August 14, 2021 | # Hazard Mitigation Plan



emergency planning consultants

SANTA ANA
1869

# Credits

| Q&A \| ELEMENT A: PLANNING PROCESS \| A1c. |
|---|
| Q: Does the plan identify who represented each jurisdiction? (At a minimum, it must identify the jurisdiction represented and the person's position or title and agency within the jurisdiction.) (Requirement §201.6(c)(1))<br>A: See Hazard Mitigation Planning Team below. |

## *Hazard Mitigation Planning Team:*

| *Name* | *Department/Division* | *Position Title* |
|---|---|---|
| *City of Santa Ana* | | |
| Daisy Perez | City Manager's Office | Senior Management Assistant |
| Waldo Barela | Finance | Budget Supervisor |
| Jason Kwak | Planning & Building | Building Safety Manager |
| Anson So | Planning & Building | Senior Plan Check Engineer |
| Ricardo Soto | Planning & Building | Associate Planner |
| Richard (Joe) Weber | Police Department | Homeland Security Division Commander |
| Steve Rhyner, Chair | Police Department | Emergency Operations Coordinator |
| Tyrone Chesanek | Public Works | Deputy Public Works Director- Construction |
| Phil Neff | Public Works | Facilities Maintenance Manager |
| Ruben Castaneda | Public Works | Associate Engineer |
| Bryan Lopez | Public Works | Public Works Safety Coordinator |
| Craig Foster | Public Works | NPDES Coordinator |
| *City of Anaheim* | | |
| Sagar Patel | Anaheim Fire & Rescue | Emergency Manager |
| Jannine Wilmoth | Anaheim Fire & Rescue | Assistant Emergency Manager |
| *Santa Ana Unified School District* | | |
| Camille Boden | Risk Management | Director |
| Kevin Phillips | SAUSD Police | Sergeant/EOC Coordinator |
| *Orange County Fire Authority* | | |
| Steve Horner | Orange County Fire Authority | Administrative Captain |
| *Emergency Planning Consultants* | | |
| Carolyn Harshman | Emergency Planning Consultants | President |

## Acknowledgements

### *City of Santa Ana*

- ✓ Vicente Sarmiento, Mayor
- ✓ Thai Viet Phan, Ward 1
- ✓ David Penaloza, Ward 2
- ✓ Jessie Lopez, Ward 3
- ✓ Phil Bacerra, Ward 4
- ✓ Johnathan Ryan Hernandez, Ward 5
- ✓ Nelida Mendoza, Ward 6

## Point of Contact

To request information or provide comments regarding this mitigation plan, please contact:

| | |
|---|---|
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## Consulting Services

### *Emergency Planning Consultants*

- ✓ Principal Planner: Carolyn J. Harshman, CEM
- ✓ Planning Assistant: Megan R. Fritzler

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## Mapping

The maps in this plan were provided by the City of Santa Ana, Orange County, 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 Santa Ana 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 \| A1a. |
| --- |
| Q Does the plan document the planning process, including how it was prepared (with a narrative description, meeting minutes, sign-in sheets, or another method)? (Requirement §201.6(c)(1))<br>A: |

# Table of Contents

# Part I: PLANNING PROCESS

# Introduction

| Q&A \| ELEMENT A: PLANNING PROCESS \| A1b. |
|---|
| Q: Does the plan list the jurisdiction(s) participating in the plan that are seeking approval? (Requirement §201.6(c)(1))<br>A: See Introduction below. |

The Hazard Mitigation Plan (Mitigation Plan) was prepared in response to the 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 City of Santa Ana emergency management planning programs. This is the City's first hazard mitigation plan. Although the City may face a wide range of potential hazards, FEMA's hazard mitigation planning requirements focus on natural hazard events. Other hazards are analyzed and discussed in the City's Emergency Operations Plan.

## 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.
- ✓ Prepare implementation strategy - Generally, high priority activities are recommended for implementation first. However, based on organizational 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.

| Q&A \| ELEMENT A: PLANNING PROCESS \| A3 |
|---|
| Q: Does the plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))<br>A: See Stakeholders below. |

## Stakeholders

The Hazard Mitigation Planning Team (Planning Team) consisted of City department staff from City's Manager's Office, Police, Public Works, Planning & Building, Finance, Human Resources as well as representatives from Santa Ana Unified School District, City of Anaheim, and Orange County Fire Authority. The Planning Team served as the primary stakeholders throughout the planning process.

As required by DMA 2000, the Planning Team involved "the public". The general public and external agencies were invited to contribute to the mitigation plan during the plan writing phase. Emails were distributed to external agencies on _____ containing a link to the Second Draft Plan's web posting. Emails to staff were distributed on _____ containing a link to the Second Draft Plan's web posting. Both emails requested comments back by _____. See Attachment: Email Sample to External Agencies for the sample email.

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

| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C2 |
|---|
| Q: 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))<br>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.

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. The City of Santa Ana adopted a floodplain management ordinance and has Flood Insurance Rate Maps (FIRM) that show floodways, 100-year flood zones, and 500-year flood zones. The Executive Director of Planning & Building and the Executive Director of Public Works are designated as the floodplain administrator.

### *NFIP Participation*

The City of Santa Ana participates in NFIP and the FEMA FIRM maps for the City were last updated December 3, 2009. These studies and maps represent flood risk at the point in time when FEMA completed the studies and does not incorporate planning for floodplain changes in the future due to new development. Although FEMA is considering changing that policy, it is optional for local communities. According to FEMA, the City is located within flood Zones X, A, AE, AH, and AO.

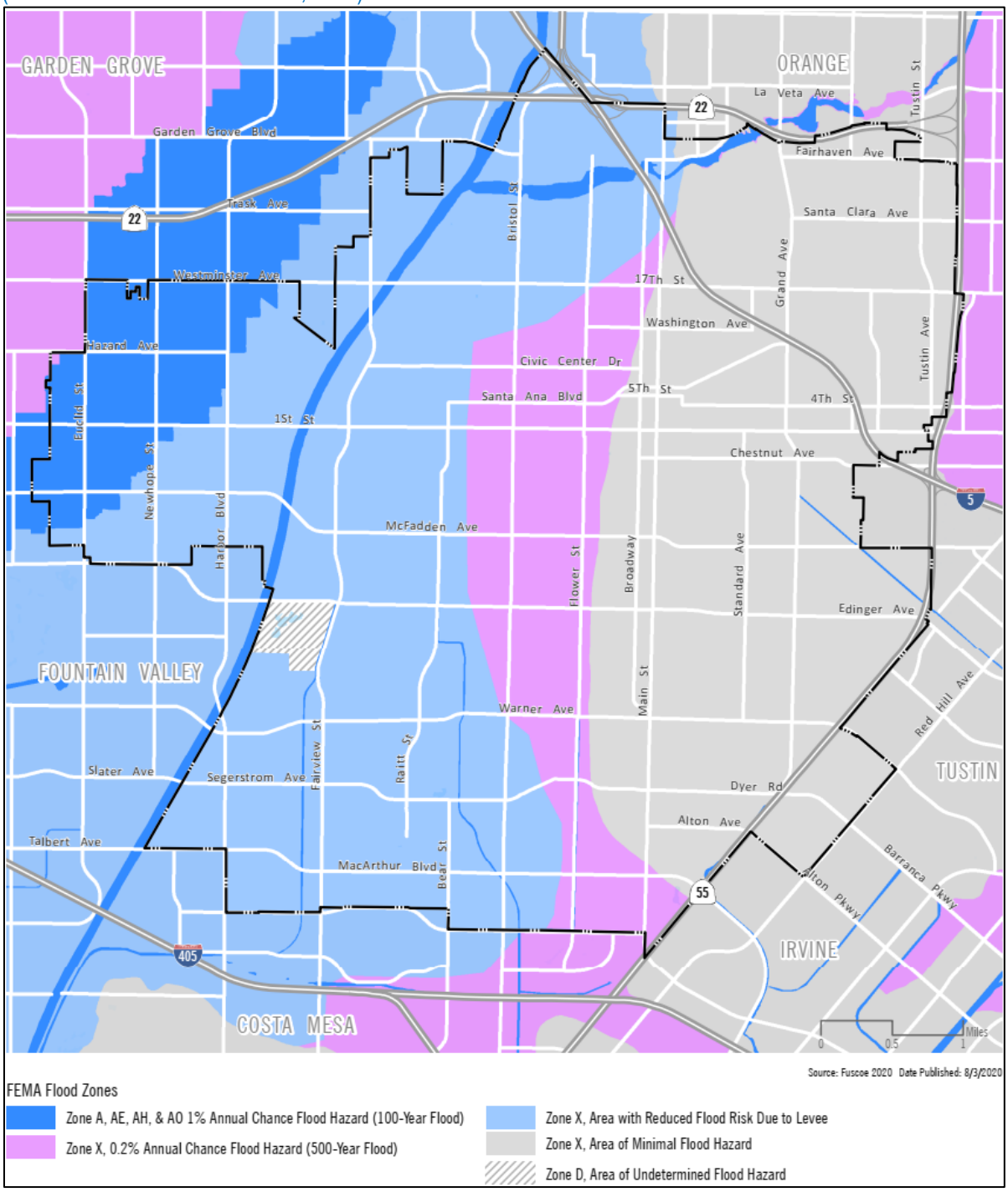
| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B4 |
|---|
| Q: Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))<br>A: See Repetitive Loss Properties below. |

### *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, none of the City owned facilities are designated as a Repetitive Loss Property (RLPs).

Map: Flood Hazard Severity Zone Map Determined by FEMA
(Source: Santa Ana General Plan, 2020)



# Planning Process

Throughout the project, the Planning Team served as the primary stakeholders while also making a concerted effort to gather information from the general public, external agencies (utility providers and special districts). In addition, the Planning Team solicited information from agencies and people with specific knowledge of hazards and past historical events, as well as building codes and facilities maintenance planning. The hazard mitigation strategies contained in this plan were developed through an extensive planning process involving City staff, general public, and external agencies.

Following review and input by the Planning Team to the First Draft Plan, next (still during the Plan Writing Phase), the Second Draft Plan was shared with the general public and external agencies (joint powers authority jurisdictions, utility providers, special districts, etc.). The general public and external agencies served as the secondary stakeholders. Next, the comments gathered from the secondary stakeholders were incorporated into a Third Draft Plan which was submitted to Cal OES and FEMA along with a request for a determination of "approval pending adoption".

Next, the Planning Team completed amendments to the Plan to reflect mandated input by Cal OES and FEMA. The Final Draft Plan was then posted in advance of the City Council public meeting. Any comments gathered were included in the staff report to the City Council. Following adoption by the City Council, proof of adoption was forwarded to FEMA with a request for approval. The FEMA Letter of Approval was included in the Final Plan. The planning process described above is portrayed below in a progression:

| Q&A \| ELEMENT A: PLANNING PROCESS \| A1a. |
|---|
| Q: Does the plan document the planning process, including how it was prepared (with a narrative description, meeting minutes, sign-in sheets, or another method)? (Requirement §201.6(c)(1))<br>A: See Plan Methodology and Planning Phases Progression below. |
| Q&A \| ELEMENT A: PLANNING PROCESS \| A3 |
| Q: Does the plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))<br>A: See Planning Phases Progression below. |

Figure: Planning Phases Progression

| PLANNING PHASES PROGRESSION | | | | |
|---|---|---|---|---|
| Plan Writing Phase (First & Second Draft Plan) | Plan Review Phase (Third Draft Plan) | Plan Adoption Phase (Final Draft Plan) | Plan Approval Phase (Final Plan) | Plan Implementation Phase |
| • Planning Team input – research, meetings, writing, review of First Draft Plan<br>• Incorporate input from the Planning Team into Second Draft Plan<br>• Invite public and external agencies via email and web posting to review, comment, and contribute to the Second Draft Plan<br>• Incorporate input into the Third Draft Plan | • Third Draft Plan sent to Cal OES and FEMA for approval pending adoption<br>• Address any mandated revisions identified by Cal OES and FEMA into Final Draft Plan | • Post public notice of City Council meeting along with the Final Draft Plan<br>• Final Draft Plan distributed to City Council in advance of meeting<br>• Present Final Draft Plan to the City Council for adoption<br>• City Council adopts Plan | • Submit Proof of Adoption to FEMA with request for final approval<br>• Receive FEMA Letter of Approval<br>• Incorporate FEMA approval and City Council resolution into the Final Plan | • Conduct annual Planning Team meetings<br>• Integrate mitigation action items into budget and other funding and strategic documents |

| Q&A \| ELEMENT E: PLAN ADOPTION \| E1 |
|---|
| Q: 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))<br>A: See Plan Adoption Process below. |

## Plan Adoption Process

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

The Third Draft Plan was submitted to Cal OES and FEMA for review and approval. FEMA issued an Approval Pending Adoption on _____ requiring the adoption of the Plan by the City Council. The adoption resolution was submitted to FEMA along with a request for a FEMA Letter of Approval.

In preparation for the public meeting with the City Council, the Planning Team prepared 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 Council voted to _____ the Hazard Mitigation Plan. The Resolution of adoption is located in the Attachments: City Council Resolution.

## Plan Approval

FEMA approved the Plan on _____. A copy of the FEMA Letter of Approval is in the Attachments: FEMA Letter of Approval.

## Plan Methodology

The Planning Team discussed knowledge of hazards and past historical events, as well as building codes and facilities maintenance plans.

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

| Q&A \| ELEMENT A: PLANNING PROCESS \| A1a. |
| --- |
| Q: Does the plan document the planning process, including how it was prepared (with a narrative description, meeting minutes, sign-in sheets, or another method)? (Requirement §201.6(c)(1))<br>A: See Planning Team Involvement below. |

## Planning Team Involvement

The Planning Team consisted of representatives from different City departments, Santa Ana Unified School District, City of Anaheim, and Orange County Fire Authority. The Planning Team served as the primary stakeholders throughout the planning process. The general public and 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
- ✓ Update status of Mitigation Action Items
- ✓ Develop new Mitigation Action Items
- ✓ Participate in Planning Team meetings and City Council public meeting
- ✓ Provide existing resources including maps and data

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.

Table: Planning Team Level of Participation

| Name | Risk Assessment, Plan Research, Writing | Planning Team Meeting 1: January 13, 2021 | Planning Team Meeting 2: January 27, 2021 | Planning Team Meeting 3: February 10, 2021 | Planning Team Meeting 4: February 24, 2021 | Planning Team Meeting 5: March 31, 2021 | Planning Team Meeting 6: April 14, 2021 | Community Input - Distribute Second Draft Plan to General Public and External Agencies | Incorporate input from Public, and External Agencies into the Third Draft Plan | Submit Third Draft Plan to Cal OES/FEMA for Approval Pending Adoption | Receive FEMA Approval Pending Adoption | Post Final Draft Plan in Advance of City Council Meeting | Present Final Draft Plan to City Council at Public Meeting for Plan Adoption | Submit Proof of Adoption to FEMA for Final Approval | Receive FEMA Final Approval and Incorporate FEMA Approval into Final Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| City of Santa Ana | | | | | | | | | | | | | | | |
| Daisy Perez | | | X | | X | | | | | | | | | | |
| Waldo Barela | | X | X | X | X | X | X | | | | | | | | |
| Steve Horner | | X | | X | | | | | | | | | | | |
| Jason Kwak | | X | X | X | X | X | X | | | | | | | | |
| Anson So | | | X | | X | X | X | | | | | | | | |
| Ricardo Soto | | X | X | X | X | X | X | | | | | | | | |
| Richard (Joe) Weber | | X | | | X | | | | | | | | | | |
| Steve Rhyner, Chair | X | X | X | X | X | X | X | | | | | | | | |
| Tyrone Chesanek | | X | X | X | X | | | | | | | | | | |
| Phil Neff | | X | X | X | X | X | X | | | | | | | | |
| Ruben Castaneda | | X | X | X | X | X | X | | | | | | | | |
| Bryan Lopez | | X | X | X | X | X | X | | | | | | | | |
| Craig Foster | | | | X | | | | | | | | | | | |
| Camille Boden | | X | | | | | | | | | | | | | |
| Kevin Phillips | | X | | | | | | | | | | | | | |
| Sagar Patel | | X | | | | | | | | | | | | | |
| Jannine Wilmoth | | X | | | | | | | | | | | | | |
| EPC | | | | | | | | | | | | | | | |
| Carolyn Harshman | X | X | X | X | X | X | | | | | | | | | |
| Megan Fritzler | X | | | | | | | | | | | | | | |

Table: Planning Team Timeline

| Task | November 2020 | December | January 2021 | February | March | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conduct Risk Assessment | X | X | | | | | | | | | | | | |
| Prepare HAZUS | X | X | | | | | | | | | | | | |
| Plan Writing - First, Second, Third, and Final Drafts, Final Plan | | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Planning Team Meeting #1 HMP Overview and Initial Hazard Briefing | | | X | | | | | | | | | | | |
| Planning Team Meeting #2 Best Practices and Plan Integration | | | X | | | | | | | | | | | |
| Planning Team Meeting #3 HAZUS and Mitigation Action Items | | | | X | | | | | | | | | | |
| Planning Team Meeting #4 Mitigation Action Items | | | | X | | | | | | | | | | |
| Planning Team Meeting #5 Review First Draft Plan | | | | | X | | | | | | | | | |
| Planning Team Meeting #6 Review HAZUS Maps and Reports | | | | | | X | | | | | | | | |
| Encourage Public Participation in Mitigation Activities | | | | | | | | | | X | | | | |
| General Public and External Agencies Input to Second Draft Plan | | | | | | | | | | X | | | | |
| Submit Third Draft Plan to Cal OES/FEMA. Complete Mandated Revisions. | | | | | | | | | | | X | X | X | X |
| Receive FEMA's Approval Pending Adoption | | | | | | | | | | | | | | X |
| Post and Conduct City Council Meeting to Adopt the Final Draft Plan and submit Proof of Adoption to FEMA | | | | | | | | | | | | | | X |
| Receive FEMA Final Approval | | | | | | | | | | | | | | X |
| Incorporate FEMA Final Approval into Final Plan | | | | | | | | | | | | | | X |

| Q&A \| ELEMENT A: PLANNING PROCESS \| A2a. |
|---|
| Q: 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 interested parties to be involved in the planning process? (Requirement §201.6(b)(2))<br>A: See Secondary Stakeholder Involvement below. |
| Q&A \| ELEMENT A: PLANNING PROCESS \| A2b. |
| Q: Does the plan identify how the stakeholders were invited to participate in the process? (Requirement §201.6(b)(2))<br>A: See Secondary Stakeholder Involvement below. |

## Secondary Stakeholder Involvement

In addition to the Planning Team, the secondary stakeholders also provided information, expertise, and other resources during plan writing phase. The secondary stakeholders included the general public and external agencies. All gathered input was incorporated into the Third Draft Plan prior to distribution to Cal OES and FEMA. For a specific accounting of the date, source, information gathered, and use of information during the Plan Writing Phase, please see Attachments: Secondary Stakeholder Involvement.

In advance of the City Council public meeting, City staff, general public, and external agencies were informed of the Final Draft Plan and encouraged to participate in the public meeting. Any comments gathered were noted in the Planning Team Staff Report and added to the Final Plan.

| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C1a. |
|---|
| Q: Does the plan document each jurisdiction's existing authorities, policies, programs and resources? (Requirement §201.6(c)(3))<br>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 City operational guidelines. FEMA identifies four types of capabilities:

- ✓ Planning and Regulatory
- ✓ Administrative and Technical
- ✓ Financial
- ✓ Education and Outreach

The table below includes a broad range of capabilities within the City to successfully accomplish mitigation.

Table: Capability Assessment - Existing Processes and Programs
(Source: City of Santa Ana Website, 2021, Emergency Planning Consultants)

| Type of Capability | | | | Name of Capability | Capability Description and Ability to Support Mitigation |
|---|---|---|---|---|---|
| Planning & Regulatory | Administrative & Technical | Financial | Education & Outreach | | |
| City of Santa Ana Departments | | | | | |
| X | X | | | City Attorney's Office | The City Attorney, appointed by and serving at the pleasure of the City Council, is mandated to provide legal services to the various officials and departments of the City of Santa Ana. The powers and duties of the City Attorney include appearing in litigation on behalf of the City and its officials; drafting all ordinances, resolutions and contracts; and advising officials and employees on all matters of law pertaining to official duties. The Santa Ana City Attorney is also empowered to prosecute violations of municipal and state law on behalf of the People of the State of California. |
| X | X | X | X | City Manager's Office | The City Manager's Office is responsible for implementing all of the City Council's policy decisions and direction, providing leadership and direction to department heads and other staff, as well as working with both Council and staff to develop action plans and programs to support the City's mission, values and priorities and serve our great community. The City of Santa Ana operates under the 'council-manager' form of government, meaning that the Council appoints the city manager, who is then responsible for the administrative and staff-appointment duties. The City Council also appoints the City Attorney and the City Clerk, and makes appointments to City Boards and Commissions. Contrary to the 'strong mayor' form of government the day-to-day operations of the City are under the authority of the City Manager. The City Manager appoints and manages the City's department heads (Chief of Police, Public Works Services Director, Community Development Director, Human Resources Director, Parks, Recreation and Community Services Director, Information Technology Director, Planning and Building Director, and Finance Director). There are a number of guiding and strategic documents to assist the City of Santa Ana serve the community and deliver on our purpose, which is to provide quality service to enhance the safety, livability and prosperity of the community. The City Council approves a strategic plan to provide a high-level guiding document to support strategic goals and measure outcomes. The Budget is the City's financial roadmap to support the City's strategic plan and goals and contains funding details to deliver city services, programs and capital improvement projects. |
| | X | | X | Clerk of the City Council | The Clerk of the Council Office is responsible for the care of official records and documents of the city such as agendas, minutes, resolutions, ordinances, and for providing and maintaining legal and historical records and information. The Clerk of the Council also |

| Type of Capability | | | | Name of Capability | Capability Description and Ability to Support Mitigation |
|---|---|---|---|---|---|
| Planning & Regulatory | Administrative & Technical | Financial | Education & Outreach | | |
| | | | | | coordinates all municipal and special elections held by the city, coordinates the annual boards, commissions, and committees recruitment process, administers the records retention and destruction policy, and receives official filings required by the Fair Political Practices Commission "FPPC", such as the Campaign Contribution Reports, Statements of Economic Interest, and other such filings. The Clerk's office prepares and posts the bi-monthly City Council meeting agendas. These agendas may be viewed on this website. Copies of agendas, minutes of prior meetings, videos, and other public documents are also available and may be requested via the Public Records Request process. |
| X | X | X | X | Community Development | The Community Development Agency is responsible for providing services in the area of economic development, job training, affordable housing, and downtown development. The Agency plans, develops and administers programs to accomplish the public policy goals of the Santa Ana City Council, Santa Ana Housing Authority and Workforce Investment Board. |
| | | X | | Finance and Management | Our Mission is to manage internal City financial operations and controls at the highest level of efficiency with effective staffing and management. We safeguard public funds through proper internal controls, expenditure, and service operations. In addition, it provides supporting services for all City agencies and residents. There are several divisions within the Finance and Management Services Agency including: Treasury & Customer Service, Purchasing, Budget and Accounting. |
| | X | | X | Human Resources | Human Resources Administration staff assist city departments with interpretation and application of the provisions in the city's labor agreements, address and resolve employee grievances, conduct administrative investigations, assist departments in addressing employee conflict resolution, disciplinary concerns and performance issues, and coordinate disciplinary review hearings before the Personnel Board. Human Resources Administration staff also investigate discrimination and harassment complaints, and administer the city's employee drug and alcohol testing programs. |
| | X | | X | Information Technology | The Information Technology Department is an Internal Service department within the City of Santa Ana organization. With about 17 FTEs and an operating budget of around $9m, IT is organized |

| Type of Capability | | | | Name of Capability | Capability Description and Ability to Support Mitigation |
|---|---|---|---|---|---|
| Planning & Regulatory | Administrative & Technical | Financial | Education & Outreach | | |
| | | | | | into three main divisions – Administration, Applications & Client Services, and Infrastructure Services. The department is a full service organization providing a centralized resource for technology deployment and support throughout the City. Services provided include e-mail, Internet/Intranet, business application systems and support, geographic information system (GIS) support, project management, voice and data network management, server and data center management, cybersecurity, user support help desk, personal computer, printer, and technology acquisition and support. We strive to provide our customers high value and excellent customer service. |
| | | | X | Library Services | Santa Ana Public Library's purpose is to respond to our community's informational, educational, and personal interest needs using books, materials, technology, and professional expertise. Santa Ana Public Library is committed to serving the needs of Santa Ana residents first and foremost. Santa Ana is one of the 100 largest cities in the United States and its residents have the youngest median age of any of those cities. For that reason, the Library places special emphasis on services to children, youth and their families.<br><br>Santa Ana's Library staff shares the cultural heritage of the community and each staff member strives to provide the highest level of customer service. The two Library locations are maintained as safe and wholesome places for young people and their families to spend out of school and leisure time. |
| | | | X | Parks and Recreation | The Parks, Recreation and Community Services Agency is responsible to deliver a variety of services to the community that includes recreation programs, parks, libraries, and operations of the Santa Ana Zoo. The core services the agency provides are essential in making lives and communities better now and in the future by providing access to nature, outdoor space to play and exercise, facilities for self-directed and organized recreation, positive alternatives for youth, and activities that encourage social connections, human development, and lifelong learning. |
| X | X | | X | Planning and Building | The Planning Division maintains the City's General Plan and Zoning documents. Planning is also responsible for environmental review, historic preservation, implementation of commercial cannabis regulations, and new development. Planning provides staff support |

| Type of Capability | | | | Name of Capability | Capability Description and Ability to Support Mitigation |
|---|---|---|---|---|---|
| Planning & Regulatory | Administrative & Technical | Financial | Education & Outreach | | |
| | | | | | to the City's Planning Commission, the Historic Resources Commission, and the City Council. |
| | X | | X | Police | The mission of the Santa Ana Police Department is to deliver public safety services to our community with the utmost professionalism and integrity. Our values act as the guideline for the discretionary use of police powers and are the basis by which employee actions are evaluated. |
| X | X | | | Public Works | The Public Works Agency is responsible for building and maintaining all public streets, storm drains, sewers, and water facilities. In addition, it coordinates the collection and recycling of refuse, sweep public streets, landscape the public right-of-way, trim trees, and remove graffiti. The Public Works department ensures that the community enjoys high quality drinking water and is able to travel around the City efficiently through the use of our state-of-the-art traffic management system. The department works with neighborhood associations to resolve speeding, parking, and traffic problems and with developers to ensure that City development standards are met. |
| Plans and Programs | | | | | |
| X | X | X | X | Santa Ana Strategic Plan | On March 18, 2014, the City Council adopted a 5-year strategic plan. The adoption of this plan marked a major milestone for both the city and the community which began in 2012 with the adoption of the Sunshine Ordinance. The Strategic Plan provides a clear statement of where the city is going and how it intends to get there. It includes a vision, a description of the mission of the organization, a set of guiding principles (values) that will guide actions, a set of multi-year goals that guide decisions, objectives and strategies for each goal, and a plan for implementation and accountability. |
| X | X | X | X | City Budget Detail (FY 2020-2021) | The City of Santa Ana has an annual fiscal budget, which begins in July and ends in June of the following year. The approach is to combine the strategic plan and annual financial plan for operations and capital improvements. This process enables us to direct our resources towards programs and activities with the greatest potential to successfully achieve our Vision and Purpose. |
| X | X | X | X | Capital Improvement Program 2020-2021 | The City's Capital Improvement Program (CIP) is a long-term plan which articulates, identifies, and prioritizes both large and expensive projects focusing on infrastructure improvements, equipment purchases, and facilities improvements as well as annual and day-to-day maintenance and repair of the City's infrastructure. The plan is executed by the City Council in rolling five-year increments based on long-term needs of the City balanced with available funding sources necessary to meet those needs. |

| Type of Capability | | | | Name of Capability | Capability Description and Ability to Support Mitigation |
|---|---|---|---|---|---|
| Planning & Regulatory | Administrative & Technical | Financial | Education & Outreach | | |
| X | X | X | X | Storm Drain Master Plan (2018) | The purpose of this study is to provide comprehensive long-range planning for the implementation and development of storm drainage facility improvements in the City, determine the capital improvement costs, identify grant opportunity programs, and discuss priorities of the drainage improvements. The City of Santa Ana encompasses approximately 27 square miles and is located adjacent to the cities of Orange, Garden Grove, Westminster, Tustin, Irvine, Costa Mesa, and Fountain Valley. The Santa Ana River and Santiago Creek run through Santa Ana, carrying flows to the ocean. |
| External Agencies | | | | | |
| X | X | | X | Orange County Fire Authority | The Orange County Fire Authority is a regional fire service agency that serves 23 cities in Orange County and all unincorporated areas. The OCFA protects nearly 2 million residents from its 77 fire stations located throughout Orange County. The OCFA, founded in 1995, is a premier public safety agency providing superior fire protection and medical emergency services to its communities. |

| Q&A \| ELEMENT A: PLANNING PROCESS \| A4 |
|---|
| Q: Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))<br>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 Santa Ana Website
https://www.santa-ana.org/
*Applicable Incorporation: City Council, Maps, Location and the Environment, City Profile, Capability Assessment*

Santa Ana General Plan, Public Hearing Draft (2020)
https://www.santa-ana.org/sites/default/files/pb/general-plan/documents/Public%20Review%20Draft/2%20-%20Safety%20Element.pdf
*Applicable Incorporation: Hazard Chapter Information*

Santa Ana General Plan, Public Safety Element Draft (2021)

https://www.santa-ana.org/sites/default/files/pb/general-plan/documents/new-elements/PublicSafety.pdf
*Applicable Incorporation: Flood Chapter Information*

City of Santa Ana Storm Drain Master Plan (2018)
https://www.santa-ana.org/sites/default/files/Documents/MasterSantaAnaMPD6_2_2016.pdf
*Applicable Incorporation: Flood Chapter Information, Mitigation Actions Matrix*

Census 2020 California Hard-to-County Fact Sheet, Santa Ana (2020)
https://census.ca.gov/wp-content/uploads/sites/4/2021/05/cahtci_all.pdf
*Applicable Incorporation: City Profile, Demographics*

State of California Hazard Mitigation Plan (2018)
www.caloes.ca.gov/cal-oes-divisions/hazard-mitigation/hazard-mitigation-planning/state-hazard-mitigation-plan
*Applicable Incorporation: Used to identify hazards posing greatest threat to State*

Vulnerability Assessment Report for the General Plan Update (2020)
https://www.santa-ana.org/sites/default/files/pb/general-plan/documents/SantaAna_Vulnerability_Assessment_Report_transmittal.pdf
*Applicable Incorporation: Climate Change Hazard Information*

Orange County General Plan, Safety Element (2013)
*https://www.ocgov.com/civicax/filebank/blobdload.aspx?blobid=40234*
*Applicable Incorporation: Hazard chapter Information*

California's Fourth Climate Change Assessment: Los Angeles Region Report (2018)
https://www.energy.ca.gov/sites/default/files/2019-07/Reg%20Report-%20SUM-CCCA4-2018-007%20LosAngeles.pdf
*Applicable Incorporation: Climate Information*

Southern California Association of Governments, Profile of the City of Santa Ana (2019)
https://scag.ca.gov/sites/main/files/file-attachments/santaana_localprofile.pdf?1606012682
*Applicable Incorporation: Maps*

HAZUS Maps and Reports
Created by Emergency Planning Consultants
*Applicable Incorporation: Numerous HAZUS maps and reports have been included for Earthquake and Flooding to determine specific risks and impacts to the City*

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
https://msc.fema.gov/portal/home

*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*

Using HAZUS for Mitigation Planning (2018)
https://www.fema.gov/media-library-data/1540479624999-ab1eca852448e271f0de82cf2031a01b/Using_Hazus_in_Mitigation_Planning_20180820_Final_508_Compliant.pdf
*Applicable Incorporation: HAZUS Information*

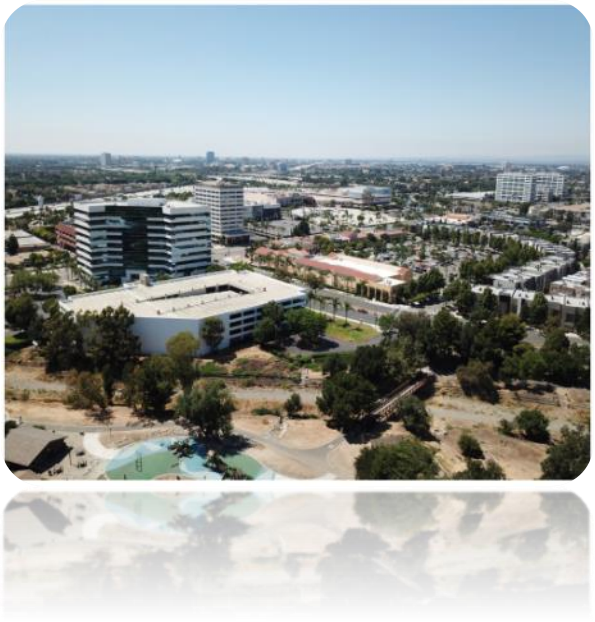
NOAA National Centers for Environmental Information, Storms Database (2021)
https://www.ncdc.noaa.gov/cag/county/time-series
*Applicable Incorporation: Previous hazard occurrences*

# Part II: RISK ASSESSMENT

## City Profile

| Q&A \| ELEMENT B3: |
| --- |
| Q: 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(b)(3))<br>A: See Location and the Environment below. |

### Location and the Environment

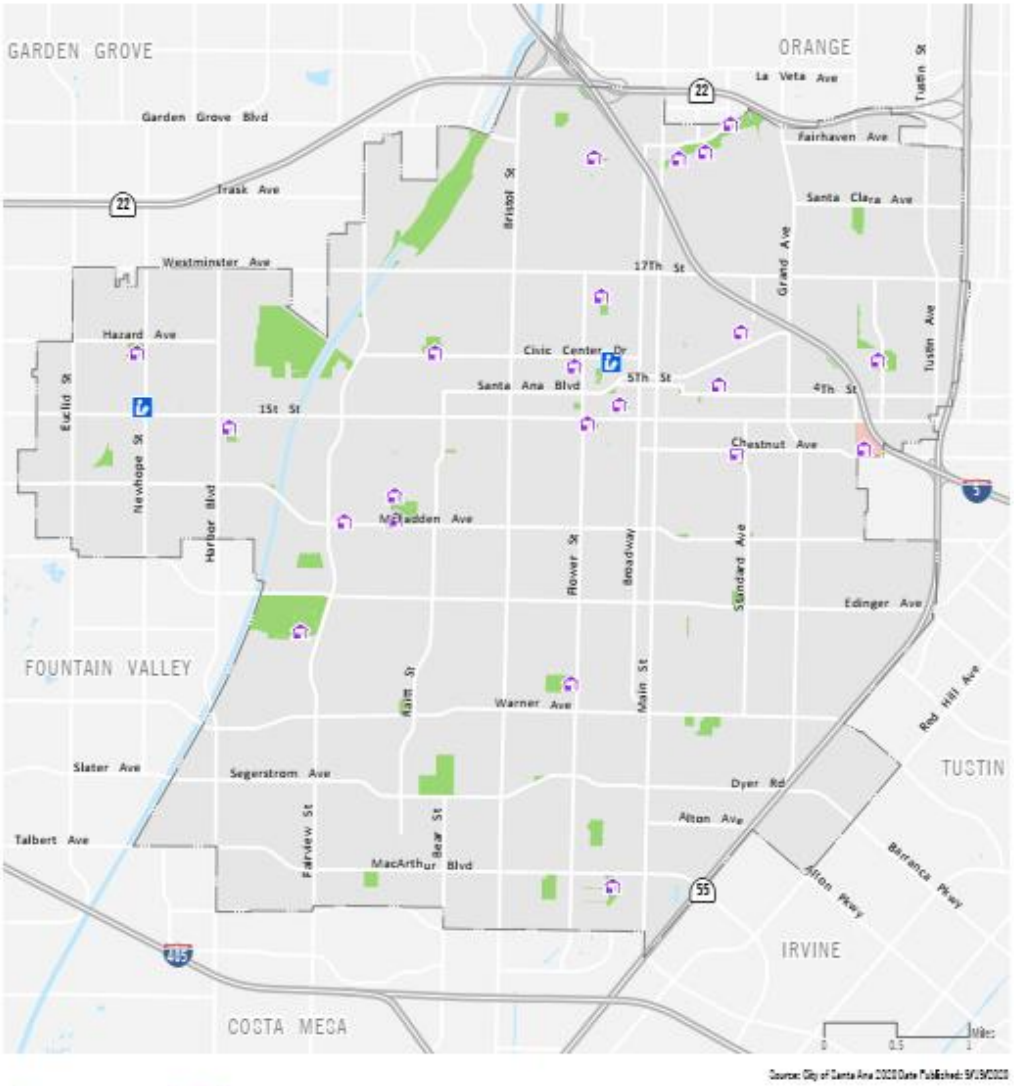


According to the City's website, Don Gaspár de Portolá, a Spanish expedition party leader, discovered a picturesque valley and river in Southern California, which he christened Santa Ana, in honor of Saint Anne, on July 26, 1769. José Antonio Yorba, a youthful expedition soldier, and his nephew Juan Peralta, were given a Spanish land grant for the area. They developed the Rancho Santiago de Santa Ana for cattle grazing and productive farmland. In 1869, William H. Spurgeon purchased 70 acres from the Yorba family and plotted a town site. The new town was given the name Santa Ana. In 1886, Santa Ana was incorporated as a city. Orange County was separated from Los Angeles in 1889, and Santa Ana was designated the County Seat. Santa Ana is the financial and governmental center of Orange County and a major city in the state.

According to the City of Santa Ana General Plan, Public Draft (2020), Santa Ana has a long, dynamic history of growth and development, starting from its establishment in 1869 (and later incorporation in 1886) on just over 74 acres of land. In the past 151 years, the City, which sits at 115 feet elevation and 35 meters above sea level, has grown to encompass over 27 square miles, with a population of more than 330,000 residents and businesses and institutions employing over 160,000 workers (both as of 2020). By the 1990s, very little vacant land remained in the City; new growth since then has largely involved the recycling and intensification of already developed properties. In the past 15 years, dozens of unique and creative projects have infused new life and investment into the City. The City has also expanded beyond its historic role as the civic center of Orange County. It is emerging as the county's cultural and economic hub.

Map: City of Santa Ana
(Source: City of Santa Ana General Plan, Public Draft 2020)

**ABOUT THE MAP.** This map shows the number, type, and distribution of facilities designed for community gathering, recreation, and learning. Together with Figures CM-2 (Schools and School Districts) and OS-1 (Open Space), the map can identify areas that may be underserved or have limited access to community services and facilities. The City seeks to ensure an equitable distribution of an access to these facilities for all Santa Ana residents.




CM 06

CITY OF SANTA ANA GENERAL PLAN

PUBLIC HEARING DRAFT

**FIGURE CM-1**
**COMMUNITY FACILITIES**

Map: Southern California Association of Governments Map of District 16
(Source: Profile of the City of Santa Ana, 2019)

# Climate

General Climate

The City of Santa Ana sits within Orange County, which experiences a Mediterranean climate, according to California's Fourth Climate Change Assessment (2018). This climate consists of hot, dry summers and cool, wet winters.

Temperatures

According to the US Climate Data, the City experiences an annual high average temperature of 76 degrees and a low average of 55 degrees. Average precipitation consists of 13.63 inches.

Graph: Weather Averages in Santa Ana
(Source: US Climate Data)

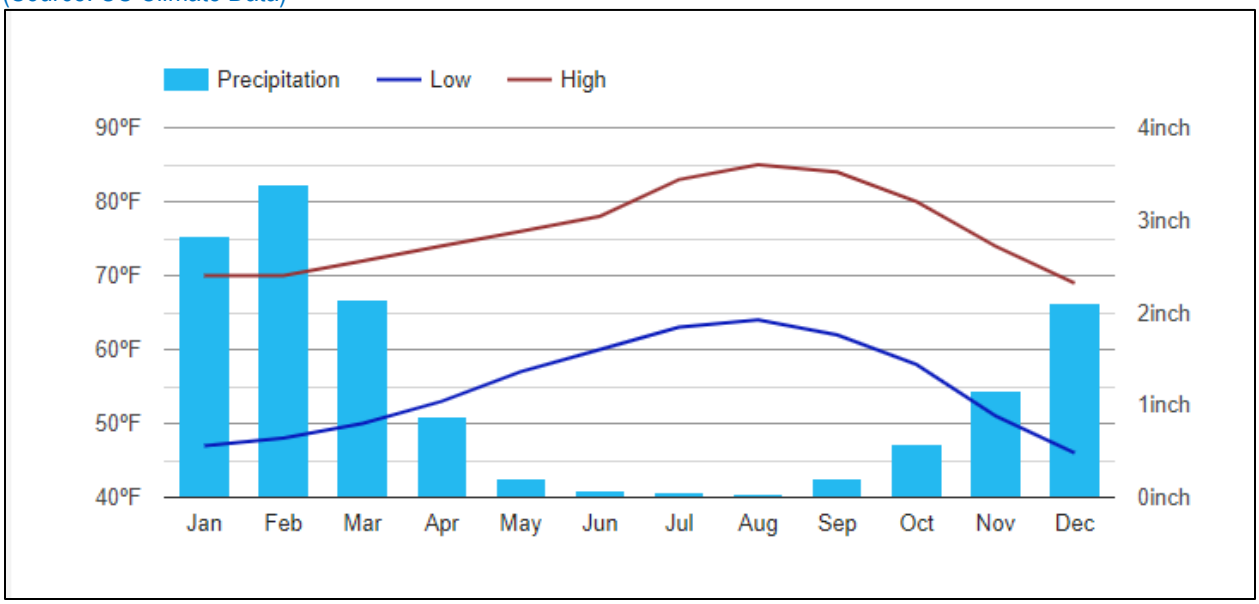
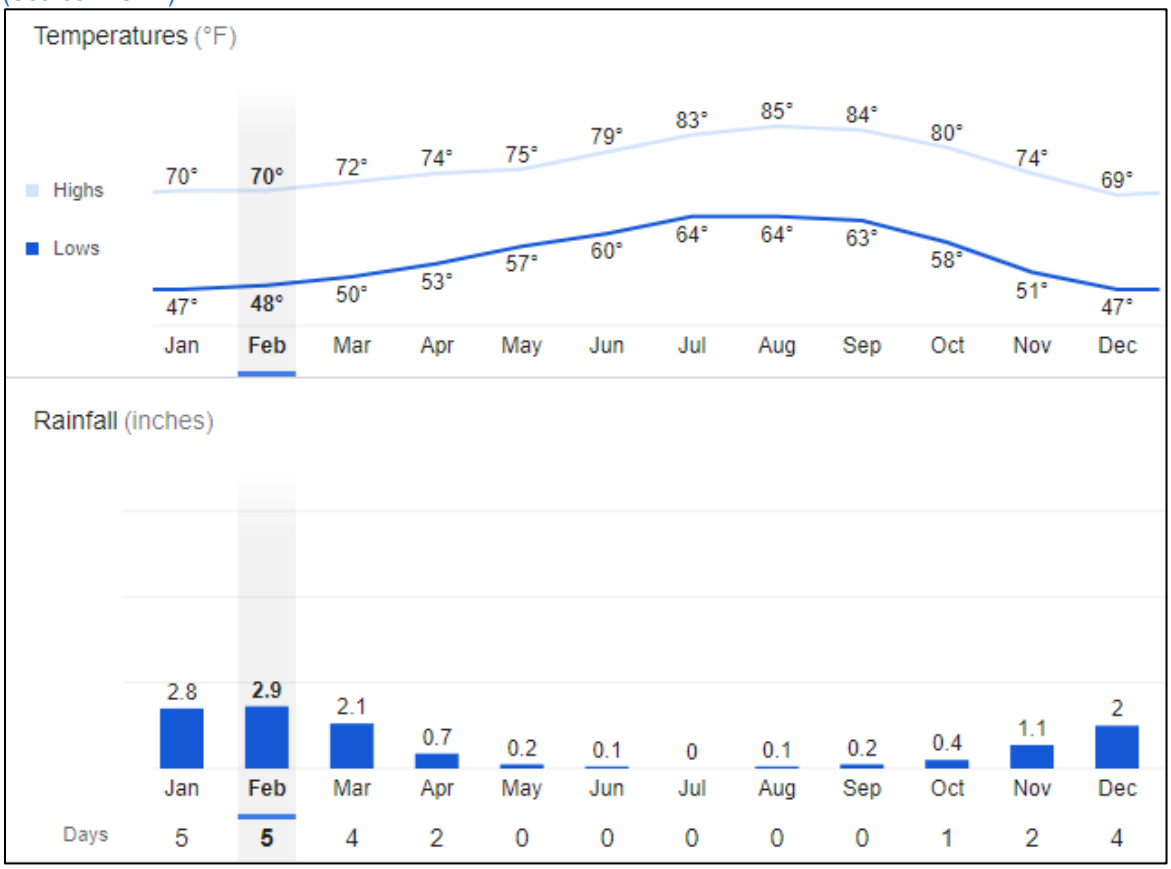



Table: Seasonal Average Temperatures
(Source: Santa Ana Website)

| Season | Lows | Highs |
|---|---|---|
| Winter | 49:0°F | 70:0°F |
| Spring | 56:33°F | 73:33°F |
| Summer | 68:66ºF | 84:33°F |
| Fall | 60:3ºF | 83:66ºF |

Graph: Weather Averages in Santa Ana
(Source: NOAA)




Precipitation
According to the Santa Ana website, the City experienced a rainfall total 19.71 inches from 2018-2019. This is an increase from the City's annual seasonal average from 1977-2017, which was 13.53 inches.

## Population and Demographics

According to the Census 2020 California Hard-to-Count Fact Sheet, Santa Ana has a population of 334,493. Most of the population identifies as Hispanic or Latino (77.3%).

**Table: City of Santa Ana Demographics**
**(Source: Census California Hard-to-Count Fact Sheet, 2020)**

| Racial/Ethnic Group | Population | Percentage (%) |
|---|---|---|
| **Hispanic or Latino of any race** | 258,563 | 77.3% |
| **White alone** | 31,442 | 9.4% |
| **Black alone** | 2,675 | 0.8% |

| Racial/Ethnic Group | Population | Percentage (%) |
|---|---|---|
| American Indian or Alaska Native alone | 334 | 0.1% |
| Asian alone | 38,132 | 11.4% |
| Native Hawaiian and Other Pacific Islander alone | 668 | 0.2% |
| Other race alone | 334 | 0.1% |

## Housing

According to the Profile of the City of Santa Ana (2019), between 2000 and 2018, the median home sales price of existing homes increased 198% from $181,000 to $540,000.

**Table: City of Santa Ana Housing Data**
**(Source: Profile of the City of Santa Ana, 2019)**

| | 2000 | 2010 | 2018 |
|---|---|---|---|
| Owners | 49.3% | 47.5% | 45.4% |
| Renters | 50.7% | 52.5% | 54.6% |
| Median Home Sale Price | $181,000 | $288,000 | $540,000 |

The most common housing type is the Single Family Detached. 53% of homes are single family and 41.8% are multi-family.

**Table: City of Santa Ana Housing Data**
**(Source: Profile of the City of Santa Ana, 2019)**

| Housing Type | Number of Units | Percent of Total Units |
|---|---|---|
| Single Family Detached | 35,640 | 45.6% |
| Single Family Attached | 5,762 | 7.4% |
| Multi-Family: 2-4 Units | 7,553 | 9.7% |
| Multi-Family: 5+ Units | 25,048 | 32.1% |
| Mobile Home | 4,049 | 5.2% |
| Total | 78,052 | 100.0% |

## Employment and Industry

According to the Profile of the City of Santa Ana (2019), the predominant employment industries for Santa Ana residents include Professional (23.1%), Education (18.2%), and Manufacturing (11.4%).

**Table: City of Santa Ana Jobs by Sector, 2017**
**(Source: Profile of the City of Santa Ana, 2019)**

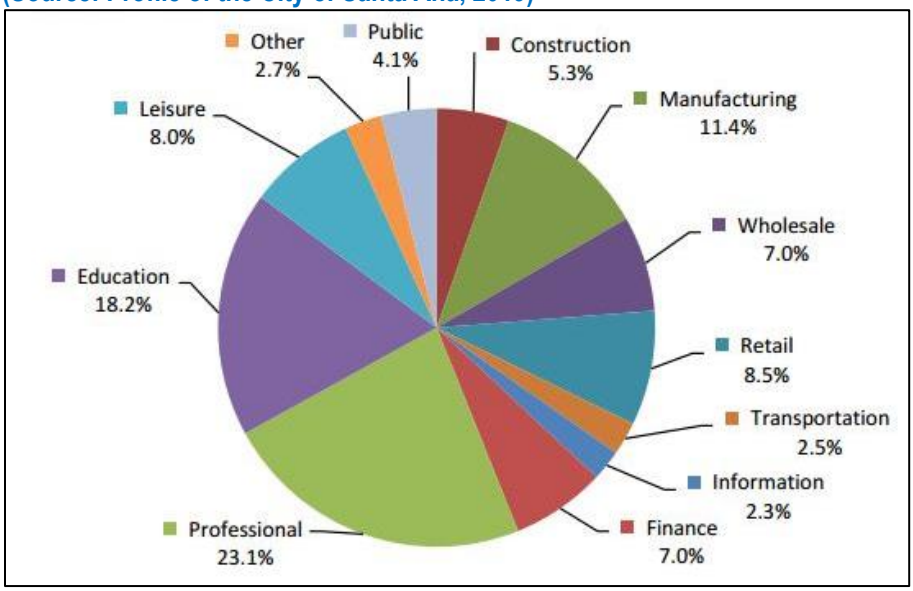


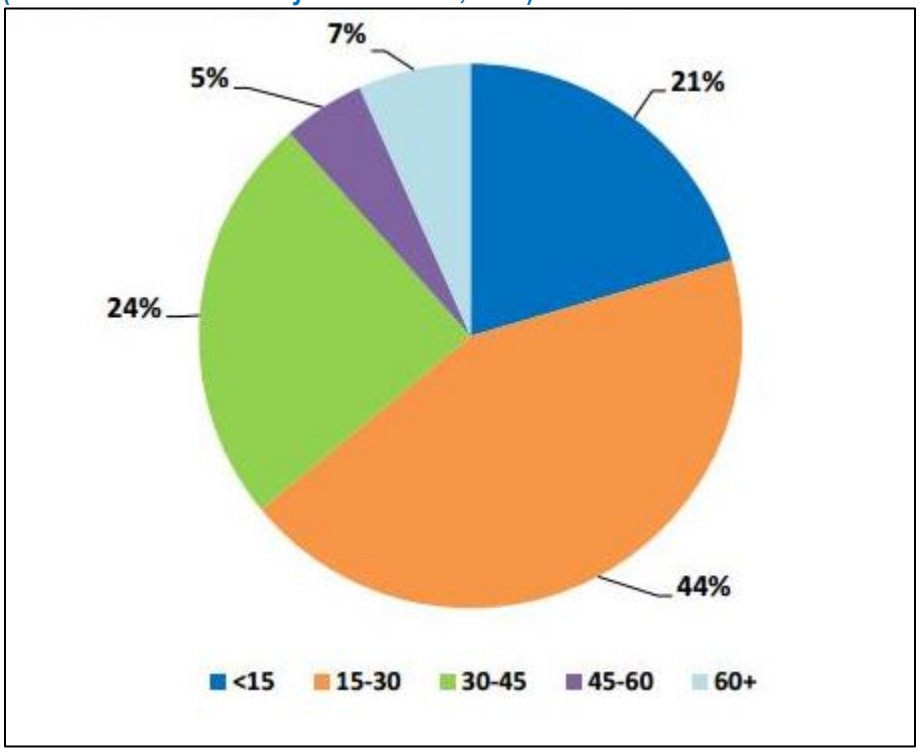

**Table: City of Santa Ana Jobs by Sector**
**(Source: Profile of the City of Santa Ana, 2019)**

| Industry | 2007 | 2017 |
|---|---|---|
| | Percent % | Percent % |
| Professional | 19.8 | 23.1 |
| Education | 15.2 | 18.2 |
| Leisure | 6.5 | 8.0 |
| Other | 3.5 | 2.7 |
| Public | 5.2 | 4.1 |
| Agriculture | 0.2 | n/a |
| Construction | 6.7 | 5.3 |
| Manufacturing | 14.8 | 11.4 |
| Wholesale | 5.6 | 7.0 |
| Retail | 8.2 | 8.5 |
| Transportation | 3.7 | 2.5 |
| Information | 2.2 | 2.3 |
| Finance | 8.4 | 7.0 |

## Transportation and Commuting Patterns

According to the Profile of the City of Santa Ana (2019), 44% of residents spend between 15-30 minutes commuting to work and 24% of people commute 30-45 minutes to work.

**Table: City of Santa Ana Travel Time to Work, 2018**
**(Source: Profile of the City of Santa Ana, 2019)**




Most residents choose to drive alone (73%) and only 14% of residents carpool. Public transit is utilized by 6% of the population, while the remainder of residents use alternate forms of transportation such as walking, bicycling, or they have in-home employment.

**Table: City of Santa Ana Transportation Data**
**(Source: Profile of the City of Santa Ana, 2019)**

| | 2000 | 2010 | 2018 |
|---|---|---|---|
| **Drive Alone** | 61% | 62% | 73% |
| **Carpool** | 25% | 22% | 14% |
| **Public Transit** | 9% | 11% | 6% |
| **Other** | 5% | 6% | 7% |

# 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:

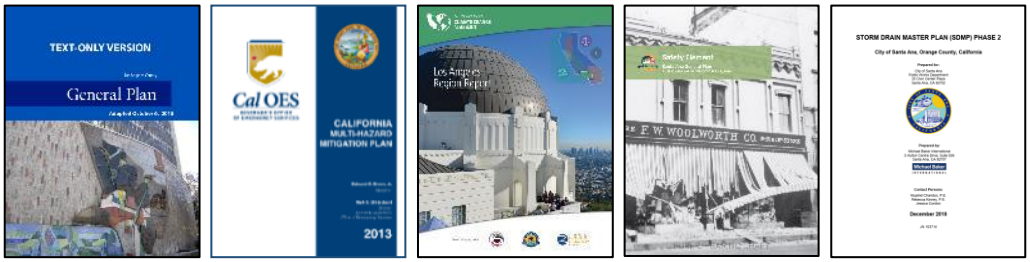
1. *Hazard Identification*
2. *Profiling Hazard Events*
3. *Vulnerability Assessment/Inventory of Existing Assets*
4. *Risk Analysis*
5. *Assessing Vulnerability/Analyzing Development Trends*

| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B1a. |
|---|
| Q: Does the plan include a general description of all natural hazards that can affect each jurisdiction? (Requirement §201.6(c)(2)(i))<br>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 Santa Ana 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 and its ability to deliver services. In other words, which hazard would likely result in a proclamation of local emergency.




The geographic extent of each of the identified hazards was identified by the Planning Team utilizing maps and data contained in the Santa Ana General Plan (2020) and the Orange County General Plan (2013). Utilizing the Calculated Priority Risk Index (CPRI) ranking technique, the Planning Team concluded the following hazards posed a significant threat against the City.

**Earthquake | Flood | Climate Change | Epidemic/Pandemic/Vector-Borne Diseases**

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 the City of Santa Ana.

Table: Calculated Priority Risk Index
(Source: FEMA Emergency Management Institute – Risk Assessment Course)

| 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.<br>Annual probability of less than 1 in 1,000 years. | 1 | 45% |
| | Possibly | Rare occurrences.<br>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.<br>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.<br>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.<br>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.<br>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 the City of Santa Ana
(Source: Emergency Planning Consultants)

| Hazard | Probability | Weighted 45% (x.45) | Magnitude Severity | Weighted 30% (x.3) | Warning Time | Weighted 15% (x.15) | Duration | Weighted 10% (x.1) | CPRI Total |
|---|---|---|---|---|---|---|---|---|---|
| Earthquake – Newport-Inglewood Fault M7.2 | 3 | 1.35 | 4 | 1.2 | 4 | 0.6 | 1 | 0.1 | 3.25 |
| Earthquake – Whittier Fault M7.0 | 3 | 1.35 | 4 | 1.2 | 4 | 0.6 | 1 | 0.1 | 3.25 |
| Epidemic/Pandemic/Vector-Borne Diseases | 3 | 1.35 | 4 | 1.2 | 1 | 0.15 | 4 | 0.4 | 3.10 |
| Earthquake – San Andreas Fault M7.9 | 3 | 1.35 | 3 | 0.9 | 4 | 0.6 | 1 | 0.1 | 2.95 |
| Earthquake – Elsinore Fault M7.5 | 2 | 0.9 | 4 | 1.2 | 4 | 0.6 | 1 | 0.1 | 2.80 |
| Earthquake – Compton M7.4 | 2 | 0.9 | 4 | 1.2 | 4 | 0.6 | 1 | 0.1 | 2.80 |
| Earthquake – Anaheim M6.4 | 2 | 0.9 | 4 | 1.2 | 4 | 0.6 | 1 | 0.1 | 2.80 |
| Flood | 3 | 1.35 | 2 | 0.6 | 2 | 0.3 | 2 | 0.2 | 2.45 |
| Climate Change | 3 | 1.35 | 1 | 0.3 | 1 | 0.15 | 4 | 0.4 | 2.20 |

## *2) Profiling Hazard Events*

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

| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B1b. |
|---|
| Q: Does the plan provide rationale for the omission of any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area? (Requirement §201.6(c)(2)(i))<br>A: See Table: Vulnerability: Location, Extent, and Probability for the City below. |
| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B1c. |
| Q: Does the plan include a description of the location for all natural hazards that can affect each jurisdiction? (Requirement §201.6(c)(2)(i))<br>A: See Table: Vulnerability: Location, Extent, and Probability for the City below. |
| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B1d. |
| Q: Does the plan include a description of the extent for all natural hazards that can affect each jurisdiction? (Requirement §201.6(c)(2)(i))<br>A: See Table: Vulnerability: Location, Extent, and Probability for the City below. |
| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B2a. |
| Q: Does the plan include information on previous occurrences of hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))<br>A: See Table: Vulnerability: Location, Extent, and Probability for the City below. |

| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B2b. |
|---|
| Q: Does the plan include information on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))<br>A: See Table: Vulnerability: Location, Extent, and Probability for the City below. |

Table: Vulnerability: Location, Extent, and Probability for the City of Santa Ana

| Hazard | Location (Where) | Extent (How Big an Event) | Probability (How Often) * | Previous Occurrences |
|---|---|---|---|---|
| Earthquake (San Andreas Fault M7.9) | Entire City | 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.[1] | Likely | March 10, 1933: Long Beach earthquake, caused substantial structural damage on 4th street. |
| Flood | City facilities located within 100-Year and 500-Year flood zones, as well as Northern border of the City and along the Santa Ana River on the West side of the City. | 100-Year and 500-Year Flood Zone areas subject to inundation, flooding, and flash flooding. | Likely | December 6, 2018: rainfall at a rate of 1 inch per hour, flash flooding across the entire region. |
| Climate Change | Entire City | Impacts would range from mild to severe throughout the City. | Likely | Increasing temperatures throughout the region over the past century. |
| Epidemic / Pandemic / Vector-Borne Diseases | Entire City | Impacts would range from mild to severe throughout the City. | Likely | Coronavirus March 2020-present |
| * Probability is defined as: Unlikely = 1:1,000 years, Possibly = 1:100-1:1,000 years, Likely = 1:10-1:100 years, Highly Likely = 1:1 year | | | | |
| [1] Uniform California Earthquake Rupture Forecast | | | | |

## HAZUS-MH


The hazard maps in the Mitigation Plan were generated by Emergency Planning Consultants using FEMA's Hazards United States – Multi Hazard (HAZUS-MH) software program. The HAZUS complete reports at attached separately.

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. It's important to note that the "project area" is based on Census Tracts not jurisdictional boundaries.

As per FEMA's HAZUS Guidebook, HAZUS is a GIS-based software that can be used to estimate potential damage, economic loss, and social impacts from earthquake, flood, tsunami and hurricane wind hazards. The HAZUS software includes nationwide general GIS datasets, and a model for the four natural disasters below. The model results can support the risk assessment piece of mitigation planning.

Graphic: Model Results to Support Risk Assessment for Mitigation Planning
(Source: Using HAZUS for Mitigation Planning, Federal Emergency Management Agency, 2018)

| | |
|---|---|
| **Earthquake model** | Estimates damages and losses to buildings, essential facilities, transportation, and utility lifelines from a single scenario or probabilistic earthquake analysis. There are also tools that allow the user to integrate earthquake hazard data generated outside of Hazus into the earthquake model. This model estimates debris generation, shelter requirements, casualties, and fire following an earthquake disaster. |
| **Flood model** | Generates flood hazard data using nationwide hydrological datasets. There are also tools that allow the user to integrate flood hazard data generated outside of Hazus software into the flood model. This model estimates the expected levels of damage to infrastructure and buildings. Debris generation and shelter requirements, as well as agricultural losses, can be calculated with this model. |
| **Tsunami model** | Can produce analyses that have several pre-tsunami and/or post-tsunami applications. Use of the methodology will generate an estimate of the consequences to a county or region of a "scenario tsunami," i.e., a tsunami with a specified inundation depth, velocity, and location. The resulting "loss estimate" generally will describe the scale and extent of damage and disruption that may result from the scenario tsunami. |
| **Hurricane wind model** | Can create the wind hazard data from a historical or real-time event, probabilistic event, or from a user-defined scenario. Estimates of potential damage and economic loss to buildings can then be calculated. The storm surge analysis combines the wind and coastal flood model to simulate storm surge for historical, and manual hurricanes. The model combines the wind and flood losses. |

HAZUS is packaged with datasets that include building inventories and infrastructure for the entire United States. Because HAZUS is currently built on GIS technology, the inventory and infrastructure datasets can be mapped and intersected with the hazard information created from the four models.

Following the intersection, HAZUS determines the effects of wind, ground shaking, and water depths on buildings and infrastructure to calculate losses and damages. The outputs and estimates can be used in hazard mitigation planning, emergency response, and planning for recovery and reconstruction.

Losses estimated in HAZUS are based on the accuracy of input data. Basic analysis can be developed using the default data and parameter data provided within HAZUS. Users can conduct more advanced analysis using more accurate data that is specific to the region, hazard, population, etc. User-supplied data improves the accuracy of inventories and/or parameters.

Advanced-level analyses may also incorporate data from third-party studies. The user must determine the appropriate level of analysis to meet the user's needs and resources.

HAZUS analysis can be performed at three different levels:

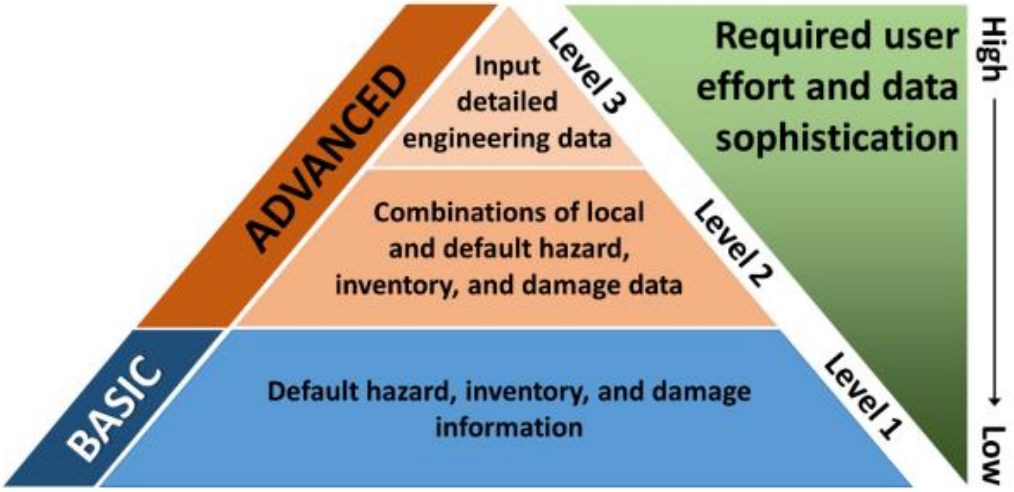
- A Level 1 basic analysis can be performed simply using the default data provided. This level of analysis is very coarse, and because the results will be subject to a much higher level of uncertainty, this should serve primarily as a baseline for further study. The user will still be able to produce basic maps and results. Limited additional data will be required to complete the flood analysis. Site specific input data produces more accuracy in vulnerability identification and loss estimation amounts. If the data is available, it is highly recommended that a user integrate site specific data to reduce uncertainty associated with the results of default data. Using a user defined depth grid, in the flood model, against default state data is classified as a level 1 analysis and is the recommendation of HAZUS Program.

- A Level 2 advanced analysis increases the accuracy and precision of an analysis by incorporating user-supplied data relevant to a given hazard. While the data included with the HAZUS software can be utilized to run a basic level one analysis, level two inputs are supplied by local sources and contain a higher level of detail. This can include datasets that model the hazards in more detail, or datasets that increase the accuracy of the inventory information. Incorporating more detailed data will improve the quality of the results. Level 2 is broadly defined as the incorporation of user-defined hazard and updated GBS or site-specific data.

- A Level 3 advanced analysis achieves the highest degree of precision and involves modifying or substituting the model parameters and/or equations, relevant to a given hazard. Users can modify inputs depending on the time and resources available. Keeping track of the data used is suggested so that any relationships between input and results is documented. It is usually done by advanced users experienced with both the hazard and the HAZUS software.

FEMA's Natural Hazard Risk Assessment Program (NHRAP) encourages users to conduct Level 2 or 3 analyses to improve the accuracy of results and recommends the use of user defined data (e.g., depth grids for all flood analysis) for mitigation planning.

Graphic: HAZUS Analysis Levels
(Source: Using HAZUS for Mitigation Planning, Federal Emergency Management Agency, 2018)




HAZUS creates credible estimates for losses and damages; datasets created on the local level typically provide greater detail than the datasets that are packaged with HAZUS (Level 1). Incorporating local datasets into the analysis will improve the results.

It's important to note that the HAZUS maps and reports on flooding, that loss estimations are for specific riverine scenarios. FEMA flood maps are not used in HAZUS analysis, in that it does not use historical flood data as an input. However, physical data (i.e. USGS DEM, or Depth Grids) are used to define the terrain in the study area. Once a scenario is chosen (100-year, 500-year) the model estimates the physical, economic, and social impacts of that one event, a snapshot in time.

HAZUS analysis does not supersede the comprehensive investigation of FEMA Flood Maps, the results will never match exactly the flooding areas found on FEMA flood maps. However, if you compare the two, you'll be able to verify areas of potential flood risk, and the result from the model will aid to identify the possible damages and the the financial cost from that event.

## *HAZUS Outputs*

The user plays a major role in selecting the scope and nature of the output of a HAZUS analysis. A variety of maps can be generated for visualizing the extent of the losses. Numerical results may be examined at the level of the census block or tract or may be aggregated by county or region. There are three main categories of HAZUS outputs: direct physical damage, induced damage, and direct losses. Direct physical damage includes general building stock (GBS), essential facilities, high potential loss facilities, transportation systems, utility systems, and user defined facilities. Induced damage includes building debris, tree debris generation and fire following disaster occurrence. Direct losses include losses for buildings, contents, inventory, income, crop damage, vehicle loss, injuries, casualties, sheltering needs and displaced households.

Graphic: HAZUS Outputs
(Source: Using HAZUS for Mitigation Planning, Federal Emergency Management Agency, 2018)

| Hazus Capabilities | **Earthquake** Ground Shaking Ground Failure | **Flood** Frequency \| Depth Riverine \| Coastal Surge | **Hurricane** Wind \| Surge | **Tsunami** Depth \| Momentum Flux \| Runup \| Velocity |
|---|---|---|---|---|
| **Inputs** | | | | |
| Historic | ✓ | | ✓ | |
| Deterministic | ✓ | ✓ | ✓ | ✓ |
| Probabilistic | ✓ | ✓ | ✓ | |
| User-supplied | ✓ | ✓ | ✓ | ✓ |
| Other supported inputs | Real-time & scenario USGS ShakeMaps | Risk MAP, User-supplied depth grids (ArcGRID, GeoTIFF, IMAGINE), HEC-RAS (.FLT) | Hurrevac, User-supplied wind files (.dat) | NOAA PMEL SIFT, State models |
| **Direct Damage** | | | | |
| General Building Stock | ✓ | ✓ | ✓ | ✓ |
| Essential Facilities | ✓ | ✓ | ✓ | |
| Transportation Systems | ✓ | ✓ | | |
| Utility Systems | ✓ | ✓ | | |
| User-Defined Facilities | ✓ | ✓ | ✓ | ✓ |
| **Induced Damage** | | | | |
| Fire Following | ✓ | | | |
| Debris Generation | ✓ | ✓ | ✓ | |
| **Direct Losses** | | | | |
| Cost of Repair | ✓ | ✓ | ✓ | ✓ |
| Income Loss | ✓ | ✓ | ✓ | ✓ |
| Agricultural | | ✓ | | |
| Casualties | ✓ | | | ✓ |
| Shelter and/or Evacuation Needs | ✓ | ✓ | ✓ | ✓ |
| Average Annualized Loss (AAL) | ✓ | ✓ | ✓ | |

### *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 below illustrates the hazards with potential to impact critical facilities owned by or providing services to the City.

Table: Critical Facilities Vulnerable to Hazards
(Source: Santa Ana website and Emergency Planning Consultants)

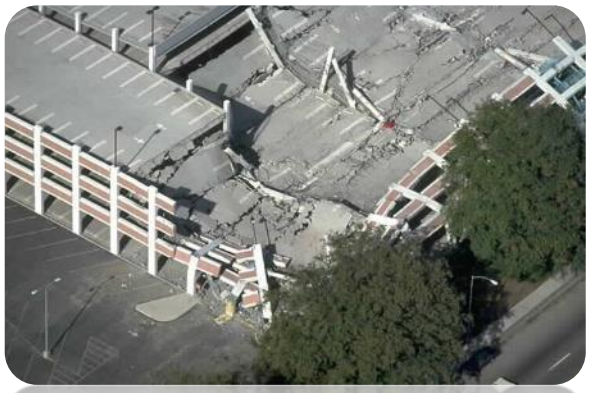
| City of Santa Ana Critical Facilities | Earthquakes | Flood | Climate Change | Epidemic / Pandemic / Vector-Borne Diseases |
|---|---|---|---|---|
| **City Offices & Governmental Functions** | | | | |
| City of Santa Ana City Hall | X | | X | X |
| City of Santa Ana City Hall Ross Annex | X | | X | X |
| City of Santa Ana Corporate Yard | X | X | X | X |
| **City Community Center Shelter Sites** | | | | |
| Jerome Recreation Center | X | X | X | X |
| Logan Recreation Center | X | | X | X |
| McFadden Learning Center (PAAL) | | | | |
| Memorial Recreation Center | X | | X | X |
| Salgado Recreation Center | X | | X | X |
| Santa Ana Senior Center | X | | X | X |
| Santa Anita Recreation Center | X | X | X | X |
| Southwest Senior Center | X | X | X | X |
| **Emergency Services** | | | | |
| Santa Ana Police Department | X | X | X | X |
| Santa Ana Police Department Detention Facility | X | | X | X |
| OCFA Fire Station 70 | X | | X | X |
| OCFA Fire Station 71 | X | | X | X |
| OCFA Fire Station 72 | X | | X | X |
| OCFA Fire Station 73 | X | X | X | X |
| OCFA Fire Station 74 | X | | X | X |

| City of Santa Ana Critical Facilities | Earthquakes | Flood | Climate Change | Epidemic / Pandemic / Vector-Borne Diseases |
|---|---|---|---|---|
| OCFA Fire Station 75 | X | | X | X |
| OCFA Fire Station 76 | X | | X | X |
| OCFA Fire Station 77 | X | X | X | X |
| OCFA Fire Station 78 | X | X | X | X |
| OCFA Fire Station 79 | X | | X | X |
| **Water Reservoirs** | X | | X | X |
| Cambridge Station | X | | X | X |
| Crooke Station | X | | X | X |
| East Station | X | | X | X |
| Elevated Tank | X | | X | X |
| J. Garthe Station | X | X | X | X |
| South Station | X | | X | X |
| Walnut Station | X | | X | X |
| West Station | X | X | X | X |
| **Water Wells** | | | | |
| Well 16 | X | | X | X |
| Well 18 | X | X | X | X |
| Well 20 | X | X | X | X |
| Well 21 | X | X | X | X |
| Well 24 | X | X | X | X |
| Well 26 | X | | X | X |
| Well 27 | X | X | X | X |
| Well 28 | X | | X | X |
| Well 29 | X | | X | X |
| Well 30 | X | X | X | X |
| Well 31 | X | | X | X |
| Well 32 | X | | X | X |
| Well 33 | X | | X | X |
| Well 34 | X | | X | X |
| Well 35 | X | X | X | X |
| Well 36 | X | X | X | X |
| Well 37 | X | | X | X |
| Well 38 | X | | X | X |
| Well 39 | X | X | X | X |
| Well 40 | X | | X | X |
| Well 41 | X | | X | X |
| **Sewer Lift Stations** | | | | |

| City of Santa Ana Critical Facilities | Earthquakes | Flood | Climate Change | Epidemic / Pandemic / Vector-Borne Diseases |
|---|---|---|---|---|
| Maxine Life Station | X | | X | X |
| Segerstrom Life Station | X | | X | X |

# Earthquake Hazards

## Hazard Definition

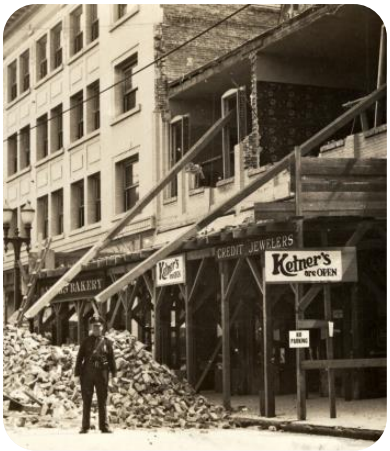


An earthquake is a sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the Earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. They usually occur without warning and, after just a few seconds, can cause massive damage and extensive casualties. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure.

One 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.

| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B2a. |
|---|
| Q: Does the plan include information on previous occurrences of hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i)) |
| A: See Previous Occurrences of Earthquakes in the City below. |

## Previous Occurrences of Earthquakes in the City




The most significant earthquake to impact the City was the 1933 Long Beach earthquake. On March 10, 1933, the Newport-Inglewood Fault ruptured with a magnitude 6.4 earthquake. Santa Ana suffered substantial structural damage from the event, especially on 4th street (as seen in adjoining photo). Santa Ana suffered 3 of the 4 deaths occurring in Orange County during this earthquake. All 3 of the deaths all occurred in downtown Santa Ana. The original Santa Ana City Hall and the original Santa Ana High School, the first high school opened in Orange County, were both destroyed by this earthquake.

The City has experiences multiple earthquakes since then, but none have had the same devastation.

Table: Historic Earthquakes Affecting Communities Near Orange County
(Source: USGS)

| Date | Earthquake | Damage |
|---|---|---|
| March 29, 2014 | La Habra, M5.1 | On March 29, 2014, at 9:09pm, an earthquake hit one mile away from La Habra. It was followed by 30 aftershocks. The quake resulted in roughly 2,000 people without power, but the community suffered minimal damage. |
| July 29, 2008 | Chino Hills, M5.4 | On Tuesday, July 29, 2008, at 11:42 a.m. Pacific Daylight Time, a magnitude 5.4 earthquake rumbled the East Los Angeles area of California. The epicenter of the quake was about 9 miles beneath the Chino Hills. According to reports from the U.S. Geological Survey (USGS), the quake and several aftershocks caused strong shaking from the Chino Basin in the north to the Los Angeles basin in the southwest. Some shaking was felt as far away as Las Vegas, Nevada, and Yuma, Arizona. |
| March 11, 1933 | Long Beach, M6.4 | In the early evening hours on March 10, 1933, the treacherous Newport-Inglewood fault ruptured, jolting the local citizenry just as the evening meals were being prepared. The Magnitude 6.4 earthquake caused extensive damage (approximately $50 million in 1933 dollars) throughout the City of Long Beach and surrounding communities. Damage was most significant to poorly designed and unreinforced brick structures. Sadly, the earthquake caused 120 fatalities. Within a few seconds, 120 schools in and around the Long Beach area were damaged, of which 70 were destroyed. Experts concluded that if children and their teachers were in school at the time of the earthquake, casualties would have been in the thousands. |

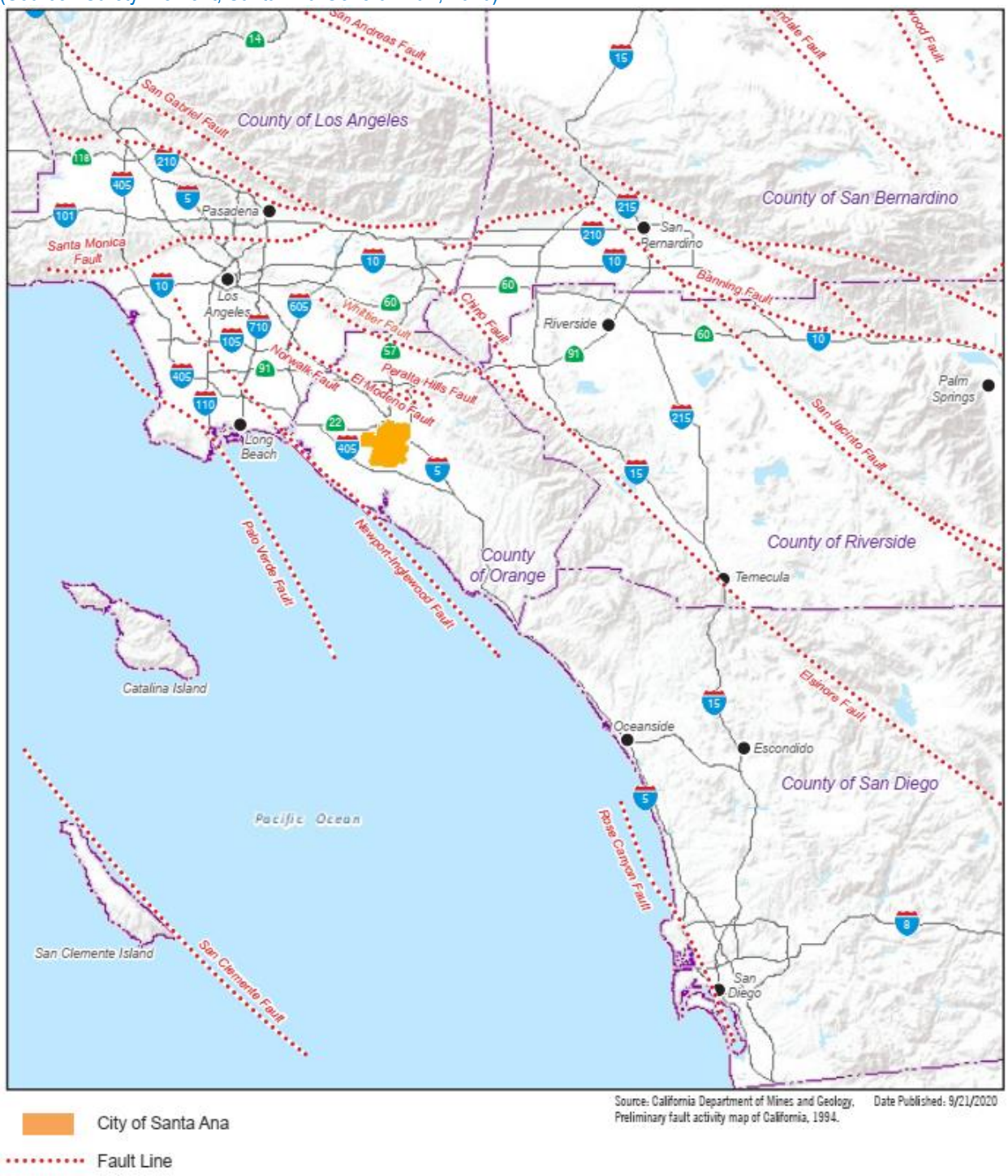
| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B1a. |
|---|
| Q: Does the plan include a general description of all natural hazards that can affect each jurisdiction? (Requirement §201.6(c)(2)(i))<br>A: See Local Conditions below. |
| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B3b. |
| Q: Is there a description of each identified hazard's overall vulnerability (structures, systems, populations, or other community assets defined by the community that are identified as being susceptible to damage and loss from hazard events) for each jurisdiction? (Requirement §201.6(c)(2)(ii))<br>A: See Local Conditions below. |

## Local Conditions

According to the Orange County General Plan, Safety Element (2013), potentially hazardous, active fault zones run along the coastal and inland edges of the County. The best known of the faults is the Newport-Inglewood Fault, which angles from offshore near Dana Point, inland through what is now the City of Newport Beach, on into Los Angeles County through the cities of Long Beach and Torrance. This fault zone produced the catastrophic 1933 Long Beach earthquake with a Richter scale magnitude of 6.3. It is believed this fault is capable of generating a maximum 7.5 magnitude earthquake.

Due to the proximity of active and potentially active faults in and around Orange County and its degree of urbanization, the risk of structural damage and loss of life due to ground shaking is considerable. The risk of secondary hazards is also great. According to various geologic experts, much of Orange County is highly susceptible to slope failure (activated by ground shaking), lurching and displacement. Another secondary hazard of particular concern to some portions of Orange County is that of liquefaction.

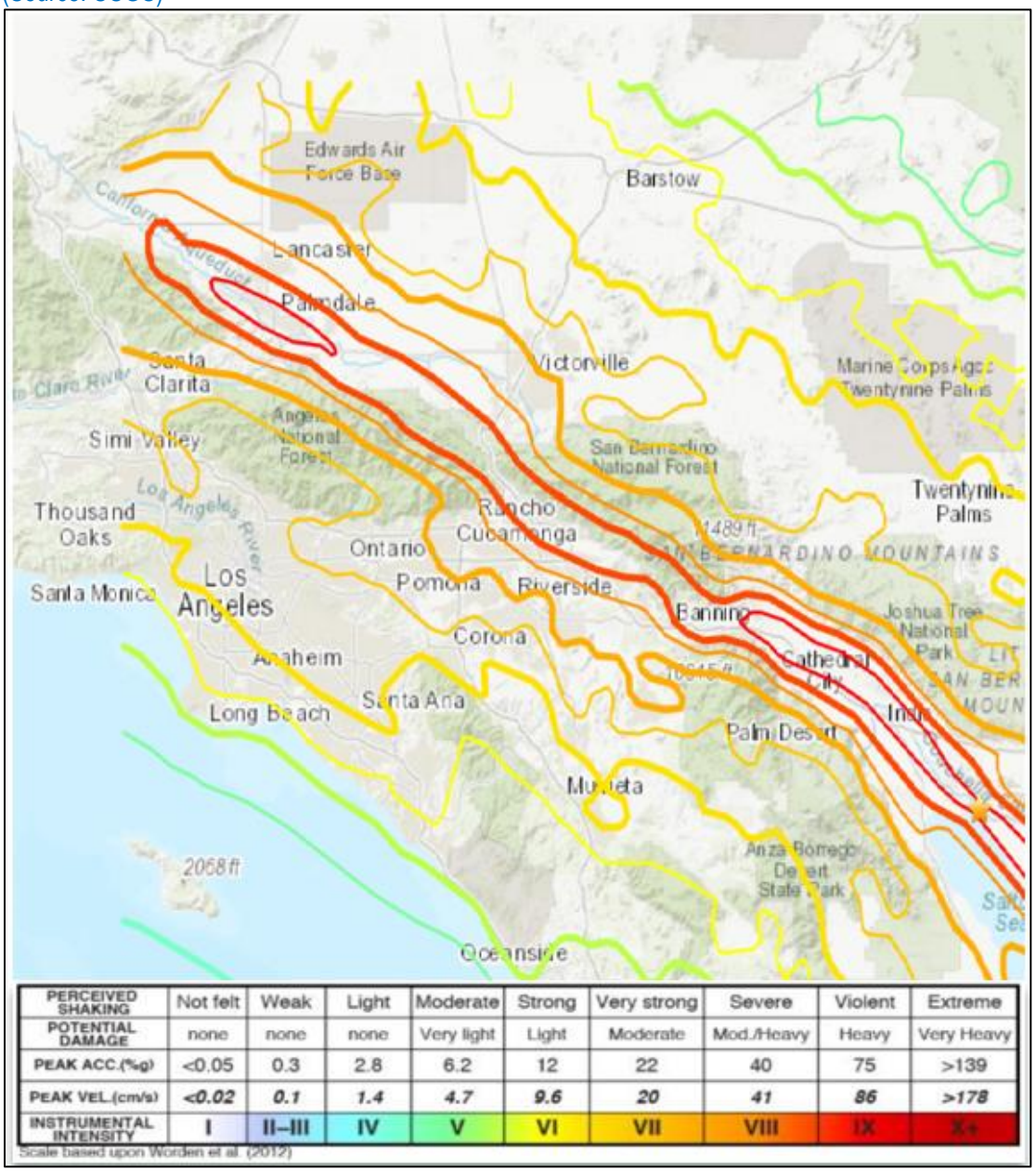
Map: Local Faults
(Source: Safety Element, Santa Ana General Plan, 2020)



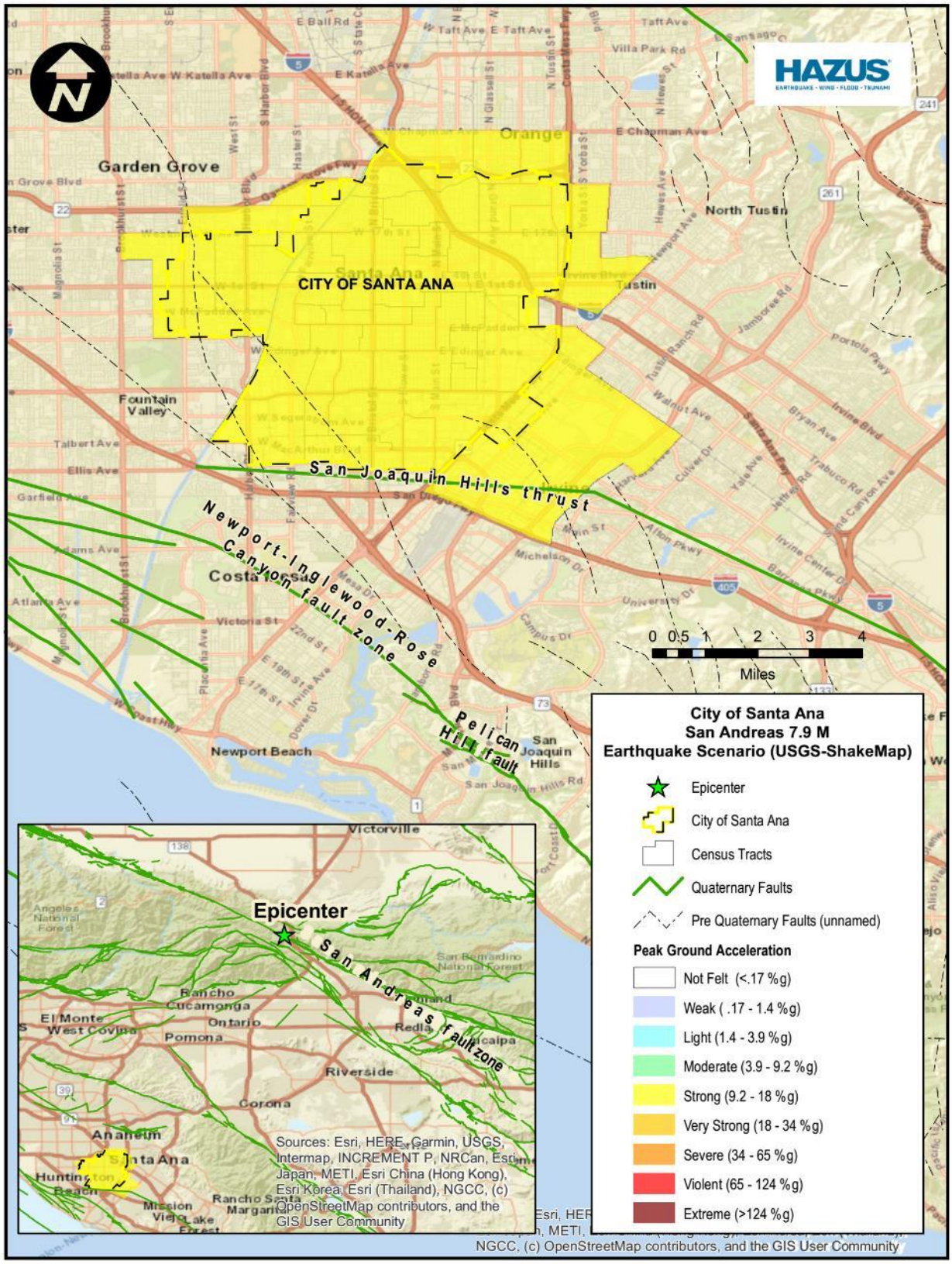
## *San Andreas Fault Zone*

The San Andreas Fault Zone falls East of the City. This fault zone extends from the Gulf of California northward to the Cape Mendocino area where it continues northward along the ocean floor. The total length of the San Andreas Fault Zone is approximately 750 miles. The activity of the fault has been recorded during historic events, including the 1906 (M8.0) event in San Francisco and the 1857 (M7.9) event between Cholame and San Bernardino, where at least 250 miles of surface rupture occurred. These seismic events are among the most significant earthquakes in California history. Geologic evidence suggests that the San Andreas Fault has a 50 percent chance of producing a magnitude 7.5 to 8.5 quake (comparable to the great San Francisco earthquake of 1906) within the next 30 years.

Map: Shake Intensity Map – San Andreas Fault M7.9
(Source: USGS)



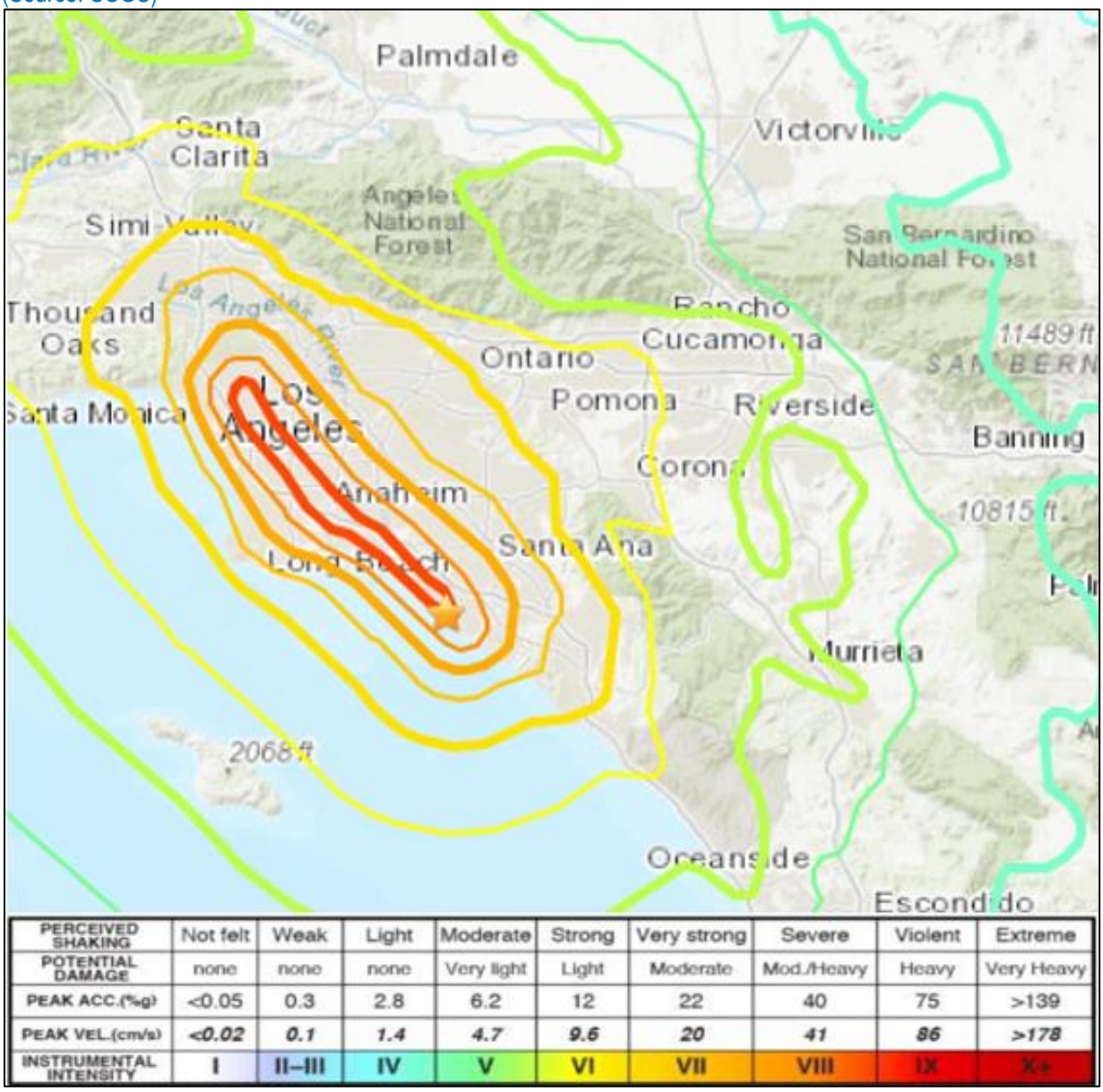
Map: HAZUS – San Andreas Fault M7.9
(Source: Emergency Planning Consultants)



## *Newport-Inglewood Fault*

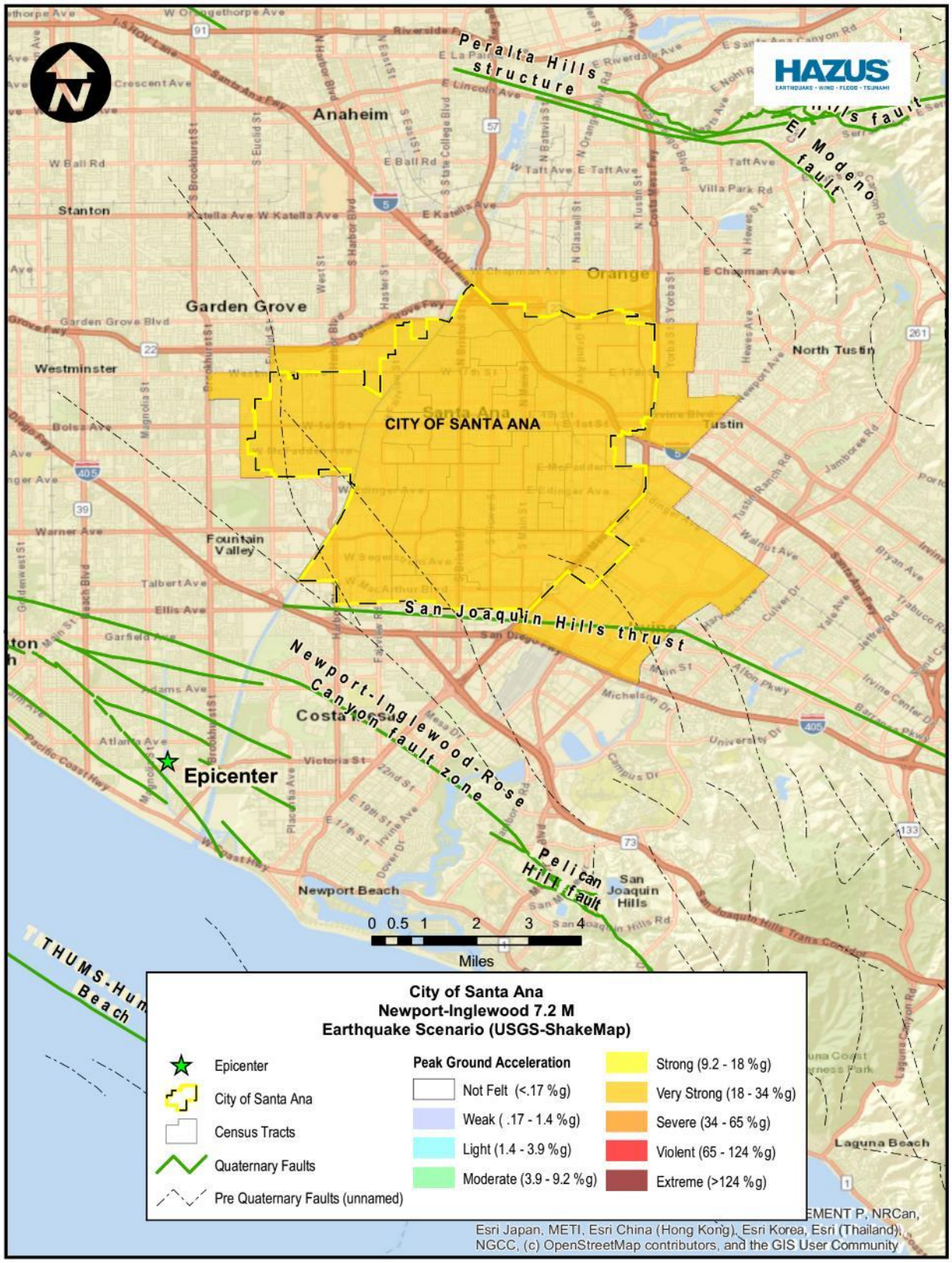
This fault zone consists of a right-lateral, local reverse slip associated with fault steps. It is 75 kilometers in length with a slip rate of .6 millimeters per year. The communities nearest to this fault are Culver City, Inglewood, Gardena, Compton, Signal Hill, Long Beach, Seal Beach, Huntington Beach, Newport Beach, and Costa Mesa. Its most recent surface rupture was in 1933 with a magnitude of 6.4. This fault has a probable magnitude of 6.0-7.4. According to the Earthquake Data Center, Surface trace is discontinuous in the Los Angeles Basin, but the fault zone can easily be noted there by the existence of a chain of low hills extending from Culver City to Signal Hill. South of Signal Hill, it roughly parallels the coastline until just south of Newport Bay, where it heads offshore, and becomes the Newport-Inglewood - Rose Canyon fault zone.

Map: Shake Intensity Map – Newport-Inglewood Fault M7.2
(Source: USGS)




| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very strong | Severe | Violent | Extreme |
|---|---|---|---|---|---|---|---|---|---|
| POTENTIAL DAMAGE | none | none | none | Very light | Light | Moderate | Mod./Heavy | Heavy | Very Heavy |
| PEAK ACC.(%g) | <0.05 | 0.3 | 2.8 | 6.2 | 12 | 22 | 40 | 75 | >139 |
| PEAK VEL.(cm/s) | *<0.02* | *0.1* | *1.4* | *4.7* | *9.6* | *20* | *41* | *86* | *>178* |
| INSTRUMENTAL INTENSITY | I | II–III | IV | V | VI | VII | VIII | IX | X+ |

Map: HAZUS – Newport-Inglewood Fault M7.2
(Source: Emergency Planning Consultants)



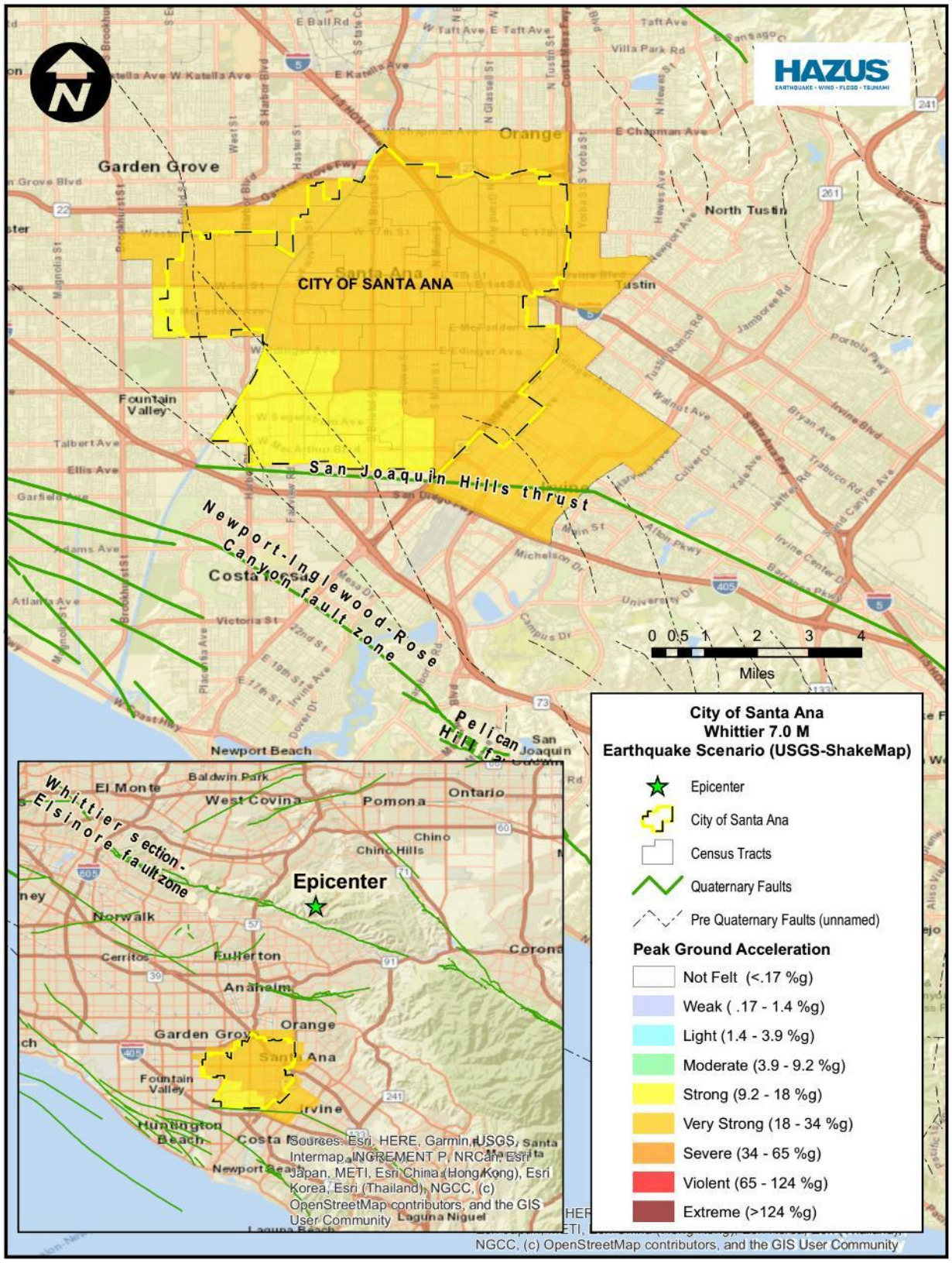
## *Whittier Fault*

The Whittier Fault lies North of the City. It is a 40-kilometer right-lateral strike-slip fault that runs along the Chino Hills range between the cities of Chino Hills and Whittier. The fault has a slip rate of 2.5 to 3.0 millimeters per year. It is estimated that this fault could generate a quake of 6.0 – 7.2M.

Map: Shake Intensity Map – Whittier Fault M7.0
(Source: USGS)


| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very strong | Severe | Violent | Extreme |
|---|---|---|---|---|---|---|---|---|---|
| POTENTIAL DAMAGE | none | none | none | Very light | Light | Moderate | Mod./Heavy | Heavy | Very Heavy |
| PEAK ACC.(%g) | <0.05 | 0.3 | 2.8 | 6.2 | 12 | 22 | 40 | 75 | >139 |
| PEAK VEL.(cm/s) | *<0.02* | *0.1* | *1.4* | *4.7* | *9.6* | *20* | *41* | *86* | *>178* |
| INSTRUMENTAL INTENSITY | I | II–III | IV | V | VI | VII | VIII | IX | X+ |

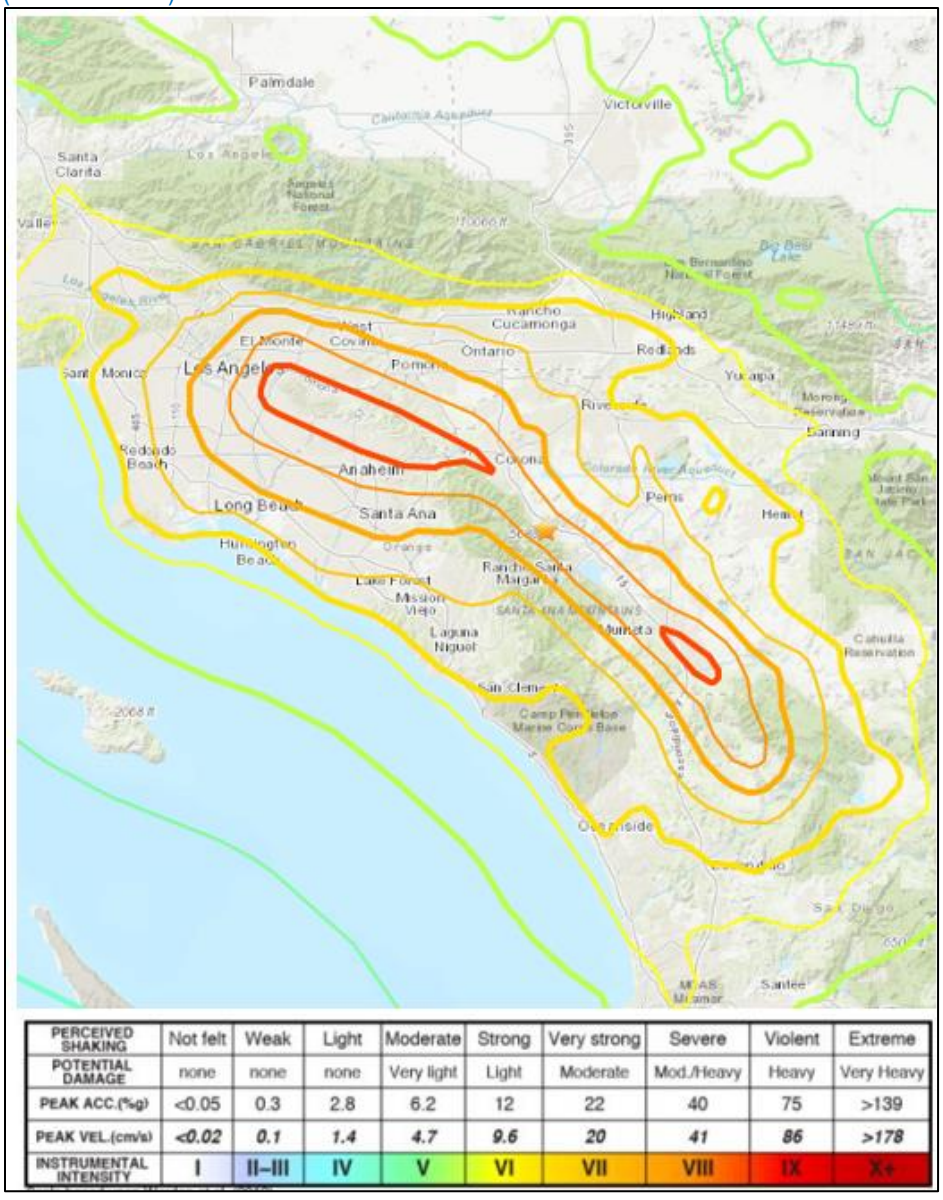
Map: HAZUS – Whittier Fault M7.0
(Source: Emergency Planning Consultants)



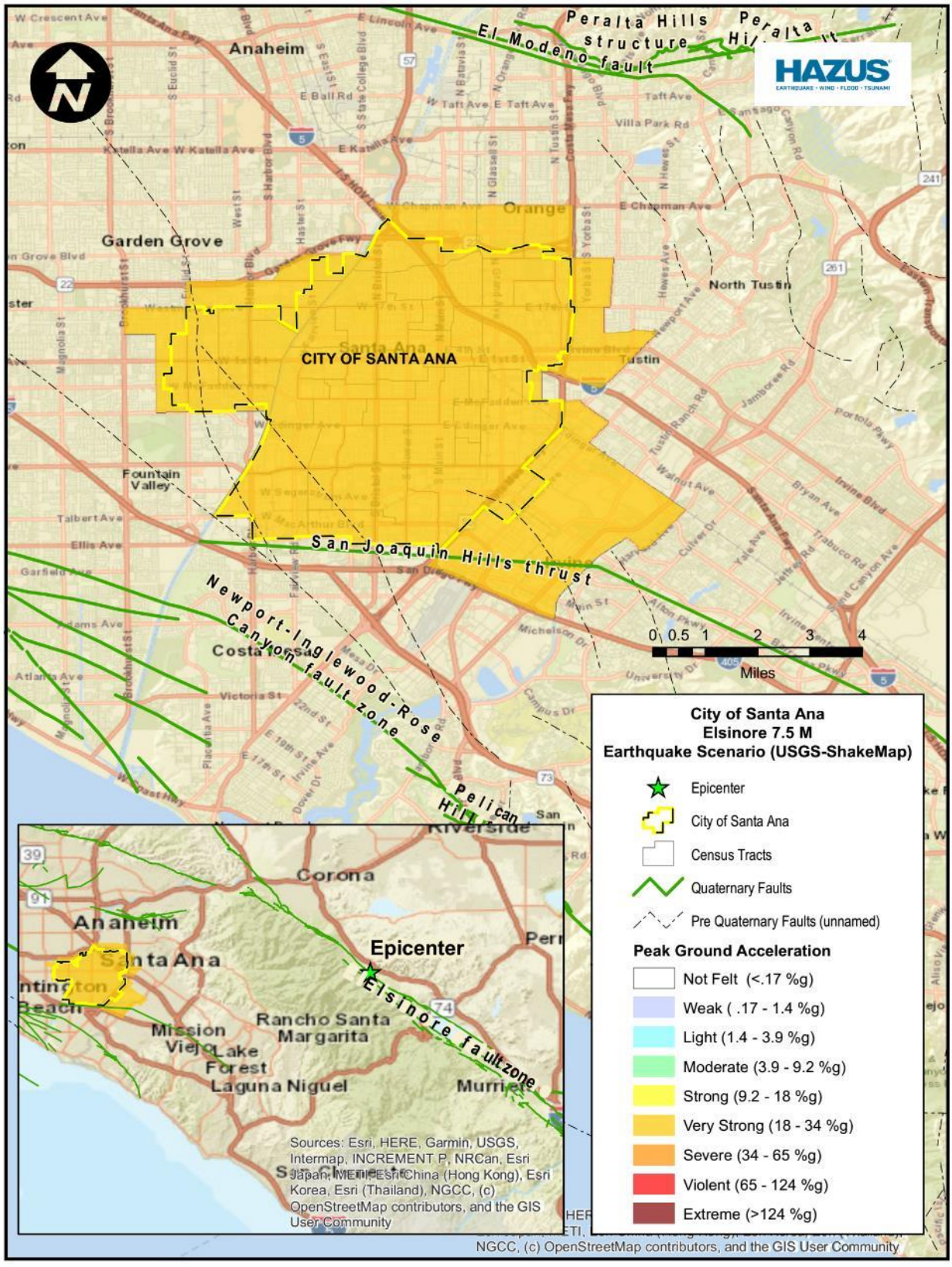
## *Elsinore Fault Zone*

The Elsinore fault zone lies approximately 18 miles East of the City. According to USGS, it's projected to have a magnitude of 7.0 with a depth of 11.6 km. The Elsinore fault zone is a major dextral shear system, parallel to the southern San Andreas fault, that accommodates about 5 mm/year of the Pacific-North American Plate boundary slip. The northern elements of the fault zone, the Chino and Whittier faults, bound the Puente Hills, an uplifted block of Tertiary sediments. The Glen Ivy section forms the northeast boundary of the Santa Ana Mountains, and, together with the Temecula section, forms the Elsinore trough. To the southeast the fault zone (Temecula, Julian, and Coyote Mountain sections) cuts diagonally across various Peninsular Range batholithic and pre-batholithic metamorphic terrain until it reaches the southwestern margin of the Salton Trough as the Laguna Salada fault. Total strike-slip is reported to be as much as 40 km but is more likely only 10–15 km, and total vertical separation is about 200 m.

Map: Shake Intensity Map – Elsinore Fault M7.5
(Source: USGS)



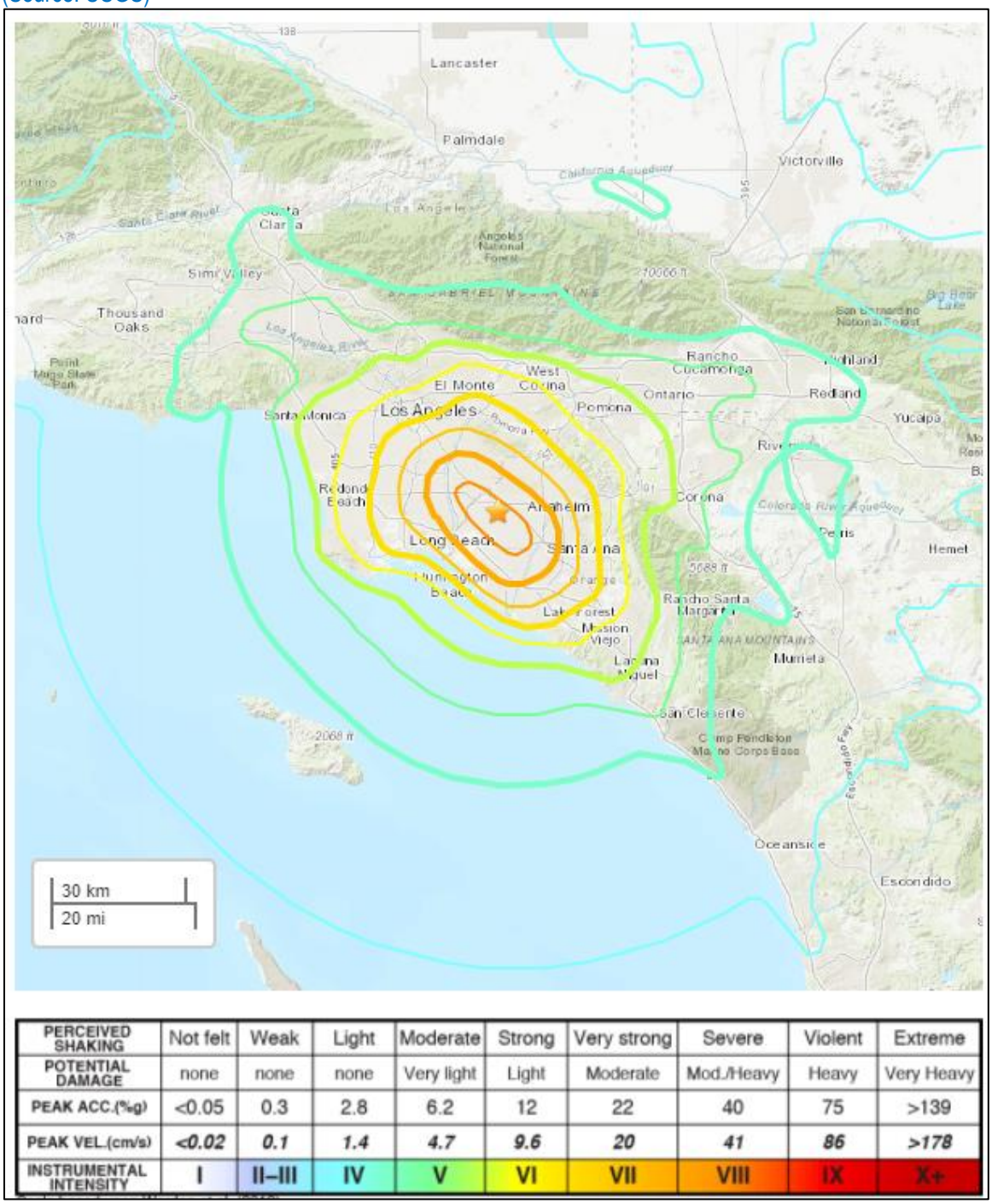
Map: HAZUS – Elsinore Fault M7.5
(Source: Emergency Planning Consultants)



## *Anaheim Scenario*

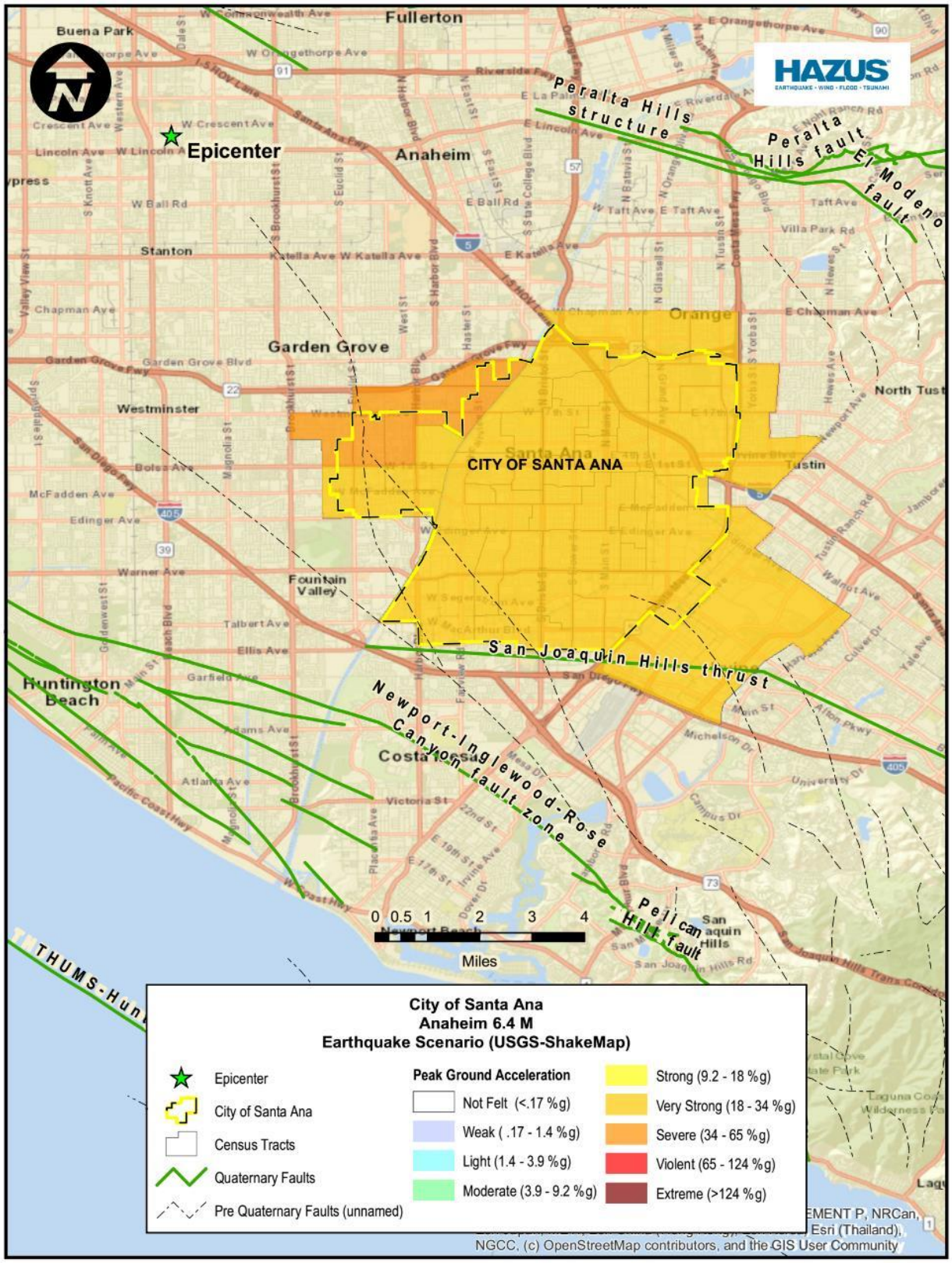
The earthquake scenario places the epicenter in Anaheim approximately 6 miles Northwest of Santa Ana. Like what occurred during the Northridge Earthquake caused by a previously unknown upward thrust fault, the scenario is not based on a known fault but rather a possible location. The scenario assumes a magnitude of 6.4 with a depth of 10.5 km.

Map: Shake Intensity Map – Anaheim Scenario M6.4
(Source: USGS)




| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very strong | Severe | Violent | Extreme |
|---|---|---|---|---|---|---|---|---|---|
| POTENTIAL DAMAGE | none | none | none | Very light | Light | Moderate | Mod./Heavy | Heavy | Very Heavy |
| PEAK ACC.(%g) | <0.05 | 0.3 | 2.8 | 6.2 | 12 | 22 | 40 | 75 | >139 |
| PEAK VEL.(cm/s) | *<0.02* | *0.1* | *1.4* | *4.7* | *9.6* | *20* | *41* | *86* | *>178* |
| INSTRUMENTAL INTENSITY | I | II–III | IV | V | VI | VII | VIII | IX | X+ |

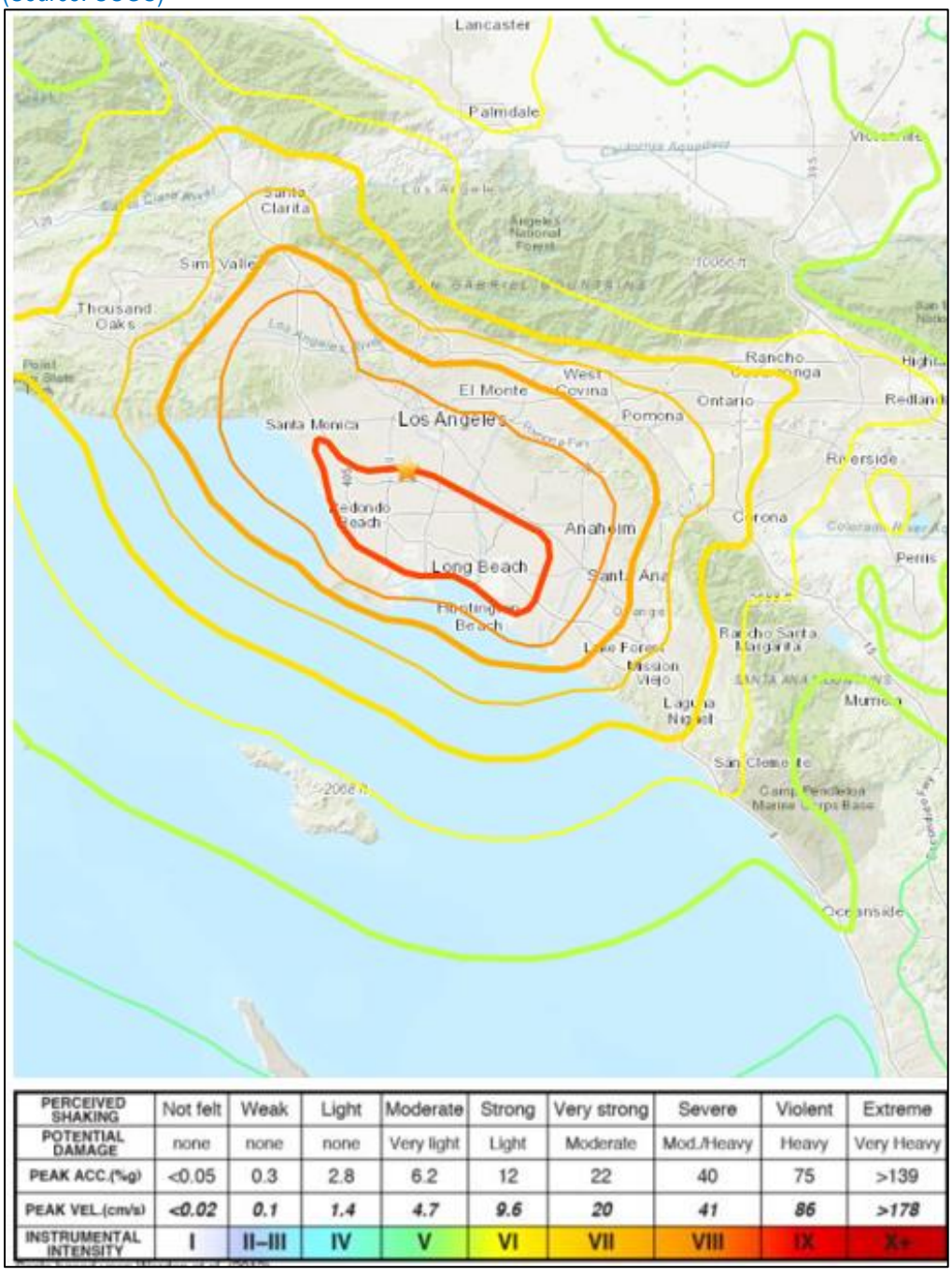
Map: HAZUS – Anaheim Scenario M6.4
(Source: Emergency Planning Consultants)



## *Compton Fault*

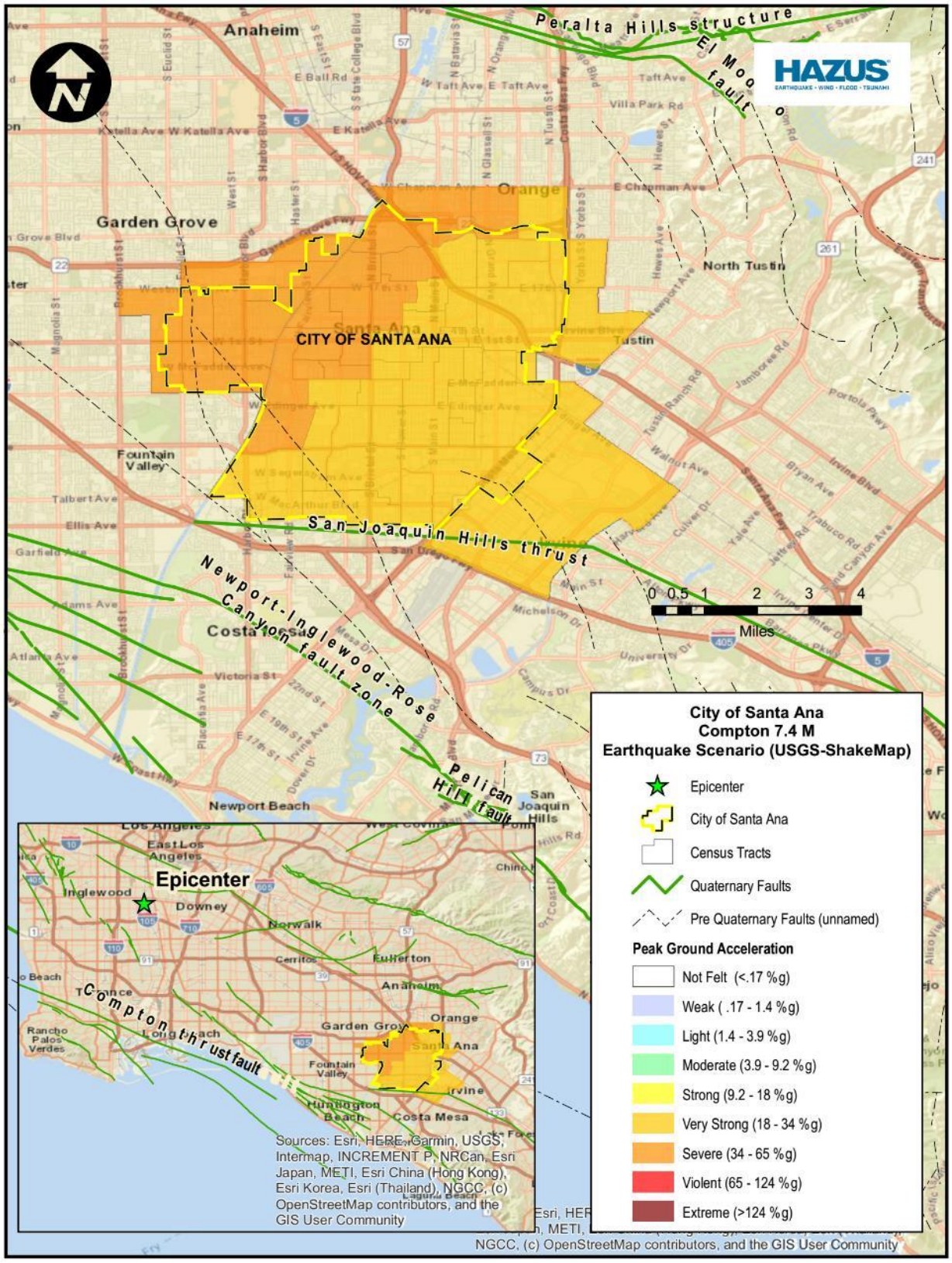
The Compton fault lies Northwest of the City. According to USUS, the Compton thrust fault (blind) extends below the western Los Angeles Basin, lying entirely within Mesozoic metamorphic basement (Catalina Schist). Most of the thrust fault is a ramp that rises to the southwest from depths as great as 10 km up to 5 km. The ramp connects the Central Basin Decollement, a thrust flat below the Los Angeles Basin, with shallower parts of the thrust fault near its tip below the Palos Verdes Peninsula. It was estimated to have a slip rate of 1.2+0.5, -0.3 mm/year.

Map: Shake Intensity Map – Compton Fault M7.4
(Source: USGS)




| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very strong | Severe | Violent | Extreme |
|---|---|---|---|---|---|---|---|---|---|
| POTENTIAL DAMAGE | none | none | none | Very light | Light | Moderate | Mod./Heavy | Heavy | Very Heavy |
| PEAK ACC.(%g) | <0.05 | 0.3 | 2.8 | 6.2 | 12 | 22 | 40 | 75 | >139 |
| PEAK VEL.(cm/s) | <0.02 | 0.1 | 1.4 | 4.7 | 9.6 | 20 | 41 | 86 | >178 |
| INSTRUMENTAL INTENSITY | I | II–III | IV | V | VI | VII | VIII | IX | X+ |

Map: HAZUS – Compton Fault M7.4
(Source: Emergency Planning Consultants)



## Earthquake Related Hazards

Ground shaking, landslides, and liquefaction are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake.

### *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.

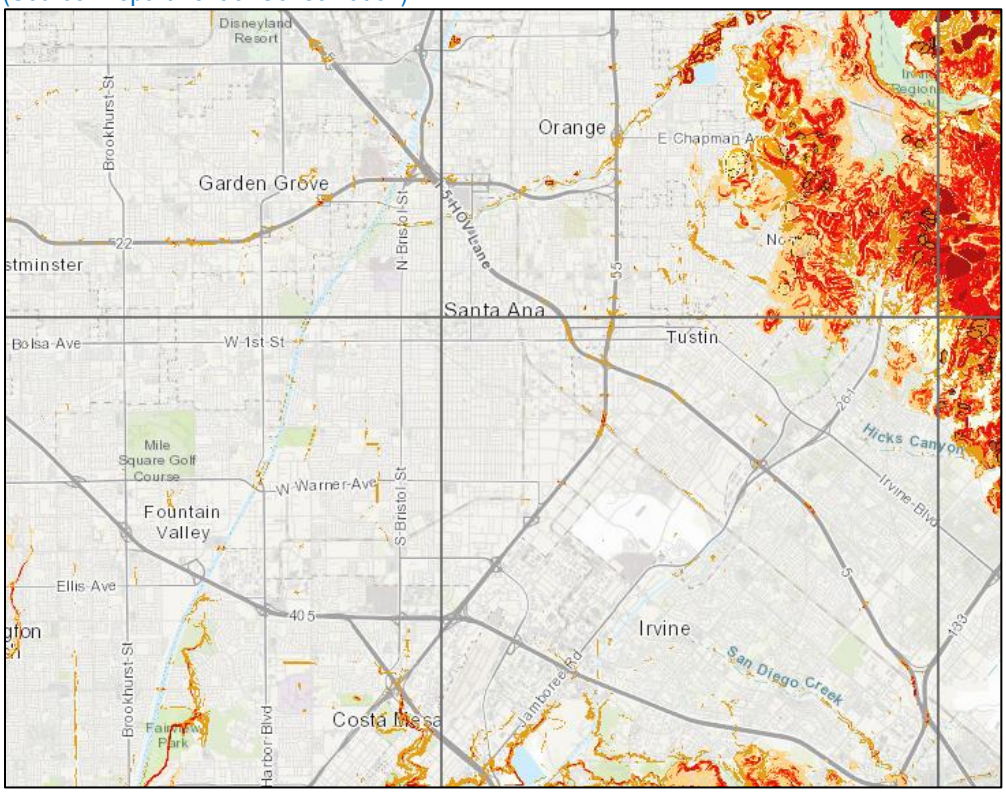
### *Earthquake-Induced Landslides*

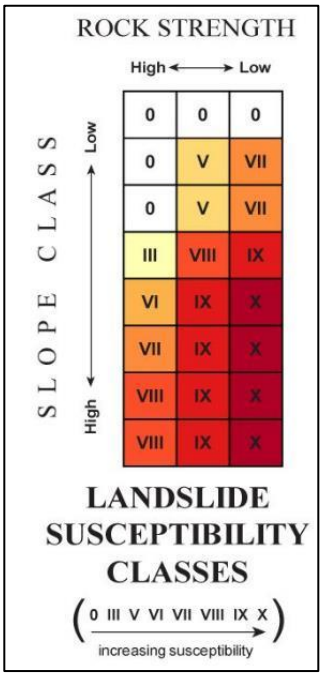
Earthquake-induced landslides are secondary earthquake hazards that occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond and recover from an earthquake. Many communities in Southern California have a high likelihood of encountering such risks, especially in areas with steep slopes.

Rock falls may happen suddenly and without warning but are more likely to occur in response to earthquake induced ground shaking, during periods of intense rainfall, or as a result of human activities, such as grading and blasting. Ground acceleration of at least 0.10g in steep terrain is necessary to induce earthquake-related rock falls.

The following map shows the minimal risk of earthquake-induced landslide risk within the City.

Map: Landslide Susceptibility
(Source: Department of Conservation)

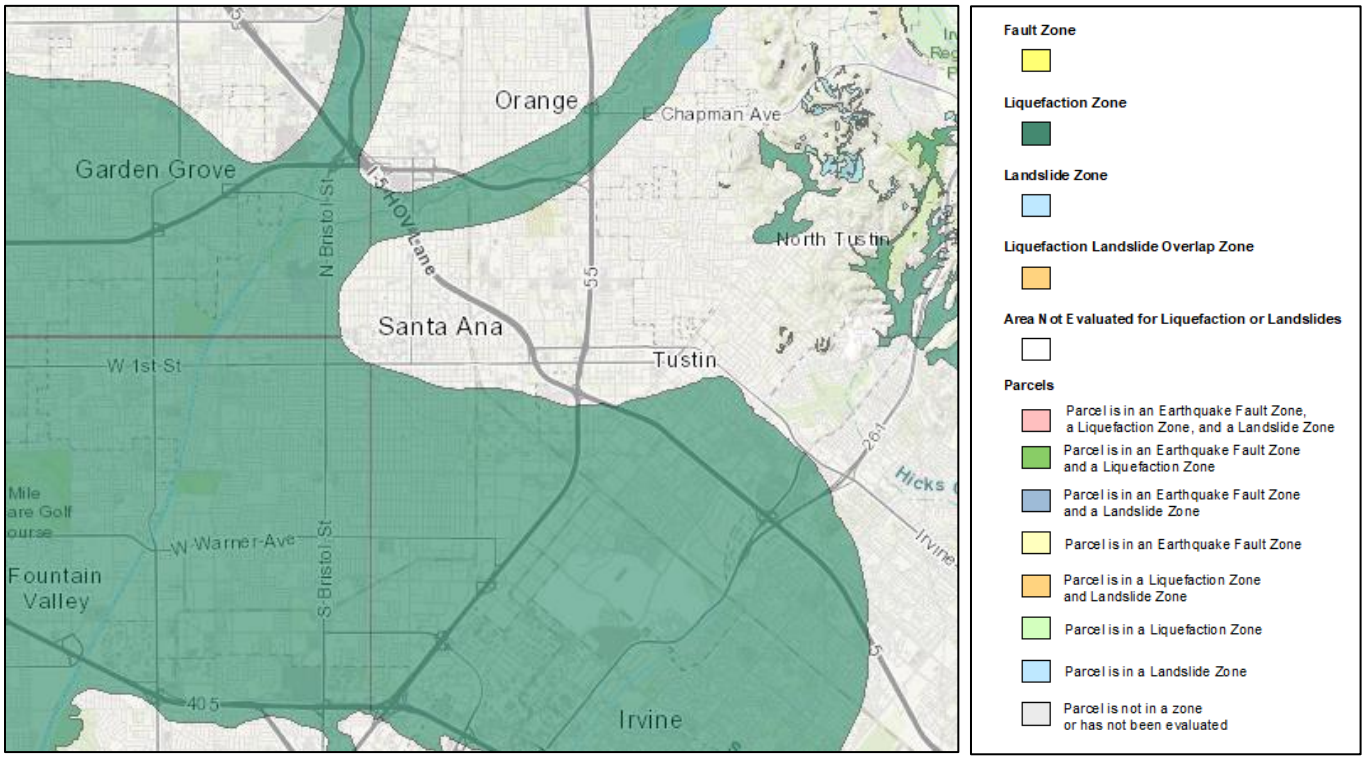


## *Liquefaction*

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other events. Liquefaction occurs in saturated soils, which are soils in which the space between individual soil particles is completely filled with water. This water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together. Prior to an earthquake, the water pressure is relatively low. However, earthquake shaking can cause the water pressure to increase to the point where the soil particles can readily move with respect to each other. Because liquefaction only occurs in saturated soil, its effects are most commonly observed in low lying areas. Typically, liquefaction is associated with shallow groundwater, which is less than 50 feet beneath the earth's surface. Map: Liquefaction Zones shows the City's significant susceptibility to liquefaction.

Map: Liquefaction Zones
(Source: Department of Conservation)



## 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 Santa Ana, many buildings were built before 1973 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. Perhaps at greatest risk are the unreinforced masonry buildings. The California Seismic Safety Commission makes annual reports on the progress of the retrofitting of unreinforced masonry buildings. According to the State of California's 2006 URM Report, all URM buildings within the City have been identified and upgraded to meet local municipal requirements.

| Jurisdiction | | | | Survey Results (numbers of URMs) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inventory Completed | Number of Historic URMs | Number of Non-Historic URMs | Mitigation Program Established | Replied to 2006 Survey | UCBC Compliance | Compliance with Jurisdiction Program | Partial Compliance/Under Construction | Retrofit Permit Issued | Plans Submitted /Plancheck Underway | Reduced Occupancy | Demolished | Slated for Demolition | Warning Placards Posted | No Mitigation Progress | Owners Notified |
| **Santa Ana** | | | | | | | | | | | | | | | |
| Yes | unknown | 211 | Yes | Yes | 146 | | | 0 | 0 | 59 | 63 | | 0 | 2 | 209 |
| **Mitigation Program Type**: Mandatory strengthening | | | | | | | | | **Mitigation Rate:** 99 percent | | | | | | |
| **Technical Mitigation Standards:** Similar to Division 88, 1982 Edition Los Angeles City Code | | | | | | | | | | | | | | | |
| **Progress and Remarks:** City used Marks Bond Act funds for historical buildings.* Included in #2, Based upon our 1980 Ordinance. 59 Buildings have reduced occupancy and are in substantial compliance with the program . Two buildings are discovered to be URM in 2004. | | | | | | | | | | | | | | | |

Implementation of earthquake mitigation policy most often takes place at the local government level. The City of Santa Ana Planning and Building Department 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 Santa Ana 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.

| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B3a. |
|---|
| Q: Is there a description of each hazard's impacts on each jurisdiction (what happens to structures, infrastructure, people, environment, etc.)? (Requirement §201.6(c)(2)(ii))<br>A: See Impact of Earthquakes in the City below. |

## Impact of Earthquakes in the City

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

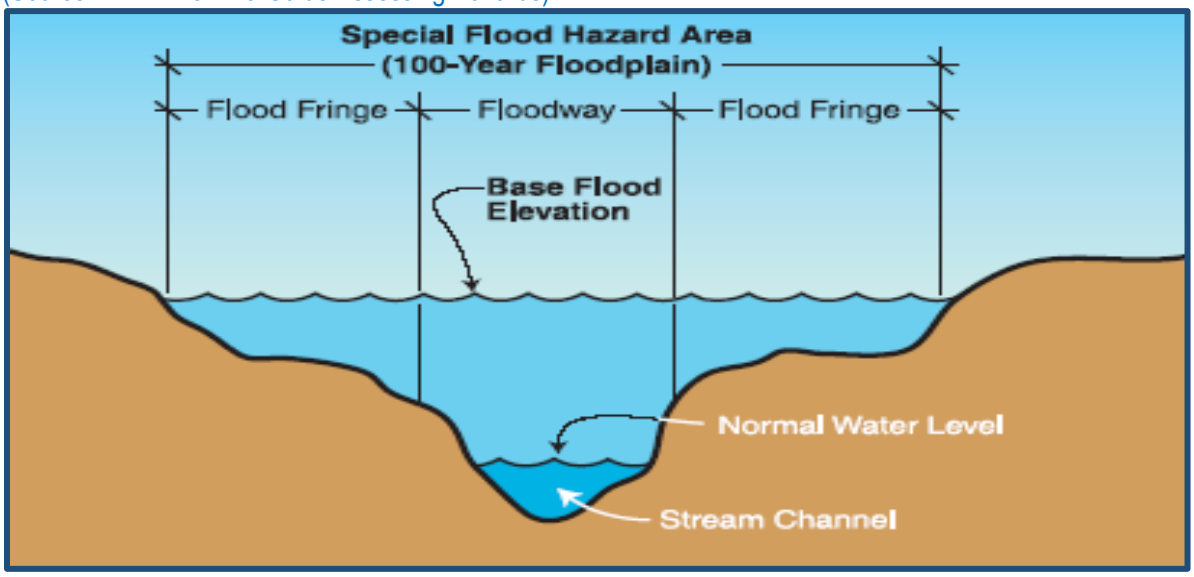
- ✓ Injury and loss of life
- ✓ Commercial and residential structural damage
- ✓ Disruption of and damage to public infrastructure
- ✓ Secondary health hazards e.g. mold and mildew
- ✓ Damage to roads/bridges resulting in loss of mobility
- ✓ Significant economic impact (jobs, sales, tax revenue) upon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

# Flood Hazards

## Hazard Definition

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. 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.

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




### *Types of Flooding*

Two types of flooding primarily affect the region: slow-rise or flash flooding. Slow-rise floods may be preceded by a warning period of hours or days. Evacuation and sandbagging for slow-rise floods have often effectively lessened flood related damage. Conversely, flash floods are most difficult to prepare for, due to extremely limited, if any, advance warning and preparation time.

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2a.

Q: Does the plan include information on previous occurrences of hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

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

## Previous Occurrences of Flooding in the City

According to the NOAA Storm Events Database, the most recent flooding event to occur within the City was on December 6, 2018. A moisture plume with a weak atmospheric river arrived on December 5th and brought rain to the region. On December 6th, a strong closed upper level low pressure brought an unstable air mass into Southern California with showers and thunderstorms, especially Orange and San Diego Counties. Rainfall of 1 inch per hour amounts occurred in Costa Mesa as well as adjacent cities. The main storm system on December 6th brought widespread rain to the entire region. All mountains and the coast and valleys areas received 1-3 inches and some spots receiving over 4 of rainfall over higher terrain. The most significant mud and debris flows occurred at recent Holy burn scar areas, and many reports of flash flooding across the region. Snow fell as low as 4000 feet with mountains receiving 1 to 4 inches of snow. John Wayne Airport reported 2.56 inches of rainfall in about 2 hours on December 6th. This is a 1 in 100 year return interval. Cars in nearby Costa Mesa were seen completely submerged or stalled in deep water up to the windows.


Orange County has experienced the following flood events since 2018:

Table: Flooding and Flash Flooding Events in Orange County
Source: NOAA Storm Events Database:

| Date | Location |
|---|---|
| 04/06/2020 | Peralta Hills |
| 04/06/2020 | Costa Mesa |
| 04/06/2020 | Los Alamitos |
| 04/06/2020 | Cypress |
| 11/28/2019 | Huntington Beach |
| 11/19/2019 | San Clemente |
| 05/22/2019 | Fullerton |
| 03/06/2019 | Freeway |
| 02/13/2019 | Laguna Beach |
| 02/04/2019 | Arcilla |
| 01/15/2019 | Seal Beach |
| 12/06/2018 | San Clemente |
| 12/06/2018 | Esperanza |
| 12/06/2018 | Anaheim |
| 12/06/2018 | Santa Ana |
| 01/09/2018 | San Clemente |

According to the Santa Ana River Vision Plan (2006), the Santa Ana River experienced flooding most recently in 1969, when flooding along the watershed caused damage to nearby tributaries. After this incident, the Santa Ana River was considered the greatest flood threat west of the Mississippi, which prompted the installation of the concrete lining in the river channel.

Table: Santa Ana River Flood History
(Source: History of the Santa Ana River, Santa Ana Website)

| Date | Description |
|---|---|
| 1969 | Flooding along the Watershed, damaged nearby tributaries |
| 1938 | Flash flood, 19 deaths, 2,000 homeless, 68,400 acres flooded |

Photo: January 12, 2017 Flooding at Bristol and 17th Street
(Source: 2018 Storm Drain Master Plan)

| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B1a. |
|---|
| Q: Does the plan include a general description of all natural hazards that can affect each jurisdiction? (Requirement §201.6(c)(2)(i))<br>A: See Local Conditions below. |
| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B3b. |
| Q: Is there a description of each identified hazard's overall vulnerability (structures, systems, populations, or other community assets defined by the community that are identified as being susceptible to damage and loss from hazard events) for each jurisdiction? (Requirement §201.6(c)(2)(ii))<br>A: See Local Conditions below. |

## Local Conditions

According to the Orange County General Plan (2013), Orange County's geography and climate increase its susceptibility to flooding. Commonly, where a broad alluvial plain exists, such as the one created by the Santa Ana River, there has been and is a continual expansion of urban development.

According to the Vulnerability Assessment Report (2020), flooding can cause significant harm to buildings, people, and infrastructure. Floodwater can be deep enough to drown people and may move fast enough to carry people or heavy objects (such as cars) away. Flooding can be caused by heavy rainfall or long periods of moderate rainfall, or clogged drains during periods of rainfall. In rare instances, a break in a dam, water pipe, or water tank can also cause flooding. Additionally, heavy periods of rainfall can stress levee systems, and overtopping can lead to catastrophic flooding. Storm drainage systems throughout the city collect stormwater runoff and convey water to prevent flooding, although these systems are typically designed based on winter storms recorded in the past and may not be designed to accommodate more intense storms. The levee system along the Santa Ana River is designed for a 190-year flood and may also not be able to accommodate a more intense storm or heavy rainfall over a short period of time. Scientists project that climate change will increase the frequency and intensity of floods within Santa Ana, although total annual precipitation levels are not expected to change very much.

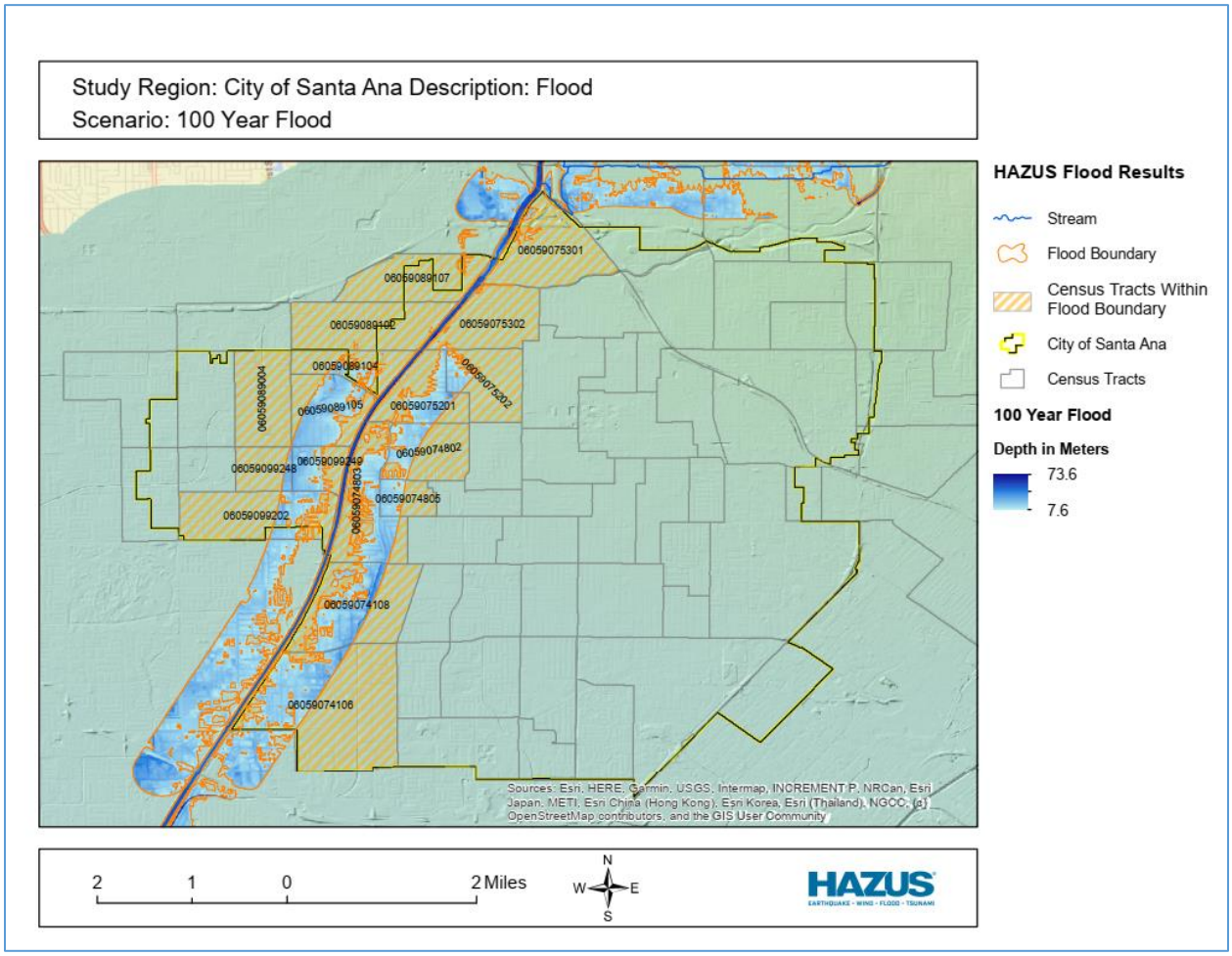
The northern, southern, and western portions of Santa Ana are within the 100-year or 500-year flood zone, or an area with reduced flood risk due to a levee. The portion of Santa Ana east of Broadway is outside of the flood zone. Due to a projected increase in frequency and intensity of rainstorms, flooding could occur more frequently, leaving major roadways and highways, bridges, and railroads highly vulnerable to damage. While parks and open space can absorb stormwater, park facilities such as restrooms and pedestrian paths can be damaged by floodwaters, rendering the parks unusable. Other buildings east of Main Street are also vulnerable to flooding, including commercial buildings in Downtown Santa Ana, industrial buildings in western Santa Ana near the Santa Ana River, and over half of school buildings, including the Santa Ana Community College. Many of the community services are also highly vulnerable to flooding, such as wastewater services that can back up due to an increase in wet weather flow and roadways that can become impassable from flood waters, disrupting public transit services, emergency medical response, and public safety response. Disruption of these services could be detrimental to both residents and businesses. Community services, such as emergency medical response, are highly vulnerable to human health hazards, such as vector-borne diseases, that can overwhelm and create shortages of facilities, equipment, pharmaceuticals, and personnel if health care workers become sick or if supply chains are disrupted.

## *Santa Ana River and Santiago Creek*

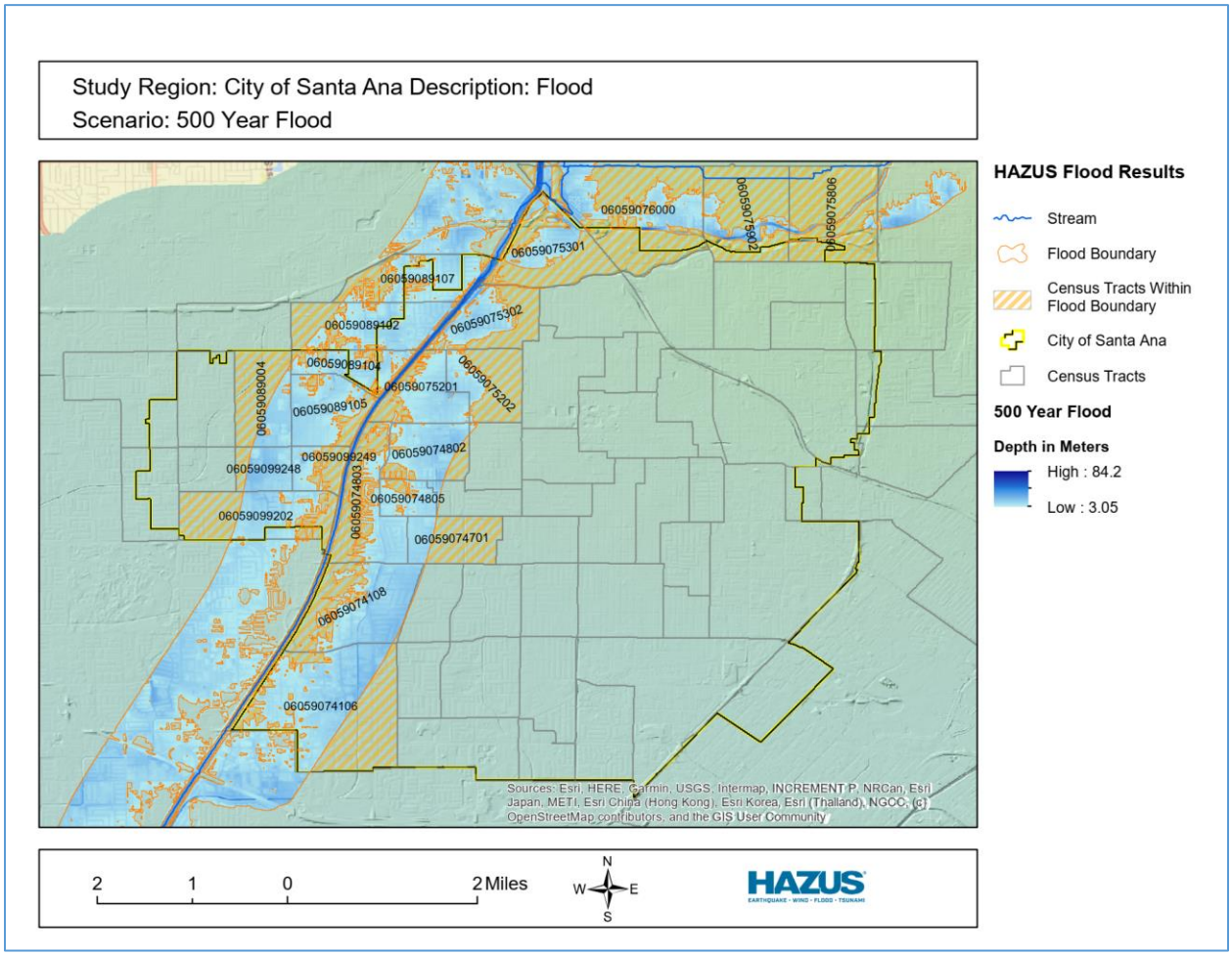
According to the Public Safety Element of Santa Ana's General Plan (2010), the City has two major drainage courses with potential for significant flooding: Santiago Creek and the Santa Ana River. The Santa Ana River, with its normally dry riverbed and broad engineered channel and armored levees, does not appear to present a significant flood hazard. However, the Santa Ana River has a long history of overflowing its banks and flooding in the surrounding areas. Another reference document concerning flooding is the Santa Ana Storm Drain Master Drain (2018) which is referenced in the Mitigation Actions Matrix.

To reduce this risk, the U.S. Army Corps of Engineers (Corps) is constructing the $2.2 billion Santa Ana River Mainstem Project which includes raising the height of Prado Dam and constructing new gate-works allowing for controlled water releases up to 30,000 cubic feet per second and constructing channel improvements between Prado Dam and the ocean. Given the progress to date, the Corps' project provides 100-year flood protection for Orange County. When completed, the project is designed to provide 190-year level protection from flooding due to the Santa Ana River. Located in Riverside County at the head of Santa Ana Canyon, Prado Dam is a single purpose dam designed to reduce the flood risk for metropolitan area in Orange County.

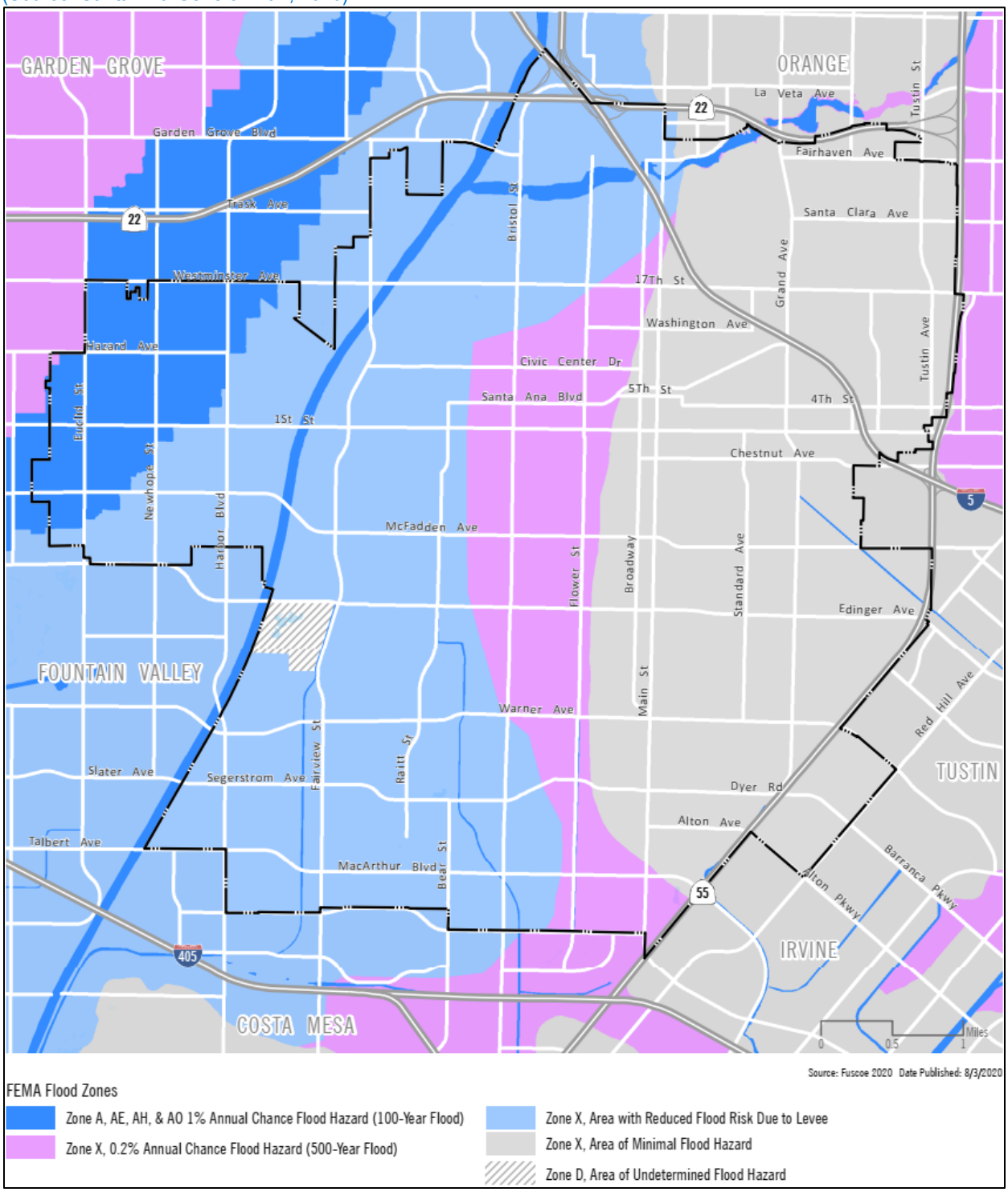
Map: HAZUS Flood Results – 100 Year Flood Scenario
(Source: HAZUS - Emergency Planning Consultants)



Map: HAZUS Flood Results – 500 Year Flood Scenario
(Source: HAZUS - Emergency Planning Consultants)



Map: Flood Hazard Severity Zone Map Determined by FEMA
(Source: Santa Ana General Plan, 2020)



| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C2 |
|---|
| Q: 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))<br>A: See NFIP Participation 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. According to FEMA, the City is located within flood Zones X, A, AE, AH, and AO.

## 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 Maps as shown in Map: Flood Hazard Severity Zone Map Determined by FEMA above. 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. |

| ZONE | DESCRIPTION |
|---|---|
| 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. |
| 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*

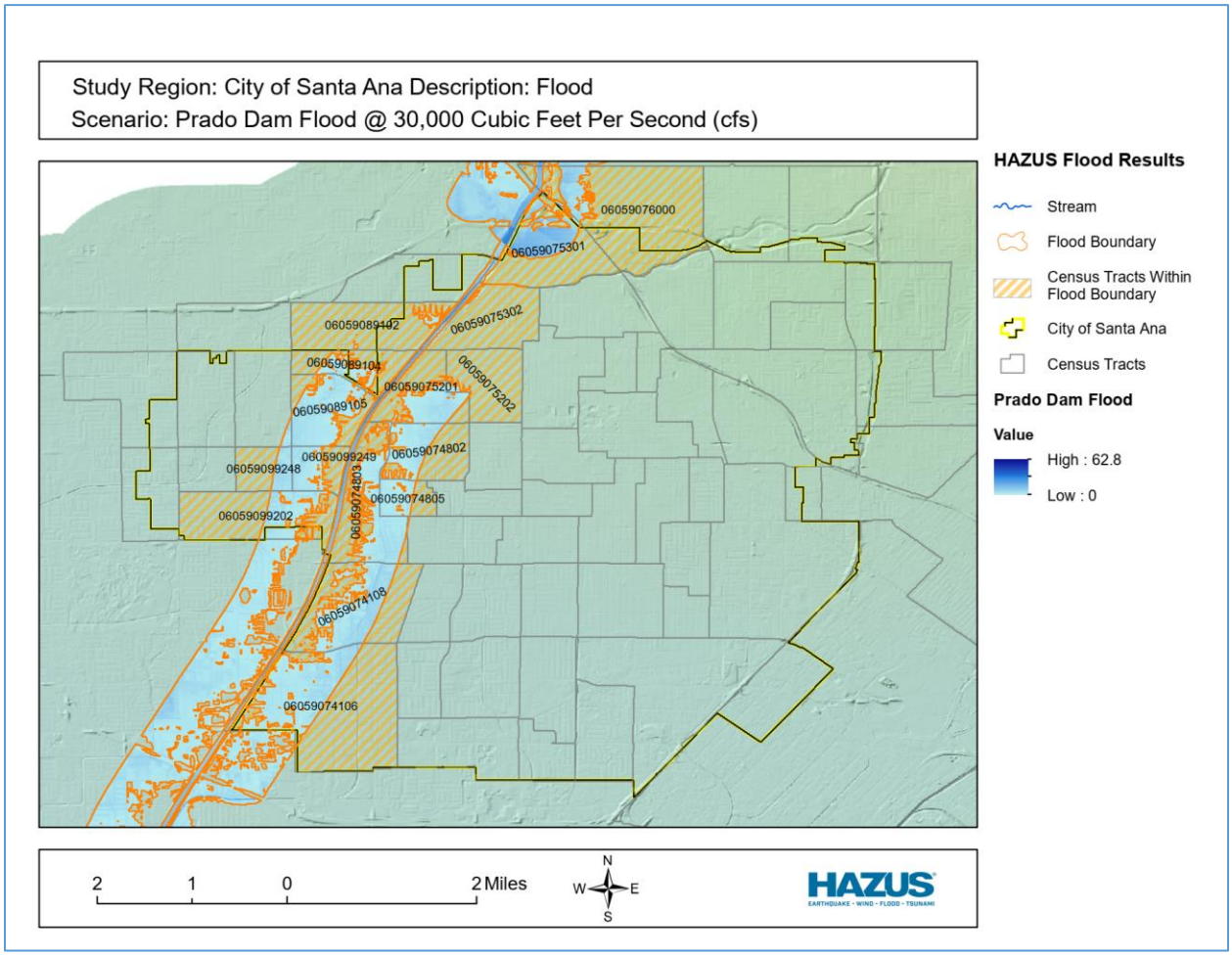
| ZONE | DESCRIPTION |
|---|---|
| D | Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk. |

## *Dam Failure*

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 mining 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.

Prado Dam and Reservoir, completed by the Corps of Engineers in 1941, are intended to provide flood protection to the Lower Santa Ana River basin. The earthen dam and its reservoir were designed in the 1930s to control floods of magnitudes that could be reasonably expected to occur under anticipated future development of the watershed (typically a 200-year flood). Since Prado Dam was built, however, changes have occurred in the drainage area. Historical data on rainfall and runoff, coupled with advances in predicting future flood potential, have shown Prado Dam to presently offer only 70-year flood protection. In addition, intensive urbanization within the drainage area has occurred, further complicating this problem. Another serious concern is that the existing Prado Dam and spillway could not accommodate a probable maximum flood, resulting in overtopping of the dam.

Map: HAZUS Flood Results – Prado Dam Flood Scenario
(Source: HAZUS - Emergency Planning Consultants)



| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B3a. |
|---|
| Q: Is there a description of each hazard's impacts on each jurisdiction (what happens to structures, infrastructure, people, environment, etc.)? (Requirement §201.6(c)(2)(ii))<br>A: See Impact of Flooding in the City below. |

## Impact of Flooding in the City

Floods and their impacts vary by location and severity of any given flood event, and likely only affect certain areas of the region during specific times. Based on the risk assessment, it is evident that floods will continue to have potentially devastating economic impacts to the City. Impacts that are not quantified, but 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 citizens as temporary facilities and relocations would likely be needed

# Climate Change Hazards

## Hazard Definition

"Climate change" refers to seasonal changes over a long period of time. It is generally perceived in the emergency management profession that climate change will have a measurable impact on the occurrence and severity of natural hazards around the world. Changes could include:

- Sea ice and snow cover losses will continue, and declining snowpack will affect snow-dependent water supplies and stream flow levels around the world.
- Sea level is projected to rise 7 to 23 inches during the 21st century due to melting snow and ice on land and thermal expansion of ocean waters.
- The risk of drought and the frequency, intensity, and duration of heat waves are expected to increase.
- More extreme precipitation is likely, increasing the risk of flooding; if the world's average temperature warms only an additional 2.7ºF to 4.5ºF above pre-industrial levels, an estimated 20 to 30 percent of known plant and animal species would be at increasingly high risk of extinction.

Climate change will affect communities in a variety of ways. Impacts could include an increased risk for extreme events such as drought, storms, flooding, forest fires; more heat-related stress; the spread of existing or new vector-born disease into a community; and increased erosion and inundation of low-lying areas along coastlines.

According to the State of California Multi-Hazard Mitigation Plan (2018), climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and both snowmelt and rainwater running off sooner in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B2a. |
|---|
| Q: Does the plan include information on previous occurrences of hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))<br>A: See Previous Occurrences of Climate Change in the City below. |

## Previous Occurrences of Climate Change in the City

The City has expereinced gradual Climate Change, with warmer temperatures increasing over the past century. According to California's Fourth Climate Change Assessment (2018), observations over the past century indicate that temperature has increased across southern California. Based on 1896-2015 temperature records for the California South Coast NOAA Climate Division, which encompasses the LA region (which includes Orange County), researchers found significant trends in annual average, maximum, and minimum temperature around 0.16°C per decade. Every month has experienced significant positive trends in monthly average, maximum, and minimum temperature. Monthly average and minimum temperatures have increased the most in September and monthly maximum temperatures have increased the most in January, with each trend exceeding 0.2°C per decade. Recently, the California South Coast Climate Division has experienced sustained record warmth. The top 5 warmest years in terms of annual average temperature have all occurred since 2012: 2014 was the warmest, followed by 2015, 2017, 2016, and 2012.

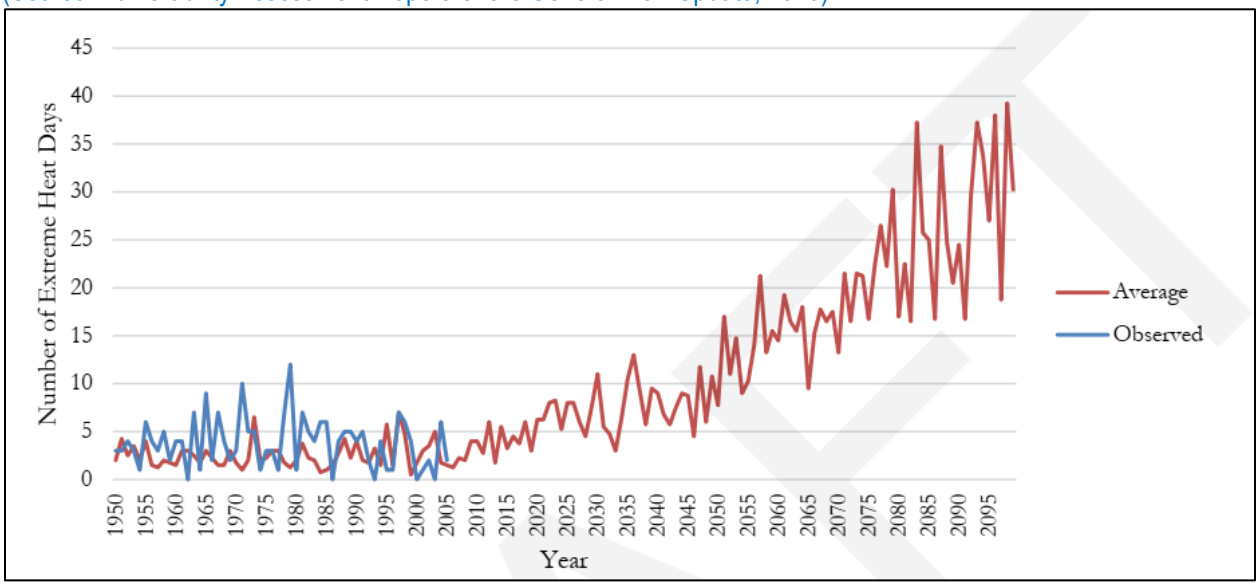
| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B1a. |
|---|
| Q: Does the plan include a general description of all natural hazards that can affect each jurisdiction? (Requirement §201.6(c)(2)(i))<br>A: See Local Conditions below. |
| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B3b. |
| Q: Is there a description of each identified hazard's overall vulnerability (structures, systems, populations, or other community assets defined by the community that are identified as being susceptible to damage and loss from hazard events) for each jurisdiction? (Requirement §201.6(c)(2)(ii))<br>A: See Local Conditions below. |

## Local Conditions

### *Extreme Heat*

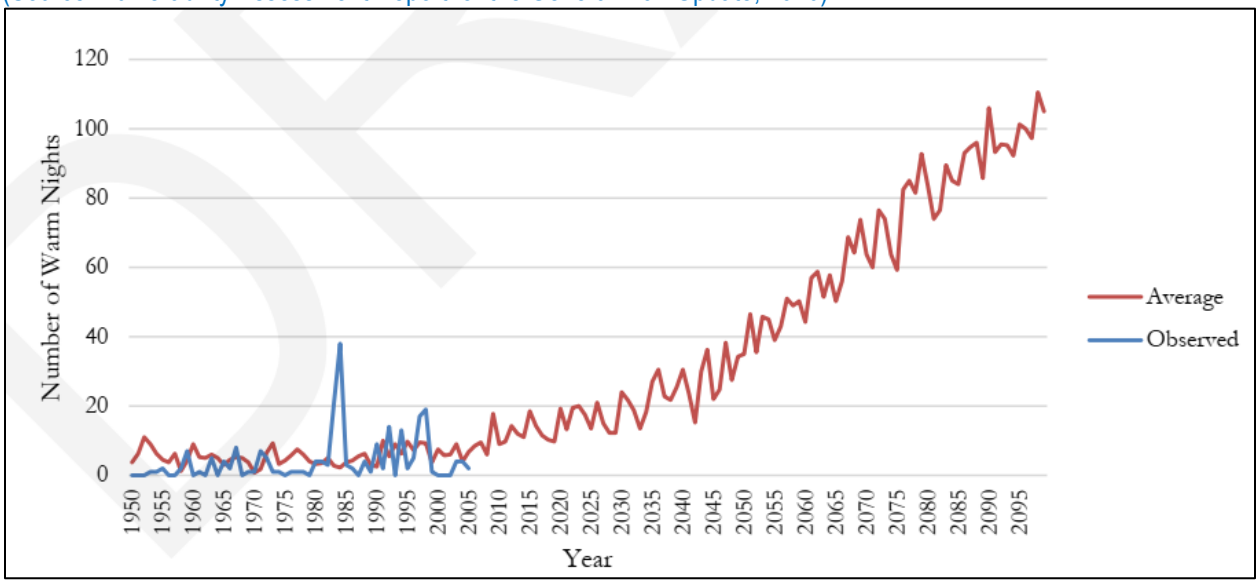
According to the Vulnerability Assessment Report for the General Plan Update (2020), extreme heat occurs when temperatures rise significantly above normal levels. In Santa Ana, an extreme heat day occurs when temperatures reach above 96.3 degrees Fahrenheit. As shown in the Figure below, the projected number of extreme heat days in Santa Ana is projected to increase to an average of 11 extreme heat days per year by mid-century and an average of 25 extreme heat days per year by end of century.

Figure: Projected Extreme Heat Days in Santa Ana
(Source: Vulnerability Assessment Report for the General Plan Update, 2020)




Extreme heat can also occur in the form of warmer nights, as temperatures do not cool down overnight and provide relief from the heat. In Santa Ana, a warm night occurs when the temperature remains above 68.3 degrees Fahrenheit. As shown in the Figure below, the projected number of warm nights in Santa Ana is projected to increase to an average of 39 warm nights per year by mid-century and an average of 87 warm nights per year by the end of the century.

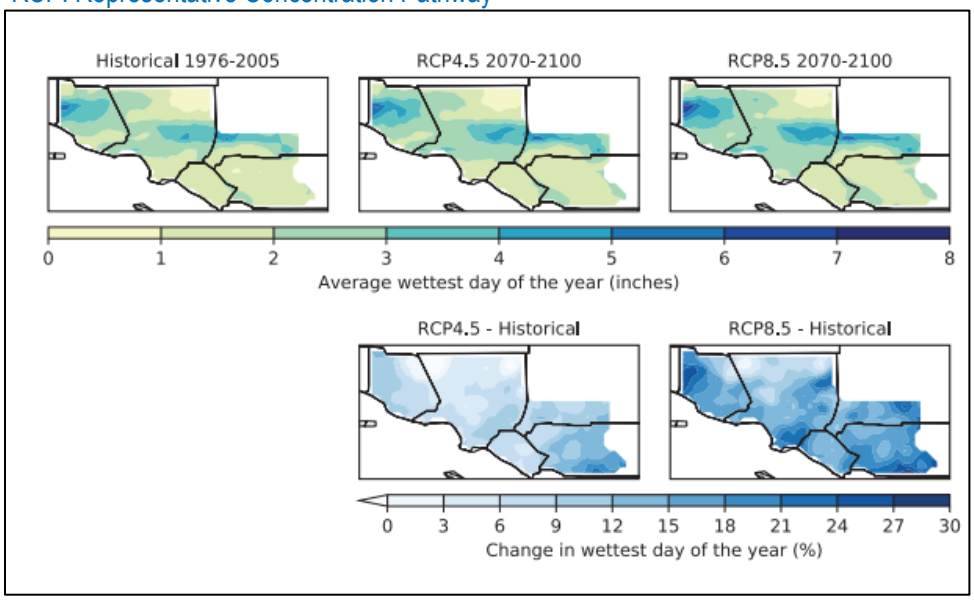
Figure: Projected Warm Nights in Santa Ana
(Source: Vulnerability Assessment Report for the General Plan Update, 2020)



## Precipitation

According to California's Fourth Climate Change Assessment (2018), Southern California lies between two large-scale zones of opposing projected precipitation change: general wetting in the northern mid-latitudes versus general drying in the southern sub-tropics. Consequently, model projections disagree on the sign of future precipitation change over southern California, but generally project small mean changes (either positive or negative) compared to the region's large historical variability. Despite small changes in average precipitation, dry and wet extremes are both expected to increase in the future. By the late-21st century, the wettest day of the year is expected to increase across most of the region, with some locations experiencing 25 30% increases under RCP8.5 (see the Figure below). Extreme precipitation often arrives via "atmospheric rivers". Extremely dry years are also projected to increase over southern California, potentially a doubling or more in frequency by the late-21st century.

Figure: Average Wettest Days of the Year
(Source: California's Fourth Climate Assessment, 2018)
*RCP: Representative Concentration Pathway




## Air Quality

According to the Vulnerability Assessment Report (2020), the dominant sources of air pollution in the City of Santa Ana are ozone pollution from vehicle exhaust, fine particulate matter from industry, and diesel particulate matter from diesel trucks, as well as smoke from wildfires in the region. Higher future temperatures may increase the production of ground-level ozone, and concentrations are expected to increase in most places already experiencing high levels of this pollutant. Ground-level ozone is associated with a variety of negative health outcomes, including reduced lung function, pneumonia, asthma, cardiovascular diseases, and premature death.

## Human Health

According to the Vulnerability Assessment Report (2020), there are several diseases, such as hantavirus pulmonary syndrome, Lyme disease, West Nile virus, and influenza, that are linked to climate change and can be debilitating or fatal for some of the population. These diseases are carried by pests, such as mice, rats, ticks, and mosquitos. Climate change can increase the rates of infections because many of the animals that carry diseases are more active during warmer weather and may expand in population size due to higher levels of rainfall during storm events and stagnant water after flooding, increasing the time for diseases to be transmitted. Some diseases and illnesses have the potential to become epidemics or pandemics if they spread within communities, regions, or over multiple countries. Additionally following natural disasters, such as flooding or severe weather events, mental health and stress-related disorders increase. Health hazards from air pollutants are evaluated as part of the air quality hazard discussion.

## Severe Weather

According to the Vulnerability Assessment Report (2020), severe weather can include strong winds, hail, and lightning, which is usually caused by intense storm systems, although types of strong winds can occur without a storm. As described in the Los Angeles Summary Report from the California Fourth Climate Change Assessment, the connection between climate change and severe storms is not as well established as other exposures, but new evidence suggests that these forms of severe weather may occur more often than in the past. Severe winds, such as the Santa Ana winds, tend to be most frequent during October to April and can have average speeds of 40 miles per hour. These winds can destroy buildings, knock over trees, damage power lines and electrical equipment, and fan small sparks into large wildfires in the region Hail can damage buildings and plants, and lightning can spark fires, injure people, or cause fatalities.

| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B3a. |
|---|
| Q: Is there a description of each hazard's impacts on each jurisdiction (what happens to structures, infrastructure, people, environment, etc.)? (Requirement §201.6(c)(2)(ii))<br>A: See Impact of Climate Change in the City below. |

# Impact of Climate Change in the City

Based on the risk assessment, it is evident that climate change will continue to have potentially devastating economic impacts to 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 citizens as temporary facilities and relocations would likely be needed

# Epidemic/Pandemic/Vector-Borne Disease Hazards

## Hazard Definition

According to the California State Hazard Mitigation Plan (2018), the California Department of Public Health has identified epidemics, pandemics, and vector-borne diseases as specific hazards that would have a significant impact throughout the State.

According to the Centers for Disease Control (CDC), an epidemic refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population area. A pandemic refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people. Vector-borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors – living organisms that can transmit infectious pathogens between humans, or from animals to humans.

### *Seasonal Influenza*

Seasonal influenza, also known as the flu, is a disease that attacks the respiratory system (nose, throat, and lungs) in humans. Seasonal influenza occurs every year. In the U.S., the influenza season typically occurs from October through May, peaking in January or February with yearly epidemics of varying severity. Although mild cases may be similar to a viral "cold," influenza is typically much more severe. Influenza usually comes on suddenly; may include fever, headache, tiredness (which may be extreme), dry cough, sore throat, nasal congestion, and body aches; and can result in complications such as pneumonia. Persons aged 65 and older, those with chronic health conditions, pregnant women, and young children are at the highest risk for serious complications, including death.

### *Pandemic Influenza*

A pandemic influenza occurs when a new influenza virus, for which there is little or no human immunity, emerges and spreads on a worldwide scale, infecting a large proportion of the human population. The most notable pandemic influenza outbreaks have been the 1918 Spanish Flu that was responsible for 20 million to 40 million deaths throughout the world. Also, H1N1 in 2009, popularly referred to as the Swine Flu, resulted in many hospitalizations and deaths. Pandemic H1N1 influenza was spread in the same way as seasonal influenza, from person to person through coughing or sneezing by infected people. In April 2009, two kids living more than 100 miles apart in Southern California came down with the flu. By mid-April, their illnesses had been diagnosed as being caused by a new strain of H1N1 influenza. Persons infected with H1N1

experienced fever and mild respiratory symptoms, such as coughing, runny nose, and congestion. In some cases, symptoms were severe and included diarrhea, chills, and vomiting, and in rare cases respiratory failure occurred. The H1N1 virus caused relatively few deaths in humans. In the United States, for example, it caused fewer deaths (between 8,870 and 18,300) than seasonal influenza, which, based on data for the years 2014–2019, causes an average of about 40,000 deaths each year. The H1N1 virus was most lethal in individuals affected by chronic disease or other underlying health conditions.

As demonstrated historically and currently, pandemic influenza has the potential to cause serious illness and death among people of all age groups and have a major impact on society. These societal impacts include significant economic disruption that can occur due to death, loss of employee work time, and costs of treating or preventing the spread of influenza.

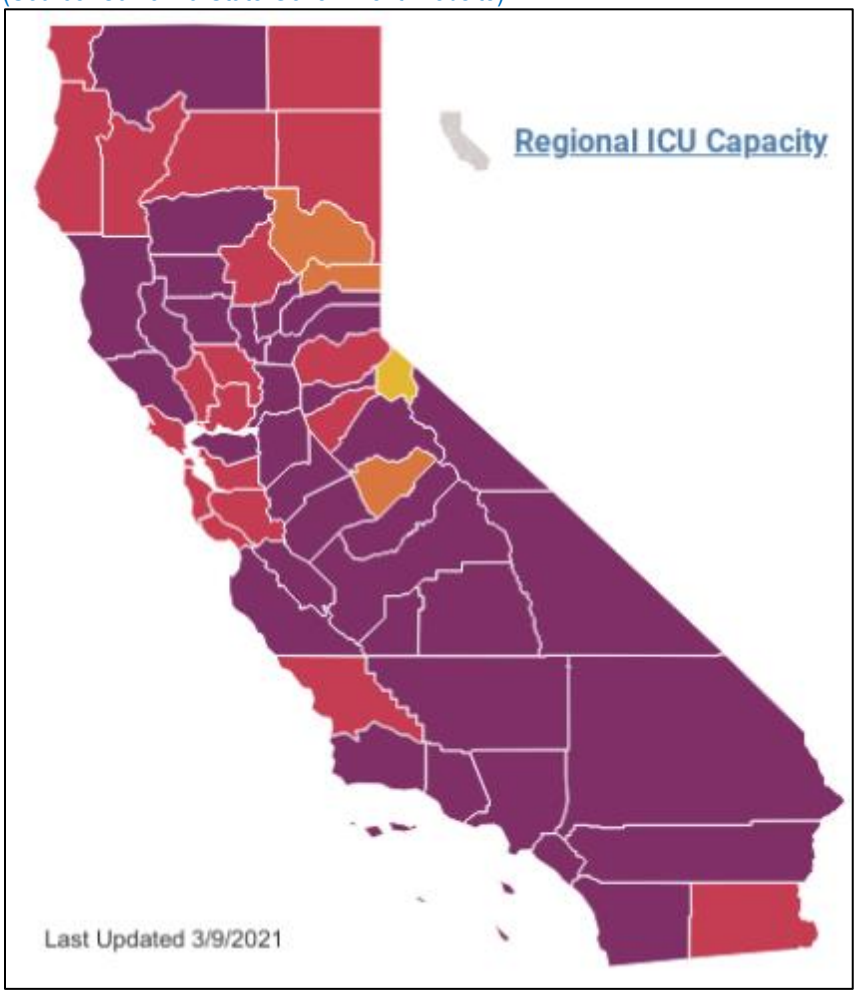
## *Novel Coronavirus*


Beginning in 2019, the U.S. Centers for Disease Control responded to a pandemic of severe respiratory disease spreading from person to person caused by a novel (new) coronavirus. The disease was named “Coronavirus Disease 2019” (abbreviated “COVID-19”). Coronaviruses are a large family of viruses that are common in people and many different species of animals, including camels, cattle, cats, and bats. Rarely, animal coronaviruses can infect people and then spread between people such as with Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS).

According to the CDC, many of the patients at the epicenter of the outbreak in Wuhan, Hubei Province, China had some link to a large seafood and live animal market, suggesting animal-to-person spread. Later, a growing number of patients reportedly did not have exposure to animal markets, indicating person-to-person spread. Person-to-person spread was subsequently reported outside Hubei and in countries outside China, including in the United States. Most international destinations now have ongoing community spread with the virus that causes COVID-19, as does the United States.

On March 4, 2020, Governor Newsom proclaimed a state of emergency in the California in response to the COVID-19 outbreak, which was followed by an executive order directing all residents immediately to heed current State public health directives to stay home, except as needed to maintain continuity of operations of essential critical infrastructure sectors. As of March 9, 2021, 80% of the state was still considered widespread risk, with many non-essential indoor business operations closed.

Figure: Current Tier Assignments as of March 9, 2021
(Source: California State Government Website)




**COUNTY RISK LEVELS**

| | Counties | Population | |
|---|---|---|---|
| Widespread | 34 | 32,103,924 | 80.0% |
| Substantial | 20 | 7,984,212 | 19.9% |
| Moderate | 3 | 39,907 | 0.1% |
| Minimal | 1 | 1,117 | 0.0% |

## *Avian Influenza*

According to the CDC, although avian influenza A viruses usually do not infect people, rare cases of human infection with these viruses have been reported. Infected birds shed avian influenza virus in their saliva, mucous and feces. Human infections with bird flu viruses can happen when enough virus gets into a person's eyes, nose or mouth, or is inhaled. This can happen when virus is in the air (in droplets or possibly dust) and a person breathes it in, or when a person touches something that has virus on it then touches their mouth, eyes or nose. Rare human infections with some avian viruses have occurred most often after unprotected contact with infected birds

or surfaces contaminated with avian influenza viruses. However, some infections have been identified where direct contact was not known to have occurred. Illness in people has ranged from mild to severe.

The spread of avian influenza A viruses from one ill person to another has been reported very rarely, and when it has been reported it has been limited, inefficient and not sustained. However, because of the possibility that avian influenza A viruses could change and gain the ability to spread easily between people, monitoring for human infection and person-to-person spread is extremely important for public health.

## *Vector-Borne Diseases*

Vector-borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors. Every year there are more than 700,000 deaths from diseases such as malaria, dengue, schistosomiasis, human African trypanosomiasis, leishmaniasis, Chagas disease, yellow fever, Japanese encephalitis and onchocerciasis. Vectors are living organisms that can transmit infectious pathogens between humans, or from animals to humans. Many of these vectors are bloodsucking insects, which ingest disease-producing microorganisms during a blood meal from an infected host (human or animal) and later transmit it into a new host, after the pathogen has replicated. Often, once a vector becomes infectious, they can transmit the pathogen for the rest of their life during each subsequent bite/blood meal.

## *Mosquito-Borne Viruses*

Mosquito-borne viruses belong to a group of viruses commonly referred to as arboviruses (for arthropod-borne). Although 12 mosquito-borne viruses are known to occur in California, only West Nile virus (WNV), western equine encephalomyelitis virus (WEE), and St. Louis encephalitis virus (SLE) are significant causes of human disease. WNV continues to seriously affect the health of humans, horses, and wild birds throughout the state. Since 2003, there have been over 6,000 WNV human cases with 248 deaths, and over 1,200 equine cases.

WNV first appeared in the United States in 1999 in New York and rapidly spread across the country to California in subsequent years. California has historically maintained a comprehensive mosquito-borne disease surveillance and control program including the Mosquito-borne Virus Surveillance and Response Plan, which is updated annually in consultation with local vector control agencies.

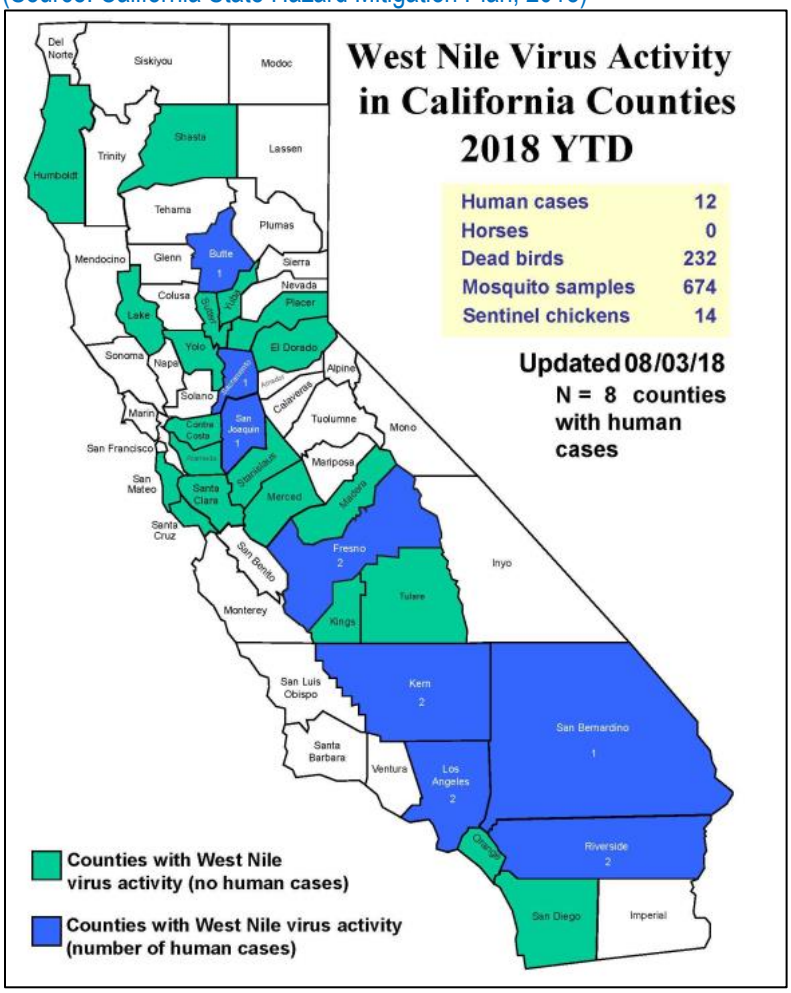
Climate change will likely affect vector-borne disease transmission patterns. Changes in temperature and precipitation can influence seasonality, distribution, and prevalence of vector-borne diseases. A changing climate may also create conditions favorable for the establishment of invasive mosquito vectors in California.

For most Californians, WNV poses the greatest mosquito-borne disease threat. Above-normal temperatures are among the most consistent factors associated with WNV outbreaks. Mild winters are associated with increased WNV transmission due, in part, to less mosquito and resident bird mortality. Warmer winter and spring seasons may also allow for transmission to

start earlier. Such conditions also allow more time for virus amplification in bird-mosquito cycles, increasing the potential for mosquitoes to transmit WNV to people.

The effects of increased temperature are primarily through acceleration of physiological processes within mosquitoes, resulting in faster larval development and shorter generation times, more frequent mosquito biting, and shortening of the incubation period time required for infected mosquitoes to transmit WNV. During periods of drought, especially in urban areas, mosquitoes tend to thrive more due to changes in stormwater management practices. Mosquitoes in urban areas can reach higher abundance due to stagnation of water in underground stormwater systems that would otherwise be flushed by rainfall. Runoff from landscape irrigation systems mixed with organic matter can also create ideal mosquito habitat. Drought conditions may also force birds to increase their utilization of suburban areas where water is more available, bringing these WNV hosts into contact with urban vectors.

Map: West Nile Virus Activity in California Counties
(Source: California State Hazard Mitigation Plan, 2018)



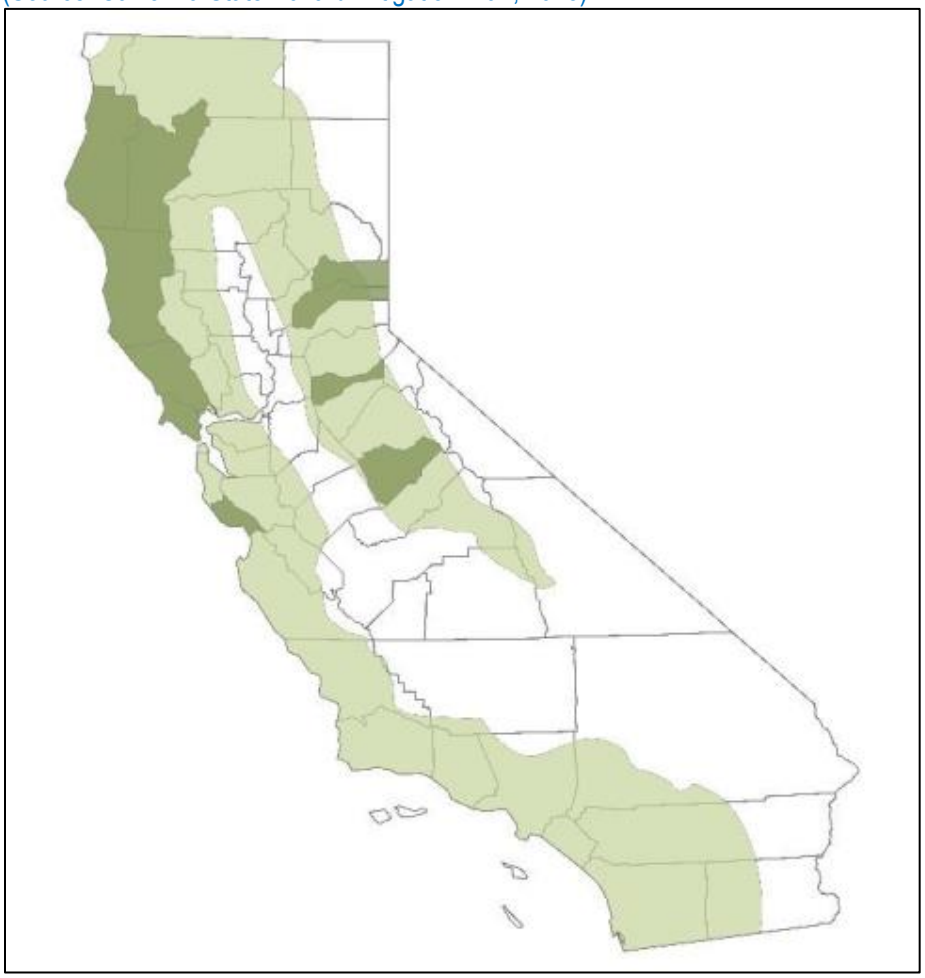

## *Lyme Disease*

Lyme disease is caused by a spirochete (a corkscrew-shaped bacteria) called Borrelia burgdorferi and is transmitted by the Western black-legged tick. Lyme disease was first described in North America in the 1970s in Lyme, Connecticut, the town for which it was then named. Though the

tick has been reported from 56 of the 58 counties in California, the highest incidence of disease occurs in the northwest coastal counties and northern Sierra Nevada counties with western-facing slopes. Ticks prefer cool, moist areas and can be found in wild grasses and low vegetation in both urban and rural areas.

The map below shows Western black-legged tick and Lyme disease incidence in California. The Western black-legged tick is commonly found in all green areas shown on the map; dark green areas on the map show where reported Lyme disease cases most often had exposure.

Map: Tick and Lyme Disease Incidence in California
(Source: California State Hazard Mitigation Plan, 2018)



## *Valley Fever*

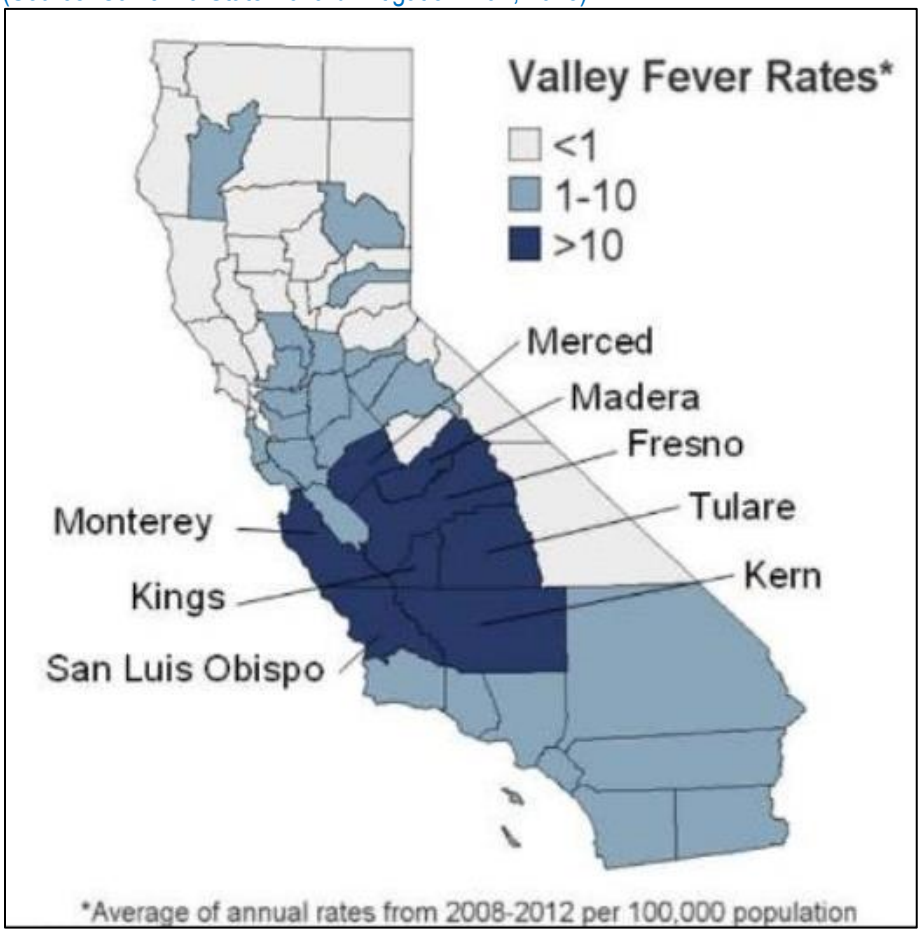
Valley Fever is caused by Coccidioides, a fungus that lives in the soil in the southwestern United States and parts of Mexico, Central America, and South America. Inhaling the airborne fungal spores can cause an infection called coccidioidomycosis, which is also known as "cocci" or "Valley Fever."

Most people who are exposed to the fungus do not get sick, but some people develop flu-like symptoms that may last for weeks to months. In a very small proportion of people who get Valley

Fever, the infection can spread from the lungs to other parts of the body and cause more severe conditions, such as meningitis or even death. Valley Fever cannot spread from person to person.

Most cases of Valley Fever in the U.S. occur in people who live in or have traveled to the southwestern United States, especially Arizona and California. The map below shows the areas where the fungus that causes Valley Fever is thought to be endemic, or native and common in the environment. The full extent of the current endemic areas is unknown and is a subject for further study.

Map: Valley Fever Average Annual Rates by California County
(Source: California State Hazard Mitigation Plan, 2018)




| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B2a. |
|---|
| Q: Does the plan include information on previous occurrences of hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i)) |
| A: See Previous Occurrences of Epidemic/Pandemic/Vector-Borne Disease below. |

## Previous Occurrences of Epidemic/Pandemic/Vector-Borne Disease

The City lies within Orange County, which has been affected by Vector Borne diseases. The table below shows the County's history:

Table: Reportable Diseases and Conditions, 2015-2019
(Source: Orange County Health Care Agency)

| | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|
| Lyme Disease | 0 | 0 | 0 | 0 | 0 |
| West Nile Infections | 97 | 36 | 38 | 13 | 7 |
| Zika Virus Infections | 0 | 30 | 12 | 1 | 2 |
| Influenza | - | 2, 718 | 8, 278 | - | - |

Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B1a.

Q: Does the plan include a general description of all natural hazards that can affect each jurisdiction? (Requirement §201.6(c)(2)(i))
A: See Local Conditions below.

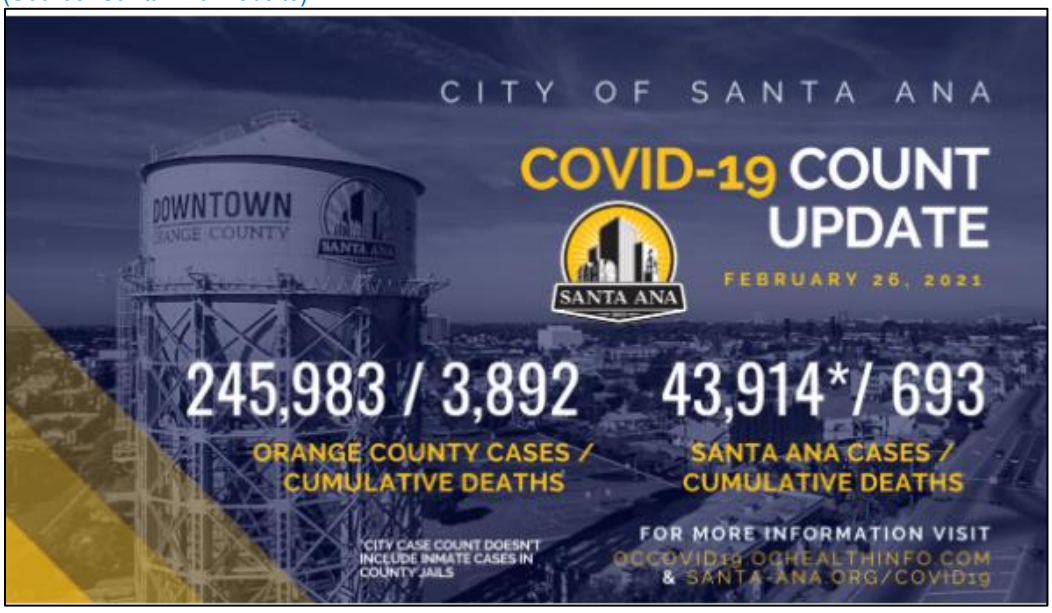
Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3b.

Q: Is there a description of each identified hazard's overall vulnerability (structures, systems, populations, or other community assets defined by the community that are identified as being susceptible to damage and loss from hazard events) for each jurisdiction? (Requirement §201.6(c)(2)(ii))
A: See Local Conditions below.

## Local Conditions

Currently, COVID-19 is devastating the the City of Santa Ana, as well as Orange County. As of February 26, 2021, the City had 43,914 cases, compared to the County's 245,983 cases, displayed in the graphic below.

Graphic: COVID-19 Count Update
(Source: Santa Ana website)



| Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B3a. |
|---|
| Q: Is there a description of each hazard's impacts on each jurisdiction (what happens to structures, infrastructure, people, environment, etc.)? (Requirement §201.6(c)(2)(ii))<br>A: See Impact of Epidemic/Pandemic/Vector-Borne Diseases in the City below. |

## Impact of Epidemic/Pandemic/Vector-Borne Diseases in City

Based on the risk assessment, it is evident that Epidemic/Pandemic/Vector-Borne Diseases will continue to have potentially devastating economic impacts to the City. Impacts that are not quantified, but can be anticipated in future events, include:

- ✓ Injury and loss of life
- ✓ Disruption of public infrastructure
- ✓ Disruption of the educational process
- ✓ Significant economic impact (jobs, sales, tax revenue) upon the community
- ✓ Negative impact on commercial and residential property values
- ✓ Closure of businesses and public services
- ✓ Reduction of transportation services

# PART III: MITIGATION STRATEGIES

## Mitigation Strategies

### Overview of Mitigation Strategy

As the cost of damage from disasters continues to increase nationwide, the City of Santa Ana 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 at City facilities.

The plan provides a set of action items to reduce risk from hazards through education and outreach programs, and to foster the development of partnerships. Further, the plan provides for the implementation of preventative activities.

The resources and information within the Mitigation Plan:

1. Establish a basis for coordination and collaboration among agencies and the public in the City
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 plans including the City's 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: Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))<br>A: See Goals below. |
| Q&A \| ELEMENT D. MITIGATION STRATEGY \| D3 |
| Q: Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))<br>A: See Mitigation Actions Matrix below. |

## Goals

The Planning Team established goals based on the risk assessment that represent a long-term vision for hazard reduction and enhanced mitigation capabilities.

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.

### *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.

### *Increase 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.

### *Protect 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.

### *Promote Partnerships and Implementation*

Strengthen communication and coordinate participation with public agencies, 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.

### *Enhance 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.

## 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 the Annual Budget, development fees, Capital Improvement Program (CIP), Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities grant (BRIC), other Grants, private funding, and other funding opportunities.

### *Lead Department*

The Mitigation Actions Matrix assigns primary responsibility for each of the action items. The hierarchies of the assignments vary – from positions to departments to committees. The primary responsibility for implementing the action items falls to the entity shown as the “Lead Department”. The lead department 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. Lead departments 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
- ✓ Enhance Emergency Services
- ✓ Promote Partnerships and Implementation

## Planning Mechanism

It's important that each action item be implemented. Perhaps the best way to ensure implementation is through integration with one or many of the City's existing "planning mechanisms" including the General Plan, Capital Improvement Program, General Fund and Grants. Opportunities for integration will be simple and easy in cases where the action item is already compatible with the content of the planning mechanism. As an example, if the action item calls for the creation of a floodplain ordinance and the same action is already identified in the General Plan's policies, then the General Plan will assist in implementation. On the contrary, if preparation of a floodplain ordinance is not already included in the General Plan policies, then the item will need to be added during the next update to the General Plan. The General Plan was last updated in 2020 and was used as a reference throughout the Mitigation Plan. The next General Plan update will likely not take place for another 10 years.

The Capital Improvement Program (CIP), depending on the budgetary environment, is updated every 5 years. The CIP includes infrastructure projects built and owned by the City. As such, the CIP is an excellent medium for funding and implementing action items from the Mitigation Plan. The Mitigation Actions Matrix includes several items from the existing CIP. The authors of the CIP served on the Planning Team and are already looking for funding opportunities for several of the Mitigation Plan action items.

The Storm Drain Master Plan (2018) identifies flood-related improvements for the City and is referenced in several flood-related items on the Mitigation Actions Matrix.

The General Fund is the budget document that guides all of the City's expenditures and is updated on an annual basis. Although primarily a funding mechanism, it also includes descriptions and details associated with tasks and projects.

Grants come from a wide variety of sources – some annually and other triggered by events like disasters. Whatever the source, the City uses the General Fund to identify successful grants as funding sources.

## Building and Infrastructure

This addresses the issue of whether or not a particular action item results in the reduction of the effects of hazards on new and existing buildings and infrastructure.

| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C5a. |
| --- |
| Q: Does the plan explain how the mitigation actions and projects will be prioritized (including cost benefit review)? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))<br>A: See Benefit/Cost Ratings and Priority Rating 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 Building Resilient Infrastructure and Communities (BRIC) grant programs. 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.

| Q&A \| ELEMENT D. MITIGATION STRATEGY \| D3 |
|---|
| Q: Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3)) |
| A: See Priority Rating below. |

## *Priority Rating*

The Planning Team utilized the following Priority Rating method. Designations of "High", "Medium", and "Low" priority have been assigned to all of the action items 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 \| C1b. |
|---|
| Q: Does the plan document each jurisdiction's ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))<br>A: See Mitigation Actions Matrix below. |
| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C4a. |
| Q: Does the plan identify and analyze a comprehensive range (different alternatives) of specific mitigation actions and projects to reduce the impacts from hazards? (Requirement §201.6(c)(3)(ii))<br>A: See Mitigation Actions Matrix below. |
| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C4b. |
| Q: Does the plan identify mitigation actions for every hazard posing a threat to each participating jurisdiction? (Requirement §201.6(c)(3)(ii))<br>A: See Mitigation Actions Matrix below. |
| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C4c. |
| Q: Do the identified mitigation actions and projects have an emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))<br>A: See Mitigation Actions Matrix below. |
| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C5a. |
| Q: Does the plan explain how the mitigation actions and projects will be prioritized (including cost benefit review)? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))<br>A: See Mitigation Actions Matrix below. |
| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C5b. |
| Q: Does the plan identify the position, office, department, or agency responsible for implementing and administering the action/project, potential funding sources and expected timeframes for completion? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))<br>A: See Mitigation Actions Matrix below. |
| Q&A \| ELEMENT D. MITIGATION STRATEGY \| D1 |
| Q: Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))<br>A: See Mitigation Actions Matrix below. |
| Q&A \| ELEMENT D. MITIGATION STRATEGY \| D2 |
| Q: Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))<br>A: See Mitigation Actions Matrix below. |
| Q&A \| ELEMENT D. MITIGATION STRATEGY \| D3 |
| Q: Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))<br>A: See Mitigation Actions Matrix below. |
| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C6c. |
| Q: The updated plan must explain how the jurisdiction(s) incorporated the mitigation plan, when appropriate, into other planning mechanisms as a demonstration of progress in local hazard mitigation efforts. (Requirement §201.6(c)(4)(ii))<br>A: See Mitigation Actions Matrix below. |

## Mitigation Actions Matrix

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

| Mitigation Action Item | Lead Department | Timeline | Goal: Protect Life and Property | Goal: Public Awareness | Goal: Natural Systems | Goal: Emergency Services | Goal: Partnerships and Implementation | Buildings & Infrastructure: Does the Action item involve New and/or Existing Buildings and/or Infrastructure? Yes (Y), No (N) | Funding Source and Planning Mechanism: B – Budget, CIP – Capital Improvement Program, , HMGP- Hazard Mitigation Grant Program, BRIC – Building Resilient Infrastructure and Communities Grant, EMPG – Emergency Management Planning Grant | Benefit: L-Low, M-Medium, H-High | Cost: L-Low, M-Medium, H-High | Priority: L-Low, M-Medium, H-High |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Multi-Hazard Mitigation Action Items | | | | | | | | | | | | |
| MH-1 Develop and maintain a database to track community vulnerability (i.e., exposure in known hazard areas). | Planning and Building | 1-5 years | X | X | | | X | Y | HMGP, BRIC | M | M | L |
| MH-2 Identify the most at-risk critical facilities and evaluating potential mitigation techniques. | Planning and Building | 1-5 years | X | X | | | X | Y | HMGP, BRIC | M | M | L |
| MH-3 Incorporate risk assessment and hazard mitigation principles into comprehensive planning efforts. (Source: General Plan) | Planning and Building | Ongoing | X | X | | | X | Y | B | M | M | L |
| MH-4 Incorporate a hazard risk assessment and mitigation practices into local | Planning and Building | 3-5 years | X | X | | | X | Y | B | M | M | L |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| development and subdivision review processes. | | | | | | | | | | | | |
| MH-5 Adopt the International Building Code (IBC) and International Residential Code (IRC). | Planning and Building | Tri-Annual | X | X | | | X | Y | B | M | M | L |
| MH-6 Incorporate higher standards for hazard resistance in local application of the building code. | Planning and Building | 3-5 years | X | X | | | X | Y | B, HMGP, BRIC | M | M | L |
| MH-7 Provide advanced training to local building inspectors (ATC, SAP) | Planning and Building | Ongoing | X | X | | | X | Y | B | M | M | L |
| MH-8 Develop and implement a multi-hazard public awareness program. | Police, Planning and Building | Ongoing | | X | | | X | N | B, EMPG | M | L | M |
| MH-9 Encourage property owners to purchase hazard insurance not as an alternative to mitigation, but rather to add financial protection if damage does occur. | Police, Planning and Building | Ongoing | | X | | | X | N | B, EMPG | M | L | M |
| MH-10 Encourage residents to prepare by stocking up the necessary items and | Police, Planning and Building | Ongoing | | X | | | X | N | B, EMPG | M | L | M |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| planning for how family members should respond during a disaster. | | | | | | | | | | | | |
| MH-11 Provide hazard vulnerability checklists for homeowners to conduct their own inspections. | Police, Planning and Building | Ongoing | | X | | | X | Y | B, EMPG | M | L | M |
| MH-12 Reconstruct or retrofit City-owned buildings and infrastructure located in high-hazard areas. | Public Works | 1-5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| MH-13 Install permanent and quick-connect emergency generators and other power source hook-ups for City-owned buildings and infrastructure. | Public Works | 1-5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| MH-14 Purchase and install emergency shut off devices to water and gas distribution lines. | Public Works | 1-5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| MH-15 Install/Upgrade security camera systems at water resources division facilities to improve security and to make the division aware of intrusions. | Water Resources Division | 5 years | X | | | | | Y | B, CIP, HMGP, BRIC, EMPG | M | M | M |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| MH-16 Purchase generators for well and pump stations to ensure power to wells and reservoirs during disasters. | Water Resources Division | 5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |
| MH-17 Perform periodic (approximately every 10 years) water/sewer resource studies and master plans to identify deficiencies and deferred maintenance for the city's infrastructure systems, including cost estimates; develop nexus calculations to determine new development's fair share cost to upgrade infrastructure systems. (Reference: GP Public Services Element) | Public Works | Ongoing | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |
| MH-18 Increase police and fire staffing levels, improve police and fire facilities and equipment, and improve community safety services and programs. (Reference: GP Public Services Element) | Police, Orange County Fire | Ongoing | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |

| Mitigation Action Item | Lead Department | Timeline | Goal: Protect Life and Property | Goal: Public Awareness | Goal: Natural Systems | Goal: Emergency Services | Goal: Partnerships and Implementation | Buildings & Infrastructure: Does the Action item involve New and/or Existing Buildings and/or Infrastructure? Yes (Y), No (N) | Funding Source and Planning Mechanism: B – Budget, CIP – Capital Improvement Program, , HMGP- Hazard Mitigation Grant Program, BRIC – Building Resilient Infrastructure and Communities Grant, EMPG – Emergency Management Planning Grant | Benefit: L-Low, M-Medium, H-High | Cost: L-Low, M-Medium, H-High | Priority: L-Low, M-Medium, H-High |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MH-19 Update the Santa Ana River Vision Plan to expand opportunities to reintroduce natural elements, increase habitat, and provide more recreational opportunities. (Reference: GP Open Space Element) | Parks / Recreation & Community Services, Public Works | 2024 | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |
| MH-20 Explore the development of a climate adaptation plan to respond to the most significant potential climate change risks and vulnerabilities identified in the vulnerability assessment and protect the natural and built environment, residents, visitors, economic base, and quality of life. (Reference: GP Safety Element) | Planning and Building, Public Works | 2022 | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |
| MH-21 Compile and maintain a list of facilities that, because of population demands (such as mobility issues at a nursing home), construction type, location relative to a fault, or other factors, may have a high risk and require special response | Planning and Building, Orange County Fire | 2025 | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| during a geologic or seismic event. (Reference: GP Safety Element) | | | | | | | | | | | | |
| MH-22 Establish a low interest/cost loan program to seismically retrofit buildings on local Historic Register. (Reference: FP Historic Preservation Element) | Community Development | 2022 | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |
| Earthquake Mitigation Action Items | | | | | | | | | | | | |
| EQ-1 Support financial incentives, such as low interest loans or tax breaks, for home and business owners who seismically retrofit their structures. | Planning and Building | 1-5 years | | X | | X | X | Y | HMGP, BRIC, EMPG | M | M | M |
| EQ-2 Develop an inventory of private buildings that may be particularly vulnerable to earthquake damage, including pre-1940s homes and homes with cripple wall foundations. | Planning and Building | 1-5 years | | X | | X | X | Y | HMGP, BRIC, EMPG | M | M | M |
| EQ-3 Document information gathered through the development process on | Planning and Building | Ongoing | | X | | X | X | Y | B | M | M | M |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| geologic information on seismic sources, soil conditions, and related potential hazards. | | | | | | | | | | | | |
| EQ-4 Educate homeowners on safety techniques to follow during and after an earthquake. | Police, Planning and Building | Ongoing | | X | | | X | Y | B, EMPG | M | L | M |
| EQ-5 Educate homeowners about structural and non-structural retrofitting of vulnerable homes and encouraging retrofit. | Police, Planning and Building | Ongoing | | X | | | X | Y | B, EMPG | M | L | M |
| EQ-6 Develop an outreach program to encourage homeowners to secure furnishings, storage cabinets, and utilities to prevent injuries and damage. | Police, Planning and Building | Ongoing | | X | | | X | Y | B, EMPG | M | L | M |
| EQ-7 Conduct seismic retrofitting for critical City-owned buildings and infrastructure most at risk to earthquakes. | Public Works | 1-5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| EQ-8 Identify and harden critical lifeline systems (i.e., critical public services such as utilities and roads) to meet “Seismic Design | Public Works | 1-5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guidelines and Standards for Lifelines" or equivalent standards. | | | | | | | | | | | | |
| EQ-9 Strengthen and retrofit City-owned buildings and infrastructure with non-reinforced masonry and non-ductile concrete that are particularly vulnerable to ground shaking. | Public Works | 5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| EQ-10 Retrofit City-owned structures with veneers to prevent failure. | Public Works | 1-5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| EQ-11 Retrofit windows in City-owned structures with film to prevent injuries from shattered glass following an earthquake. | Public Works | 1-5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| EQ-12 Retrofit City-owned rooftop-mounted equipment (i.e., HVAC units, satellite dishes, etc.) with better anchoring. | Public Works | 1-5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| EQ-13 Seismic evaluation of reservoir and pump stations. | Water Resources Division | 5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | L | L | L |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| Flooding Mitigation Action Items | | | | | | | | | | | | |
| FLD-1 Due to potential for flood damage and overall security, relocate the main City of Santa Ana I.T. server room from City Hall Basement to the Police Department. | Information Technology | 2 years | X | | | | | Y | CIP | H | H | H |
| FLD-2 Improve drainage at City Hall loading dock. The loading dock has a 12-foot drop from street level. A poor drainage system and high rains in 2018 caused severe damage to basement. There are several key City services located on the basement level. Modifications would include increasing surface area of drain grates, increasing slope and piping size from grates to sump pumps and modifying curbs at the bottom of ramp to better utilize both drainage grates. | Public Works | Complete | X | | | X | | Y | CIP | H | L | H |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FLD-3 Improve the various significantly undersized existing City storm drain systems by installing additional drains, increasing capacity, or re-routing. | PWA | 5-10 years | | | | | | Y | HMP, BRIC, EMPG | H | H | H |
| FLD-4 City-owned facility will use porous pavement, vegetative buffers, and islands in large parking areas. (Source: NPDES) | Public Works, Planning and Building | Ongoing | | X | X | | X | Y | B | M | L | L |
| FLD-5 Encourage the use of permeable driveways and surfaces to reduce runoff and increase groundwater recharge. (NPDES) | Public Works, Planning and Building | Ongoing | | X | X | | X | Y | B | M | L | L |
| FLD-6 Fund and complete an update to the Master Water Quality Plan. | Public Works | 1-5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| FLD-7 Prepare and adopt a Storm Drain Master Plan. | Public Works | Completed 2018 | X | | | X | | Y | B | H | H | H |
| FLD-8 Increase dimensions of drainage culverts in flood-prone areas. | Public Works | Ongoing | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FLD-9 At City-owned facilities, perform regular drainage system maintenance, such as sediment and debris clearance, as well as detection and prevention of discharges into stormwater and sewer systems from home footing drains, downspouts, or sewer pumps. | Public Works | Ongoing | X | | | X | | Y | B | H | H | H |
| FLD-10 Floodproofing water and wastewater treatment facilities located in flood hazard areas. | Public Works | Ongoing | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| FLD-11 Install and/or upgrade stormwater pumping stations. Completed include First Street lift station and Civic Center lift stations. | Public Works | Complete | X | | | X | | Y | CIP | H | H | H |
| FLD-12 Installing back-up generators or other power sources for pumping and lift stations in sanitary sewer systems along with other measures (alarms, meters, remote controls, and switchgear upgrades). | Public Works | 1-5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FLD-13 Continue participation in NPDES (National Pollutant Discharge Elimination System). Seek funding for administrative, engineering, and construction aspects of compliance. | Public Works | Ongoing | X | X | X | X | X | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |
| FLD-14 As per the Storm Drain Master Plan (2018), seek funding and implement the "Top 10 Capital Improvement Projects" including:<br>1. Greenville-Banning subarea 18 improvements<br>2. Gardens subareas 18, 19 & 20 improvements<br>3. Delhi subarea 1 improvements<br>4. Gardens subarea 14 improvements<br>5. Delhi subareas 16, 17 & 18 improvements<br>6. Delhi subarea 40 improvements<br>7. Delhi subarea 2 improvements<br>8. Santa Fe Grand subarea 3 improvements<br>9. Wintersburg subarea 15 improvements | Public Works | 1-20 years | X | X | X | X | X | Y | B, CIP, HMGP, BRIC, EMPG | H | H | H |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10. Santa Fe subarea 1 (2 of 2) improvements | | | | | | | | | | | | |
| FLD-15 Redesign or reengineer sewer lift stations to prevent flooding inside stations. If flooding occurs, limited ability to pump sewage. | Water Resources Division | 5 years | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | M | H | M |
| Epidemic / Pandemic / Vector-Borne Disease Mitigation Action Items | | | | | | | | | | | | |
| EPV- 1 Partner with County of Orange Vector Control to develop and maintain a public information campaign to educate residents and businesses on vector-borne hazards and mitigation measures. | Public Works | Ongoing | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | M | H | M |
| EPV-Continue to work with County of Orange Vector Control for mosquito abatement projects aimed at protecting the City. | Public Works | Ongoing | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | M | H | M |

| Climate Change Mitigation Action Items | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CC-1 Organize outreach to vulnerable populations, including establishing and promoting accessible heating or cooling centers in the community. | Parks / Recreation & Community Services | 1-5 years | X | | | X | | Y | B | M | M | M |
| CC-2 In private and public spaces, encourage installation of green roofs, which provide shade and remove heat from the roof surface and surrounding air. | Planning and Building | 1 year | | X | | | X | Y | B | M | L | M |
| CC-3 Increasing tree plantings around buildings to shade parking lots and along public rights- of-way. | Public Works | Ongoing | X | | X | | | Y | B, CIP, HMGP, BRIC, EMPG | M | M | M |
| CC-4 In private and public spaces, use cool roofing products that reflect sunlight and heat away from a building. | Public Works | Ongoing | X | | X | | | Y | B, CIP, HMGP, BRIC, EMPG | M | M | M |
| CC-5 Investigate, fund, and install solar panels and battery back-ups for all City-owned buildings. | Public Works | 1-5 years | X | | X | | | Y | B, CIP, HMGP, BRIC, EMPG | M | M | M |
| CC-6 Review and update the City's Climate Action Plan | Public Works | 2025 | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |
| CC-9 Update Citywide Design Guidelines to incorporate energy conservation principles, including passive heating and cooling, siting, shading, and material choices. Provide examples of site plans that illustrate energy conservation principles. (Reference: GP Conservation Element) | Planning and Building | 2022 | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |
| CC-10 Support and encourage retrofitting existing buildings to achieve energy optimization. Partner with Southern California Edison and other stakeholders to provide incentives, rebates, and expedited permitting for energy retrofit projects and to make residents, property owners, and businesses | Planning and Building, Public Works | Ongoing | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| aware of such programs. (Reference: GP Conservation Element) | | | | | | | | | | | | |
| CC-11 Reduce the amount of carbon dioxide that would otherwise be released into the atmosphere through the continued maintenance and expansion of the city's urban forest and development of other green infrastructure. Explore options to include green infrastructure requirements in new public realm plans. (Reference: GP Conservation Element) | Public Works | Ongoing | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |
| CC-12 Establish and maintain a clearinghouse of information on available funding alternatives for renewable energy projects, rates of return, and other information to support developers and community members interested in pursuing renewable energy projects. (Reference: GP Conservation Element) | Public Works, Community Development | 2022 | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |
| CC-13 Create educational programs to sustain public awareness of the importance of resource conservation (e.g., energy, water, and open space), the continued existence of long-term resource demand challenges, and specific conservation tactics that are recommended. (Reference: GP Conservation Element) | Public Works | 2022 | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |
| CC-14 Provide educational outreach materials for residents and businesses on proper water use and other water conservation practices. (Reference: GP Conservation Element) | Public Works | Ongoing | | | | | | | | | | |
| CC-15 Promote awareness of the City Landscape and Parkway Improvement Guidelines to require public projects and new private development to incorporate drought- | Public Works, Planning and Building | 2022 | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| tolerant landscaping. Continue to encourage drought-tolerant retrofits through the Turf Removal Rebate Program and educate property owners about incentives available through the SoCal Water$mart program to public and private property owners for planting native or drought-tolerant vegetation. (Reference: GP Conservation Element) | | | | | | | | | | | | |
| CC-16 Pursue funding to implement the first phase of the City of Santa Ana Recycled Water Master Plan, with an emphasis on local water recycling programs and cooperation with regional water recycling efforts. (Reference: GP Conservation Element) | Public Works | 2023 | X | | | X | | Y | B, CIP, HMGP, BRIC, EMPG | H | M | H |

# 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 \| A6a. |
|---|
| Q: Does the plan identify how, when, and by whom the plan will be monitored (how will implementation be tracked) over time? (Requirement §201.6(c)(4)(i))<br>A: See Local Mitigation Officer and Method and Scheduling of Plan Implementation below. |

## *Local Mitigation Officer*

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 Planning Team Chair Steve Rhyner who will be referred to as the 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 the 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 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. The Local Mitigation Officer or designee will be responsible for contacting the Planning Team members and organizing the annual meeting which will take place annually during the month of the Plan's approval.

## Method and Scheduling of Plan Implementation

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

## Monitoring and Implementing the Plan

### *Plan Adoption*

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 Office of Emergency Services (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, the City will gain eligibility for Hazard Mitigation Grant Program funds.

| Q&A \| ELEMENT A: PLANNING PROCESS \| A6a. |
|---|
| Q: Does the plan identify how, when, and by whom the plan will be monitored (how will implementation be tracked) over time? (Requirement §201.6(c)(4)(i))<br>A: See Monitoring the Plan below. |

## *Monitoring the Plan*

The Local Mitigation Officer will hold an annual meeting with representatives from the coordinating agencies in order to gather status updates on the mitigation action items. 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. See the Annual Implementation Report discussed below which will be a valuable tool for the Planning Team to measure the success of the Hazard Mitigation Plan. The focus of the annual meeting will be on the progress and changes to the Mitigation Action Items.

| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C6a. |
|---|
| Q: Does the plan identify the local planning mechanisms where hazard mitigation information and/or actions may be incorporated? (Requirement §201.6(c)(4)(ii))<br>A: See Implementation through Existing Programs below. |
| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C6b. |
| Q: Does the plan describe each community's process to integrate the data, information, and hazard mitigation goals and actions into other planning mechanisms? (Requirement §201.6(c)(4)(ii))<br>A: See Implementation through Existing Programs below. |
| Q&A \| ELEMENT C. MITIGATION STRATEGY \| C6c. |
| Q: The updated plan must explain how the jurisdiction(s) incorporated the mitigation plan, when appropriate, into other planning mechanisms as a demonstration of progress in local hazard mitigation efforts. (Requirement §201.6(c)(4)(ii))<br>A: See Implementation through Existing Programs below. |

## *Implementation through Existing Programs*

The City addresses statewide planning goals and legislative requirements through the General Fund, Capital Projects, and Grants. 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 will implement recommended mitigation action items through existing programs and procedures.

The City is responsible for adhering to the State of California's Building and Safety Codes. In addition, the City may 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 strategic and other budget documents. The various departments involved in developing the Plan will review it on an annual basis. During the review, the Planning Team will ensure the Mitigation Plan action items are consistent with the City's strategic and budget documents to ensure the Mitigation Plan goals and action items are implemented in a timely fashion.

Upon FEMA approval, the Planning Team will begin the process of incorporating risk information and mitigation action items into existing planning mechanisms. The annual 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 the City's planning documents and procedures.

Specifically, the Planning Team will utilize the updates of the following documents to implement the Mitigation Plan:

- ✓ Risk Assessment, City Profile, Planning Process (stakeholders) – Emergency Operations Plan, General Plan
- ✓ Mitigation Actions Matrix – General Fund, Capital Projects, Grants, Bonds

## *Annual Implementation Report*

The Annual Implementation Matrix is the same as the Mitigation Actions Matrix but with a column added to track the annual status of each Action Item. Upon approval and adoption of the Plan, the entire Annual Implementation Report will be added to the Appendix of the Plan. Following is a view of the Annual Implementation Matrix:

An equal part of the monitoring process is the need to maintain a strategic planning process which needs to include funding and organizational support. In that light, at least one year in advance of the FEMA-mandated 5-year submission of an update, the Local Mitigation Officer will convene the Planning Team to discuss funding and timing of the update planning process. On the fifth year of the planning cycles, the Planning Team will broaden its scope to include discussions and research on all of the sections within the Plan with particular attention given to goal achievement and public participation.

## *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.

## Evaluating and Updating the Plan

| Q&A \| ELEMENT A: PLANNING PROCESS \| A6b. |
|---|
| Q: Does the plan identify how, when, and by whom the plan will be evaluated (assessing the effectiveness of the plan at achieving stated purpose and goals) over time? (Requirement §201.6(c)(4)(i))<br>A: See Evaluation below. |

### *Evaluation*

At the conclusion of the Annual Implementation Meeting, the Local Mitigation Officer will lead a discussion with the Planning Team on the success (or failure) of the Mitigation Plan to meet the plan goals. The results of that discussion will be added to the Evaluation portion of the Annual Implementation Report and inclusion in the 5-year update to the Plan. Efforts will be made immediately by the Local Mitigation Officer to address any failed plan goals.

| Q&A \| ELEMENT A: PLANNING PROCESS \| A6c. |
|---|
| Q: Does the plan identify how, when, and by whom the plan will be updated during the 5-year cycle? (Requirement §201.6(c)(4)(i))<br>A: See Formal Update Process below. |

### *Formal Update Process*

As identified above, the Mitigation Action Items will be monitored for status on an annual basis as well as an evaluation of the Plan's goals. The Local Mitigation Officer or designee will be responsible for contacting the Planning Team members and organizing the annual meeting which will take place annually during the month of the Plan's approval. Planning Team members will also be responsible for participating in the formal update to the Plan every fifth year of the planning cycle.

The Planning Team will begin the update process with a review of the plan's goals and mitigation action items to determine their relevance to changing situations within 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 Plan's Risk Assessment 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, including the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised. Amendments and updates will be made to the Mitigation Actions Matrix and other sections in the Plan as deemed necessary by the Planning Team.

| Q&A \| ELEMENT A: PLANNING PROCESS \| A5 |
|---|
| Q: Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))<br>A: See Continued Public Involvement below. |

### *Continued Public Involvement*

The City is dedicated to involving the public directly in the continual review and updates to the Mitigation Plan. Copies of the plan will be made available at City Hall and on the City website.

The existence and location of these copies will be publicized in City Newsletters and on the website. This site will also contain an email address and phone number where people can direct their comments and concerns. At the discretion of the Local Mitigation Officer, a public meeting may be held after the Annual Implementation Meeting. The meeting would provide the public a forum in which interested individuals and/or agencies could express their concerns, opinions, or ideas about the plan.

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

# Attachments

## FEMA Letter of Approval

# City Council Resolution

# Web Posting of Second Draft Plan

# Email Sample to External Agencies

## Secondary Stakeholders Involvement

| Date Invited to Provide Input or Input Gathered | Agency Represented, Name, Position Title | Information Received | How Information was Incorporated into Plan |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# Planning Team Sign-In Sheet: Meeting 1 – January 13, 2021

**City of Santa Ana**
**Hazard Mitigation Plan**
**Planning Team Meeting #1**
**January 13, 2021**
**(Note: Virtual meeting so initials entered electronically)**

| Name | Initials |
|---|---|
| Waldo Barela | WB |
| Steve Horner | SH |
| Jason Kwak | JK |
| Ricardo Soto | RS |
| Richard (Joe) Weber | RW |
| Steve Rhyner | SR |
| Tyrone Chesanek | TC |
| Phil Neff | PN |
| Ruben Castaneda | RC |
| Bryan Lopez | BL |
| Camille Boden | CB |
| Kevin Phillips | KP |

*Emergency Planning Consultants*

**City of Santa Ana**
**Hazard Mitigation Plan**
**Planning Team Meeting #1**
**January 13, 2021**
**(Note: Virtual meeting so initials entered electronically)**

| Name | Initials |
|---|---|
| Sagar Patel | SP |
| Jannine Wilmoth | JW |
| Carolyn Harshman | CH |

*Emergency Planning Consultants*

# Planning Team Sign-In Sheet: Meeting 2 – January 27, 2021

**City of Santa Ana**
**Hazard Mitigation Plan**
**Planning Team Meeting #2**
**January 27, 2021**
**(Note: Virtual meeting so initials entered electronically)**

| Name | Initials |
|---|---|
| Waldo Barela | WB |
| Jason Kwak | JK |
| Anson So | AS |
| Ricardo Soto | RS |
| Steve Rhyner | SR |
| Tyrone Chesanek | TC |
| Phil Neff | PN |
| Ruben Castaneda | RC |
| Bryan Lopez | BL |
| Daisy Perez | DP |
| Carolyn Harshman | CH |

*Emergency Planning Consultants*

# Planning Team Sign-In Sheet: Meeting 3 – February 10, 2021

**City of Santa Ana**
**Hazard Mitigation Plan**
**Planning Team Meeting #3**
**February 10, 2021**
**(Note: Virtual meeting so initials entered electronically)**

| Name | Initials |
|---|---|
| Waldo Barela | WB |
| Steve Horner | SH |
| Jason Kwak | JK |
| Ricardo Soto | RS |
| Steve Rhyner | SR |
| Tyrone Chesanek | TC |
| Phil Neff | PN |
| Ruben Castaneda | RC |
| Bryan Lopez | BL |
| Craig Foster | CF |
| Carolyn Harshman | CH |

*Emergency Planning Consultants*

# Planning Team Sign-In Sheet: Meeting 4 – February 24, 2021

**City of Santa Ana**
**Hazard Mitigation Plan**
**Planning Team Meeting #4**
**February 24, 2021**
**(Note: Virtual meeting so initials entered electronically)**

| Name | Initials |
|---|---|
| Daisy Perez | DP |
| Waldo Barela | WB |
| Jason Kwak | JK |
| Anson So | AS |
| Richard (Joe) Weber | RW |
| Steve Rhyner | SR |
| Tyrone Chesanek | TC |
| Phil Neff | PN |
| Ruben Castaneda | RC |
| Bryan Lopez | BL |
| Carolyn Harshman | CH |

*Emergency Planning Consultants*

## Planning Team Sign-In Sheet: Meeting 5 – March 31, 2021

**City of Santa Ana**
**Hazard Mitigation Plan**
**Planning Team Meeting #5**
**March 31, 2021**
**(Note: Virtual meeting so initials entered electronically)**

| Name | Initials |
|---|---|
| Waldo Barela | WB |
| Ruben Castaneda | RC |
| Jason Kwak | JK |
| Bryan Lopez | BL |
| Phil Neff | PN |
| Anson So | AS |
| Ricardo Soto | RS |
| Steve Rhyner | SR |
| Carolyn Harshman | CH |

## Planning Team Sign-In Sheet: Meeting 6 – April 14, 2021

**City of Santa Ana**
**Hazard Mitigation Plan**
**Planning Team Meeting #6**
**April 14, 2021**
**(Note: Virtual meeting so initials entered electronically)**

| Name | Initials |
|---|---|
| Waldo Barela | WB |
| Ruben Castaneda | RC |
| Jason Kwak | JK |
| Bryan Lopez | BL |
| Phil Neff | PN |
| Anson So | AS |
| Ricardo Soto | RS |
| Steve Rhyner | SR |
| Carolyn Harshman | CH |