness
- ✓ Delayed travel
- ✓ Accidents
- ✓ Vehicle damage due to chemical contact

Agencies with on highway responsibility in LEPC Region I should become familiar with shipping corridors and traffic patterns.

Region I Transportation Needs

Research has indicated that the majority of hazardous materials incidents occur in the transportation arena. This fact strongly suggests that the region make the following recommendations for further transportation planning assessment:

- ✓ Identify various surface transporters within the region
- ✓ Determine level of training as it relates to transportation routes and notification requirements
- ✓ Evaluate emergency response resources for both public and private hazardous materials response teams
- ✓ Prioritize response resources in areas unable to respond to proportionally higher number of incidents.
- ✓ Develop standard guidelines for evacuation of populations impacted by transportation related incidents.
- ✓ Evaluate the need to perform Transportation Risk Assessment for selected high priority areas.

Region I Map

Emergency planning principles and practices indicate that emergency plans include all the hazards existing within a jurisdiction. California OES has developed the Emergency Planning Guidance for Local Government to assist local government in conducting emergency planning. Information on hazard analysis is also included in this guidance document.

Terrorism

The complexity, scope, and potential consequences of a terrorist threat or incident require that there be a rapid and decisive capability to resolve the situation. The resolution to an act of terrorism demands an extraordinary level of coordination of crisis and consequence management functions and technical expertise across all levels of government. No single Federal, State, or Local governmental agency has the capability or requisite authority to respond independently and mitigate the consequences of such a threat to national security.
The incident may affect a single location or multiple locations, each of which may be a disaster scene, a hazardous scene and/or a crime scene simultaneously.

State of California Terrorism Guidance

The catastrophic attacks on the World Trade Center Building in New York City and the Alfred P. Murrah Federal Building in Oklahoma City shocked the nation into the reality that there are no domestic safe havens from acts of terrorism. These two apparently unrelated events punctuate our nation's vulnerability, and highlight California's risk of similar attack against its public officials, private and multi-national corporations, public infrastructure, and government facilities.

Historically, California has had a long experience combating terrorist groups, both domestic and international. Domestic terrorist groups in the state have been largely issue-oriented, while the few known internationally based incidents have mostly targeted the state's émigré communities and been related to foreign disputes. Today, however, both groups are more likely to be aligned nationally and/or internationally through electronic networking. The issues and politics of these groups remain essentially unchanged but now include increasing expressions of hatred for existing forms of government. The World Trade Center Incident demonstrates that international terrorist groups have the potential to operate with deadly effectiveness in this country. Such groups may offer no allegiance to any particular country but seek political or personal objectives that transcend national/state boundaries.

There is appropriate concern that such attacks as witnessed in Tokyo, New York City, and Oklahoma City could occur in California. A terrorist acting alone or in concert with any of the known national or international groups could readily commit acts of terrorism in California. The open availability of basic shelf-type chemicals and mail order biological research materials, coupled with an access to even the crudest laboratory facilities, could enable the individual extremist or an organized terrorist faction to manufacture proven highly lethal substances or to fashion less sophisticated weapons of mass destruction. The use of such weapons could result in mass casualties, long term contamination, and wreak havoc to both the state and national economies.

The freedom of movement and virtually unrestricted access to government officials, buildings, and critical infrastructure afforded to California's citizens and foreign visitors, presents the terrorist with the opportunity and conditions of anonymity to deliver such devastation and its tragic consequences with only the crudest devices of nuclear, chemical, or biological content.

Terrorist incidents create a unique environment in which to manage emergency response. Local responders are typically the first on scene during an actual incident and local government has primary responsibility for protecting public health and safety. Ordinarily, the local first response will be conducted under California's Standardized Emergency Management System (SEMS) which forms the basis of California's concept of operations for managing any kind of emergency or disaster, including terrorist incidents. The local responders will manage all

aspects of the incident until the FBI assumes command, by virtue of its legal authority, of the law enforcement aspects relating to identifying, apprehending, and neutralizing the terrorists and their weapons. Local and state authorities always maintain control of their response resources and continue to operate utilizing SEMS.

Los Angeles County Terrorism Early Warning (TEW) Group

Effective and rapid dissemination of indications and warnings to local emergency response agencies is an essential yet problematic element of terrorism management efforts. For bio-terrorist threats, such efforts must integrate ongoing real-time surveillance efforts. Terrorism Early Warning Groups are a multilateral, multidisciplinary effort to monitor open source data to identify trends and potential threats, monitor potential threat information during periods of heightened concern, assess potential targets and perform net assessments to guide decision making during actual events. TEW provides integrated threat and net assessment from a multi-jurisdictional perspective. City and county fire departments work together with emergency management, FBI, local law enforcement agencies, Department of Health Services, as well as other state and federal offices. The formation of TEW groups supports field response in the preparation for and response to acts of terrorism.

The Los Angeles Operational Area TEW Group provides Unified Command Structure with the impact of an attack on the operational area, gauges resource needs and shortfalls, continuously monitors and assesses situational awareness and status, and acts as the point of contact for inter-agency liaison in order to develop options for courses of action for incident resolution. TEW is an Emerging Threat Workspace (Civil Battle Lab) for stimulating National Strategy for emerging threat issues:

- Terrorism and Infrastructure Protection
- Public Order (Riots/Disturbances)
- Civil-Military Interoperability for Urban Operations
- Civilian Police (CIVPOL) for Peace Officers
- Networked Threats and Emerging Threats
- Counterterrorism Technology Test Bed

Biological & Chemical Terrorism

The Public Health Response to Biological and Chemical Terrorism: Interim Planning Guidance for State Public Health Officials (hereafter referred to as the Planning Guidance) outlines steps for strengthening the capacity of the public health system to respond to and protect the nation against the dangers of a terrorism incident. Although the Planning Guidance focuses on the biological and chemical terrorism preparedness efforts of state-level health department personnel, it can be used as a planning tool by anyone in the response community, regardless of his or her position within that community or level of government.

The public health community at large also can use this document to improve its terrorism preparedness and develop terrorism response plans. The preparedness program outlined in this Planning Guidance, once implemented, should improve the ability of all public health agencies to respond to emergency situations arising from all sources, not just terrorism.

The Planning Guidance focuses on the capabilities that state health departments are likely to need to respond effectively to a terrorism incident. Despite the public health focus of this document, the terrorism plan ultimately should not be agency-specific. Instead, the terrorism plan should be integrated, outlining the roles and responsibilities of all agencies that participate in a response. This coordinated terrorism plan should then be annexed to the State's all-hazard Emergency Operations Plan (EOP).

Terrorism Mitigation

Because the primary mechanism for past terrorist incidents has been bombings and because of the potential for mass casualties from a WMD terrorist event, the primary focus of the State's hazard mitigation strategy for terrorism is on mitigation measures that reduce risk from bomb blast and nuclear, biological, and chemical attacks to critical state facilities and population.

Measures include:

Hardening (construction/retrofitting)

- ✓ Relocation/retrofitting of air intakes
- ✓ Ventilation system upgrade/retrofit
- ✓ Protect tower bases of bridges
- ✓ Seismic retrofitting
- ✓ Upgrade/retrofit water main system
- ✓ Blast guard window film/glazing, frames
- ✓ Egress improvements

Barriers and Fencing

- ✓ Fencing around air intakes
- ✓ Fencing around fuel supply
- ✓ Vehicle barriers, bollards, popup gates, hydraulic barriers
- ✓ Waterfront security system
- ✓ Perimeter fencing

Redundant systems

- ✓ Fire protection system
- ✓ Communications systems
- ✓ Information technology
- ✓ Utility (Gas/Heat/Water)
- ✓ Utility (Electric)

Security Measures

- ✓ Security systems/early warning systems
- ✓ Warning and alarms systems directly related to system protection/shut down
- ✓ Smart utility management systems on all critical services.

Planning/Studies

- ✓ Telecommunications plans
- ✓ IT disaster recovery plans
- ✓ Business continuity/resumption plans
- ✓ Intelligence gathering and sharing
- ✓ Threat, vulnerability, and risk assessments
- ✓ Evacuation plans
- ✓ Site security planning

Seismic Study

- ✓ Retrofitting
- ✓ Interior lighting
- ✓ Exterior lighting
- ✓ Staging areas

Surveillance

- ✓ Secure Access & Entry Points
- ✓ Card swipe system
- ✓ Magnetometer
- ✓ Metal detectors
- ✓ Surveillance cameras & closed circuit TVs
- ✓ Personnel detection equipment
- ✓ Vehicle detection equipment
- ✓ Radar systems
- ✓ Building access system
- ✓ Motion detectors
- ✓ Replacing door locks and keys

IT Systems

- ✓ Security management system
- ✓ Building access system
- ✓ Employee identification system
- ✓ Coding protocol for sensitive records.

These above-listed measures are already being used in many communities and situations and have proven effective in reducing or eliminating hazard risk. Each of these measures directly meets an objective stated in the state's Hazard Mitigation Strategy.

Aircraft Accident

While the City of La Puente is not within the direct flight paths of any particular airport, aircraft fly over the City throughout the day and night because of the high number of airports in the region. Because of the large number of flights over the City, there is the risk of an air disaster resulting from a variety of aircraft situations. The major airports in the area include: Los Angeles International Airport, Long Beach Airport, John Wayne Airport, Ontario Airport and Burbank Airport. There are also a number of smaller private and military airports in the region that could affect the City.

Aircraft flying over La Puente are located in the Los Angeles Terminal Control Area (TCA). The TCA is airspace restricted to large, commercial airliners. Each TCA has an established maximum and minimum altitude in which a large aircraft must travel. Smaller aircraft desiring to transit the TCA may do so by obtaining Air Traffic Control clearance. The aircraft may then proceed to transit when traffic conditions permit. Aircraft departing from other than LAX, whose route of flight would penetrate the TCA, are required to give this information to Air Traffic Control on appropriate frequencies. Pilots operating small aircraft often rely on landmarks, rather than charts, to indicate their locations. If a pilot is unfamiliar with the geographical landmarks within the Southern California Basin, he/she could inadvertently enter the restricted TCA airspace. This misunderstanding could result in a mid-air collision.

Table: Major Airports near La Puente

Airport	Distance from City
Ontario International Airport (ONT)	24 miles
Long Beach Airport (LGB)	30 miles
John Wayne Airport (SNA)	33 miles
Los Angeles International Airport (LAX)	35 miles
Bob Hope Airport (BUR)	35 miles

Most Recent Major Accident – Los Angeles Area

It was just after 6:00pm on the evening of February 2, 1991 and USAir flight 1493 was preparing to land at Los Angeles International Airport in California. Six crew members and 83 passengers were aboard the 737 during its three-hour flight from Columbus, Ohio. On the ground, SkyWest's flight 5569 was preparing for takeoff. The Metroliner carrying 10 passengers and two crew was bound for Palmdale, California, flying one of the many rush hour commuter flights out of the Los Angeles area. USAir 1493 was cleared for the ILS 24L approach as SkyWest 5569 was taxing away from the gate towards runway 24L. Due to traffic, SkyWest 5569 was cleared to taxi to 24L and enter at the intersection of taxiway 45, some 2,200ft from the runway threshold.

As the SkyWest Metro awaited its takeoff clearance, USAir 1493 touched down near the threshold of runway 24L and shortly thereafter slammed into 5569. Both aircraft skidded down the runway, the Metro crushed beneath the 737's fuselage. The wreckage came to rest on the far side of the taxiway against an empty building. All 12 in the SkyWest aircraft were killed as were 21 people in the USAir 737, including the Captain.

Clearly both aircraft believed they had sole use of the runway at the time of the crash. In order to determine the origin of the confusion, a careful analysis of radio transcripts and ATC procedures at Los Angeles International was begun. After receiving clearance from Clearance Delivery, the flight strips go directly to the local controller (LC), bypassing the ground controller(GC). While this lessened the GC's workload by not having to mark the flight strips, it actually increased the LC's workload by denying them information regarding the aircraft's position on the field. Aircraft were allowed to request intersection departures directly from the GCs. Because SkyWest 5569 was taxing from the south side of the airport, it had been in contact with both GC1 and GC2 on its way to runway 24L and had been cleared to hold short at taxiway 45 before contacting LC2.

In its initial call to LC2, it reported "at [taxiway] 45 we'd like to go from here if we can." After the accident, LC2 reported that she had not heard the "at [taxiway] 45" part of the transmission. Because the flight strips bypassed the GCs, there was no indication for LC2 as to the aircraft's position. LC2 then cleared 5569 to taxi up to and hold short of runway 24L which was acknowledged. During this time, another flight, Wings West 5006, had just landed and was attempting to clear the runway. The crew had inadvertently changed frequencies and was out of contact with LC2. SkyWest 5569 was cleared into position and hold on runway 24L.

Communications with Wings West 5006 was re-established just after this instruction and several seconds were spent with unnecessary transmissions regarding the loss of communication. Southwest 725 was also preparing for takeoff at the time and LC2 also cleared it to taxi up to and hold short of runway 24L. Just after this, USAir 1493 called for landing clearance "on the left side, two four left." LC2 confirmed that Southwest 725 was holding short and then cleared 1493 to land. Shortly thereafter, Wings West 5072 called ready for departure. There was no flight strip in front of LC2 for 5072, so she and several others began a search for it.
It was found still at the Clearance Delivery station, believed to still be waiting for initial contact. Just after the strip was found, LC2 saw 1493 touchdown and cleared 725 to taxi into position and hold. Just seconds after this transmission, 1493 collided with 5569 still sitting in position and holding at the intersection of taxiway 45 and runway 24L.

The First Officer of 1493 reported that the touchdown was normal. As the nose was being lowered, he reported that the landing lights began to reflect on 5569's propellers and its rear position light became visible. Maximum braking was applied, but there was insufficient space and time to avoid the collision. He did not report hearing that another aircraft had been placed into position on runway 24L even though 1493 had come on to LC2's frequency prior to the instructions.

LC2 was clearly distracted by several events in the few short minutes prior to the accident. Allowing 5569 to make an intersection departure was acceptable and she cleared the flight into

position prior to giving 1493 landing clearance. The initial confusion with 5006 caused her to lose awareness of 5569's position. The further confusion regarding the flight strip of 5072 caused her again to avert her attention from the situation on the active runways. She later said she had believed 5072 taxied in front of the tower to runway 24L was actually 5569 and formed a mental picture that all was correct.

The NTSB cited many factors as contributing to the cause of the accident. Primary was Air Traffic Control procedures at Los Angeles International Airport. The FAA later required LAX to revise its flight strip handling to relieve the local controllers (LCs) from carrying the full responsibility of flight strip marking and handling and allowing better awareness during high workloads. LC2 was also cited for becoming distracted and allowing a breakdown in awareness during the incident period. The NTSB also cited lighting placement on the Metro, showing that its light blended with and were not conspicuous against the runway environment background during low light periods. Although both flight crews were operating within their ATC clearances, they were both still responsible for "see and avoid" operations since conditions were VFR.

PART III: MITIGATION STRATEGIES

Mitigation Strategies

Overview of Mitigation Strategy

As the cost of damage from natural disasters continues to increase nationwide, the City of La Puente recognizes the importance of identifying effective ways to reduce vulnerability to disasters. Mitigation Plans assist communities in reducing risk from natural hazards by identifying resources, information and strategies for risk reduction, while helping to guide and coordinate mitigation activities throughout the City.

The plan provides a set of action items to reduce risk from natural hazards through education and outreach programs, and to foster the development of partnerships. Further, the plan provides for the implementation of preventative activities, including programs that restrict and control development in areas subject to damage from natural hazards.

The resources and information within the Mitigation Plan:

1. Establish a basis for coordination and collaboration among agencies and the public in the City of La Puente;
2. Identify and prioritize future mitigation projects; and
3. Assist in meeting the requirements of federal assistance programs

The Mitigation Plan is integrated with other City plans including the City of La Puente Emergency Operations Plan, General Plan as well as department-specific standard operating procedures.

Mitigation Measure Categories

Following is FEMA's list of mitigation categories. The activities identified by the Planning Team are consistent with the six broad categories of mitigation actions outlined in FEMA publication 386-3 *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies*.

- ✓ **Prevention:** Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.
- ✓ **Property Protection:** Actions that involve modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.
- ✓ **Public Education and Awareness:** Actions to inform and educate citizens, property owners, and elected officials about hazards and potential ways to mitigate them.

  Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

- ✓ **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses preserve or restore the functions of natural systems. Examples include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- ✓ **Emergency Services:** Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- ✓ **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, retaining walls, and safe rooms.

Q&A | ELEMENT C. MITIGATION STRATEGY | C3

Q: C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))

A: See **Goals** below.

Goals

The Planning Team developed mitigation goals to avoid or reduce long-term vulnerabilities to hazards. These general principles clarify desired outcomes.

The goals are based on the risk assessment and Planning Team input, and represents a long-term vision for hazard reduction or enhanced mitigation capabilities. They are compatible with community needs and goals expressed in other planning documents prepared by the City.

Each goal is supported by mitigation action items. The Planning Team developed these action items through its knowledge of the local area, risk assessment, review of past efforts, identification of mitigation activities, and qualitative analysis.

The five mitigation goals and descriptions are listed below.

FEMA defines **Goals** as general guidelines that explain what you want to achieve. They are usually broad policy-type statements, long-term, and represent global visions.

FEMA defines **Mitigation Activities** as specific actions that help you achieve your goals and objectives.

Protect Life and Property

Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to losses from natural, human-caused, and technological hazards.

Improve hazard assessment information to make recommendations for avoiding new development in high hazard areas and encouraging preventative measures for existing development in areas vulnerable to natural, human-caused, and technological hazards.

Enhance Public Awareness

Develop and implement education and outreach programs to increase public awareness of the risks associated with natural, human-caused, and technological hazards.

Provide information on tools; partnership opportunities, and funding resources to assist in implementing mitigation activities.

Preserve Natural Systems

Support management and land use planning practices with hazard mitigation to protect life.

Preserve, rehabilitate, and enhance natural systems to serve hazard mitigation functions.

Encourage Partnerships and Implementation

Strengthen communication and coordinate participation with public agencies, citizens, non-profit organizations, business, and industry to support implementation.

Encourage leadership within the City and public organizations to prioritize and implement local and regional hazard mitigation activities.

Strengthen Emergency Services

Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure.

Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.

Coordinate and integrate hazard mitigation activities where appropriate, with emergency operations plans and procedures.

The Planning Team also developed hazard-specific mitigation goals, which appear in the **Mitigation Strategies Section**.

How are the Mitigation Action Items Organized?

The action items are a listing of activities in which City agencies and citizens can be engaged to reduce risk. Each action item includes an estimate of the timeline for implementation.

The action items are organized within the following **Mitigation Actions Matrix**, which lists all of the multi-hazard (actions that reduce risks for more than one specific hazard) and hazard-specific action items included in the mitigation plan. Data collection and research and the public participation process resulted in the development of these action items. The Matrix includes the following information for each action item:

Funding Source

The action items can be funded through a variety of sources, possibly including: operating budget/general fund, development fees, Community Development Block Grant (CDBG), Hazard Mitigation Grant Program (HMGP), other Grants, private funding, Capital Improvement Plan, and other funding opportunities.

Coordinating Organization

The Mitigation Actions Matrix assigns primary responsibility for each of the action items. The hierarchies of the assignments vary – some are positions, others departments, and other committees. The primary responsibility for implementing the action items falls to the entity shown as the "Coordinating Organization". The coordinating organization is the agency with regulatory responsibility to address hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include local, County, or regional agencies that are capable of or responsible for implementing activities and programs.

Plan Goals Addressed

The plan goals addressed by each action item are included as a way to monitor and evaluate how well the mitigation plan is achieving its goals once implementation begins.

The plan goals are organized into the following five areas:

- ✓ Protect Life and Property
- ✓ Enhance Public Awareness
- ✓ Preserve Natural Systems
- ✓ Encourage Partnerships and Implementation
- ✓ Strengthen Emergency Services

Q&A | ELEMENT C. MITIGATION STRATEGY | C5

Q: C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))

A: See **Priority Ratings** below.

Benefit/Cost Ratings

The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was performed. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

Cost ratings were defined as follows:

High: Existing jurisdictional funding will not cover the cost of the action item so other sources of revenue would be required.

Medium: The action item could be funded through existing jurisdictional funding but would require budget modifications.

Low: The action item could be funded under existing jurisdictional funding.

Benefit ratings were defined as follows:

High: The action item will provide short-term and long-term impacts on the reduction of risk exposure to life and property.

Medium: The action item will have long-term impacts on the reduction of risk exposure to life and property.

Low: The action item will have only short-term impacts on the reduction of risk exposure to life and property.

Priority Rating

Going beyond rating "benefit and cost", the Planning Team adopted the following process for rating the "priority" of each mitigation action item. Designations of "High", "Medium", and "Low" priority have been assigned to each action item using the following criteria:

Does the Action:

- ☐ solve the problem?
- ☐ address Vulnerability Assessment?
- ☐ reduce the exposure or vulnerability to the highest priority hazard?
- ☐ address multiple hazards?
- ☐ benefits equal or exceed costs?
- ☐ implement a goal, policy, or project identified in the General Plan or Capital Improvement Plan?

Can the Action:

- ☐ be implemented with existing funds?
- ☐ be implemented by existing state or federal grant programs?
- ☐ be completed within the 5-year life cycle of the LHMP?
- ☐ be implemented with currently available technologies?

Will the Action:

- ☐ be accepted by the community?
- ☐ be supported by community leaders?
- ☐ adversely impact segments of the population or neighborhoods?
- ☐ require a change in local ordinances or zoning laws?
- ☐ positive or neutral impact on the environment?
- ☐ comply with all local, state and federal environmental laws and regulations?

Is there:

- ☐ sufficient staffing to undertake the project?
- ☐ existing authority to undertake the project?

As mitigation action items were updated or written the Planning Team, representatives were provided worksheets for each of their assigned action items. Answers to the criteria above determined the priority according to the following scale.

- 1-6 = Low priority
- 7-12 = Medium priority
- 13-18 = High priority

Q&A | ELEMENT C. MITIGATION STRATEGY | C1

Q: C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

A: See **Mitigation Actions Matrix** below.

Q&A | ELEMENT C. MITIGATION STRATEGY | C4

Q: C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

A: See **Mitigation Actions Matrix** below.

Q&A | ELEMENT C. MITIGATION STRATEGY | C5

Q: C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))

A: See **Mitigation Actions Matrix** below.

Q&A | ELEMENT D. MITIGATION STRATEGY | D2

Q: D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))

A: See **Mitigation Actions Matrix** below.

Q&A | ELEMENT D. MITIGATION STRATEGY | D3

Q: D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))

A: See **Mitigation Actions Matrix** below.

Mitigation Actions Matrix

Following is **Table: Mitigation Actions Matrix** which identifies future mitigation activities developed by the Planning Team.

Table: Mitigation Actions Matrix

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
MULTI-HAZARD ACTION ITEMS													
MH-1	Integrate the City of La Puente's Hazard Mitigation Plan into future General Plan – Safety Element update.	Development Services	5 years	X	X		X	X	GF, GR	GP	H	M	M
MH-2	Develop, enhance, and implement education programs aimed at mitigating natural hazards, and reducing the risk to citizens, public agencies and private property owners.	Public Safety	Ongoing		X				GF	HMP	H	L	M
MH-3	Post the Hazard Mitigation Plan on the City's website	Administration	Ongoing	X	X	X		X	GF	HMP	H	L	H

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
	and update the City website to provide additional hazard related information that is easily accessible.												
MH-4	Provide a response/reply section on the City's website where residents can comment on the effectiveness of the current Plan and where they can make suggestions for future revisions of the plan.	Development Services	Every 5 years		X				GF	HMP	H	L	H
MH-5	Utilize existing government access public safety announcements on mitigation steps and strategies and disaster preparedness tips to be broadcasted on the local cable access channel.	Administration	Ongoing		X				GF	HMP	H	L	L

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	Goal: Protect Life and Property	Goal: Public Awareness	Goal: Natural Systems	Goal: Emergency Services	Goal: Partnerships and Implementation	Funding Source: GF- General Fund, GR-Grant	Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP	Benefit: L-Low, M-Medium, H-High	Cost: L-Low, M-Medium, H-High	Priority: L-Low, M-Medium, H-High
MH-6	Send mitigation-related news releases to local newspapers.				X				GF	HMP	H	L	L
MH-7	Update the City's website to provide additional hazard related information that is easily accessible.	Administration	Ongoing		X				GF	HMP	H	L	M
MH-8	Conduct full-scale mitigation-focused exercise including evaluation tools that will identify critical performance expectations for each discipline on a regular basis.	Administration	Bi-Annual					X	GR	HMP	H	H	H
MH-9	Publicize FEMA Emergency Management Institute's independent study courses available to the public to include but not be limited to Emergency Preparedness USA, Hazardous Materials:	Administration	Ongoing		X				GF	HMP	H	L	L

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
	Citizen Orientation, Animals in a Disaster, Disaster Mitigation for Homeowners, etc. via the City's website.												
MH-10	Review existing land use regulations to identify methods for reducing the effects of natural hazards on future development.	Development Services	Ongoing	X					GF	HMP	H	M	M
MH-11	Seek funding and complete updates to the General Plan. Priorities are the Land Use, Safety, and Circulation Elements.	Development Services	5 years	X	X	X	X	X	GF	HMP	H	M	H
MH-12	Assess availability of backup power resources (generators) at community center; upgrade communications; upgrade resources at all City facilities.	Development Services	1 year				X		GR	HMP	H	L	H

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
MH-13	Partner with other organizations and agencies in the community to identify grant programs and foundations that may support mitigation activities.	Administration, Development Services	Ongoing					X	GR	HMP	H	L	L
MH-14	Strengthen mitigation by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.	Development Services	Ongoing					X	GF	HMP	H	L	L
MH-15	Conduct a full review of the Natural Hazards Mitigation Plan every 5 years by evaluating mitigation successes, failures, and areas that were not addressed.	Development Services	5 years	X					GF	HMP	H	L	M

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
MH-16	Develop and distribute public education materials aimed at mitigating natural hazards and reducing risk to residents and private property owners.	Public Safety	3 years	X	X			X	GF	HMP	H	L	M
MH-17	Provide public awareness information describing all types of hazards, methods for preventing damages resulting from hazardous conditions, and how to respond when a hazard threatens.	Public Safety	3 years	X	X			X	GF	HMP	H	L	M
MH-18	Encourage the use of National Oceanic and Atmospheric Administration (NOAA) Weather Radios among residents and businesses. NOAA Weather Radio continuously	Public Safety	1 year	X	X		X		GF	HMP	H	L	L

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
	broadcasts National Weather Service forecasts, warnings and other crucial weather information. NOAA Weather Radio also provide direct warnings to the public for natural, human-caused, or technological hazards, and it is the primary trigger for activating our country's Emergency Alert System (EAS) on commercial radio, television, and cable systems.												
MH-19	Review and modify as necessary the City's existing land use regulations to guide development away from	Development Services	5 years	X	X				GF	HMP	H	M	L

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
	hazardous areas; reduce density in the hazardous areas; and encourage greater development restrictions on the property.												
MH-20	Encourage development and testing of Site Emergency Plans at businesses, schools, factories, office buildings, shopping malls, hospitals, recreation areas, and other similar facilities. City Hall will also prepare a Site Emergency Plan.	Public Safety	3 years		X		X		GF	HMP	H	L	M
MH-21	Fund and conduct training and exercises for emergency response personnel. At a minimum, City staff with	Public Safety, Administration	1 year	X	X		X		GF	HMP	H	M	H

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
	emergency-related duties should meet training and exercises identified in California's Standardized Emergency Management System and federal National Incident Management System.												
MH-22	Prepare an update to the City's Emergency Operations Plan in order to ensure an efficient and effective response to a major emergency or disaster.	Public Safety, Administration	1 year	X	X		X	X	GF	HMP	H	M	H
MH-23	Continue to support and advertise Community Emergency Response Team. CERT is a volunteer group of	Public Safety	Ongoing	X	X		X	X	GF	HMP	H	M	H

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
	citizens who are trained and equipped to respond if emergency services are unable to meet all of the immediate needs of the community following a major disaster. City of La Puente works jointly with the Industry Sheriff's Station CERT Coordinator. Also, the City desires to have City staff participate in CERT.												
MH-24	Share information about the benefits of prevention and preparedness while also promoting the importance of hazard insurance.	Public Safety, Administration	Ongoing	X	X		X		GF	HMP	H	L	M
MH-	Encourage Personal	Public Safety,	Ongoing	X	X		X		GF	HMP	H	L	M

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
25	Preparedness among residents and businesses. These steps include understanding local hazards, stocking up with necessary items, and planning for how family members should respond if any of a number of possible emergency or disaster events strike.	Administration											
MH-26	City will prune trees located near power lines in an effort to reduce the potential for trees falling on and breaking power lines. Encourage residents and businesses to do the same.	Development Services, Southern California Edison	Ongoing	X			X		GF	HMP	H	M	M
MH-	Post a link on the City's	Administration	1 year		X				GF	HMP	H	L	M

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	Goal: Protect Life and Property	Goal: Public Awareness	Goal: Natural Systems	Goal: Emergency Services	Goal: Partnerships and Implementation	Funding Source: GF- General Fund, GR-Grant	Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP	Benefit: L-Low, M-Medium, H-High	Cost: L-Low, M-Medium, H-High	Priority: L-Low, M-Medium, H-High
27	website to California's Office of Emergency Services website "MyHazards.caloes.gov". MyHazards is mapping software that requires only an address. A map is instantly created showing the property's vulnerability to a wide range of hazards.												
MH-28	Continue to support Alert LA, the region-wide emergency alert notification system sponsored and maintained by the County of Los Angeles. Encourage City staff, residents and businesses to register.	Public Safety, Administration	Ongoing		X			X	GF	HMP	H	L	M

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
MH-29	Encourage the use of National Oceanic and Atmospheric Administration (NOAA) weather radios among their residents. NOAA Weather Radio continuously broadcasts National Weather Service forecasts, warnings and other crucial weather information. NOAA Weather Radio also provides direct warnings to the public for natural, man-made, or technological hazards, and it is the primary trigger for activating our country's Emergency Alert System (EAS) on commercial radio,	Public Safety	Ongoing	X	X		X		GF	HMP	L	L	L

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	Goal: Protect Life and Property	Goal: Public Awareness	Goal: Natural Systems	Goal: Emergency Services	Goal: Partnerships and Implementation	Funding Source: GF- General Fund, GR-Grant	Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP	Benefit: L-Low, M-Medium, H-High	Cost: L-Low, M-Medium, H-High	Priority: L-Low, M-Medium, H-High
	television, and cable systems.												
MH-30	Ensure City Hall and other City-owned critical facilities maintain adequate backup power. This will ensure a continuance of critical services.	Development Services	Ongoing				X		GF	GF	M	M	M
MH-31	Proactive pruning of trees near power lines will reduce the potential for trees falling on and breaking power lines.	Development Services	Ongoing	X			X		Gas Tax	Budget	M	M	M
MH-32	Seek out training and maintain skills in Rapid Visual Screening. Rapid visual screening is a technique used to quickly inspect a building and identify disaster damage	Development Services	3 years	X	X		X		GF	Budget	M	M	M

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
	or potential seismic structural and non-structural weaknesses. This method may be used to screen and prioritize retrofitting efforts, or inventory high-risk structures and critical facilities. In a post disaster setting, rapid visual screening can be used to assess risk during response and recovery efforts and determine if buildings are safe to re-occupy.												
MH-33	HAZUS (Hazards United States) is a loss estimation software that projects deaths, injuries, and property damage to earthquakes, hurricanes,	Development Services	5 years	X			X	X	GR	GR	M	M	L

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
	and flooding. HAZUS was utilized for earthquake and flooding scenarios in this HMP and should be included in the next update to the Hazard Mitigation Plan.												
EARTHQUAKE ACTION ITEMS													
EQ-1	Integrate new earthquake hazard mapping data into future City GIS.	Development Services	5 years	X				X	GF	HMP	H	M	M
EQ-2	Incorporate earthquake transportation evacuation routes into the next update of the General Plan Safety Element.	Development Services	5 years	X	X		X		GF	HMP	H	M	M
EQ-3	Seek funding and regulatory support to conduct seismic retrofitting on the nineteen privately owned unreinforced	Development Services	Ongoing	X	X			X	GR	HMP	H	L	H

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
	masonry (URM) buildings in downtown.												
EQ-4	Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.	Hazard Mitigation Advisory Committee, Public Safety, Development Services	Ongoing	X	X				GF	HMP	H	L	L
EQ-5	Adopt updates to the International Conference of Building Officials (ICBO).	Development Services	Ongoing	X					GF	HMP	H	L	H
EQ-6	Support and facilitate additional building policies and requirements adopted by the State of California into local government building code for post-disaster situations.	Development Services, Public Safety	Ongoing	X					GF	HMP	H	L	H

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EQ-7	Encourage seismic strength evaluation of critical facilities in the City to identify vulnerabilities for mitigation of schools, public infrastructure, critical facilities and homes to meet current seismic standards.	Development Services, Public Safety	Ongoing	X					GF	HMP	H	L	M
EQ-8	Pursue training for Rapid Visual Screening, a technique used to quickly inspect a building and identify disaster damage or potential seismic structural and non-structural weaknesses. The City desires to also have qualified staff attend the Safety Assessment Program course.	Development Services, Public Safety	2 years	X			X		GF	HMP	H	M	H
EQ-9	Encourage homeowners and	Development	Ongoing	X	X			X	GF	HMP			M

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	businesses to take simple measures to strengthen their buildings before the next earthquake. Bracing walls and bolting sill plates to the foundation are examples. Non-reinforced masonry buildings and non-ductile concrete facilities are particularly vulnerable to ground shaking. These buildings should be strengthened and retrofitted against future seismic events.	Services											
EQ-10	Minimize injuries associated with earthquakes. Many of these injuries are caused by nonstructural hazards such as attachments inside and	Development Services	Ongoing	X	X			X	GF	HMP	H	L	M

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	outside of buildings. These include lighting fixtures, windows (glass), pictures, tall bookcases, computers, ornamental decorations on the outside of the buildings (like parapets), gas lines, etc. The City desires to encourage anchoring and other methods of nonstructural mitigation.												
FLOOD ACTION ITEMS													
FLD-1	Analyze properties within potential floodplains and identify feasible mitigation options.	Development Services	2 years	X		X			GF	HMP	H	L	M
FLD-2	Prepare an inventory of major urban drainage problems, and identify causes and	Development Services	1 year	X					GF	HMP	H	M	H

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	potential mitigation actions for urban drainage problem areas.												
FLD-3	Maintain and enforce Storm Drainage Master Plan. Flood mitigation can involve installing, re-routing, or increasing the capacity of a storm drainage system that may involve detention and retention ponds, drainage easements, or creeks and streams. It can include separation of storm and sanitary sewerage systems as well as higher engineering standards for drain and sewer capacity.	Development Services	1 year			X			GF	HMP	H	L	H
FLD-	Utilize the Capital	Development	2 years	X		X			GR	HMP	H	H	H

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4	Improvement Plan to mitigate against localized flood hazards including Valley Boulevard (Old Valley to Ferero) and Nelson (California to Hacienda).	Services											
FLD-5	Seek funding and prepare a Stormwater Plan that will regulate development in upland areas in order to reduce stormwater runoff. Examples may include erosion control techniques that may be employed within a watershed area include proper bank stabilization with sloping or grading techniques, planting	Development Services, Administration	5 years			X			GF	HMP	H	H	H

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	vegetation on slopes, terracing hillsides, or installing riprap boulders or geotextile fabric.												
FLD-6	Continue to mitigate against flooding through installation, re-routing, and increasing the capacity of a storm drainage system. Methods have or may in the future involve detention and retention ponds, drainage easements, or creeks and streams. Also, techniques may include separation of storm and sanitary sewerage systems as well as higher engineering standards for drain and sewer	Development Services	3 years	X		X			GF	HMP	H	H	L

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	capacity.												
FLD-7	Debris control is a critical component in maximizing capacity for storm drains. Community members should be encouraged to secure debris including yard items, or stored objects that may otherwise be swept away, damaged, or pose a hazard if floodwaters would pick them up and carry them away. Additionally, the City will enforce the ordinance that regulates dumping.	Los Angeles County Public Works Department, Development Services	Ongoing	X		X		X	GF	HMP	H	L	L
FLD-8	Revise existing land use regulations so that manufactured and mobile	Development Services	Ongoing	X		X		X	GF	HMP	H	M	L

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	homes will be elevated above the base flood elevation and anchored, or more preferably, kept out of the floodplain.												
FLD-9	Basement Backflow Prevention – The City encourages the use of basement backflow prevention devices. Devices may include check valves, sump pumps, and backflow prevention devices in homes and buildings with a history or likelihood of flooding.	Development Services	Ongoing	X		X			GF	HMP	H	L	L
LANDSLIDE ACTION ITEMS													
LS-1	Improve knowledge of landslide hazard areas and understanding of vulnerability	Development Services	3 years	X		X			GF	HMP	H	M	M

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	Goal: Protect Life and Property	Goal: Public Awareness	Goal: Natural Systems	Goal: Emergency Services	Goal: Partnerships and Implementation	Funding Source: GF- General Fund, GR-Grant	Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP	Benefit: L-Low, M-Medium, H-High	Cost: L-Low, M-Medium, H-High	Priority: L-Low, M-Medium, H-High
	and risk to life and property in hazard-prone areas.												
LS-2	Develop an information sheet on expansive soils and what homeowners or business owners can do to mitigate this problem.	Development Services	3 years	X	X			X	GF	HMP	H	L	M
WINDSTORM ACTION ITEMS													
WS-1	Educate the community on the dangers of windstorms and potential mitigation measures.	Development Services	3 years		X				GF	HMP	H	L	M
WS-2	Continue with regular grid pruning in order to reduce damage caused by trees during windstorms.	Development Services	Ongoing	X					GF	HMP	H	L	H
DROUGHT ACTION ITEMS													
DR-1	Support the City's three water purveyors in encouraging	Administration	Ongoing		X			X	GF	HMP	H	L	H

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	citizens and businesses to practice water conservation measures. Possibilities include installing low-flow water saving personal hygiene and landscaping devices.												
DR-2	Enforce the City's current Landscape Ordinance.	Development Services	Ongoing		X				GF	HMP	H	L	H
DR-3	Continue with installation of necessary infrastructure for use of recycled water at City parks.	Development Services, Water Purveyors	Ongoing		X			X	GF	HMP	H	M	H
DAM FAILURE ACTION ITEMS													
DAM -1	Acquire and maintain dam inundation maps and communications with Army Corps of Engineers for Santa Fe Dam, Whittier-Narrows,	Public Safety	Ongoing	X			X		GF	HMP	H	L	H

Item Identifier	Mitigation Action Item	Coordinating Agency	Timeline	**Goal**: Protect Life and Property	**Goal**: Public Awareness	**Goal**: Natural Systems	**Goal**: Emergency Services	**Goal**: Partnerships and Implementation	**Funding Source: GF- General Fund, GR-Grant**	**Planning Mechanism: GP-General Plan, CIP, GF-General Fund, GR-Grant, HMP**	**Benefit: L-Low, M-Medium, H-High**	**Cost: L-Low, M-Medium, H-High**	**Priority: L-Low, M-Medium, H-High**
	and Puddingstone Reservoirs.												
DAM -2	Research existing emergency notification methods between Army Corps of Engineers, Los Angeles County Sheriff, and City of La Puente to ensure connectivity and redundancy of emergency notification system.	Public Safety	3 years	X	X		X	X	GF	HMP	H	L	M
DAM -3	Incorporate dam inundation information into hazard-related public awareness campaigns. Post General Plan Dam Inundation Map on the City's website.	Public Safety, Administration	3 years	X	X				GF	HMP	H	L	M
HUMAN-CAUSED & TECHNOLOGICAL ACTION ITEMS													
HCT-1	Develop public awareness information for distribution to	Public Safety, Administration	3 years	X	X				GF	HMP	H	L	M

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	home and business owners regarding threats associated with human-caused and technological hazards.												
HCT-2	Collect and prepare maps and other resources identifying the location and threats associated with the nearby railroad tracks and yard. These resources should be incorporated into future updates to the EOP as well as copies stored in the Emergency Operations Center.	Public Safety, Administration	3 years	X	X				GF	HMP	H	L	M

Plan Maintenance

The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the City will integrate public participation throughout the plan maintenance process.

Q&A | ELEMENT A: PLANNING PROCESS | A6

Q: A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

A: See **Method and Scheduling of Plan Implementation** below.

Method and Scheduling of Plan Implementation

The Planning Team that was involved in research and writing of the Plan will also be responsible for implementation. The Planning Team will be led by the Chair of the Planning Team and will be referred to as the Local Mitigation Officer.

	Year 1	Year 2	Year 3	Year 4	Year 5
Monitoring	X	X	X	X	X
Evaluating					X
Internal Planning Team Evaluation	X	X	X	X	X
Cal OES and FEMA Evaluation					X
Updating					X

Monitoring and Implementing the Plan

Plan Adoption

Adoption of the Mitigation Plan by the City's governing body is one of the prime requirements for approval of the plan. Once the plan is completed, the City Council will be responsible for adopting the Mitigation Plan. The governing body has the responsibility and authority to promote sound public policy regarding hazards. The local agency governing body will have the authority to periodically update the plan as it is revised to meet changes in the hazard risks and exposures in the City. The approved Mitigation Plan will be significant in the future growth and development of the City.

The City Council will be responsible for adopting the Mitigation Plan. This governing body has the authority to promote sound public policy regarding hazards. Once the plan has been adopted, the Local Mitigation Officer will be responsible for submitting it to the State Hazard Mitigation Officer at California Emergency Management Agency (Cal OES). Cal OES will then submit the plan to the Federal Emergency Management Agency (FEMA) for review and approval. This review will address the requirements set forth in 44 C.F.R. Section 201.6 (Local Mitigation Plans). Upon acceptance by FEMA, City of La Puente will gain eligibility for Hazard Mitigation Grant Program funds.

Local Mitigation Officer

Under the direction of the Local Mitigation Officer, the Planning Team will take responsibility for plan maintenance and implementation. The Local Mitigation Officer will facilitate the Planning Team meetings and will assign tasks such as updating and presenting the Plan to the members of the Planning Team. Plan implementation and evaluation will be a shared responsibility among all of the Planning Team members. The Local Mitigation Officer will coordinate with City leadership to ensure funding for 5-year updates to Plan as required by FEMA.

The Planning Team will be responsible for coordinating implementation of plan action items and undertaking the formal review process. The Local Mitigation Officer will be authorized to make changes in assignments to the current Planning Team.

The Planning Team will meet no less than semi-annually. Meeting dates will be scheduled once the final Planning Team has been established. These meetings will provide an opportunity to discuss the progress of the action items and maintain the partnerships that are essential for the sustainability of the mitigation plan.

Q&A | ELEMENT C. MITIGATION STRATEGY | C6

Q: C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

A: See **Implementation through Existing Program** below.

Implementation through Existing Programs

The City of La Puente addresses statewide planning goals and legislative requirements through its General Plan, its Capital Improvement Plan, and City Building and Safety Codes. The Mitigation Plan provides a series of recommendations - many of which are closely related to the goals and objectives of existing planning programs. The City of La Puente will implement recommended mitigation action items through existing programs and procedures.

The City's Building & Safety Department is responsible for adhering to the State of California's Building and Safety Codes. In addition, the Planning Team will work with other agencies at the state level to review, develop and ensure Building and Safety Codes are adequate to mitigate or present damage by hazards. This is to ensure that life-safety criteria are met for new construction.

Some of the goals and action items in the Mitigation Plan will be achieved through activities recommended in the CIP. Various City departments develop the CIP and review it on an annual basis. Upon annual review of the CIP, the Planning Team will work with the City departments to identify areas that the Mitigation Plan action items are consistent with CIP goals and integrate them where appropriate.

Upon FEMA approval, the Planning Team will begin the process of incorporating existing planning mechanisms at the City level. The meetings of the Planning Team will provide an opportunity for Planning Team members to report back on the progress made on the integration of mitigation planning elements into City planning documents and procedures.

Economic Analysis of Mitigation Projects

FEMA's approach to identify the costs and benefits associated with hazard mitigation strategies, measures, or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis.

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.

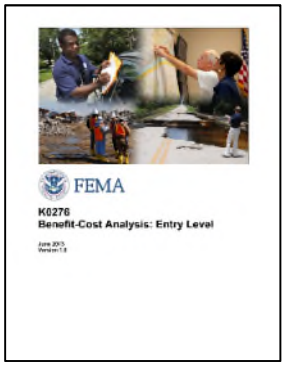
Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating hazards can provide decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Given federal funding, the Planning Team will use a FEMA-approved benefit/cost analysis approach to identify and prioritize mitigation action items. For other projects and funding sources, the Planning Team will use other approaches to understand the costs and benefits of each action item and develop a prioritized list.

The “benefit”, “cost”, and overall “priority” of each mitigation action item was included in the Mitigation Actions Matrix located in Part III: Mitigation Strategies. A more technical assessment will be required in the event grant funding is pursued through the Hazard Mitigation Grant Program. FEMA Benefit-Cost Analysis Guidelines are discussed below.

FEMA Benefit-Cost Analysis Guidelines

The Stafford Act authorizes the President to establish a program to provide technical and financial assistance to state and local governments to assist in the implementation of hazard mitigation measures that are cost effective and designed to substantially reduce injuries, loss of life, hardship, or the risk of future damage and destruction of property. To evaluate proposed hazard mitigation projects prior to funding FEMA requires a Benefit-Cost Analysis (BCA) to validate cost effectiveness. BCA is the method by which the future benefits of a mitigation project are estimated and compared to its cost. The end result is a benefit-cost ratio (BCR), which is derived from a project’s total net benefits divided by its total project cost. The BCR is a numerical expression of the cost effectiveness of a project. A project is considered to be cost effective when the BCR is 1.0 or greater, indicating the benefits of a prospective hazard mitigation project are sufficient to justify the costs.



Although the preparation of a BCA is a technical process, FEMA has developed software, written materials, and training to support the effort and assist with estimating the expected future benefits over the useful life of a retrofit project. It is imperative to conduct a BCA early in the project development process to ensure the likelihood of meeting the cost-effective eligibility requirement in the Stafford Act.

The BCA program consists of guidelines, methodologies and software modules for a range of major natural hazards including:

- ✓ Flood (Riverine, Coastal Zone A, Coastal Zone V)
- ✓ Hurricane Wind

- ✓ Hurricane Safe Room
- ✓ Damage-Frequency Assessment
- ✓ Tornado Safe Room
- ✓ Earthquake
- ✓ Wildfire

The BCA program provides up to date program data, up to date default and standard values, user manuals and training. Overall, the program makes it easier for users and evaluators to conduct and review BCAs and to address multiple buildings and hazards in a single BCA module run.

Q&A | ELEMENT A: PLANNING PROCESS | A6

Q: A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

A: See **Evaluating and Updating the Plan** below.

Evaluating and Updating the Plan

Formal Review Process

The Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. The evaluation process includes a firm schedule and timeline, and identifies the agencies and organizations participating in plan evaluation. The Local Mitigation Officer or designee will be responsible for contacting the Planning Team members and organizing the annual meeting. Planning Team members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan.

The Planning Team will review the goals and action items to determine their relevance to changing situations in the City, as well as changes in State or Federal policy, and to ensure they are addressing current and expected conditions. The Planning Team will also review the **Risk Assessment** portion of the Plan to determine if this information should be updated or modified, given any new available data. The coordinating organizations responsible for the various action items will report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised.

The Local Mitigation Officer will assign the duty of updating the Plan to one or more of the Planning Team members. The designated Planning Team members will have three months to make appropriate changes to the Plan before submitting it to the Planning Team members. The Planning Team will also notify all holders of the City plan when changes have been made. Every five years the updated plan will be submitted to the State Hazard Mitigation Officer at the California Office of Emergency Services and the Federal Emergency Management Agency for review.

At each of the quarterly Planning Team meetings, the Local Mitigation Officer will facilitate a discussion on each section of the FEMA-approved Plan:

Planning Process – Update as necessary, including regulatory changes.

Risk Assessment - Determine if this information should be updated or modified, given any new available data.

Mitigation Strategies - Review the goals and action items to determine their relevance to changing situations in the City, as well as changes in State or Federal policy, and to ensure they are addressing current and expected conditions. Most importantly, is the thorough review of the Mitigation Action Matrix. The coordinating organizations responsible for the various action items will report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised.

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MULTI-HAZARD ACTION ITEMS												
MH-1												
EARTHQUAKE ACTION ITEMS												
EQ-1												

The Local Mitigation Officer will assign the duty of updating the Plan to one or more of the Planning Team members. The designated Planning Team members will have three months to make appropriate changes to the Plan before submitting it to the Planning Team members. The Planning Team will also notify all holders of the City plan when changes have been made. Every five years the updated plan will be submitted to the State Hazard Mitigation Officer at the California Office of Emergency Services and the Federal Emergency Management Agency for review and approval.

Q&A | ELEMENT A: PLANNING PROCESS | A5

Q: A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))

A: See **Continued Public Involvement** below.

Continued Public Involvement

The City of La Puente is dedicated to involving the public directly in the continual review and updates to the Mitigation Plan. Copies of the plan will be catalogued and made available at City hall and at all City operated public libraries. The existence and location of these copies will be publicized in City newsletters and on the City website. This site will also contain an email address and phone number where people can direct their comments and concerns. A public meeting will also be held after each evaluation or when deemed necessary by the Planning Team. The meetings will provide the public a forum in which they can express their concerns, opinions, or ideas about the Plan.

The Local Mitigation Officer will be responsible for using City resources to publicize the annual public meetings and maintain public involvement through the public access channel, web page, and newspapers.

PART IV: APPENDIX

General Hazard Overviews

Earthquake Hazards

Measuring and Describing Earthquakes

An earthquake is a sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the Earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. They usually occur without warning and, after just a few seconds, can cause massive damage and extensive casualties. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. Ground motion is 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. Soft soils can further amplify ground motions. The severity of these effects is dependent on the amount of energy released from the fault or epicenter. One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. The acceleration due to gravity is often called "g". A ground motion with a peak ground acceleration of 100%g is very severe. Peak Ground Acceleration (PGA) is a measure of the strength of ground motion. PGA is used to project the risk of damage from future earthquakes by showing earthquake ground motions that have a specified probability (10%, 5%, or 2%) of being exceeded in 50 years. These ground motion values are used for reference in construction design for earthquake resistance. The ground motion values can also be used to assess relative hazard between sites, when making economic and safety decisions.

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.

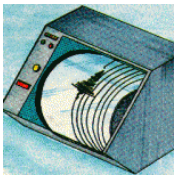
Another tool used to describe earthquake intensity is the Magnitude Scale. The Magnitude Scale is sometimes referred to as the Richter Scale. The two are similar but not exactly the same. The Magnitude Scale was devised as a means of rating earthquake strength and is an indirect measure of seismic energy released. The Scale is logarithmic with each one-point increase corresponding to a 10-fold increase in the amplitude of the seismic shock waves generated by the earthquake. In terms of actual energy released, however, each one-point increase on the Richter scale corresponds to about a 32-fold increase in energy released. Therefore, a Magnitude 7 (M7) earthquake is 100 times (10 X 10) more powerful than a M5 earthquake and releases 1,024 times (32 X 32) the energy.

An earthquake generates different types of seismic shock waves that travel outward from the focus or point of rupture on a fault. Seismic waves that travel through the earth's crust are called body waves and are divided into primary (P) and secondary (S) waves. Because P waves move faster (1.7 times) than S waves, they arrive at the seismograph first. By measuring the time delay between arrival of the P and S waves and knowing the distance to the epicenter, seismologists can compute the magnitude for the earthquake.

The duration of an earthquake is related to its magnitude but not in a perfectly strict sense. There are two ways to think about the duration of an earthquake. The first is the length of time it takes for the fault to rupture and the second is the length of time shaking is felt at any given point (e.g. when someone says "I felt it shake for 10 seconds" they are making a statement about the duration of shaking). (Source: www.usgs.gov)

The Modified Mercalli Scale (MMI) is another means for rating earthquakes, but one that attempts to quantify intensity of ground shaking. Intensity under this scale is a function of distance from the epicenter (the closer to the epicenter the greater the intensity), ground acceleration, duration of ground shaking, and degree of structural damage. The Modified Mercalli Intensity Scale below rates the level of severity of an earthquake by the amount of damage and perceived shaking.

Table: Modified Mercalli Intensity Scale

	MMI Value	Description of Shaking Severity	Summary Damage Description Used on 1995 Maps	Full Description
	I			Not Felt
	II			Felt by persons at rest, on upper floors, or favorably placed.
	III			Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
	IV			Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motorcars rock. Windows, dishes, doors rattle. In the upper range of IV, wooden walls and frame creak.
	V	Light	Pictures Move	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clock stop, start, change rate.

	MMI Value	Description of Shaking Severity	Summary Damage Description Used on 1995 Maps	Full Description
	VI	Moderate	Objects Fall	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked.
	VII	Strong	Nonstructural Damage	Difficult to stand. Noticed by drivers of motorcars. Hanging objects quiver. Furniture broken. Damage to masonry, including cracks. Weak chimneys broken at roofline. Fall of plaster, loose bricks, stones, tiles, cornices. Some cracks in masonry C. Small slides and caving in along sand or gravel banks. Concrete irrigation ditches damaged.
	VIII	Very Strong	Moderate Damage	Steering of motorcars affected. Damage to masonry C, partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, and elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Cracks in wet ground and on steep slopes.
	IX	Violent	Heavy damage	General panic. Damage to masonry buildings ranges from collapse to serious damage unless modern design. Wood-frame structures rack, and, if not bolted, shifted off foundations. Underground pipes broken.
	X	Very Violent	Extreme Damage	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land.
	XI			Rails bent greatly. Underground pipelines completely out of services.
	XII			Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into air.

Earthquake Related Hazards

Ground shaking, landslides, liquefaction, and amplification 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.

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 (where the earthquake originates). Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.

Seismic activity along nearby or more distant fault zones are likely to cause ground shaking within the City limits.

Earthquake-Induced Landslide Potential

Generally, these types of failures consist of rock falls, disrupted soil slides, rock slides, soil lateral spreads, soil slumps, soil block slides, and soil avalanches. Areas having the potential for earthquake-induced landslides generally occur in areas of previous landslide movement, or where local topographic, geological, geotechnical, and subsurface water conditions indicate a potential for permanent ground displacements.

Liquefaction

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. Liquefaction generally occurs during significant earthquake activity, and structures located on soils such as silt or sand may experience significant damage during an earthquake due to the instability of structural foundations and the moving earth. Many communities in Southern California are built on ancient river bottoms and have sandy soil. In some cases, the soil may be subject to liquefaction, depending on the depth of the water table.

Flood Hazards

Flood Terminology

Floodplain

A floodplain is a land area adjacent to a river, stream, lake, estuary, or other water body that is subject to flooding. This area, if left undisturbed, acts to store excess flood water. The floodplain is made up of two sections: the floodway and the flood fringe.

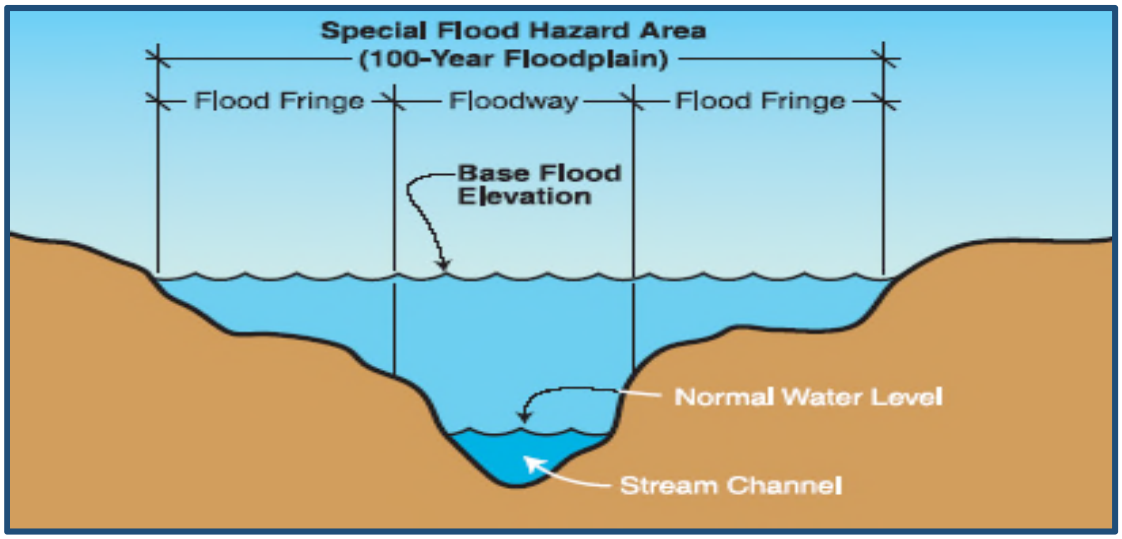
100-Year Flood

The 100-year flooding event is the flood having a one percent chance of being equaled or exceeded in magnitude in any given year. Contrary to popular belief, it is not a flood occurring once every 100 years. The 100-year floodplain is the area adjoining a river, stream, or watercourse covered by water in the event of a 100-year flood. Schematic: Floodplain and Floodway shows the relationship of the floodplain and the floodway.

The 100-year flooding event is the flood having a 1% chance of being equaled or exceeded in magnitude in any given year.

Contrary to popular belief, it is not a flood occurring once every 100 years.

Figure: Floodplain and Floodway
(Source: FEMA How-To-Guide Assessing Hazards)



Floodway

The floodway is one of two main sections that make up the floodplain. Floodways are defined for regulatory purposes. Unlike floodplains, floodways do not reflect a recognizable geologic feature. For NFIP purposes, floodways are defined as the channel of a river or stream, and the overbank areas adjacent to the channel. The floodway carries the bulk of the flood water downstream and is usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures that would obstruct or divert flood flows onto other properties.

Base Flood Elevation (BFE)

The term "Base Flood Elevation" refers to the elevation (normally measured in feet above sea level) that the base flood is expected to reach. Base flood elevations can be set at levels other than the 100-year flood. Some communities use higher frequency flood events as their base flood elevation for certain activities, while using lower frequency events for others. For example, for the purpose of storm water management, a 25-year flood event might serve as the base flood elevation; while the 500-year flood event serves as base flood elevation for the tie down of mobile homes. The regulations of the NFIP focus on development in the 100-year floodplain.

Types of Flooding

Two types of flooding primarily affect the City of La Puente: slow-rise or flash flooding. Slow-rise floods in La Puente may be preceded by a warning period of hours or days. Evacuation and sandbagging for slow-rise floods have often effectively lessened flood related damage. Conversely, flash floods are most difficult to prepare for, due to extremely limited, if any, advance warning and preparation time. Unlike most of California, the areas of Los Angeles County that are subject to slow-rise flooding are not associated with overflowing rivers, aqueducts, canals or lakes. Slow-rise flooding in La Puente is usually the result of one or a combination of the following factors: extremely heavy rainfall, saturated soil, area recently burned in wild fires with inadequate new ground cover growth, or heavy rainfall with runoff from melting mountain snow.

Urban Flooding

As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization of a watershed changes the hydrologic systems of the basin. Heavy rainfall collects and flows faster on impervious concrete and asphalt surfaces. The water moves from the clouds, to the ground, and into streams at a much faster rate in urban areas. Adding these elements to the hydrological systems can result in flood waters that rise very rapidly and peak with violent force.

The City of La Puente has a high concentration of impermeable surfaces that either collect water, or concentrate the flow of water in unnatural channels. During periods of urban flooding, streets can become swift moving rivers and basements can fill with water. Storm drains often back up with vegetative debris causing additional, localized flooding. Drainage systems within the City of La Puente have been updated and it is anticipated that they would be fully functional in an emergency.

Riverine Flooding

Riverine flooding is the overbank flooding of rivers and streams. The natural processes of riverine flooding add sediment and nutrients to fertile floodplain areas. Flooding in large river systems typically results from large-scale weather systems that generate prolonged rainfall over a wide geographic area, causing flooding in hundreds of smaller streams, which then drain into the major rivers. Shallow area flooding is a special type of riverine flooding. FEMA defines shallow flood hazards as areas that are inundated by the 100-year flood with flood depths of only one to three feet. These areas are generally flooded by low velocity sheet flows of water.

Definitions of FEMA Flood Zone Designations

Flood zones are geographic areas that the FEMA has defined according to varying levels of flood risk. These zones are depicted on a community's Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map. Each zone reflects the severity or type of flooding in the area.

Moderate to Low Risk Areas

In communities that participate in the NFIP, flood insurance is available to all property owners and renters in these zones:

ZONE	DESCRIPTION
B and X (shaded)	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
C and X (unshaded)	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.

High Risk Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones:

ZONE	DESCRIPTION
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.

ZONE	DESCRIPTION
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.

Undetermined Risk Areas

ZONE	DESCRIPTION
D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

Dam Failure Hazards

Hazard Characteristics

Definition

Dams are man-made structures built for a variety of uses including flood protection, power, agriculture, water supply, and recreation. When dams are constructed for flood protection, they usually are engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If a larger flood occurs, then that structure will be overtopped. Overtopping is the primary cause of earthen dam failure in the United States.

Failed dams can create floods that are catastrophic to life and property as a result of the tremendous energy of the released water. A catastrophic dam failure could easily overwhelm local response capabilities and require mass evacuations to save lives. Dams typically are constructed of earth, rock, concrete, or mine tailings. Two factors that influence the potential severity of a full or partial dam failure are the amount of water impounded and the density, type, and value of development and infrastructure located downstream.

Dam failures can result from any one or a combination of the following causes:

- ✓ Prolonged periods of rainfall and flooding, resulting in excess overtopping flows
- ✓ Earthquake
- ✓ Inadequate spillway capacity, resulting in excess overtopping flows
- ✓ Internal erosion caused by embankment or foundation leakage or piping
- ✓ Improper design
- ✓ Improper maintenance
- ✓ Negligent operation
- ✓ Failure of upstream dams on the same waterway

Since 1929, the State of California is responsible for overseeing dams to safeguard life and property (California Department of Resources, 1995). This legislation was prompted by the 1928 failure of St. Francis Dam. In 1965, the law was amended to include off stream storage reservoirs due to the 1963 failure of Baldwin Hill Reservoir. In 1973, Senate Bill 896 was enacted to require dam owners, under the direction of Cal OES, to show the possible inundation path in the event of a dam failure.

Governmental assistance could be required and continued for an extended period. These efforts are required to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities, and provide continuing care and welfare for the affected population including, as required, temporary housing for displaced persons.

Landslide Hazards

Hazard Characteristics

Landslides are a serious geologic hazard in almost every state in America. Nationally, landslides cause 25 to 50 deaths each year. The best estimate of direct and indirect costs of landslide damage in the United States range between $1 and $2 billion annually. As a seismically active region, California has a significant number of locations impacted by landslides. Some landslides result in private property damage; other landslides impact transportation corridors, fuel and energy conduits, and communication facilities. They can also pose a serious threat to human life.

Landslides can be broken down into two categories: 1) rapidly moving (generally known as debris flows), and; 2) slow moving. Rapidly moving landslides or 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. Slow moving landslides can cause significant property damage, but are less likely to result in serious human injuries.

The primary effects of mudslides/landslides include: abrupt depression and lateral displacement of hillside surfaces over distances of up to several hundreds of feet, disruption of surface drainage, blockage of flood control channels and roadways, displacement or destruction of improvements such as roadways, buildings, and water wells.

Historic Southern California Landslides

1928 St. Francis Dam

Cost, $672.1 million (2000 Dollars) The dam, located in Los Angeles County, gave way on March 12, and its waters swept through the Santa Clara Valley toward the Pacific Ocean, about 54 miles away. Sixty-five miles of valley was devastated, and over 500 people were killed.

1956 Portuguese Bend

Cost, $14.6 million (2000 Dollars) California Highway 14, Palos Verdes Hills. Land use on the Palos Verdes Peninsula consists mostly of single-family homes built on large lots, many of which have panoramic ocean views. All of the houses were constructed with individual septic systems, generally consisting of septic tanks and seepage pits. Landslides have been active here for thousands of years, but recent landslide activity has been attributed in part to human activity. The Portuguese Bend Landslide began its modern movement in August 1956, when displacement was noticed at its northeast margin. Movement gradually 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.

1958-1971 Pacific Palisades

Cost, $29.1 million (2000 Dollars) California Highway 1 and house damaged.

1961 Mulholland Cut

Cost, $41.5 million (2000 Dollars) On Interstate 405, 11 miles north of Santa Monica, Los Angeles County.

1963 Baldwin Hills Dam

Cost, $50 million (1963 Dollars) On December 14, the 650-foot-long by 155-foot-high earth fill dam gave way and sent 360 million gallons of water in a 50-foot-high wall cascading onto the community below, killing five persons.

1969 Glendora

Cost, $26.9 million (2000 Dollars) Los Angeles County, 175 houses damaged, mainly by debris flows.

1969 Seventh Ave., Los Angeles County

Cost, $14.6 million (2000 Dollars) California Highway 60.

1970 Princess Park

Cost, $29.1 million (2000 Dollars) California Highway 14, ten miles north of Newhall, near Saugus, northern Los Angeles County.

1971 Upper and Lower Van Norman Dams, San Fernando

Cost, $302.4 million (2000 Dollars) Earthquake-induced landslides. Damage due to the February 9, 1971, Magnitude 7.5 San Fernando, Earthquake.
The earthquake of February 9 severely damaged the Upper and Lower Van Norman Dams.

1971 Juvenile Hall, San Fernando

Cost, $266.6 million (2000 Dollars) Landslides caused by the February 9, 1971, San Fernando earthquake. In addition to damaging the San Fernando Juvenile Hall, this 1.2 km-long slide damaged trunk lines of the Southern Pacific Railroad, San Fernando Boulevard, Interstate Highway 5, the Sylmar electrical converter station, and several pipelines and canals.

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

Cost, $14.6 million (2000 Dollars) 100 houses damaged in 1980 due to debris flows.

1978 Bluebird Canyon Orange County

Cost, $52.7 million (2000 Dollars) October 2, 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.

1979 Big Rock, California, Los Angeles County

Cost, $1.08 billion (2000 Dollars) California Highway 1 rockslide.

1980 Southern California Slides

Cost, $1.1 billion in damage (2000 Dollars) Heavy winter rainfall in 1979-90 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 eight inches of rain fell in a six-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 two days.

1983 San Clemente, Orange County

Cost, $65 million (2000 Dollars), California Highway 1. Litigation at that time involved approximately $43.7 million (2000).

1983 Big Rock Mesa

Cost, $706 million (2000 Dollars) in legal claims condemnation of 13 houses, and 300 more threatened rockslide caused by rainfall.

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. 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 $1 million, seven occurred in the Friars Formation, and two in the Santiago Formation in the northern part of San Diego County.

1994 Northridge Earthquake Landslides

As a result of the Magnitude 6.7 Northridge Earthquake, more than 11,000 landslides occurred over an area of 10,000 km^2. Most were in the Santa Susana Mountains and in mountains north of the Santa Clara River Valley. Destroyed dozens of homes, blocked roads, and damaged oil-field infrastructure. Caused deaths from Coccidioidomycosis (valley fever) the spore of which was released from the soil and blown toward the coastal populated areas. The spore was released from the soil by the landslide activity.

March 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.

January 2005 Ventura County

On January 10, 2005, a landslide once again struck the community of La Conchita, killing ten people and destroying or seriously damaging 36 houses.

Landslide Characteristics

What is a landslide?

"A landslide is defined as, the movement of a mass of rock, debris, or earth movement down a slope. Landslides are a type of "mass wasting" which denotes any down slope movement of soil and rock under the direct influence of gravity. The term "landslide" encompasses events such as rock falls, topples, slides, spreads, and flows.

Landslides are initiated by rainfall, earthquakes, volcanic activity, changes in groundwater, disturbance and change of a slope by human-caused construction activities, or any combination of these factors. Landslides also occur underwater, causing tidal waves and damage to coastal areas. These landslides are called submarine landslides."

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.

Slides 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 slides are generally slow moving and can be deep. Slumps are small rotational slides that are generally shallow. Slow-moving landslides occur on relatively gentle slopes and cause significant property damage, but are far less likely to result in serious injuries than rapidly moving landslides.

What is a Debris Flow?

A debris or mud flow is a river of rock, earth and other materials, including vegetation that is saturated with water. This high percentage of water gives the debris flow a very rapid rate of movement down a slope. Debris flows move with speeds greater than 20 miles per hour, and often move much faster. This high rate of speed makes debris flows extremely dangerous to people and property in its path.

Areas Particularly Susceptible to Landslides

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 power lines, 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
- ✓ Canyon areas below hillside and mountains that recently (within 1-6 years) were subjected to a wildland fire

Excavation and Grading

Slope excavation is common in the development of home sites or roads on sloping terrain. Grading these slopes results in slopes that are steeper than the pre-existing natural slopes. Since slope steepness is a major factor in landslides, these steeper slopes are at an increased risk for landslides.

The added weight of fill placed on slopes also results in an increased landslide hazard. Small landslides are 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 increases landslide hazards. Broken or leaking water or sewer lines can be especially problematic, as does water retention facilities that direct water onto slopes. However, even lawn irrigation in landslide prone locations results in damaging landslides. Ineffective storm water management and excess runoff also cause erosion, and increase the risk of landslide hazards. Drainage is affected, naturally by the geology and topography of an area. Development that results in an increase in impervious surface impairs the ability of the land to absorb water and redirects water to other areas. Channels, streams, ponding, and erosion on slopes indicate potential slope problems.

Road and driveway drains, gutters, downspouts, and other constructed drainage facilities concentrates and accelerates flow. Ground saturation and concentrated velocity flow are major causes of slope problems and triggers landslides.

Changes in Vegetation

Removing vegetation from very steep slopes increases 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 require constant watering to remain green. Changing away from native ground cover plants increases the risk of landslide.

Windstorm Hazards

Hazard Characteristics

Santa Ana wind conditions results in two general disaster conditions. The most common is fire fanned by the high winds. This was the situation in 1993 in Laguna Beach when a massive fire destroyed a number of homes in the surrounding hills. Wind driven flames again caused the destruction of more than 3,000 homes in Southern California in October, 2003. Other forms of disaster would be direct building damage, damage to utilities and infrastructure as a result of the high winds. This has occurred in the past few years in many southland communities including Los Angeles County.

Santa Ana winds commonly occur between October and February, with December having the highest frequency of events. Summer events are rare. Wind speeds are typically north to east at 35 knots through and below passes, and canyons with gusts to 50 knots. Stronger Santa Ana winds has gusts greater than 60 knots over widespread areas, and gusts greater than 100 knots in favored areas. Frequently, the strongest winds in the basin occur during the night and morning hours due to the absence of a sea breeze. The sea breeze which typically blows onshore daily, can moderate the Santa Ana winds during the late morning and afternoon hours. Santa Ana winds are an important forecast challenge because of the high fire danger associated with them. Also, unusually high surf conditions on the northeast side of the Channel Islands normally accompany a Santa Ana event.

The Beaufort Scale below, coined and developed by Sir Francis Beaufort in 1805, illustrates the effect that varying wind speed can have on sea swells and structures:

Table: Beaufort Scale
(Source : NOAA Storm Center)

Beaufort Force	Speed (mph)	Wind Description - State of Sea - Effects on Land
0	Less 1	Calm - Mirror-like - Smoke rises vertically
1	1-3	Light - Air Ripples look like scales; No crests of foam - Smoke drift shows direction of wind, but wind vanes do not
2	4-7	Light Breeze - Small but pronounced wavelets; Crests do not break - Wind vanes move; Leaves rustle; You can feel wind on the face
3	8-12	Gentle Breeze - Large Wavelets; Crests break; Glassy foam; A few whitecaps - Leaves and small twigs move constantly; Small, light flags are extended
4	13-18	Moderate Breeze - Longer waves; Whitecaps - Wind lifts dust and loose paper; Small branches move
5	19-24	Fresh Breeze - Moderate, long waves; Many whitecaps; Some spray - Small trees

Beaufort Force	Speed (mph)	Wind Description - State of Sea - Effects on Land
		with leaves begin to move
6	25-31	Strong Breeze - Some large waves; Crests of white foam; Spray - Large branches move; Telegraph wires whistle; Hard to hold umbrellas
7	32-38	Near Gale - White foam from breaking waves blows in streaks with the wind - Whole trees move; Resistance felt walking into wind
8	39-46	Gale - Waves high and moderately long; Crests break into spin drift, blowing foam in well-marked streaks - Twigs and small branches break off trees; Difficult to walk
9	47-54	Strong Gale - High waves with wave crests that tumble; Dense streaks of foam in wind; Poor visibility from spray - Slight structural damage
10	55-63	Storm - Very high waves with long, curling crests; Sea surface appears white from blowing foam; Heavy tumbling of sea; Poor visibility - Trees broken or uprooted; Considerable structural damage
11	64-73	Violent Storm - Waves high enough to hide small and medium sized ships; Sea covered with patches of white foam; Edges of wave crests blown into froth; Poor visibility - Seldom experienced inland; Considerable structural damage
12	>74	Hurricane - Sea white with spray. Foam and spray render visibility almost non-existent - Widespread damage. Very rarely experienced on land.

Santa Ana Winds and Tornado-Like Wind Activity

Based on local history, most incidents of high wind in the City of La Puente are the result of the Santa Ana and El Niño related wind conditions. While high impact wind incidents are not frequent in the area, significant wind events and sporadic tornado activity have been known to negatively impact the City. In addition, the City is increasingly concerned with “global warming” ramifications and potential increases in wind related events.

What are Santa Ana Winds?

“Santa Ana winds are generally defined as warm, dry winds that blow from the east or northeast (offshore). These winds occur below the passes and canyons of the coastal ranges of Southern California and in the Los Angeles and Orange County basins. Santa Ana winds often blow with exceptional speed in the Santa Ana Canyon (the canyon from which it derives its name). Forecasters at the National Weather Service offices in Oxnard and San Diego usually place speed minimums on these winds and reserve the use of "Santa Ana" for winds greater than 25 knots.” These winds accelerate to speeds of 35 knots as they move through canyons and passes, with gusts to 50 or even 60 knots.

“The complex topography of Southern California combined with various atmospheric conditions create numerous scenarios that may cause widespread or isolated Santa Ana events. Commonly, Santa Ana winds develop when a region of high pressure builds over the Great Basin (the high plateau east of the Sierra Mountains and west of the Rocky Mountains including most of Nevada and Utah). Clockwise circulation around the center of this high pressure area forces air downslope from the high plateau. The air warms as it descends toward the California coast at the rate of five degrees F per 1,000 feet due to compressional heating. Thus, compressional heating provides the primary source of warming. The air is dry since it originated in the desert, and it dries out even more as it is heated.”

These regional winds typically occur from October to March, and, according to most accounts are named either for the Santa Ana River Valley where they originate, or for the Santa Ana Canyon, southeast of Los Angeles, where they pick up speed.

What are Tornados?

Tornadoes are spawned when there is warm, moist air near the ground, cool air aloft, and winds that speed up and change direction. An obstruction, such as a house, in the path of the wind causes it to change direction. This change increases pressure on parts of the house, and the combination of increased pressures and fluctuating wind speeds creates stresses that frequently cause structural failures.

In order to measure the intensity and wind strength of a tornado, Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale. This scale compares the estimated wind velocity with the corresponding amount of suspected damage. The scale measures six classifications of tornadoes with increasing magnitude from an "F0" tornado to a "F6+" tornado.

Table: Fujita Tornado Damage Scale
(Source: NOAA Storm Prediction Center)

Scale	Wind Estimated (mph)	Typical Damage
F0	< 73	Light damage. Some damage to chimneys and TV antennas; breaks twigs off trees; pushes over shallow-rooted trees.
F1	73-112	Moderate damage. Peels surface off roofs; windows broken; light trailer houses pushed or overturned; some trees uprooted or snapped; moving automobiles pushed off the road. 74 mph is the beginning of hurricane wind speed.
F2	113-157	Considerable damage. Roofs torn off frame houses leaving strong upright walls; weak buildings in rural areas demolished; trailer houses destroyed; large trees snapped or uprooted; railroad boxcars pushed over; light object missiles generated; cars blown off highway.
F3	158-206	Severe damage. Roofs and some walls torn off frame houses; some rural buildings completely demolished; trains overturned; steel-framed hangar-warehouse-type structures torn; cars lifted off the ground; most trees in a forest uprooted snapped, or leveled.
F4	207-260	Devastating damage. Whole frame houses leveled, leaving piles of debris; steel structures badly damaged; trees debarked by small flying debris; cars and trains thrown some distances or rolled considerable distances; large missiles generated.
F5	261-318	Incredible damage. Whole frame houses tossed off foundations; steel-reinforced concrete structures badly damaged; automobile-sized missiles generated; trees debarked; incredible phenomena can occur.
F6-F12	319 to sonic	Inconceivable damage. Should a tornado with the maximum wind speed in excess of F5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures.

Microbursts

Unlike tornados, microbursts are strong, damaging winds which strike the ground and often give the impression a tornado has struck. They frequently occur during intense thunderstorms. The origin of a microburst is downward moving air from a thunderstorm's core. But unlike a tornado, they affect only a rather small area. University of Chicago storm researcher Dr. Ted Fujita first coined the term "downburst" to describe strong, downdraft winds flowing out of a thunderstorm cell that he believed were responsible for the crash of Eastern Airlines Flight 66 in June of 1975.

A downburst is a straight-direction surface wind in excess of 39 mph caused by a small-scale, strong downdraft from the base of convective thundershowers and thunderstorms. In later investigations into the phenomena he defined two sub-categories of downbursts: the larger macrobursts and small microbursts.

Macrobursts are downbursts with winds up to 117 mph which spread across a path greater than 2.5 miles wide at the surface and which last from five to 30 minutes. The microburst, on the other hand is confined to an even smaller area, less than 2.5 miles in diameter from the initial point of downdraft impact. An intense microburst can result in damaging winds near 270 km/hr (170 mph) and often last for less than five minutes.

Downbursts of all sizes descend from the upper regions of severe thunderstorms when the air accelerates downward through either exceptionally strong evaporative cooling or by very heavy rain which drags dry air down with it. When the rapidly descending air strikes the ground, it spreads outward in all directions, like a fast-running faucet stream hitting the sink bottom.

When the microburst wind hits an object on the ground such as a house, garage or tree, it can flatten the buildings, and strip limbs and branches from the tree. After striking the ground, the powerful outward running gust can wreak further havoc along its path. Damage associated with a microburst is often mistaken for the work of a tornado, particularly directly under the microburst. However, damage patterns away from the impact area are characteristic of straight-line winds rather than the twisted pattern of tornado damage."

Tornados, like those that occur every year in the Midwest and Southeast parts of the United States, are a rare phenomenon in most of California, with most tornado-like activity coming from micro-bursts.

What is Susceptible to Windstorms?

Life and Property

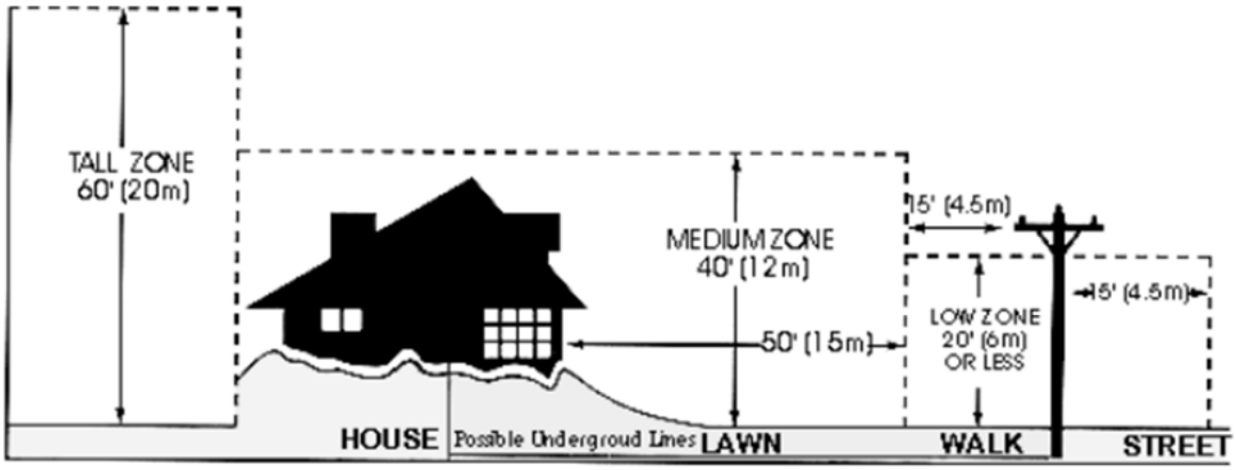
Based on the history of the region, windstorm events can be expected, perhaps annually, across widespread areas of the region which can be adversely impacted during a windstorm event. This can result in the involvement of City emergency response personnel during a wide-ranging windstorm or microburst tornadic activity. Both residential and commercial structures with weak reinforcement are susceptible to damage. Wind pressure creates a direct and frontal

assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents creates 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 City, downed trees, power lines, and damaged property can be major hindrances to emergency response and disaster recovery.

Utilities

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



Infrastructure

Windstorms 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.

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 every few years 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.

Transportation

Windstorm activity impacts 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 recreational vehicle traffic. However, typically these disruptions are not long lasting, nor do they carry a severe long term economic impact on the region.

Drought Hazards

Hazard Characteristics

Definition

Drought is defined as a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector. Drought should be considered relative to some long-term average condition of balance between precipitation and evapotranspiration (i.e., evaporation + transpiration) in a particular area, a condition often perceived as "normal". It is also related to the timing (e.g., principal season of occurrence, delays in the start of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness of the rains (e.g., rainfall intensity, number of rainfall events). Other climatic factors such as high temperature, high wind, and low relative humidity are often associated with it in many regions of the world and can significantly aggravate its severity. Drought should not be viewed as merely a physical phenomenon or natural event. Its impacts on society result from the interplay between a natural event (less precipitation than expected resulting from natural climatic variability) and the demand people place on water supply. Human beings often exacerbate the impact of drought. Recent droughts in both developing and developed countries and the resulting economic and environmental impacts and personal hardships have underscored the vulnerability of all societies to this "natural" hazard.

One dry year does not normally constitute a drought in California, but serves as a reminder of the need to plan for droughts. California's extensive system of water supply infrastructure - its reservoirs, groundwater basins, and inter-regional conveyance facilities - mitigates the effect of short-term dry periods for most water users. Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users having a different water supply. Individual water suppliers may use criteria such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler to define their water supply conditions.

Many governmental utilities, the National Oceanic and Atmospheric Administration (NOAA), and the California Department of Water Resources, as well as academic institutions such as the University of Nebraska-Lincoln's National Drought Mitigation Center and the National Drought Mitigation Center, generally agree that there is no clear definition of drought. Drought is highly variable depending on location.

Drought Threat

The region’s Mediterranean climate makes it especially susceptible to variations in rainfall. Severe water shortages could have a bearing on the economic well-being of the community. Comparison of climate (rainfall) records from Los Angeles with water well records beginning in 1930 from the San Gabriel Valley indicates the existence of wet and dry cycles on a 10-year scale as well as for much longer periods. The climate record for the Los Angeles region beginning in 1890 suggests drying conditions over the last century. With respect to the present day, climate data also suggests that the last significant wet period was the 1940s. Well level data and other sources seem to indicate the historic high groundwater levels (reflecting recharge from rainfall) occurred in the same decade. Since that time, rainfall (and groundwater level trends) appears to be in decline. This slight declining trend, however, is not believed to be significant. Climatologists compiled rainfall data from 96 stations in the State that spanned a

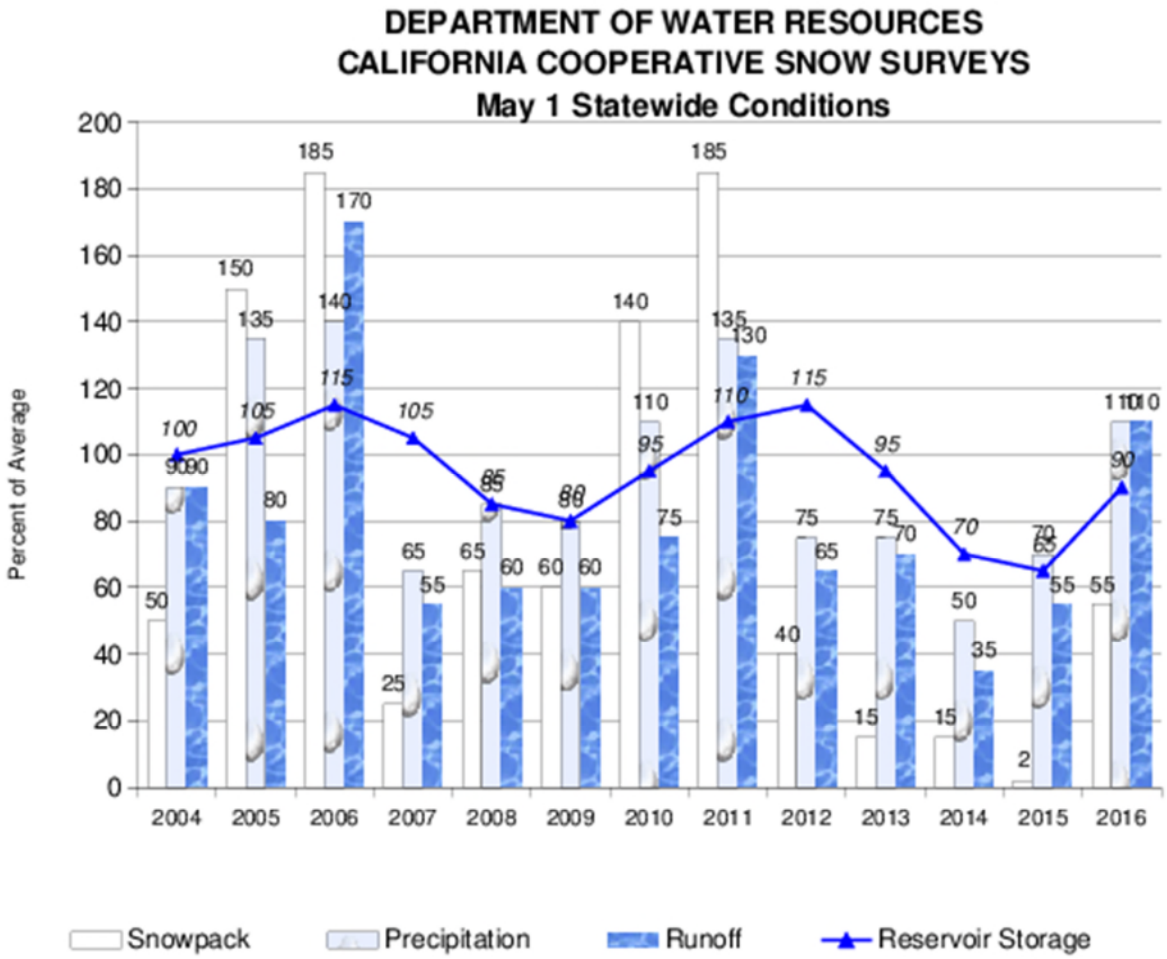
100-year period between 1890 and 1990. An interesting note is that during the first 50 years of the reporting period, there was only one year (1890) that had more than 35 inches of rainfall, whereas the second 50-year period recording of 5 year intervals (1941, 1958, 1978, 1982, and 1983) that exceeded 35 inches of rainfall in a single year. The year of maximum rainfall was 1890 when the average annual rainfall was 43.11 inches. The second wettest year on record occurred in 1983 when the State's average was 42.75 inches.

The driest year of the 100-year reported in the study was 1924 when the State's average rainfall was only 10.50 inches. The region with the most stations reporting the driest year in 1924 was the San Francisco Bay area. The second driest year was 1977 when the average was 11.57 inches. The most recent major drought (1987 to 1990) occurred at the end of a sequence of very wet years (1978 to 1983). The debate continues whether "global warming" is occurring, and the degree to which global climate change will have an effect on local micro-climates. The semi-arid southwest is particularly susceptible to variations in rainfall. A study that documented annual precipitation for California since 1600 from reconstructed tree ring data indicates that there was a prolonged dry spell from about 1755 to 1820 in California. Fluctuations in precipitation could contribute indirectly to a number of hazards including wildfire and the availability of water supplies.

General Situation

Figure: Water Supply Conditions below illustrates several indicators commonly used to evaluate California water conditions. The percent of average values are determined for measurement sites and reservoirs in each of the State's ten major hydrologic regions. Snow pack is an important indicator of runoff from Sierra Nevada watersheds, the source of much of California's developed water supply.

Figure: Water Supply Conditions
(Source: California Department of Water Resources)



Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multiyear period. There is no universal definition of when a drought begins or ends.

Types of Drought

There are four different ways that drought can be defined:
(1) Meteorological - a measure of departure of precipitation from normal. Due to climatic differences what is considered a drought in one location may not be a drought in another location.
(2) Agricultural - refers to a situation when the amount of moisture in the soil no longer meets the needs of a particular crop.
(3) Hydrological - occurs when surface and subsurface water supplies are below normal.
(4) Socioeconomic - refers to the situation that occurs when physical water shortage begins to affect people.

Historical California Droughts

A significant drought, reported by many of the ranchers in southern California, occurred in 1860. The great drought of the 1930s, coined the "Dust Bowl," was geographically centered in the Great Plains yet ultimately affected water shortages in California. The drought conditions in the plains resulted in a large influx of people to the west coast. Approximately 350,000 people from Arkansas and Oklahoma immigrated mainly to the Great Valley of California. As more people moved into California, including Los Angeles County increases in intensive agriculture led to overuse of the Santa Ana River watershed and groundwater resulting in regional water shortages. Several bills have been introduced into Congress in an effort to mitigate the effects of drought. In 1998, President Clinton signed into law the National Drought Policy Act, which called for the development of a national drought policy or framework that integrates actions and responsibilities among all levels of government. In addition, it established the National Drought Policy Commission to provide advice and recommendations on the creation of an integrated federal policy. The most recent bill introduced into Congress was the National Drought Preparedness Act of 2003, which established a comprehensive national drought policy and statutorily authorized a lead federal utility for drought assistance. Currently there exists only an ad-hoc response approach to drought unlike other disasters (e.g., hurricanes, floods, and tornadoes) which are under the purview of FEMA.

Droughts exceeding three years are relatively rare in Northern California, the source of much of the State's developed water supply. The 1929-34 droughts established the criteria commonly used in designing storage capacity and yield of large Northern California reservoirs. The driest single year of California's measured hydrologic record was 1977. According to USGS, California's most recent multi-year droughts occurred between 1987-92, 2006-2010 and 2012-2016.

The Long-term Climatic Viewpoint

The historical record of California hydrology is brief in comparison to geologically modern climatic conditions. The following sampling of changes in climatic conditions over time helps put California's twentieth century droughts into perspective. Most of the dates shown below are necessarily approximations.

Not only must the climatic conditions be inferred from indirect evidence, but the onset or extent of changed conditions may vary with geographic location. Readers interested in the subject of paleo-climatology are encouraged to seek out the extensive body of popular and scientific literature on this subject.

Past California Droughts

The historical record of California hydrology is brief in comparison to the time period of geologically modern climatic conditions. The following samplings of changes in climatic and hydrologic conditions help put California's twentieth century droughts into perspective, by illustrating the variability of possible conditions. Most of the dates shown below are approximations, since the dates must be inferred from indirect sources.

11,000 years before present

Beginning of Holocene Epoch- Recent time, the time since the end of the last major glacial epoch.

6,000 years before present

Approximate time when trees were growing in areas now submerged by Lake Tahoe. Lake levels were lower then, suggesting a drier climate.

900-1300 A.D. (Approximate)

The Medieval Warm Period, a time of warmer global average temperatures. The Arctic ice pack receded, allowing Norse settlement of Greenland and Iceland. The Anasazi civilization in the Southwest flourished, its irrigation systems supported by monsoonal rains.

1300-1800 A.D. (approximate)

The Little Ice Age, a time of colder average temperatures. Norse colonies in Greenland failed near the start of the time period, as conditions became too cold to support agriculture and livestock grazing. The Anasazi culture began to decline about 1300 and had vanished by 1600, attributed in part to drought conditions that made agriculture infeasible.

Mid - 1500s A.D.

Severe, sustained drought throughout much of the continental U.S., according to dendrochronology. Drought suggested as a contributing factor in the failure of European colonies at Parris Island, South Carolina and Roanoke Island, North Carolina.

1850s A.D.

Sporadic measurements of California precipitation began.

1890s A.D.

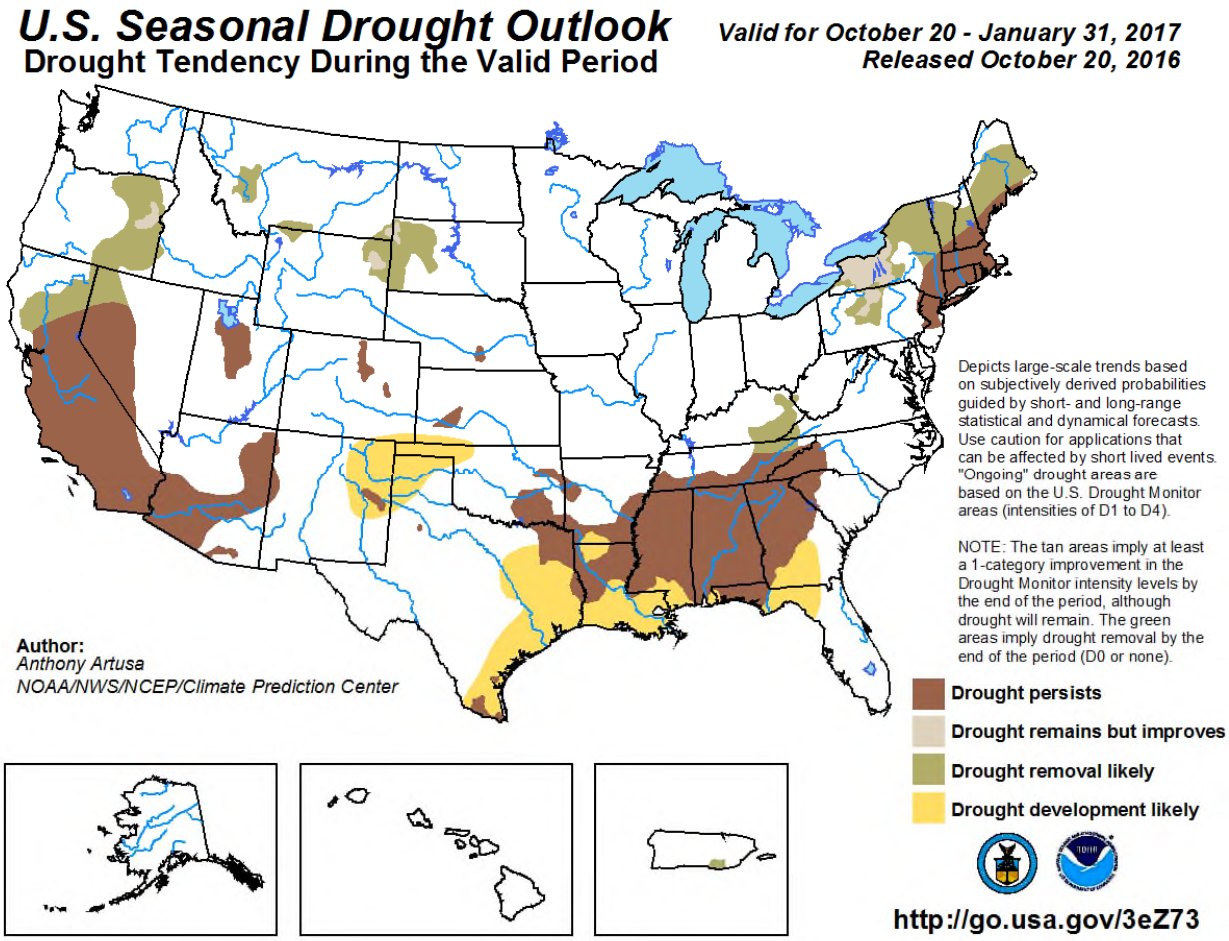
Long-term stream flow measurements began at a few California locations.

Palmer Drought Severity Index

Of the many varied indexes used to measure drought, the "Palmer Drought Severity Index" (PDSI) is the most commonly used drought index in the United States. Developed by meteorologist Wayne Palmer, the PDSI is used to measure dryness based on recent temperature compared to the amount of precipitation. It utilizes a number range, 0 as normal, drought shown in terms of minus numbers, and wetness shown in positive numbers. The PDSI is most effective at analyzing long-range drought forecasts or predications. Thus, the PDSI is very effective at evaluation trends in the severity and frequency of prolonged periods of drought, and conversely wet weather. The National Oceanic and Atmospheric Administration (NOAA) publish weekly Palmer maps, which are also used by other scientists to analyze the long-term trends associated with global warming and how this has affected drought conditions.

The following map is the most current snapshot of drought conditions across the U.S. It is provided by NOAA's Climate Prediction Center.

Map: U.S. Seasonal Drought Outlook
(Source: NOAA Climate Prediction Center)



Attachments

FEMA Letter of Approval

City Council Staff Report – Receive and File April 11, 2017

City of La Puente
AGENDA REPORT

To:	Mayor and City Council	For meeting of:	[insert]
From:	David Carmany, City Manager	Date:	[insert]
By:	[insert name and title]		

SUBJECT: RECEIVE AND FILE DRAFT NATURAL HAZARDS MITIGATION PLAN

BACKGROUND

The Disaster Mitigation Act of 2000 (DMA 2000) requires that all local agencies have a local Natural Hazards Mitigation Plan in place to be eligible for both pre- and post disaster federal funding. A Natural Hazards Mitigation Plan is a comprehensive document that identifies potential natural hazards, the extent of risk posed by these hazards, the vulnerabilities of the City to these hazards, and the actions the City may take to mitigate or reduce the potential impact of the hazards.

DISCUSSION

The City of La Puente has undertaken completion of the Plan in order to meet a mandate set forth by the Federal Emergency Management Agency (FEMA). The local mitigation plan is the representation of La Puente's commitment to reduce risks from natural hazards and serves as a guide for decision makers as they commit resources toward reducing the effects of natural hazards.

The City of La Puente has identified earthquakes, flooding, dam failure, landslides, windstorms and drought as natural disasters that could impact the City and surrounding areas. The community was made aware of the preparation of this plan and asked to comment via the City web site. In addition 27 local agencies were notified by mail that the draft plan was available for comment if they were interested

Failure to implement an approved Natural Hazard Mitigation Plan could have a devastating impact on the City in the event of a natural disaster. The plan provides a comprehensive review of the potential impacts and identifies remedies for various natural disasters that could occur within the East San Gabriel Valley region. But more importantly, without the City proceeding with the development and adoption of a comprehensive plan, federal financial assistance could be jeopardized. To maintain the City's eligibility for federal disaster assistance, the plan must be updated and resubmitted for state and federal approval every five years. There was an attempt by the City to develop a plan that lasted from 2007 to 2009 but the plan was never completed. This will be the first plan adopted by the City.

The steps from this point will be to submit the plan to OES and FEMA for review and approval and then the plan will come before the City Council for adopting.

AGENDA ITEM NO. ___

FISCAL IMPACT

There is no direct fiscal impact associated with this recommendation.

RECOMMENDATION

It is recommended that the City Council receive and file the draft Natural Hazards Mitigation Plan.

ATTACHMENTS

Attachment A: Draft Natural Hazards Mitigation Plan

City Council Staff Report

City Council Resolution

Planning Team Sign-In Sheets

City of La Puente
Hazard Mitigation Planning Team Meeting #1
March 23, 2016

Name	Department
CAROLYN HARSHMAN	EMERGENCY PLANNING CONSULTANTS
Reina Schaetzl	Development Services
JOHN DiMARIO	" "
VINCE MASTROSIMONE	Admin Svcs
David Carmany	City Manager

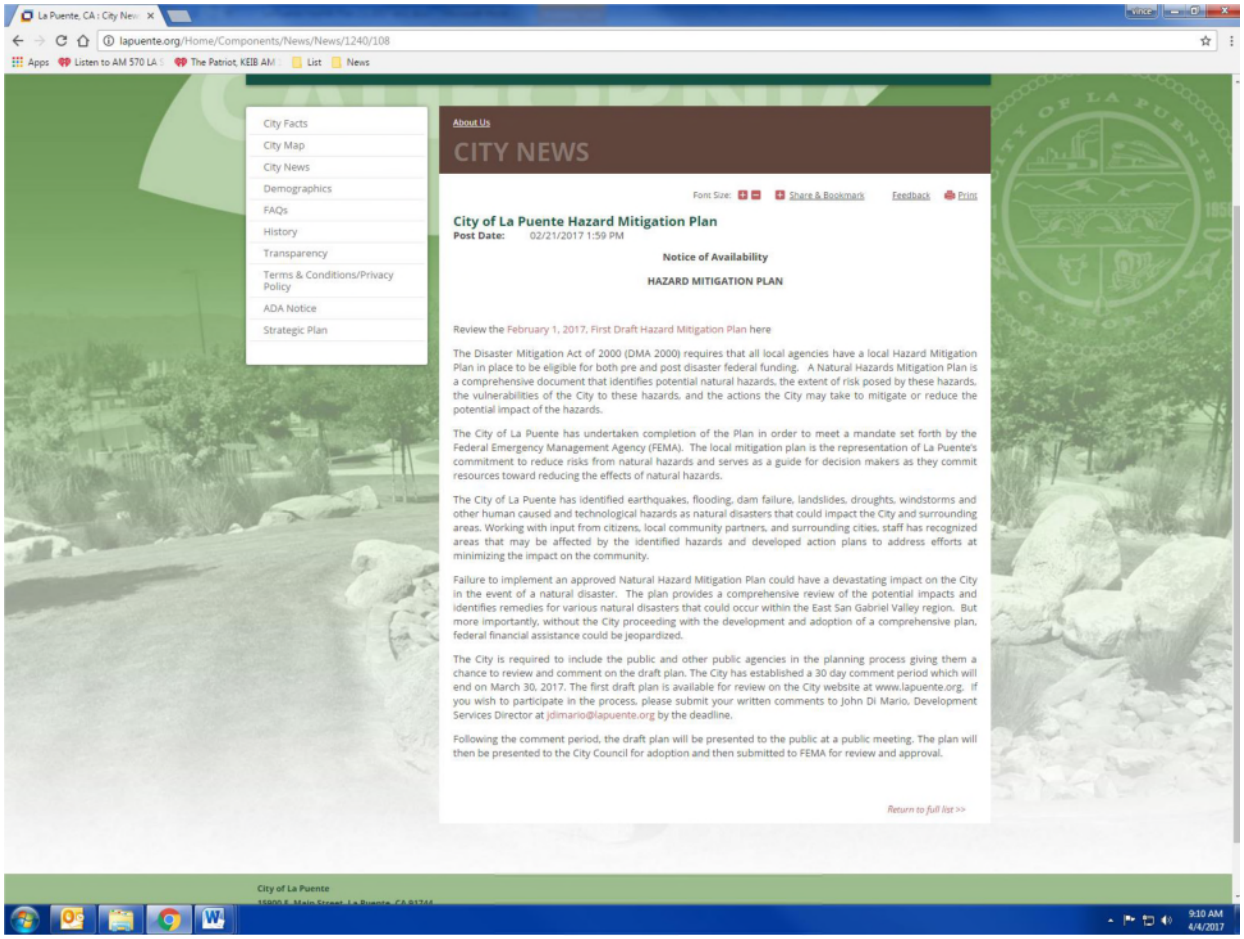
City of La Puente
Hazard Mitigation Planning Team Meeting #2
April 27, 2016

Name	Department
CAROLYN HARSHMAN	EMERGENCY PLANNING CONSULTANTS
VINCE MASTROSIMONE	City of L.P.
Reina Schaetzl	Development Services
JOHN DiMARIO	" "
David Carmany	City Manager

City of La Puente
Hazard Mitigation Planning Team Meeting #3
June 13, 2016

Name	Department
CAROLYN HARSHMAN	EMERGENCY PLANNING CONSULTANTS
JOHN DIMARIO	DEV SERVICES DEPT.
VINCE MASTROSIMONE	CITY OF L.P.
David Carney	City Manager
Reina Schaefer	Dev. Services
Pete Cacheiro	LASD (PMCACHEI@LASD.ORG)

Web Postings and Notice of Availability



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City of La Puente Hazard Mitigation Plan

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Notice of Availability

HAZARD MITIGATION PLAN

Review the February 1, 2017, First Draft Hazard Mitigation Plan here

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The City is required to include the public and other public agencies in the planning process giving them a chance to review and comment on the draft plan. The City has established a 30 day comment period which will end on March 30, 2017. The first draft plan is available for review on the City website at www.lapuente.org. If you wish to participate in the process, please submit your written comments to John Di Mario, Development Services Director at jdimario@lapuente.org by the deadline.

Following the comment period, the draft plan will be presented to the public at a public meeting. The plan will then be presented to the City Council for adoption and then submitted to FEMA for review and approval.

Return to full list >>

City of La Puente

9:10 AM 4/4/2017

City of La Puente

Notice of Availability
HAZARD MITIGATION PLAN

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