

CITY OF BUENA PARK



LOCAL HAZARD MITIGATION PLAN

December 2022
(Updated July 2025)

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PART I: BACKGROUND

1. CREDITS

Mitigation Planning Team

Agency	Name	Department	Position
City of Buena Park	Lance Charnes, Chair	Police Department	Emergency Services Coordinator
	Eddie Fenton	City Manager's Office	Assistant City Manager
	Swati Meshram / Ian McAleese	Community & Economic Development Department	Planning Division Manager / Associate Planner
	Mark Saucedo	Community Services Department	Community Services Supervisor
	Sung Hyun	Finance Department	Finance Director
	Sergio Lepe	Police Department	Detective Sergeant
	Deepthi Arabolu	Public Works	Principal Engineer
Orange County Fire Authority	Steve Dohman	Division 7	Division Chief
	Erik Miranda	Division 7	Battalion Chief
	Michael Yeun	Division 7	Administrative Captain

City of Buena Park City Council

- Art Brown, Mayor
- Susan Sonne, Mayor Pro Tem
- Joyce Ahn
- Jose Trinidad Castaneda
- Connor Traut

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Note: The City of Buena Park, the County of Orange, the Federal Emergency Management Agency (FEMA), and authoritative public Internet sources originated the maps in this plan. While the City considers the sources to be reliable, it provides these maps "as is." The City can't accept any responsibility for any errors, omissions, or positional accuracy; therefore, these maps come with no warranties. Although these maps may have used information from land surveys, this Plan in no way represents or constitutes a land survey. You should field-verify information on this product before using it to make any decisions.

Mandated Contents

To assist the reader and reviewer of this document, the City has flagged the mandated contents identified in the [Disaster Mitigation Act of 2000](#) (Public Law 106-390). Below is an example of those references inserted as footnotes throughout this Plan.

EXAMPLE

ELEMENT A: PLANNING PROCESS | A1

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



2. EXECUTIVE SUMMARY

The City of Buena Park (“the City,” “us,” or “we”) prepared this Local Hazard Mitigation Plan (“the Plan,” or LHMP) to comply with Public Law 106-390, the *Disaster Mitigation Act of 2000* (DMA 2000)¹. DMA 2000 requires state and local governments to prepare mitigation plans to document their mitigation planning process, and to identify hazards, potential losses, mitigation needs, goals, and strategies. This type of planning supplements the City’s comprehensive emergency management program.

Under DMA 2000, each state and local government must have a federally approved mitigation plan to be eligible for hazard mitigation grant funding.² **This Plan updates the mitigation plan we first prepared for the City in 2016-7.**

DMA 2000 means to help state and local governments work together by facilitating cooperation. Through collaboration, we can identify mitigation needs before disasters strike, resulting in faster allocation of resources and more effective risk-reduction projects.

This Plan uses these Federal Emergency Management Agency (FEMA) definitions:

- **Hazard Mitigation:** “Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.”
- **Planning:** “The act or process of making or carrying out plans; specifically, the establishment of goals, policies, and procedures for a social or economic unit.”

2.1. Mitigation Planning Benefits

Planning ahead helps residents, businesses, and government agencies effectively respond when disasters strike. It also keeps public agencies eligible for Hazard Mitigation Grant Program (HMGP) funding. The long-term benefits of mitigation planning include:

- Greater understanding of hazards faced by our community
- Use of limited resources on hazards posing the greatest threat to our community
- Financial savings through partnerships for planning and mitigation
- Reduced long-term impacts and damages to human health and structures, and lower repair costs
- More sustainable, disaster-resistant communities

2.2. Hazards and Land-Use Policy in California

Planning for hazards should be an integral element of any city’s land-use planning program. All California cities and counties have General Plans and implementing ordinances; these are required to comply with statewide land-use planning regulations.

¹ ELEMENT A: PLANNING PROCESS | A1

A1. Does the Plan list the jurisdiction(s) participating in the Plan that are seeking approval? (Requirement §201.6(b)(1))

² FEMA, 2002, *Getting Started, Building Support for Mitigation Planning*, FEMA 386-1.



Local and state officials face a continuing challenge in keeping the network of local plans effective in responding to the changing conditions and needs of California's diverse communities, particularly in light of the very active seismic region in which we live.

Planning for hazards requires a thorough understanding of the various hazards facing the City and region as a whole. It's also important to take an inventory of the structures and contents of various City holdings. These inventories should include the catalog of hazards facing the City, the built environment at risk, the personal property that hazards may damage, and most of all, the people who live in the shadow of these hazards.

2.3. Support for Hazard Mitigation

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

Some of the key agencies include:

- **California Governor's Office of Emergency Services** (Cal OES) is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds after a major disaster declaration.
- **Southern California Earthquake Center** (SCEC) gathers information about earthquakes, integrates information on earthquake phenomena, and communicates this data to end-users and the public to increase earthquake awareness, reduce economic losses, and save lives.
- **California Department of Forestry and Fire Protection** (CAL FIRE) is responsible for all aspects of wildland fire protection on private and state properties. It administers forest practices regulations, including landslide mitigation, on non-federal lands.
- **California Geological Survey** (CGS) is responsible for geologic hazard characterization, public education, and the development of partnerships aimed at reducing risk within the state.
- **California Department of Water Resources** (DWR) plans, designs, constructs, operates, and maintains the State Water Project, regulates dams, provides flood protection, and assists in emergency management. It also educates the public and serves local water needs by providing technical assistance to water and reclamation districts.
- **FEMA** provides hazard mitigation guidance, resource materials, and educational materials to support implementation of the capitalized DMA 2000.
- **U. S. Census Bureau** (USCB) provides demographic data on the populations affected by natural disasters.
- **U. S. Department of Agriculture** (USDA) provides data on matters pertaining to land management.
- **U. S. Geological Survey** (USGS) is responsible for geologic hazard characterization, public education, and the development of partnerships aimed at reducing risk throughout the nation.
- **U.S. Army Corps of Engineers** (USACE) builds, maintains, and operates dams and flood-control facilities throughout the country. It operates a number of dams in Southern California.



2.4. How is the Plan Organized?

This Plan's structure enables you to go directly to subjects that interest you. It also allows the City to review and update sections when new data is available. The ease of incorporating new data into the plan will result in a Mitigation Plan that remains current and relevant to the City.

Following is a brief description of each section of the Plan.

Part I: Background

1.0. Credits

2.0. Executive Summary

The Executive Summary provides a very general overview of mitigation planning, the planning process, and the steps involved in implementing the plan.

3.0. Introduction

The Introduction describes the background and purpose of developing the Mitigation Plan for the City.

4.0. Community Profile

The section presents the history, geography, demographics, and socioeconomics of the City of Buena Park. It provides valuable information on the demographics and history of the region.

Part II: Hazard Analysis

5.0. Risk Assessment

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

6.0-10.0. Hazard-Specific Sections

This Plan addresses hazard-specific analysis on four chronic hazards facing the City. *Chronic hazards* occur with some regularity and may be predicted through historic evidence and scientific methods. These chronic hazards are:

- 6.0. Earthquake
- 7.0. Cyberterrorism
- 8.0. Urban Fires
- 9.0. Dam failure
- 10.0. Drought

Each hazard-specific section includes information on the history, causes, characteristics, and assessment of each hazard.

Part III: Mitigation Strategies

11.0. Overview of Mitigation Strategy

This section highlights the Mitigation Actions Matrix and (1) past accomplishments, (2) planning approach, (3) goals and objectives, (4) identification, analysis, and implementation of mitigation activities, (5) prioritized mitigation activities, and (6) next steps.



12.0. Planning Process

This section describes the mitigation planning process, including (1) Planning Team involvement, (2) extended Planning Team support, (3) public and other stakeholder involvement, and (4) integration of existing data and plans.

13.0. Plan Maintenance

This section provides information on plan implementation, monitoring, and evaluation.

Part IV: Appendix

The Plan's appendices provide you with additional information to help you understand the Plan's contents, as well as potential resources to help you with implementation.

2.5. City of Buena Park and Hazard Mitigation

The potential impact of hazards associated with the City's location, population centers, and varying terrain make the environment and population vulnerable to disaster situations. The City is subject to natural hazards such as earthquakes, floods, and drought, as well as technological hazards such as hazardous materials spills, transportation accidents, dam failures, and utility outages. We can assess any disaster scenario only through careful planning and collaboration with other public agencies, private sector organizations, and City residents to make it possible to minimize loss.

Since the City's founding in 1887, its residents have experienced numerous disasters and hazardous conditions. Photographs, diaries, and newspapers demonstrate that residents of the area have experienced earthquakes, flooding, drought, and other major emergencies.

When Buena Park was a sparsely populated agrarian community, the local hazards adversely affected the lives of the residents who depended on the land and climate conditions for food and welfare. Today, as the population density grows within what's now an entirely urban city, the exposure to hazards (natural and otherwise) creates a greater risk than previously experienced.

2.6. Mitigation Planning

As the cost of damage from disasters continues to increase nationwide, we recognize the importance of identifying effective ways to reduce vulnerability to disasters. Mitigation plans help us reduce risk from hazards by identifying resources, information, and strategies for risk reduction, while helping to guide and coordinate mitigation activities throughout the City.

This Plan provides a set of action items to reduce risk from hazards, ranging from education to large-scale capital projects. The Plan also provides for the implementation of preventative activities, including programs that restrict and control development in areas subject to damage from hazards.

The resources and information within the Mitigation Plan:

- Establish a basis for coordination and collaboration among City agencies and the public
- Identify and prioritize future mitigation projects
- Assist in meeting the requirements of federal assistance programs



The Mitigation Plan has incorporated findings and recommendations from other City plans, including the Buena Park *Emergency Operations Plan*, Buena Park *General Plan 2010*, *General Plan Environmental Impact Report*, *Master Water Plan*, *Sewer Master Plan*, *Master Drainage Plan*, and *Capital Improvement Plan*. Next updates of those documents will include mentions of and integration with the Mitigation Plan.

Mitigation Plan Jurisdiction and Scope

This Mitigation Plan affects the area within the City's boundaries, with emphasis on City-owned facilities and land. It provides a framework for planning for natural, technological, and human-caused hazards. The resources and background information in the Plan addresses existing and future land development throughout the City.

Risk Assessment

Risk assessment is the identification of risks posed by a hazard and the corresponding impacts to the community. This process involves five steps:

- Identify hazards
- Profile hazards
- Inventory critical assets
- Assess risks
- Assess vulnerability of future development

Although the DMA 2000 requirements apply only to natural hazards, the Planning Team felt it was important to also identify, profile, assess, and mitigate technological and human-caused hazards.

Mitigation Goals

The risk assessment and public input involve a review of past mitigation actions, future goals, and appropriate mitigation strategies. The Planning Team identified five mitigation goals that summarize the hazard reduction outcome the City wants to achieve:

- Protect life and property
- Enhance public awareness
- Preserve natural systems
- Encourage partnerships and implementation
- Strengthen emergency services

These goals guided the development and implementation of specific mitigation activities. Many of the mitigation objectives and action items come from current programs. We emphasized the effectiveness of the activities with respect to their estimated cost.

Mitigation Planning Process

The 2022 LHMP Planning Team included members representing different City departments—and sometimes specific divisions within those departments—with a role in mitigation efforts. The Planning Team met and identified characteristics and consequences of natural hazards with significant potential to affect the City.

The Planning Team developed hazard mitigation strategies and goals through gaining an understanding of the risks posed by the identified hazards. The Team also identified current and



future hazard mitigation activities and priorities, including scenarios for both present and future conditions. We will implement the final Mitigation Plan through various projects, changes in day-to-day City operations, and through continued hazard mitigation development.

Public Input³

The City made Plan-related documents available to the public during the update process. The Planning Team presented overviews of the mitigation planning process and hazard analyses at Whole Community Working Group meetings on **August 8 and September 14, 2022**. Invitees included representatives from schools/districts, fire/EMS, healthcare, disability, access and functional needs experts and advocates, non-governmental and community-based organizations, private sector businesses and industry, and religious organizations.

Participating Organizations

In addition to the Whole Community Working Group, the Planning Team invited several external agencies to review the draft Plan update during the revision phase. A number of external organizations also reviewed the draft Mitigation Plan before the City Council public meeting.

Plan Review

The Planning Team reviewed the first draft Plan update when it was completed. Following that review, the team sent an email invitation to the Whole Community Working Group members along with a link to the Plan posted on the City's website. Simultaneously, we invited external organizations via email to review the plan and provide input. The Planning Team incorporated all pertinent reviewer comments in the second draft Plan update, which we then forwarded to Cal OES and FEMA for review and conditional approval pending adoption by the City Council.

Plan Adoption⁴

The Planning Team presented the **2022** Mitigation Plan to the City Council for adoption on **December 13, 2022**. A copy of the City Council resolution is located in [Plan Approval](#) (page **177**).

Plan Approval

Following the City Council adoption, the City submitted the Final Draft Plan to FEMA with a request for approval. FEMA issued a final approval on **December 20, 2022**. A copy of the FEMA Letter of Approval is located in [Plan Approval](#) (page **174**).

Point of Contact

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

³ ELEMENT A: PLANNING PROCESS | A3

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

⁴ ELEMENT E: PLAN ADOPTION | E1

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



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2.7. Plan Maintenance

Mitigation planning is an ongoing process. It involves changes as the area develops, as new hazards arise, and as we learn more about existing hazards and their impacts. The Planning Team will monitor changing conditions, help implement mitigation activities, annually review the plan to determine if City goals are being met, and provide an update to Cal OES and FEMA every five years. The Planning Team will also review after-action reports generated after any disaster that affects the City and revise the Mitigation Plan as needed.



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3. INTRODUCTION

Founded in 1887 and incorporated in 1953, most people think of the City of Buena Park, with its many attractions, as a tourist destination. It's also a vibrant residential community with a population of over 83,000 and an industrious business community. Buena Park is the 103rd most populous city in California⁵. It offers the benefits of living in a Mediterranean type of climate and shares with its neighbors the attractive geography that makes the area so popular. However, the potential impacts of hazards associated with the terrain make the environment and population vulnerable to various disasters⁶.

Based on history, development, and geology, Buena Park is subject to a number of hazards.

- Blackouts and other utility interruptions
- **Cybercrime and cyberterrorism**
- Dam failures
- Domestic and international terrorism
- Drought
- Earthquakes
- Flooding
- Hazardous materials releases
- Serious transportation accidents involving trains, aircraft, or heavy trucks
- Severe heat
- **Urban fire**

There's no way we can predict exactly when any of these disasters will occur, or how exactly they'll affect the City. However, with careful planning and collaboration among public agencies, private-sector organizations, and our residents, we *can* minimize the losses that can result from these disasters.

3.1. Why Develop a Mitigation Plan?

As the costs of damage from disasters continue to increase, the City realizes the importance of identifying effective ways to reduce its vulnerability to disasters. Our **Local Hazard Mitigation Plan** (LHMP) gives us a set of action items to reduce risks from hazards through education and outreach programs, foster the development of partnerships, accomplish capital improvements in the built environment, and implement preventative activities (such as land-use programs) that restrict and control development in areas subject to damage from hazards.

The resources and information within the LHMP:

- Establish a basis for coordination and collaboration among City agencies and the public
- Identify and prioritize future mitigation projects
- Help meet federal assistance program requirements

⁵ [California Demographics by Cubit](#), 2022.

⁶ City of Buena Park General Plan.



The LHMP works along with other City plans, including the City's *General Plan*, *Emergency Operations Plan*, and *General Plan Environmental Impact Report*.

3.2. Why Plan for Hazards?

Hazards affect Buena Park's residents, businesses, property, environment, and economy. They expose the City to the financial and emotional costs of recovery. The risk associated with hazards increases as more people move to areas affected by hazards.

Even in communities such as Buena Park that are essentially "built-out" (have little or no vacant land remaining for development), population density continues to increase when existing lower-density residential and non-residential development is replaced with medium- and high-density residential development projects. Even if the severity of the hazard does not change, its impact will grow as more people move into harm's way.

The inevitability of hazards, and the growing population and activity within the City, create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future hazard events. Identifying the risks posed by hazards, and developing strategies to reduce the impact of a hazard, can help protect life and property. Residents and businesses can work together with the City to create a Mitigation Plan that addresses potential hazard impacts.

3.3. Hazard Mitigation Legislation

Hazard Mitigation Grant Program

In 1974, Congress enacted the Robert T. Stafford Disaster Relief and Emergency Act, commonly referred to as the Stafford Act. In 1988, Congress established the **Hazard Mitigation Grant Program** (HMGP) via Section 404 of the Stafford Act. Regulations regarding HMGP implementation based on the DMA 2000 were initially changed by an Interim Final Rule (44 CFR Part 206, Subpart N) published in the Federal Register on February 26, 2002. A second Interim Final Rule was issued on October 1, 2002.

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

In California, Cal OES administers the HMGP. Examples of typical HMGP projects include:

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



Building Resilient Infrastructure and Communities

Section 203 of the Stafford Act (as amended by Section 102 of the DMA 2000) authorizes the Building Resilient Infrastructure and Communities (BRIC) grant program. The BRIC Fund makes federal funds available to states, U.S. territories, federally recognized tribal governments, and local communities for hazard mitigation activities.

Starting in Fiscal Year 2021, the BRIC grant program funded two types of activities.

- Capacity and capability activities enhance the knowledge, skills, and expertise of the current workforce, to expand or improve the administration of hazard mitigation assistance.
- Hazard mitigation projects are cost-effective projects designed to:
 - Increase resilience and public safety
 - Reduce injuries and loss of life
 - Reduce damage and destruction to property, critical services, facilities, and infrastructure from natural hazards ⁷.

Flood Mitigation Assistance Program

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

Planning, project, and technical assistance grants are available under FMA:

- *Planning grants* are available to states and communities to prepare flood mitigation plans.
- NFIP-participating communities with approved Flood Mitigation Plans can apply for *project grants* to implement measures to reduce flood losses.
- *Technical assistance grants* consisting of ten percent of the project grant are available to the state for program administration.

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

Craig Fugate,
former FEMA Director

Communities that receive planning or project grants must participate in the NFIP. Examples of eligible projects include elevation, acquisition, and relocation of NFIP-insured structures⁸.

Disaster Mitigation Act of 2000

President Clinton signed Public Law 106-390 (DMA 2000) on October 30, 2000. Section 322 primarily deals with the development of mitigation plans. The mitigation planning requirements are implemented via 44 CFR Part 201.6.

⁷ https://www.fema.gov/sites/default/files/documents/fema_fy22-bric-nofo-fact-sheet_08122022.pdf.

⁸ <http://www.fema.gov/fima/fma.shtm>.



DMA 2000 established a national program for pre-disaster mitigation, streamlined disaster relief at the federal and state levels, and controlled federal disaster assistance costs. Congress believed these requirements would produce the following benefits:

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

Under DMA 2000, state, tribal, and local governments (city, county, and special district) must develop a mitigation plan to be eligible to receive HMGP funds. Every mitigation plan must be reviewed by the state and approved by FEMA, and should address the following items:

- Plan promulgation
- Planning process, including public involvement
- Hazard identification and risk assessment
- Mitigation strategy
- Plan implementation and maintenance
- Specific state requirements

3.4. State and Federal Support

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

Cal OES is the lead agency for mitigation planning support to local governments. In addition, FEMA offers grants, tools, and training.

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

- DMA 2000 (Public Law 106-390, October 10, 2000)
- *Using HAZUS-MH for Risk Assessment* (FEMA 433), August 2004
- *FEMA Local Mitigation Planning Handbook*, March 2013
- *Integrating Historic Property and Cultural Resource Considerations into Mitigation Planning* (FEMA 386-6)
- FEMA *Report on Costs and Benefits of Natural Hazard Mitigation*, 1996
- *G-318 Local Mitigation Planning Virtual Workshop Resource Library*, Cal OES

3.5. Hazards U.S. – Multi-Hazard

In 1997, FEMA developed a standardized model for estimating losses caused by an earthquake. Hazards U.S. (HAZUS) addressed the need for more effective national, state, and local planning and the need to identify areas that face the highest risk and potential for loss.

Hazards U.S. Multi-Hazard (HAZUS-MH) provides models to estimate potential losses from floods (coastal and riverine) and winds (hail, hurricane, tornado, tropical cyclone, and thunderstorm).



HAZUS-MH applies engineering and scientific risk calculations developed by hazard and information technology experts to provide defensible damage and loss estimates. This methodology provides a consistent framework for assessing risk across a variety of hazards.

HAZUS-MH uses geographic information system technology to produce maps and analytical reports on physical damage to building stock, critical facilities, transportation systems, and utilities. The damage reports cover induced damage (debris, fire, hazardous material, and inundation) and direct economic and social losses (casualties, shelter requirements, and economic impacts), promoting standardization.

The City looked at HAZUS during the development of this Plan. However, well-known quality deficits in both the standard datasets and the geotechnical modeling rendered the earthquake-related HAZUS results suspect, so we didn't use them for more detailed planning.

3.6. Whom Does the Mitigation Plan Affect?⁹

The LHMP affects the areas within the City's boundaries and City-owned facilities and land. The resources and background information in the Plan are applicable citywide and to City-owned facilities outside the City's boundaries. This Plan provides a framework for planning for natural, technological, and human-caused hazards in conjunction with our neighboring cities and special districts. [Figure 1](#) shows Buena Park in context with its adjoining communities.

⁹ **ELEMENT A: PLANNING PROCESS | A1**

A1b. Does the Plan list the jurisdiction(s) participating in the Plan that are seeking approval?
(Requirement §201.6(c)(1))

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



Figure 1. Buena Park's situation in northern Orange County



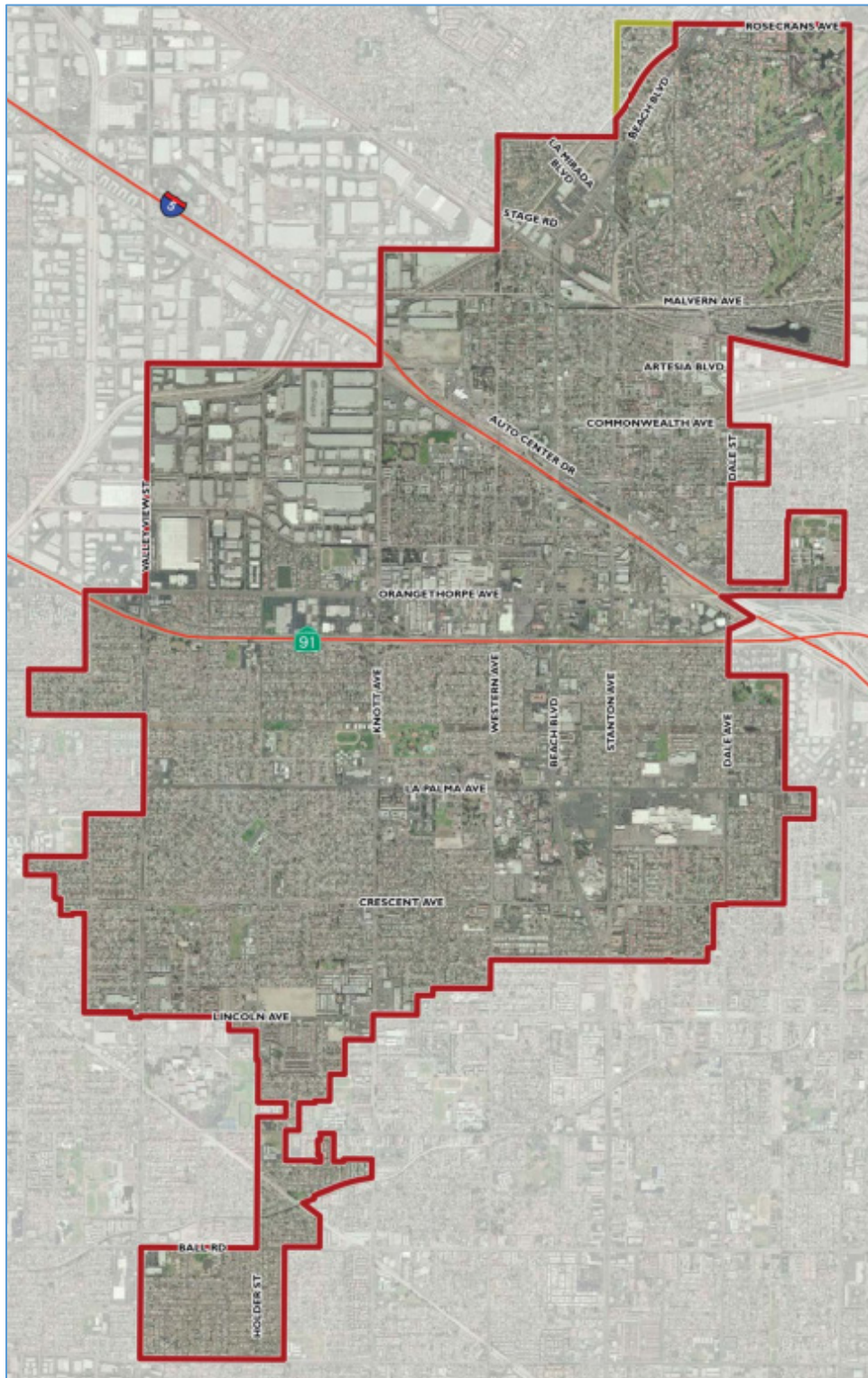
(Source: Google Maps)

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



Figure 2. Buena Park city boundary



(Source: Buena Park General Plan 2010)



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4. COMMUNITY PROFILE

4.1. Geography and the Environment

The City of Buena Park is located in northwestern Orange County, about 12 miles northwest of downtown Santa Ana. The city calls itself “The Center of the Southland” and is home to several tourist attractions, most notably Knott’s Berry Farm. The City is located within the Los Angeles Metropolitan Statistical Area.

According to the United States Census Bureau, the City has a total area of 10.6 square miles. Of this area, 0.03 square miles is water. State Route 91 divides the City into North Buena Park and South Buena Park. Neighboring cities include Fullerton to the east, Anaheim to the southeast, Cypress to the southwest, Cerritos and La Palma to the west, and La Mirada to the northwest.



4.2. History

Spanish explorers originally settled *ranchos* on land grants made by the King of Spain in what was then Alta California. The area transferred from Spanish to Mexican authority in 1822. In 1834, heirs of a Spanish explorer divided one of these land grants into five *ranchos*, including Rancho Los Coyotes. This area included the current site of Buena Park. The *rancho*’s adobe headquarters lay on what’s now Los Coyotes Country Club’s golf course. Mexico ceded all of Alta California to the United States in 1848 at the end of the Mexican-American War. California gained statehood in 1850.

In 1885, James A. Whitaker, a wholesale grocer from Chicago, purchased 690 acres of this land. In 1887, he founded the City of Buena Park in conjunction with the railway development of what we now know as Orange County¹⁰.

4.3. Climate¹¹

Average City temperatures range from 40° Fahrenheit in the winter months to 80° in the summer months. However, the temperatures can vary over a wide range, particularly when the Santa Ana

¹⁰ Buena Park Historical Society.

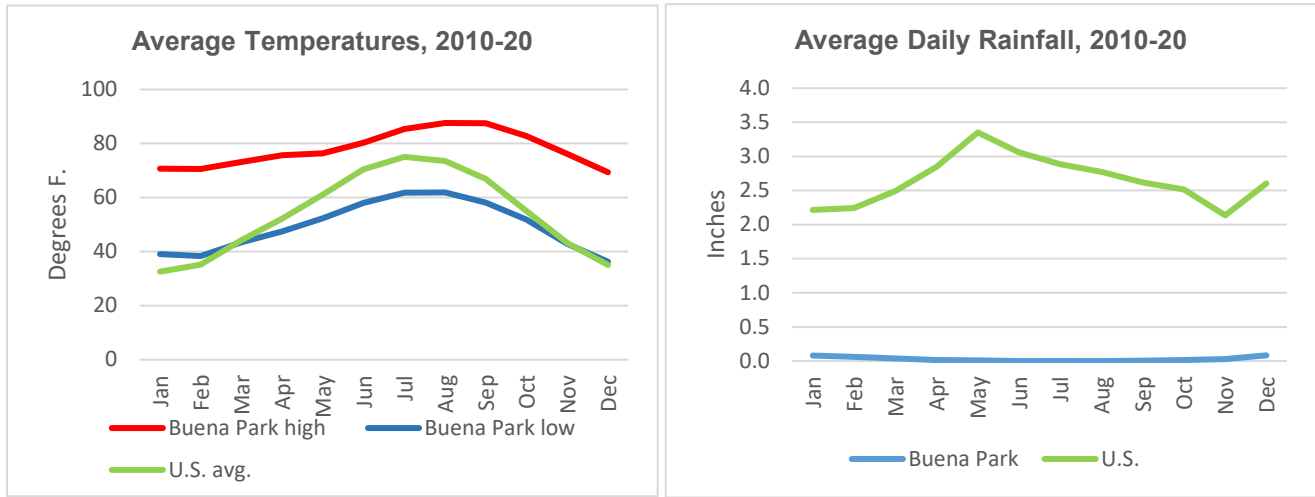
¹¹ www.city-data.com



winds blow, bringing higher temperatures and very low humidity. Temperatures often exceed 85° in the summer months (June-September), and rarely drop below 45° in the winter months (November-March). The average temperature is 63°.

The City averages 1.2 inches of rain per year. However, the term “average rainfall” is misleading because over the City’s recorded history, rainfall amounts have ranged from no rain at all in some years to over 40 inches of rain in very wet years.

Figure 3. Buena Park average temperatures and rainfall, 2010-20



(Source: National Weather Service)

Furthermore, actual rain in the Southern California region tends to fall in large amounts during sporadic and often heavy storms rather than consistently over somewhat regular intervals. In short, rainfall in Southern California is a feast-or-famine proposition within any given year. Because the metropolitan basin is fully developed, water originating in higher-elevation communities can have a sudden impact on adjoining communities at lower elevations.

Climate Change

Climate change appears to be an ongoing fact of life. Each year sets new records for high temperatures, droughts, severe storms, and the like. Buena Park will certainly not be immune to its effects.

Because of its location and its development, some of the more dire effects of climate change—sea-level rise, more severe hurricanes, decreased agricultural production—are unlikely to directly affect the City. It’s likely that climate change’s most severe effects on the City will be increased high temperatures, more extreme temperature events, longer heat waves, **more severe wildfires**, and decreased regional water supplies. This Plan discusses drought—one of the chief regional hazards of climate change—in [Drought](#) (page [101](#)).

However, specific data needed to assess risk—such as maps of extent and location and applied damage functions—is only slowly coming available for these climate effects. The City isn’t yet able to estimate with any certainty the scope of these changes. Also, standardized climate change models based on greenhouse gas emissions don’t currently exist, resulting in a high variation in



scenarios that result in differing projections. The City expects to incorporate climate adaptation into the next review of its General Plan.

4.4. Population and Demographics

According to the **2020 decennial census**, the City of Buena Park has a residential population of about **84,034** in an area of 10.6 square miles. The population grew by **0.9% between 2015 and 2020**. Buena Park ranks as the **13th** most populated city among Orange County's 34 cities. According to the **2020 Southern California Association of Governments *Demographics and Growth Forecast Technical Report***, the City's 2045 population may grow to 96,200 persons, representing an approximately 14.5% increase between 2020 and 2045.

As a primarily built-out city with limited vacant land, future development within Buena Park will largely occur through infill and redevelopment. This increase in density is increasing the service loads on the built infrastructure, including roads, water supply, sewer services, and storm drains.

[Table 1](#) breaks down the demographic makeup of the City.

Table 1. City of Buena Park demographics, 2020

Racial/Ethnic Group	Population (%) [*]
Hispanic/Latinx	40.8
Asian	33.1
Non-Hispanic White	25.9
African American	3.2
Multiracial	2.9
Native American/Alaska Native/ Pacific Islander	1.8
Other (single race)	0.4

(Source: 2020 U.S. Census)

* Total can be greater than 100% because **multiracial respondents may be included in single-race totals**

4.5. Housing and Community Development

[Table 2](#) (page [26](#)) shows the amount and types of housing in the City.

The City participates in the Community Development Block Grant (CDBG) program, the primary resource available to address non-housing community development needs. HUD provides funding for City's Community Program. During the **2020-1** Fiscal Year, the City received **\$875,154** in CDBG funds¹².



¹² City of Buena Park Community & Economic Development Department.



There's an increased concentration of resources and capital in the City. The best indicator of this fact is the increasing **household** income in the region since the 1970s. Household income is an estimate of total personal income divided by **the number of City households**. According to the **2019 U.S. Census American Community Survey**, Buena Park's **median household income was \$87,378, and the average household income was \$103,385.**

Table 2. City of Buena Park housing profile, 2019

	Number	Percent %
Housing Type		
1-unit, detached	16,276	61.4
1-unit, attached	1,617	6.1
Multi-Residential (2+ units)	7,661	28.9
Mobile homes	927	3.5
Housing Statistics		
Total Available Housing Units	26,509	100
Owner-Occupied Housing	16,329	61.6
Renter-Occupied	10,179	38.4
Vacant Housing units	1,147	4.3
Average Household Size	3.31 persons	
Median Home Price	\$616,400	

(Source: 2019 Census American Community Survey)

While this estimate is useful to compare economic areas as a whole, it doesn't reflect how the income is distributed among residents. There are pockets of relative affluence in Buena Park; however, **6.1% of Buena Park's residents live at or below** the poverty line. The City's per capita personal income makes it the **eighth-poorest** city in Orange County.

Subtle but measurable changes occur constantly in communities that increase the potential loss that will occur in a major disaster. A number of factors contribute to this increasing loss potential.

- Populations continue to increase, putting more people at risk within a defined geographic space.
- Inflation constantly increases the worth of real property and permanent improvements.
- Over time, the amount of property owned per capita increases for certain parts of the community, but not others.

4.6. Employment and Industry

Buena Park's principal employment and industrial activities are **education and health services, retail, professional services, and arts, entertainment, and hospitality services.** The City's business



climate has been strong and growing. The City provided almost 44,000 jobs in 2019, an 18.1% increase since 2010. See [Table 3](#) below for a breakdown of employment by industry.

Employees are highly mobile, commuting from surrounding areas to industrial and business centers. This creates a greater dependency on roads, communications, accessibility, and emergency plans to reunite people with their families. Businesses need to participate in and initiate onsite mitigation activities to prepare for local hazards, respond efficiently, prevent loss of life and property, and ensure the survival of the businesses themselves.

Table 3. Buena Park employment by industry segment, 2019

Industry	Number	Percent %
Civilian employed population 16 and over	43,755	100.0
Agriculture, forestry, fishing & hunting, and mining	776	1.8
Construction	3,823	8.7
Manufacturing	3,846	8.8
Wholesale trade	2,393	5.5
Retail trade	4,703	10.7
Transportation & warehousing, and utilities	1,712	3.9
Information	324	0.7
Finance & insurance; real estate, rental, and leasing	3,514	8.0
Professional, scientific, and management; administrative & waste management services	4,518	10.3
Educational services; health care and social assistance	11,140	25.5
Arts, entertainment, & recreation; accommodation & food services	3,926	9.0
Other services, except public administration	1,727	3.9
Public administration	1,353	3.1

(Source: 2019 Census American Community Survey)



Table 4. Buena Park occupational distribution, 2019

Occupation	Number	Percent %
Civilian employed population (16 years and over)	43,755	100.0
Management, business, science, and arts occupations	18,551	42.4
Service occupations	6,144	14.0
Sales and office occupations	9,600	21.9
Natural resources, construction, and maintenance occupations	4,295	9.8
Production, transportation, and material moving occupations	5,165	11.8

(Source: 2019 Census American Community Survey)

4.7. Transportation and Commuting Patterns

Over the past decade, the Los Angeles Metropolitan Statistical Area (LAMSA) experienced rapid growth in employment and population. There's been a steady increase in vehicle licensing levels within Buena Park and an increase in the vehicle miles traveled within City borders.

Two public transit systems serve the City. Orange County Transportation Authority (OCTA) provides local and regional bus service. A railroad station in the northeast portion of the City serves both the Metrolink regional commuter system and Amtrak long-haul passenger routes.



The Santa Ana Freeway (Interstate 5) provides north-south regional circulation, extending from Los Angeles County, through Orange County, into San Diego County. The Artesia Freeway (SR-91) provides for east-west regional access from Los Angeles County, through Orange County, into Riverside County. Both I-5 and SR-91 cut through the center of the City. The I-5/SR-91 interchange is located to the east of the City boundary, just south of Orangethorpe Avenue.



Beach Boulevard (State Route 39) originates at Pacific Coast Highway in Huntington Beach and extends north through Westminster, Garden Grove, Anaheim, and Buena Park, terminating in La Habra. Beach Boulevard has full interchanges with Interstate 405 (I-405), State Route 22 (SR-22), SR-91, and I-5. Beach Boulevard's designation as a state highway ends at I-5¹³.

¹³ General Plan Economic Impact Report 2010.



Part II: HAZARD ANALYSIS

5. RISK ASSESSMENT

5.1. What is a Risk Assessment?

Conducting a risk assessment can reveal information regarding:

- Location of hazards
- Value of existing land and property in hazard locations
- An analysis of risk to life, property, and the environment that may result from natural hazard events

The five levels of a risk assessment are:

- Hazard identification
- Hazard event profiling
- Vulnerability assessment/inventory of existing assets
- Risk analysis
- Vulnerability assessment /development trends analysis

Hazard Identification¹⁴

This describes the geographic extent, potential intensity, and the probability of occurrence of a given hazard. This Plan uses maps to display hazard identification data. The City used the California State Hazard Mitigation Plan's categorization of hazards, including earthquakes, floods, levee failures, wildfires, landslides and earth movements, tsunamis, climate-related hazards, volcanoes, and other hazards. For 2022, we also looked at hazardous materials releases, cyberterrorism, and sinkholes as potential hazards. In 2025, we added urban fires to the list.

The Planning Team reviewed existing documents to determine which of these hazards posed the most significant threat to the City—in other words, which hazards could result in a local declaration of emergency. The result was a list of ten hazards that seemed to warrant further study.

- Cyberterrorism
- Dam failure
- Drought
- Earthquake
- Flood
- HAZMAT release
- Heat emergency
- Sinkholes
- Terrorism
- Urban fires

¹⁴ ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B1

B1ab. Does the Plan include a description of all natural hazards that can affect each jurisdiction, and provide a rationale for the omission of any natural hazards that are commonly recognized to affect the jurisdiction? (Requirement §201.6(c)(2)(i))



The Planning Team identified the **scope or** geographic extent of each of these hazards, using maps and data contained in the City's *General Plan* and *Emergency Operations Plan*. In addition, numerous internet resources and the *County of Orange and Orange County Fire Authority (OCFA) Local Hazard Mitigation Plan* served as valuable resources.

Using a modified version of FEMA's Calculated Priority Risk Index (CPRI) ranking technique, the Planning Team determined risk ratings for each of the nine hazards. **The Planning Team sorted these and chose the top six hazards to consider for inclusion in this Plan: earthquakes, cyberterrorism, dam failure, HAZMAT release, and drought.**

- **After a discussion with our subject-matter expert, the team found that HAZMAT release, the fourth-ranked hazard, can be meaningfully mitigated only at the state and federal levels. The Planning Team omitted HAZMAT release from the list.**
- **The Planning Team found that the City has mitigated heat emergencies, the sixth-ranked hazard, to the extent practical within its power.**
- **The 2021 *County of Orange and Orange County Fire Authority Local Hazard Mitigation Plan* identifies wildfires, landslides, and tsunamis as high-priority hazards. In 2022, Buena Park wasn't subject to any of the three, so they weren't included in our risk assessment. In 2025, new California Department of Forestry and Fire Protection (CAL FIRE) fire severity zone maps showed a Very High Fire Hazard Severity Zone (VHFHSZ) intruding into the northern part of Buena Park. This prompted the 2025 LHMP revision including this new hazard.**

Table [5](#) (page [31](#)) describes the hazard-ranking system, while [Table 6](#) (page [32](#)) shows the rankings for the **hazards the Planning Team decided to include in this Plan.**

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Table 5. Calculated Priority Risk Index

CPRI Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Value	
Probability	Unlikely	Extremely rare with no documented history of occurrences or events. Annual probability of less than 1 in 1,000 years.	1	45%
	Possible	Rare occurrences. Annual probability of between 1 in 100 years and 1 in 1,000 years.	2	
	Likely	Occasional occurrences with at least 2 or more documented historic events. Annual probability of between 1 in 10 years and 1 in 100 years.	3	
	Highly Likely	Frequent events with a well-documented history of occurrence. Annual probability of 1 or more every year.	4	
Magnitude/ Severity	Negligible	Negligible economic damages. Less than 5% of critical and non-critical facilities and infrastructure affected. ¹⁵ Injuries or illnesses are treatable with first aid and there are no deaths. Negligible loss of quality of life. Critical public facilities shut down for less than 24 hours.	1	30%
	Limited	Slight economic damages. Greater than 5% and less than 25% of critical and non-critical facilities and infrastructure affected. Injuries or illnesses do not result in permanent disability, and there are no deaths. Moderate loss of quality of life. Critical public facilities shut down for between 1 day and 1 week.	2	
	Critical	Moderate economic damages. Greater than 25% and less than 50% of critical and non-critical facilities and infrastructure affected. Injuries or illnesses result in permanent disability and at least 1 death. Critical public facilities shut down for more than 1 week and less than 1 month.	3	
	Catastrophic	Severe economic damages. Greater than 50% of critical and non-critical facilities and infrastructure affected. Injuries and illnesses result in permanent disability and multiple deaths. Critical public facilities shut down 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	

¹⁵ This revision recognizes that a disaster may have a severe economic impact without causing physical damage (such as a prolonged blackout or pandemic).

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CPRI Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Value	
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	

(Source: Federal Emergency Management Agency)

Table 6. Calculated Priority Risk Index ranking for City of Buena Park

Hazard	Probability	Weighted 45% (x.45)	Magnitude / Severity	Weighted 30% (x.3)	Warning Time	Weighted 15% (x.15)	Duration	Weighted 10% (x.1)	CPRI Ranking
Earthquake – Newport/Inglewood or San Andreas Fault	3	1.35	4	1.2	4	0.6	3	0.3	3.45
Cybercrime/Cyberterrorism	3	1.35	3	0.9	4	0.6	3	0.3	3.15
Urban fire	3	1.35	3	0.9	4	0.6	3	0.3	3.15
Carbon Canyon/Prado Dam Failure	3	1.35	3	0.9	3	0.45	2	0.2	2.9
HAZMAT release	3	1.35	2	0.6	4	0.6	2	0.2	2.75
Drought	4	1.8	1	0.3	1	0.15	4	0.4	2.65
Heat emergency	4	1.8	1	0.3	1	0.15	3	0.3	2.55
Sinkholes	2	0.9	2	0.6	4	0.6	3	0.3	2.4
Flood	3	1.35	2	0.6	1	0.15	2	0.2	2.3



Hazard Events Profiles

The hazard profiles describe the causes and characteristics of each hazard, and call out which City facilities, infrastructure, and environment may be vulnerable to each hazard. A profile of each hazard discussed in this Plan is provided in the hazard-specific sections (Sections 6-9, starting on page 37). [Table 7](#) (page 34) shows a generalized perspective of the community's vulnerability to the various hazards according to extent (or degree), location, and probability.

Vulnerability Assessment/Inventory of Existing Assets

This combines hazard identification with an inventory of the existing (or planned) property developments and populations exposed to a hazard. Critical facilities are of particular concern because these locations provide essential equipment or provide services to the general public that are necessary to preserve important public safety, emergency response, and/or disaster recovery functions. Attachment A identifies the City's critical facilities.

Risk Analysis

Estimating potential losses involves assessing the damage, injuries, and financial costs the City will likely sustain over a given period. This level of analysis involves using mathematical models. The two measurable components of risk analysis are magnitude of the harm that may result and the likelihood of the harm occurring. Describing vulnerability in terms of dollar losses provides the City and the state with a common framework with which to measure the effects of hazards on assets. Quantitative estimates for potential losses have been included in the hazard assessment for each hazard for which data was available. Data wasn't available to make vulnerability determinations in terms of dollar losses for all of the identified hazards. The [Mitigation Actions Matrix](#) (page 129) includes an action item to conduct such an assessment in the future.

Vulnerability Assessment / Development Trends Analysis

This step provides a general description of City facilities and contents in relation to the identified hazards so that the City can consider mitigation options in land-use planning and future land-use decisions. This Mitigation Plan provides an overview of the City's character in [Community Profile](#) (page 22). This description includes the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns.

Analyzing these City characteristics can help identify potential problem areas and can serve as a guide for incorporating this Plan's goals and ideas into other community development plans.

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

Regardless of the data available for hazard assessments, the City can use several strategies to reduce risk. The [Mitigation Actions Matrix](#) (page 129) describes these strategies. Mitigation strategies can further reduce disruption to critical services, reduce the risk to human life, and alleviate damage to personal and public property and infrastructure.

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Table 7. Vulnerability: Location, extent, and probability for City of Buena Park^{16,17,18}

Hazard	Location (Where)	Extent (How Big an Event)	Probability (How Often) ¹
Earthquake – Newport/Inglewood or San Andreas Fault	Entire project area	SCEC concluded in 2013 that there is a 75% probability that an earthquake of M _w 7.0 or greater will hit California within 30 years. ²	Likely
Cybercrime/ Cyberterrorism	Entire project area	Documented recent instances have shut down government functions for multiple days and crippled critical infrastructure	Likely
Urban Fire	Northern 20% of project area	Increased fire activity in local FHSZs suggests a possibly severe impact on housing, business, and infrastructure	Likely
Drought	Entire project area	Droughts of varying severity affect California regularly.	Highly likely
Dam Failure – Carbon Canyon or Prado Dam	Entire project area south of Malvern Av.	Flood wave would reach Buena Park in approximately six hours and would be approximately 2-4 feet deep.	Likely
¹ Probability is defined as: Possible = 1:100 years, Likely = 1:10 years, Highly likely = 1:1 years			
² Uniform California Earthquake Rupture Forecast 2013 Source: Buena Park General Plan/EIR 2010			

16 ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B1

B1cde. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))

17 ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

B2b. Does the Plan include information on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

18 ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B1

B3b. Is there a description of each identified hazard's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))



5.2. Critical and Essential Facilities

Facilities critical to local government response activities (life safety; property and environmental protection) include:

- 9-1-1 dispatch centers
- Emergency operations centers
- Police and fire stations
- Public works facilities
- Utilities facilities (such as water-treatment plants)
- Public and private communications facilities
- Facilities used as emergency or post-impact shelters
- Hospitals

Facilities that could cause serious secondary impacts if damaged are also considered critical. A hazardous materials facility is an example of this type of critical facility.

Essential facilities are vital to the continued delivery of key City services or may significantly affect the City's ability to recover from the disaster. These facilities include but aren't limited to:

- City Hall
- Schools
- Jails, prisons, or other community corrections centers
- Law enforcement or fire administrative centers
- Public or social services centers
- Key transportation infrastructure
- Courthouses



Attachment A lists the critical and essential facilities within Buena Park and the vulnerability of those facilities to the identified hazards. Because of the potentially sensitive nature of the information, Attachment A isn't available to the public.

5.3. Land and Development

Development in Southern California was a cycle of boom and bust from the earliest days. The Second World War, however, dramatically changed that cycle. Military personnel and defense workers came to Southern California to fill the war effort's logistical needs. The influx of people rapidly exhausted available housing and rendered existing commercial centers inadequate. Construction on the freeway system began in earnest immediately after the war, forever changing the face of Southern California. Home developments and shopping centers sprung up everywhere; within a few decades, the urbanized portions of Southern California were nearly fully developed. This pushed new development further and further away from the urban center.

The *City of Buena Park General Plan* provides the framework for the growth and development of the City, including the use and development of private land (residential, industrial, and commercial areas), as demonstrated in [Figure 4](#) (page [37](#)). This plan is one of the City's most important tools



in addressing environmental challenges such as transportation and air quality, growth management, conservation of natural resources, clean water, and open spaces.

The environment of most Orange County cities is nearly identical to that of their immediate neighbors. The transition from one city to another is seamless to most people. Consequently, many Orange County communities are at risk from the same natural hazards.

Key Focus Areas for Growth

The City anticipates that the majority of change and growth envisioned by the *General Plan* will occur in a number of key focus areas over an assumed 25-year period.

- Central Buena Park
- Orangethorpe Corridor East
- Orangethorpe Corridor West
- Entertainment Corridor
- Entertainment Corridor North
- Northwest
- Civic Center
- Commonwealth Corridor
- North Beach Commercial
- Fillmore/Jackson

Development within the City didn't cause any significant change in vulnerability, and we don't expect any significant change in vulnerability resulting from the development listed above.

5.4. Summary

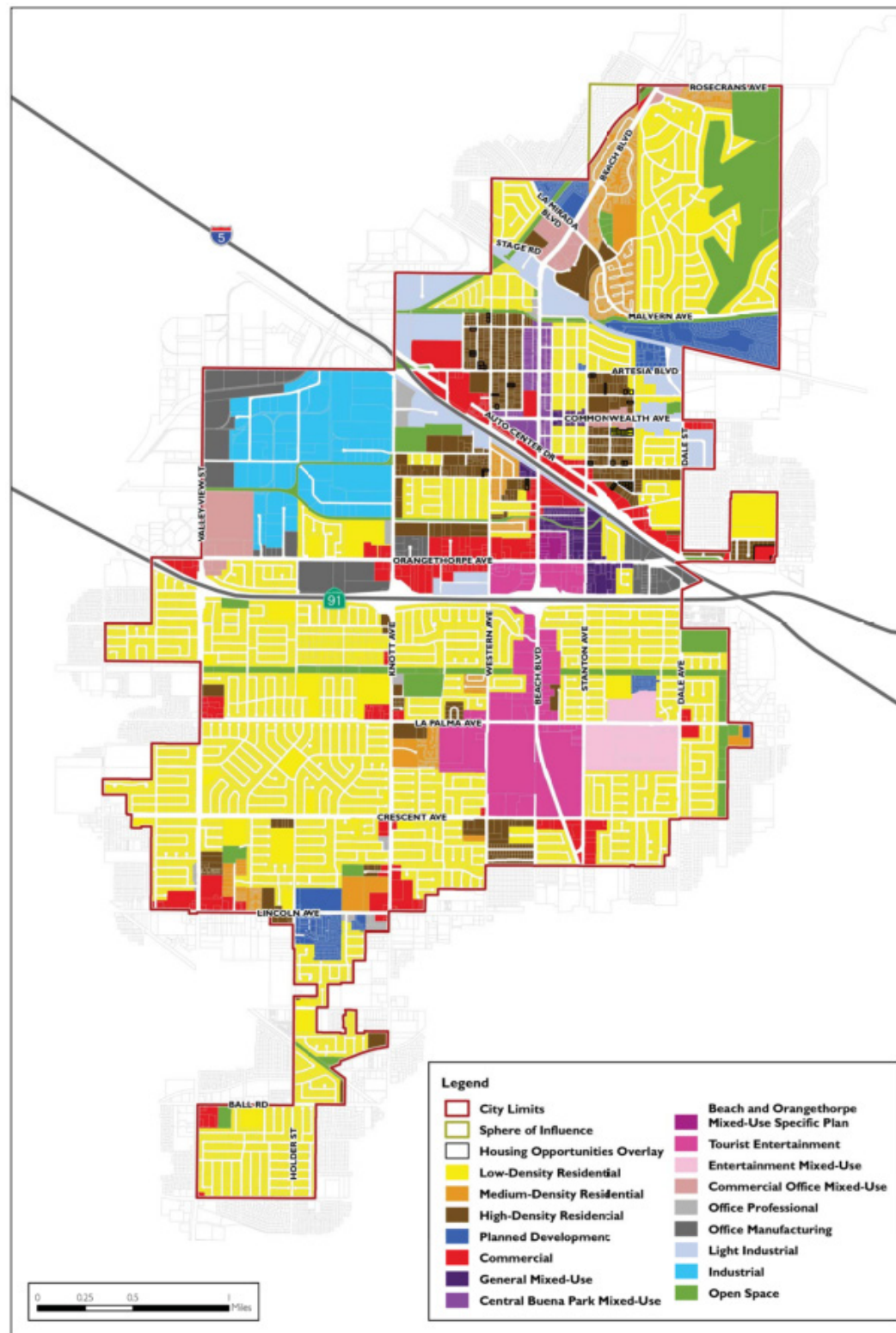
Hazard mitigation strategies can reduce the impacts concentrated around large employment and industrial centers, public infrastructure, and critical facilities. Hazard mitigation for industries and employers may include developing relationships with emergency management services and their employees before disaster strikes, and establishing mitigation strategies together. Collaboration between the public and private sector to create mitigation plans and actions can reduce the impacts of hazards.

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Figure 4. Land use plan map



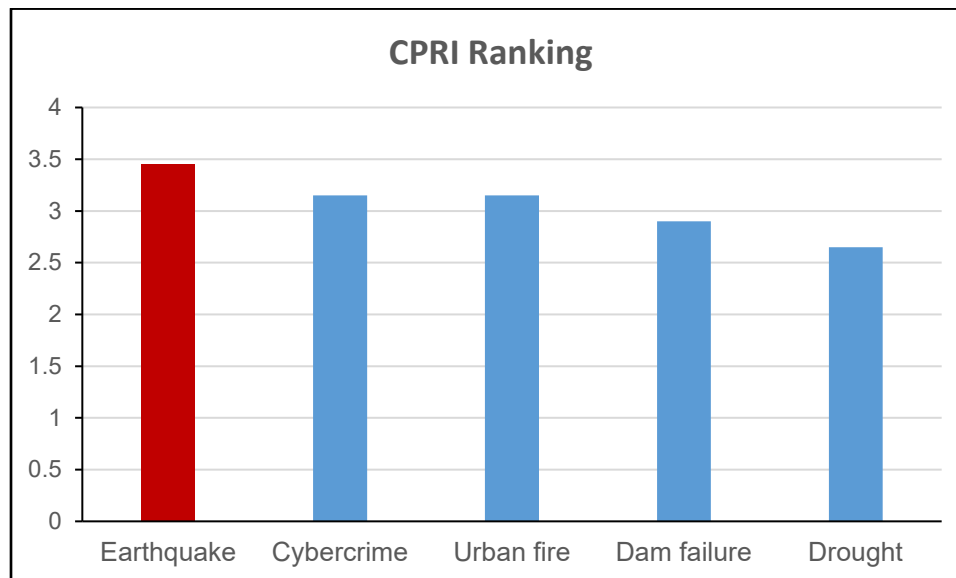
(Source: Buena Park General Plan 2010)



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6. EARTHQUAKES



6.1. Earthquake Characteristics

A recent [Southern California Earthquake Center report¹⁹](#) indicates a 75% probability of an earthquake of Magnitude 7 or larger in Southern California in the next thirty years.

Based on models and prior experience, we know that a significant earthquake along one of the major local faults will have a catastrophic effect on the region. It could exceed the response capabilities of the local communities and even the state. Such an earthquake would cause:

- Substantial numbers of casualties
- Extensive damage to buildings, roads, and bridges
- Widespread urban fires
- Large aftershocks
- Landslides
- Hazardous materials releases
- Dam failure

The loss of communications, damage to transportation routes throughout the disaster area, and disruption of public utilities and services will seriously hamper response operations.

- Fire and police departments will have to conduct extensive search-and-rescue operations to help trapped or injured people following a major earthquake.
- Injured and displaced persons will need emergency medical care, food, and temporary shelter.
- Identification and burial of the dead would be challenging after a truly catastrophic earthquake.
- Mass evacuation may be essential to save lives, particularly in areas below dams.

¹⁹ Southern California Earthquake Center Publication 1792, <http://pubs.usgs.gov/of/2013/1165>.



- Many families will find themselves separated, particularly if the earthquake happens during working hours.

The entire region will need extensive and sustained, long-term state and federal assistance. Cities and counties would have to remove debris and clear roadways, demolish unsafe structures, help reestablish public services and utilities, and provide continuing care and welfare for the affected population, including temporary housing for displaced persons. Recovery will take years. **One indication of the long-lasting impact of this kind of event: the last FEMA recovery project for the 1994 M_w 6.7 Northridge earthquake finally closed in 2017²⁰. The Northridge temblor released roughly 3% of the energy the model Great ShakeOut earthquake (M_w 7.8) would produce.**

In general, City residents are at less risk during non-work hours if they're at home. Wood-frame structures are relatively less vulnerable to major structural damage than are typical commercial and industrial buildings. An earthquake that happens during work hours will intensify transportation problems, as large numbers of employees would be stranded in place.

6.2. Measuring and Describing Earthquakes

An *earthquake* is a sudden motion or trembling caused by a release of strain accumulated within or along the edge of the Earth's tectonic plates. The effects of an earthquake spread far beyond its center. They usually happen without warning and, after just a few seconds, can cause massive damage and extensive casualties.

When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter.

Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. *Ground motion* is the ground's vibration or shaking during an earthquake. Seismic waves radiate when a fault ruptures, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and the soils being shaken. While the shaking usually decreases with distance from the causative fault or epicenter, the falloff isn't always linear. Soft soils often further amplify ground motion, and the geology underlying the impact zone can focus or bounce the waves of energy released by the fault. These two facts explain how the 1989 Loma Prieta earthquake could inflict severe damage on San Francisco's Marina District, which was over sixty miles from the epicenter.

One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity, or *g*. Peak Ground Acceleration (PGA) is a measure of the strength of ground motion. Ground motion with a PGA of 1.0 *g* is severe. PGA is used to project the risk of damage from future earthquakes by showing seismic ground motions that have a specified probability (10%, 5%, or 2%) of being exceeded in 50 years. These ground motion values inform construction codes and design for earthquake resistance. The ground motion values can also be used to assess relative hazards between sites when making economic and safety decisions.

The Moment Magnitude Scale (MMS) is another tool we use to describe earthquake intensity. The MMS replaced the better-known Richter Scale among seismologists; USGS adopted MMS

²⁰ Cal OES Public Assistance Division.



as a standard in January 2002. The two scales are similar but not exactly the same. The MMS indirectly measures released seismic energy on a logarithmic scale, with each one-point increase corresponding to a tenfold 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 MMS corresponds to about a 32-fold increase in energy released. For example, a Magnitude 7 (M_w 7) earthquake generates seismic waves 100 times (10×10) larger than those of an M_w 5 earthquake and releases 1,024 times (32×32) the energy.

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

The duration of an earthquake is related to its magnitude, but not in a strict sense. There are two ways to think about the duration of an earthquake: the first is the length of time it takes for the fault to rupture, and the second is the length of time shaking is felt at any given point. When people say, "I felt it shake for 10 seconds," they're making a statement about the duration of local shaking, not the duration of the quake itself. (Source: www.usgs.gov)

The Modified Mercalli Scale (MMI) ([Table 8](#), page [41](#)) is another means for rating earthquakes, but one that attempts to quantify the intensity of ground shaking. "Intensity" under this scale is a function of distance from the epicenter (the closer to the epicenter, the greater the intensity), ground acceleration, duration of ground shaking, and degree of structural damage. This rates the level of severity of an earthquake by its perceived shaking and the amount of damage it causes.

Table 8. Modified Mercalli Intensity Scale

MMI Value	Description of Shaking Severity	Summary Damage Description Used on 1995 Maps	Full Description
I			Not felt
II			Felt by persons at rest, on upper floors, or favorably placed.
III			Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV			Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motorcars rock. Windows, dishes, doors rattle. In the upper range of IV, wooden walls and frames creak.

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

(Source: USGS Earthquake Hazards Program)



6.3. Regulatory Background

The state regulates development within California to reduce or mitigate potential hazards from earthquakes or other geologic hazards. The [Alquist-Priolo Earthquake Fault Zoning Act](#) and the [Seismic Hazards Mapping Act](#) also govern development in potentially seismically active areas.

Chapter 16A, Division IV of the California Building Code (CBC), titled “Earthquake Design,” states that “The purpose of the earthquake provisions herein is primarily to safeguard against major structural failures or loss of life.” The CBC, which is based on the International Building Code (IBC), regulates the design and construction of excavations, foundations, building frames, retaining walls, and other building elements to mitigate the effects of seismic shaking and adverse soil conditions. The procedures and limitations for the design of structures are based on site characteristics, occupancy type, configuration, structural system, height, and seismic zonation. Seismic zones are mapped areas (Figure 16A-2 of the CBC and Figure 16-2 of the IBC) are based on proximity to known active faults, the potential for future earthquakes, and intensity of seismic shaking. Seismic zones range from 0 to 4, with Zone 4 areas being potentially subject to the highest accelerations due to seismic shaking and the shortest recurrence intervals.

The City of Buena Park is located within Seismic Zone 4²¹.

6.4. Historical Earthquakes in Orange County²²

Southern California has a history of powerful and relatively frequent earthquakes, dating to before people lived in the region in any numbers. The powerful M_w 7.9+ Fort Tejon Earthquake in 1857 is simply the earliest for which there is significant first-person reporting.

Since seismologists started recording and measuring earthquakes, there have been tens of thousands of recorded earthquakes in Orange County, most with a magnitude below three. No community in Orange County is beyond the reach of a damaging earthquake.

Paleoseismological research indicates that large-magnitude (8.0+) earthquakes occur on the San Andreas Fault at intervals between 45 and 332 years with an average interval of 140 years. The southern segment of the San Andreas Fault has not recorded a major earthquake since 1690. Other lesser faults have also caused very damaging earthquakes since 1857. [Table 9](#) (page 44) lists a number of damaging earthquake events that have affected Los Angeles and Orange counties.

The 1994 Northridge Earthquake was the most recent significant earthquake event affecting Los Angeles or Orange counties. At 4:31 a.m. on Monday, January 17, a moderate but very damaging M_w 6.7 earthquake struck the San Fernando Valley. Thousands of aftershocks occurred in the following days and weeks, causing additional damage to affected structures.

²¹ www.seismic.ca.gov.

²² **ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2**

B2a. Does the Plan include information on previous occurrences of hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))



Table 9. Earthquakes causing damage in Los Angeles or Orange Counties²³

1769	Los Angeles Basin ($M_w \sim 6.0$)	1986	Oceanside (M_w 5.4)
1812	Wrightwood ($M_w \sim 7.5$)	1987	Whittier Narrows (M_w 5.9)
1857	Ft. Tejon ($M_w \sim 7.9$)	1991	Sierra Madre (M_w 5.8)
1933	Long Beach (M_w 6.4)	1994	Northridge (M_w 6.7)
1941	Torrance/Gardena (M_w 4.8)	2008	Chino Hills (M_w 5.4)
1970	Lytle Creek (M_w 5.2)	2014	La Habra (M_w 5.1)
1971	San Fernando/Sylmar (M_w 6.5)		

The earthquake killed 57 people and seriously injured more than 1,500. For days afterward, thousands of homes and businesses were without electricity, tens of thousands had no gas, and nearly 50,000 had little or no water. Approximately 15,000 structures were moderately to severely damaged, which left thousands of people temporarily homeless. Inspectors assessed over 66,500 buildings, finding that nearly 4,000 were severely damaged and over 11,000 were moderately damaged. Several collapsed bridges and overpasses created commuter havoc on the freeway system. The City of Santa Monica's experience is of most relevance to Buena Park: earthquake-triggered liquefaction led to significant property damage twelve miles south of the epicenter.

6.5. Previous Occurrences of Earthquakes in the City of Buena Park

Although there are several active or potentially active faults near or in the City, no earthquake has severely affected Buena Park during its short recorded history. It's likely that the area has been involved in nearby earthquakes but there were no residents present for those earthquakes to affect.

6.6. Earthquake Hazard Assessment

Hazard Identification

The Working Group on California Earthquake Probabilities (WGCEP)—a multi-disciplinary collaboration of scientists and engineers jointly organized by SCEC, USGS, and the CGS—has released three Uniform California Earthquake Rupture Forecasts since 2007. The latest, Version 3 (UCERF3, 2013), incorporates data gleaned from several major earthquakes that occurred since the 2008 forecast (Italy, Japan, New Zealand, Sumatra, and Mexico). The changes included more modeling of multi-fault ruptures and data addressing a persistent problem of over-forecasting earthquakes between 6.5 M_w and 7.0 M_w .²⁴ The California Earthquake Authority, which is responsible for setting earthquake insurance rates statewide, provided major support for the work.

²³ <http://www.scedc.caltech.edu>.

²⁴ [Uniform California earthquake rupture forecast, version 3 \(UCERF3\)—The time-independent model](#): U.S. Geological Survey Open-File Report 2013–1165.



According to **UCERF3**, California has a 99.7% chance of experiencing a magnitude 6.7 or larger earthquake during the next 30 years. The likelihood of an even more powerful quake of magnitude 7.5 or greater in the next 30 years is **48%**.

[Figure 5](#) (page [47](#)) shows the various major faults located closest to the City of Buena Park.

- The Norwalk Fault traverses the northeast portion of Buena Park.
- The Los Coyotes Fault is located near the City's northern boundary, according to the City of Buena Park General Plan Final Environmental Impact Report.
- The Whittier-Elsinore (M_w 6.0-7.5), Newport-Inglewood (M_w 6.0-7.2), and Los Alamitos (magnitude not estimated) faults are located within five miles of the City.

While the Norwalk Fault can potentially cause the most severe ground shaking in the City, the Whittier-Elsinore and Newport-Inglewood faults could also result in significant ground shaking.

Historically, the City has generally been spared a major destructive earthquake. However, based on a search of earthquake databases of the USGS National Earthquake Information Center, several earthquakes of M_w 6.0 or more have been recorded within approximately 100 kilometers of the City since 1769.

The City of Buena Park lies within a seismically active metropolitan area. Faults are prevalent throughout California and are commonly classified as either "active" or "potentially active." An *active fault* is a break that has moved in recent geologic time (the last 11,000 years) and is likely to move within the next approximately 100 years. We're mostly concerned about active faults when we plan to prevent earthquake hazards. A *potentially active fault* is one that hasn't shifted in the recent geologic period (between 11,000 and 3 million years ago) and is considered dormant or unlikely to move in the future.

Several active faults have been identified within or adjacent to the boundaries of the Buena Park Planning Area. This indicates that our community falls under the State Earthquake Fault Zoning Act and the State Hazards Mapping Act (SHMA) ²⁵. These laws require that in the general plan update process, local governments will adopt policies and criteria to ensure the structural adequacy of buildings erected for human occupancy across active faults. The City must prohibit development of structures in some cases. A 2004 update to the SHMA requires identification of areas of amplified ground shaking, liquefaction, or earthquake-induced landslides.

Buena Park faces limited threats from interior seismicity. However, earthquakes that could result in hazards to the City will most likely originate from active regional faults. Also, SHMA products indicate that the southern 80% of the City lies on soils prone to liquefaction, which is common for Orange County cities located on the coastal plain.

Geologic evidence suggests that the San Andreas Fault has a 50% chance of producing a magnitude 7.5 to 8.5 quake (comparable to the great San Francisco earthquake of 1906) within the next thirty years. The other active faults closest to or within twenty miles of Buena Park include (as previously noted) the Newport-Inglewood, Whittier-Elsinore, Los Alamitos, San Gabriel, and

²⁵ Verification obtained through correspondence with the State Department of Conservation; on file with the City Planning Division.



Raymond faults. A significant earthquake originating along any of these or other regional faults could cause damage to the City's buildings and infrastructure as well as injuries and fatalities.

[Figure 8](#) through [Figure 11](#) (pages [53-56](#)) present four of the many possible earthquake scenarios that could affect the City. The colors correspond to the MMI severity of shaking level; the more red, the worse the shaking. The San Andreas and Newport-Inglewood scenarios have numerous variations that shift but don't significantly change the presented outcomes.

Earthquake-Related Hazards

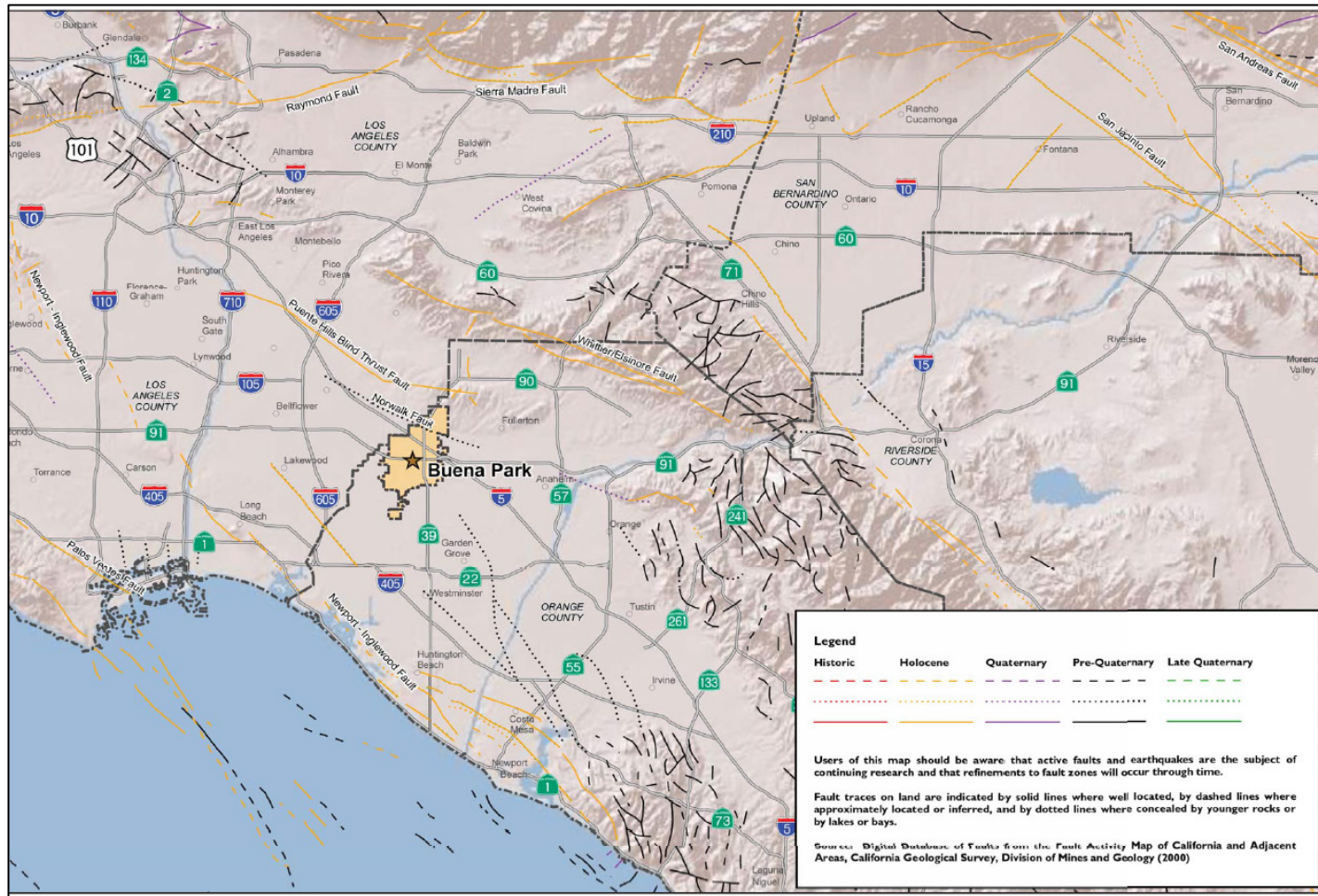
The relative or secondary earthquake hazards—liquefaction, ground shaking, amplification, and earthquake-induced landslides—are just as devastating as the earthquake itself. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake.

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Figure 5. Regional fault map



(Source: Digital databases of faults from the Fault Activity Map of California and Adjacent Areas, California Geographical Survey, Division of Mines and Geology (2000))



Ground Shaking

Ground shaking is the motion felt on the earth's surface caused by earthquake-generated seismic waves. It's the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault, the soils being shaken, the underlying geology, and distance from the epicenter (where the earthquake originates). Buildings on thick or poorly consolidated soils will typically see more damage than buildings on well-consolidated soils or bedrock.

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

Amplification

Soils and soft sedimentary rocks near the earth's surface can modify ground shaking caused by earthquakes. *Amplification* is one of these modifications. Amplification increases the magnitude of the earthquake's seismic waves. The thickness of geologic materials and their physical properties influence the amount of amplification. Buildings and structures built on soft and unconsolidated soils can face greater risk. Amplification can also occur in areas with deep sediment-filled basins and on ridge tops.

Liquefaction

Liquefaction occurs when ground shaking causes wet, granular soils to change from a solid to a liquid. This results in the loss of soil strength and the soil's ability to support weight. Research and historical data show that loose, granular materials situated at depths of less than fifty feet, with fines (silt and clay) content of less than thirty percent, saturated by a relatively shallow groundwater table, are most susceptible to liquefaction. Many communities in Southern California are built on ancient river bottoms or alluvial floodplains and have sandy soil. Depending on the depth of the water table, this ground may be subject to liquefaction.

Liquefaction tends to amplify any ground shaking caused by an earthquake. For example: during the Northridge event, the Northridge seismic station at the epicenter showed a PGA of 45.265% g. At Encino station, 2.6 km from the epicenter but on more consolidated soil, PGA registered at 20.1662% g. At Santa Monica station, 17.2 kilometers from the epicenter but located on poorly consolidated soils prone to liquefaction, the measured PGA was 88.2722% g²⁶.

Buildings located on silty or sandy soils may experience significant damage during an earthquake. Liquefying soil loses its weight-bearing capacity, undermining structural foundations. During the 1971 San Fernando and 1994 Northridge earthquakes, liquefaction caused significant damage to roads, utility pipelines, buildings, and other structures in the Los Angeles area.

Potential liquefaction zones are areas of historic occurrence of liquefaction, or local geological, geotechnical, and groundwater

Soil liquefaction is a seismically induced form of ground failure, which has been a major cause of earthquake damage in southern California.

²⁶ USGS Earthquake Hazards Program.



conditions that indicate a potential for permanent ground displacement. The CGS Seismic Hazards Zone Map (Los Alamitos, Anaheim, Whittier, and La Habra quadrangles) shows high liquefaction susceptibility throughout the majority of the City south of Malvern Avenue. The northeastern portion of the City is not as susceptible to liquefaction except for those areas adjoining Coyote Creek²⁷. [Figure 6](#) (page [51](#)) shows the results of these studies.

Fault Rupture

The City has a low potential for fault rupture²⁸. Only the Norwalk Fault traverses Buena Park (the north and northeast portions); no surface faulting has been associated with this fault. Furthermore, the Norwalk Fault is not a state-designated Alquist-Priolo Earthquake Fault Zone (refer to the [Regulatory Background discussion](#) [page [43](#)]). The Los Coyotes Fault is located outside but near the City's northern boundary.

Earthquake-Induced Landslides

These types of failures consist of rock falls, disrupted soil slides, rockslides, soil lateral spreads, soil slumps, soil block slides, and soil avalanches. Areas having the potential for earthquake-induced landslides are generally areas of previous earth movement. They may also be where local topographic, geological, geotechnical, and subsurface water conditions indicate a potential for permanent ground displacements.

USGS maps potential landslide zones. Mapped potential earthquake-induced landslide zones should prompt more detailed, site-specific geotechnical studies as required by the SHMA.

The City is not located within an area identified as having the potential for earthquake-induced landslides, according to the CGS Seismic Hazard Zones Map. However, the areas the Norwalk Fault underlies (northeastern portion of the City) may be prone to earthquake-induced slope failure²⁹.

Structure Failure

Buena Park is fortunate that most of its buildings follow recent building codes and design criteria. A substantial amount of construction occurred in the City under design standards dating from 1975-6 that take into account some of the lessons learned from the 1971 Sylmar earthquake. A smaller number of buildings, albeit some of the largest, conform to design standards that post-date the Loma Prieta and Northridge earthquakes.

Because most of the structures and infrastructure in Buena Park have been built under modern building codes, it's possible that inhabitants will survive the maximum expected earthquake with relatively moderate injuries. These standards, however, only increase the probability that a structure won't suffer a catastrophic failure during an earthquake; the structure may still be unusable afterwards. Possible geologic effects of a likely major earthquake in Buena Park include:

²⁷ Buena Park General Plan 2010.

²⁸ Buena Park Environmental Impact Report 2010.

²⁹ Buena Park Environment Impact Report 2010.



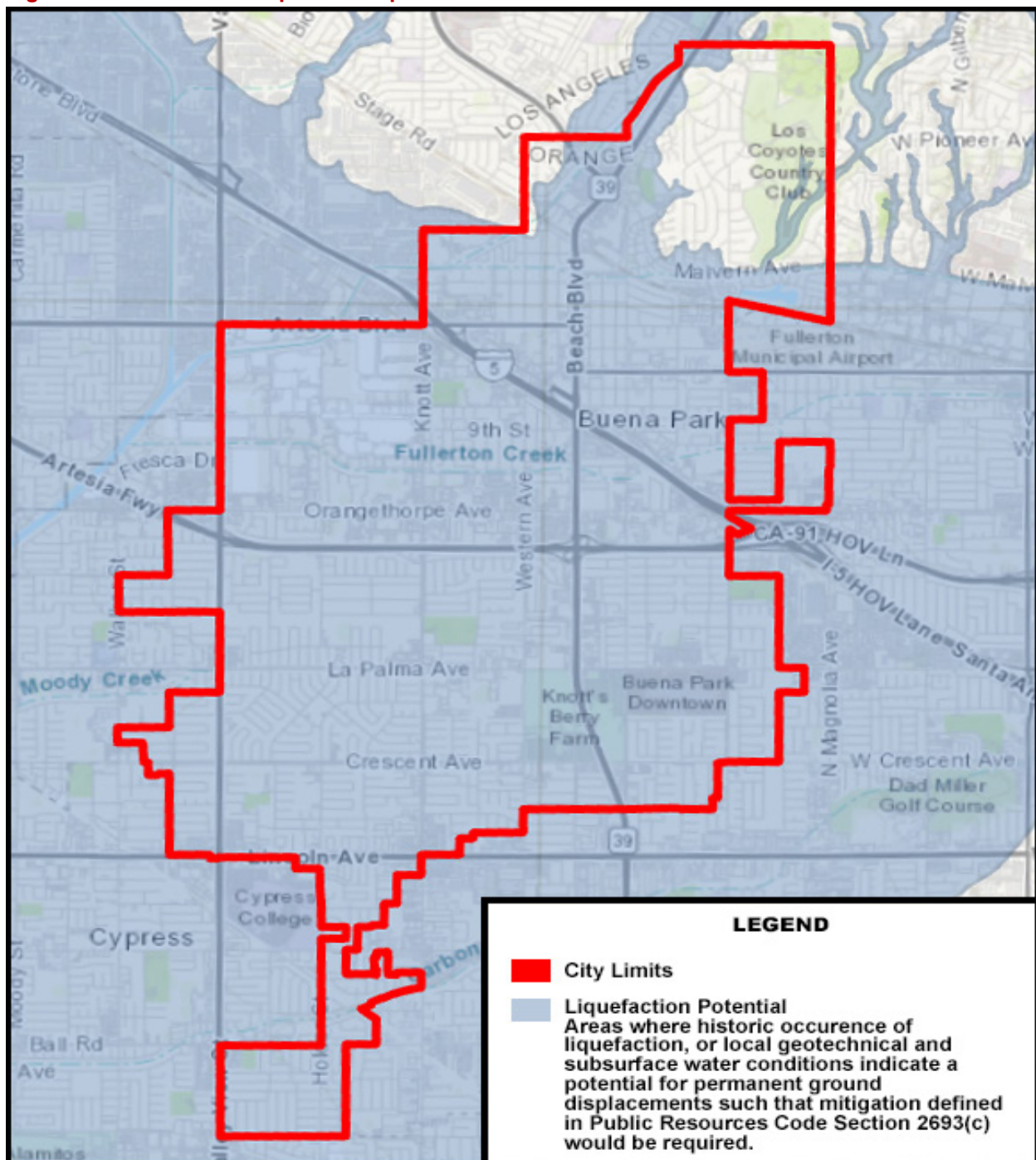
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- Rupture of the ground surface associated directly with movement along fault traces. This will most likely happen along the Norwalk Fault trace in the foothill portions of the City, though the likelihood of such an event is remote.
- Ground failure due to liquefaction is likely to occur in Buena Park in the areas south of Malvern Avenue that are prone to liquefaction. Liquefaction conditions may also occur in areas along the canyon and wash areas located at the base of the foothills and in isolated areas.
- Ground shaking with moderate-to-high lateral accelerations would be the primary seismic effect in the City. Liquefaction will amplify this shaking in the southern 80% of the City.
- In general, it's unlikely that we'll see wholesale complete building collapses in the City. Building damage is likely to be widespread but highly variable in its severity. The majority of construction has followed modern building codes. **Based on evidence from the Sylmar, Loma Prieta, and Northridge earthquakes, however, partial to total collapse could occur among some specific types of structures that we believe exist in Buena Park:**
 - Pre-1933 concrete block buildings
 - Concrete tilt-ups permitted before January 1, 1996
 - Multi-story, wood-frame, multi-household structures with soft stories permitted before November 10, 1980.

If the City enforces current state-of-the-art seismic standards for all future development, and if we maintain a high level of disaster preparedness, we may survive the maximum expected earthquake with relatively moderate losses.



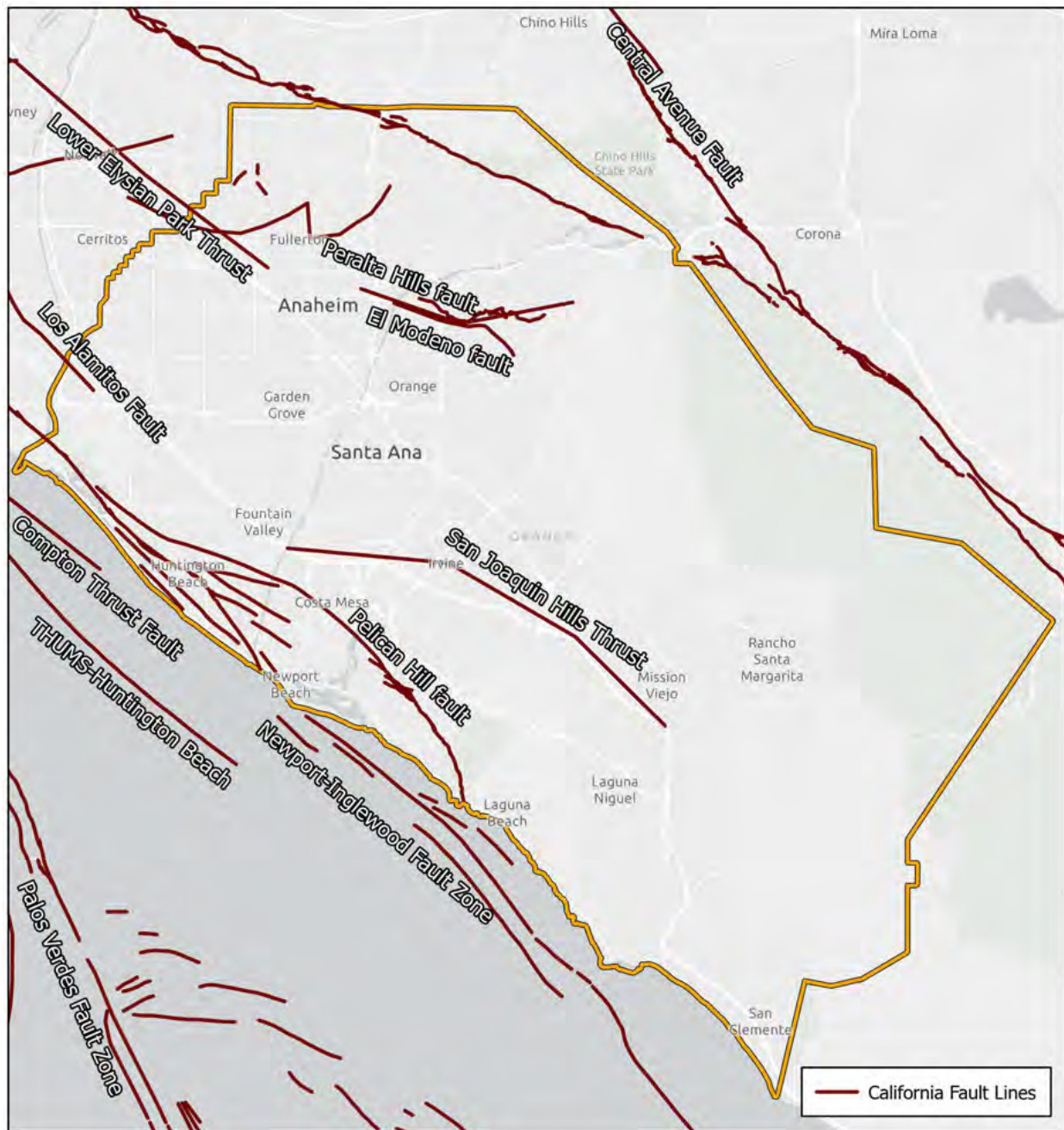
Figure 6. Landslide and liquefaction potential



(Source: State of California Department of Conservation, Seismic Hazard Zonation Program, Seismic Hazard Zones Map; La Habra, Anaheim, Los Alamitos and Whittier Quadrangles)



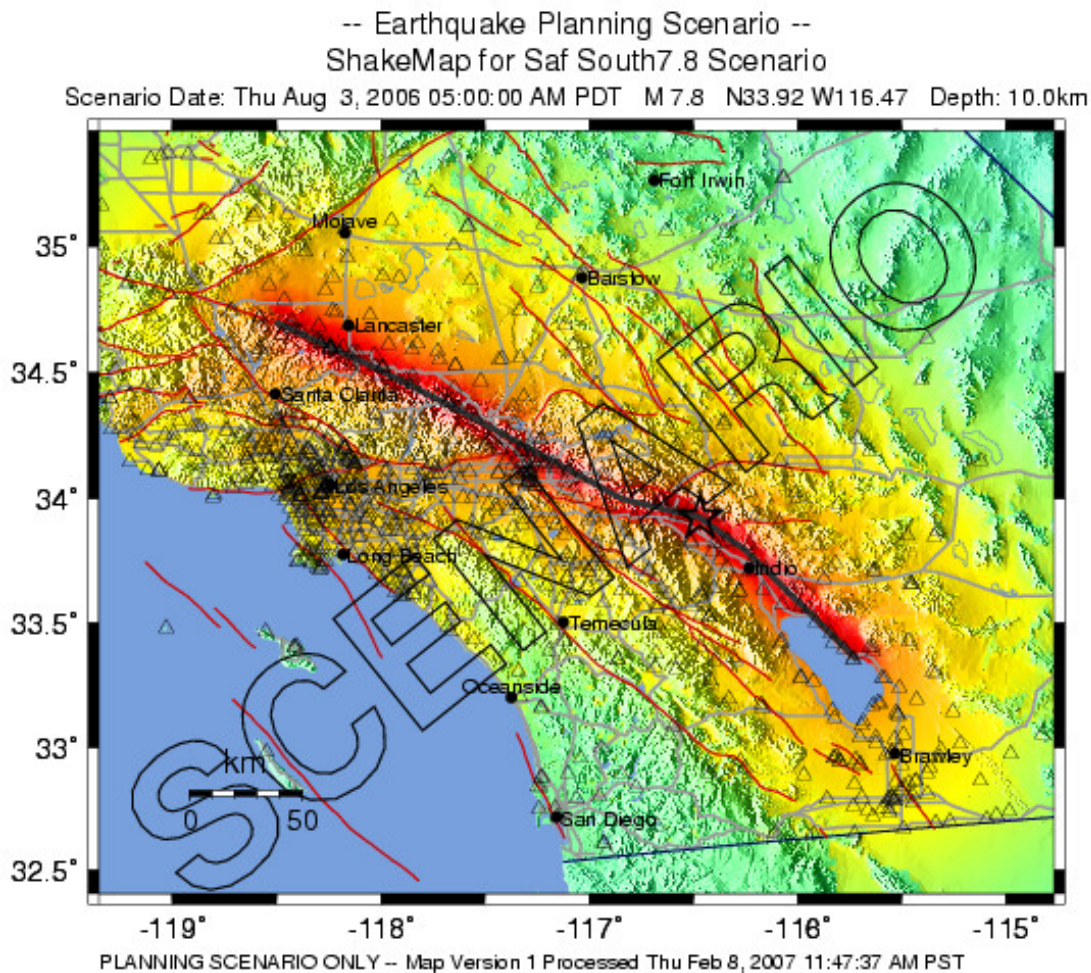
Figure 7. Orange County fault zones



(Source: County of Orange and Orange County Fire Authority Local Hazard Mitigation Plan, 2021)



Figure 8. Seismic shaking intensities for the San Andreas Fault, Southern Segment, M7.8

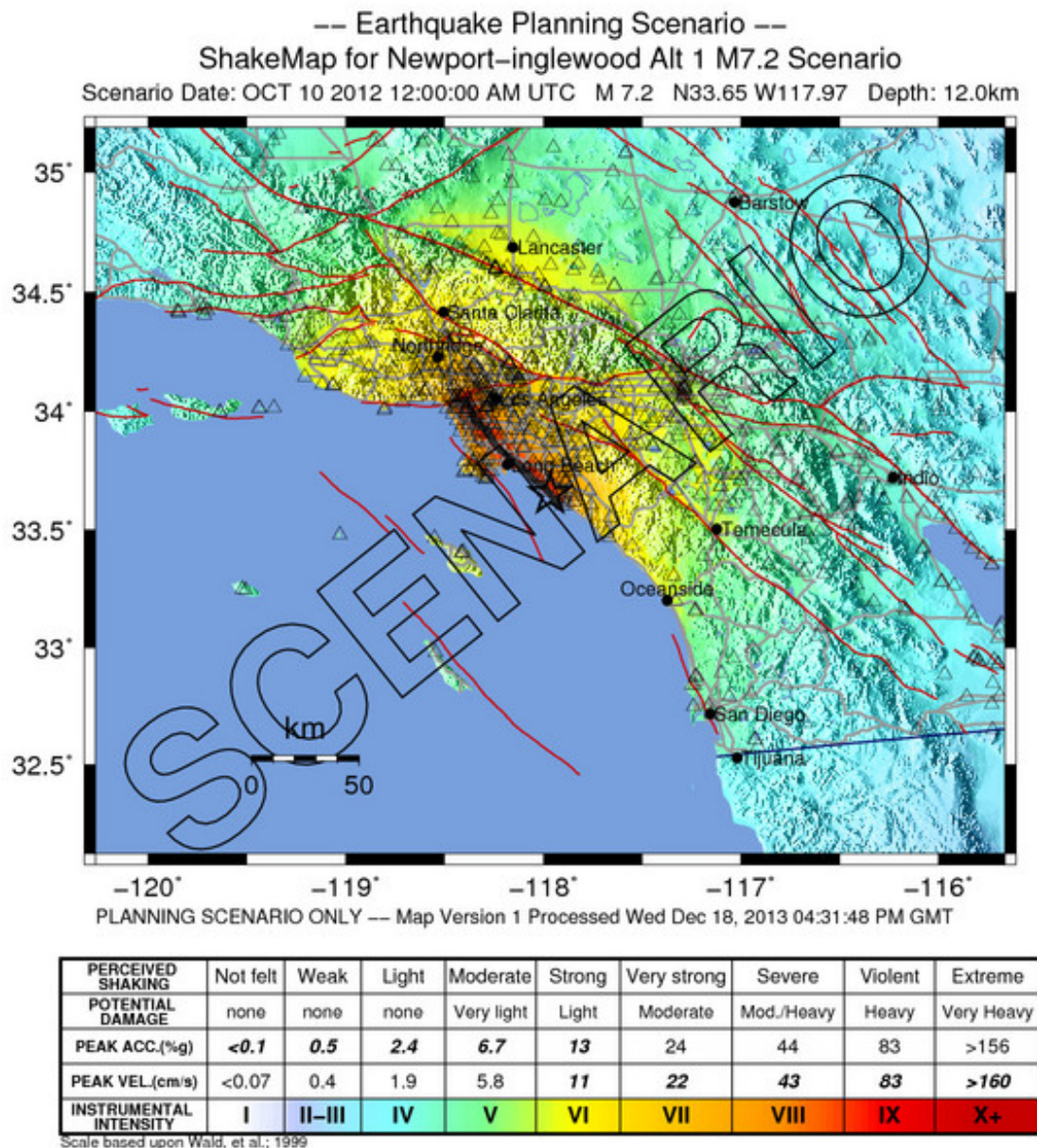


PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK AOC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

(Source: USGS Earthquake Hazards Program)



Figure 9. Seismic shaking intensities for the Newport-Inglewood Fault M7.2



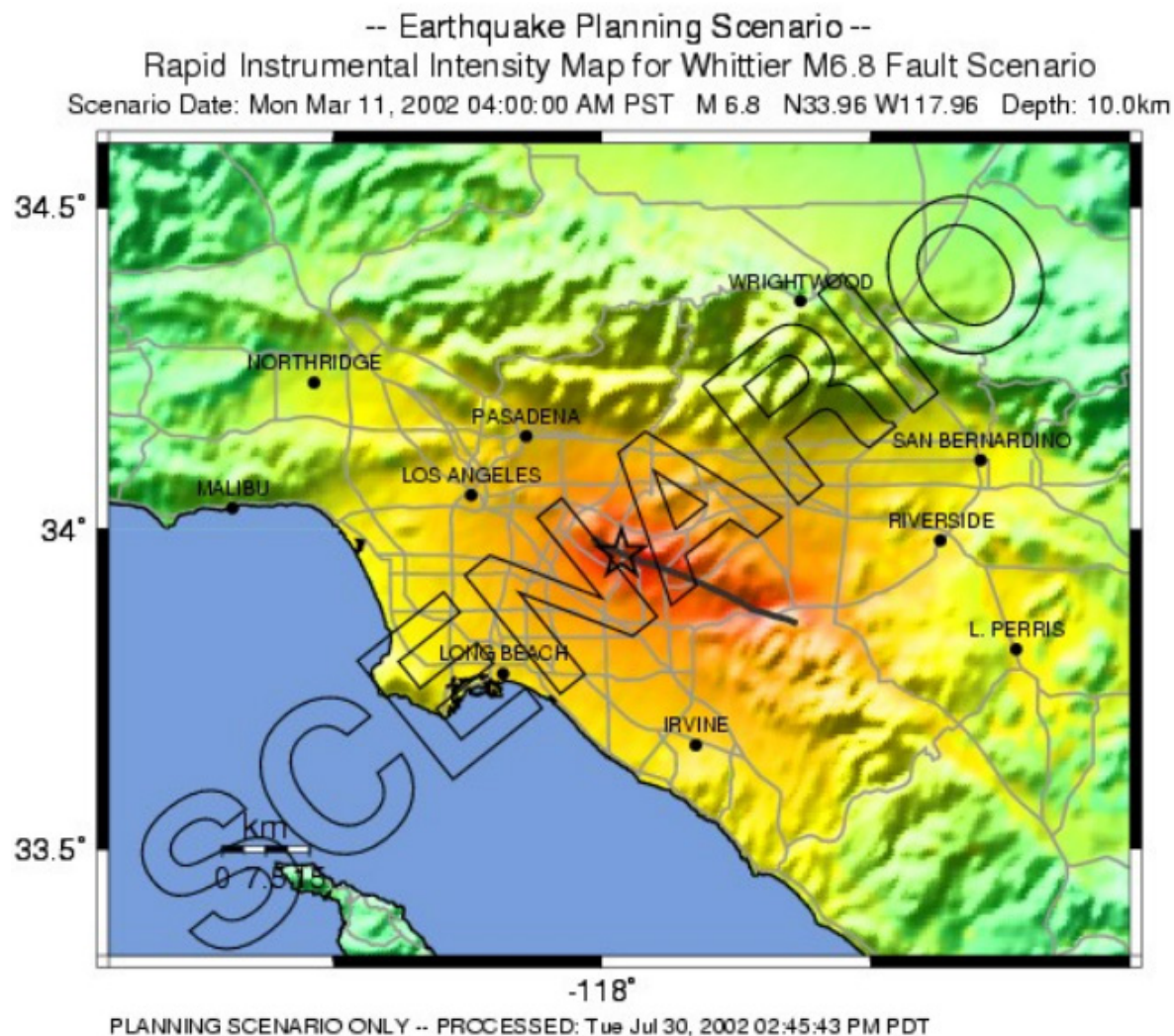
(Source: USGS Earthquake Hazards Program)

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Figure 10. Seismic shaking intensities for the Whittier Fault M6.8

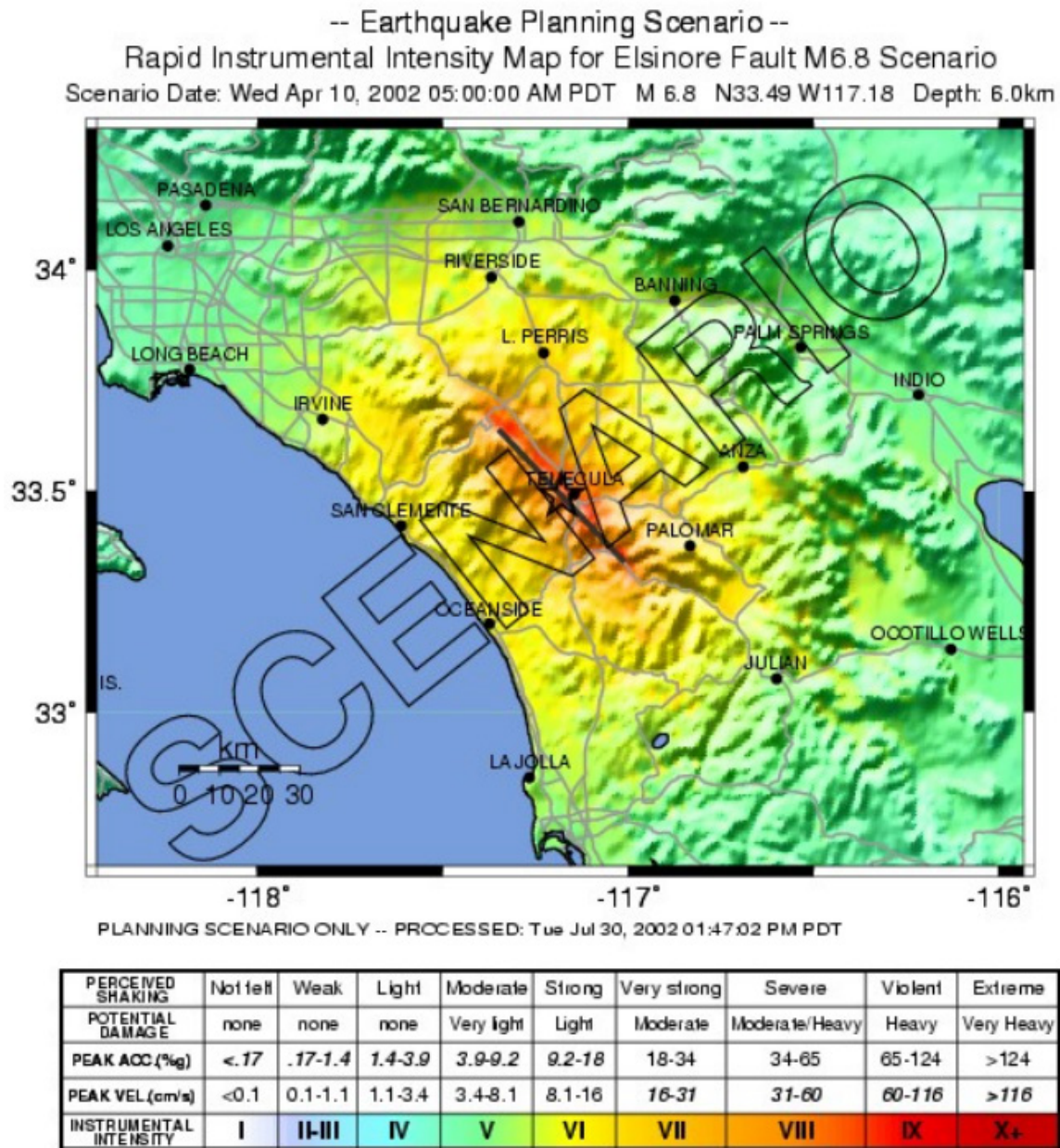


PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC (%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL (cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

(Source: USGS Earthquake Hazards Program)



Figure 11. Seismic shaking intensities for the Elsinore Fault M6.8



(Source: USGS Earthquake Hazards Program)



6.7. Impact of Earthquakes in the City of Buena Park³⁰

Based on the risk assessment, we see that earthquakes will continue to have potentially devastating economic impacts to certain areas of the City. Impacts that aren't 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 and private infrastructure, including water and sewer systems, electricity, natural gas distribution, dams, flood-control channels, and telecommunications systems
- Secondary disaster effects, such as large fires, gas leaks, and hazardous materials spills
- Secondary health hazards, such as dust, asbestos, mold, and mildew
- Damage to roads and bridges, resulting in loss of mobility
- Significant economic disruption (lost jobs, sales, tax revenue)
- Significant damage to the City's hospitality and entertainment industry, a major economic engine
- Negative impact on commercial and residential property values
- Significant disruption to residents and workers as relocations and temporary housing or business facilities follow the earthquake

A major regional earthquake could cause serious damage to many aspects of the region's critical infrastructure beyond the City, with immediate and long-term impacts on the City. For instance, damage to wastewater treatment plants downstream of Buena Park could result in the imposition of strict limits on sewer flows within the City. In another example, the loss of data communications capacity and damage to financial-industry data centers could affect the ability of local government, businesses, and residents to make payments and purchases.

The time of day and season of the year would have a profound impact on the number of dead and injured and the amount of property damage. Such an earthquake could exceed the response capabilities of the individual cities, the Orange County Operational Area, and the state. We would almost certainly need support for damage control and disaster relief from mutual aid partners, private organizations, and the state and federal governments.

The City would suffer considerable economic impact in terms of lost employment and lost tax base. Over 3.5 million tourists visit the City every year, and an average of 1900 stay overnight each day. A major earthquake could depress visitor numbers for months or years, depriving the City of a significant sum in sales and transient occupancy taxes. Auto Row, another major generator of sales taxes for the City, will face significant repair and inventory-replacement costs at the same time that car sales may fall off precipitously as potential buyers devote their resources to repairing homes and businesses. Damage to the region's telecommunications infrastructure, especially wired and wireless broadband internet access, will leave many small- and medium-sized businesses unable to function.

³⁰ **ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3**

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



Risk Analysis

Risk analysis involves estimating the damage and costs caused by a particular hazard likely to be experienced in a geographic area over a period of time. Earthquake risk factors include:

- Population and property distribution in the hazard area
- Frequency of earthquake events
- Landslide susceptibility
- Buildings and infrastructure
- Regional disaster preparedness

This type of analysis can generate estimates of the damages to the region due to an earthquake event in a specific location.

What is Susceptible to Earthquakes?

Earthquake damage occurs because humans have built structures that can't withstand severe shaking. Buildings, airports, schools, and lifelines (highways, utility lines, aqueducts) suffer damage in earthquakes and can kill or injure people and animals. The condition of homes, major businesses, and public infrastructure is very important. The City faces challenges in addressing the reliability of its built environment and understanding the potential costs to government, the private sector, and people imposed by an earthquake.

Dams

There are 32 dams in Orange County, owned by thirteen agencies or organizations, ranging from the federal government to homeowner's associations. These dams can hold billions of gallons of water in reservoirs designed to protect Southern California from floodwaters and to store domestic water. Seismic activity can compromise the dam structures; the resultant flooding could cause widespread casualties and property damage³¹.

Prado Dam in Corona is the largest reservoir that can pose a hazard to the City.

Buildings

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 damage is great. In most California communities, including Orange County, many buildings were built before 1993 when building codes weren't as strict. Retrofitting can also be expensive and isn't required except under certain conditions. The number of buildings at risk remains high because of this. The California Seismic Safety Commission makes annual reports on the progress of retrofitting unreinforced masonry buildings³².

³¹ 2010 Orange County Hazard Mitigation Plan.

³² Ibid.



Buena Park may experience high levels of ground shaking during a seismic event. As a result, numerous buildings within the community could sustain substantial damage. Some types of structures are particularly susceptible to earthquake damage:

- Unreinforced masonry buildings (URMs)
 - The City's Building Division has no record of URMs inside the City.
- Pre-1976 buildings
 - There's a large but unquantified number of pre-1976 buildings in the City, primarily single-family houses and small businesses.
- Pre-1996 tilt-up structures
 - The City contains 24 pre-1996 tilt-ups.
- Buildings higher than four stories
 - There are eight buildings of this type in the City, with at least two more in the planning stages or under construction.
- **Pre-1981** soft-story buildings
 - These buildings exist in the City, but no survey or count has been accomplished.
- Mobile homes
 - The City hosts two mobile home parks containing a total of 205 mobile homes.

Buena Park's many unreinforced chimneys are also vulnerable to earthquake damage, as are the ubiquitous six-foot-high cinderblock walls surrounding front and back yards. These present a potential hazard to pedestrians if the walls or chimneys collapse onto sidewalks because of ground shaking. Chimneys falling through roofs may inflict serious damage on structures and injury on their inhabitants.

Knott's Berry Farm, the Entertainment Zone, Buena Park Downtown, and several large businesses in the commercial area have the potential for structural failures capable of injuring large numbers of people³³.

Infrastructure and Lifelines

Lifelines are the connections between communities and outside services. They include water and gas distribution systems, transportation networks, electrical service, and communication networks.

Ground shaking and amplification can cause pipes to break open, power lines to fall, electrical substations to go offline or sometimes burn, roads and railways to crack or move, and radio and telephone communication to cease. These consequences can affect Buena Park even if the damage itself happens outside the City or Orange County.

Infrastructure and lifeline damage can have severe impacts on the City's economy and even basic habitability in any number of ways.

³³ **2021** Buena Park EOP.



- The water and sewer systems are highly vulnerable to disruption by ground shaking and liquefaction. Replacing potentially dozens of miles of water and sewer pipe just within the City will be a major burden that will disrupt every other system, never mind the task of repairing or replacing the hundreds or thousands of miles of pipe outside the City that will be damaged after a major regional event. In the meantime, households will face draconian restrictions on water availability and use, while some businesses (especially in the hospitality and manufacturing sectors) will be unable to operate. A regional earthquake may also damage or destroy aqueducts that bring water into the area from Northern California and the Colorado River.
- Many individuals and nearly all businesses rely to a greater or lesser extent on working telecommunications networks, especially broadband internet access and mobile phones. Without these, commerce and finance will come to a virtual standstill. People who depend on mobile apps (especially the majority of younger people) will find their ability to manage their lives compromised.
- Most supermarkets, pharmacies, department stores, and gas stations depend on just-in-time supply, which in turn depends on fully functional supply chains. **The COVID-19 pandemic showed us how even mild disruptions to the supply chain can affect our lives.** Earthquake damage to the road and rail networks in particular will hinder or prevent regular resupply of retail outlets. This will quickly cause shortages of basic commodities.
- The Northridge and Loma Prieta earthquakes taught us that earthquake-related damage to roads and bridges leads to a mobility disaster among the majority of residents and visitors who have to drive to work, school, shopping, and other day-to-day destinations. This same damage will also hamper emergency response and recovery.

Nearly the City's entire critical infrastructure is located in the mapped liquefaction zone. This suggests that the bulk of its highways, streets, water and sewer systems, natural gas and fuel distribution pipelines, and telecommunications networks will suffer significantly higher ground shaking than they would if they were located on (or in) more consolidated soils or bedrock.

Damaged infrastructure strongly affects the economy of the community because it disconnects people from work, school, food, and leisure, and separates businesses from their customers and suppliers³⁴.

Bridges

Even modern bridges can sustain damage during earthquakes, leaving them unsafe for use. Some bridges have failed completely due to strong ground motion. Bridges are a vital transportation link; some areas may become inaccessible with even minor damage. Because bridges vary in size, materials, location and design, any given earthquake will affect them differently. Bridges built before the mid-1970s have a significantly higher risk of suffering structural damage during a moderate-to-large earthquake compared with those built after 1980, when design improvements came into force.

Much of the interstate highway system was built in the mid-to-late 1960's. The bridges in the City of Buena Park are state-, county-, or privately owned (including railroad bridges). Caltrans has retrofitted most bridges on the freeway systems; however, there are still some county-maintained

³⁴ 2010 Orange County Hazard Mitigation Plan.



bridges that aren't retrofitted. The FHWA requires biennial inspections for bridges on the National Bridge Inventory. Caltrans tracks bridge inspections because it administers the federal funds for bridge projects.

Nearly all the City's bridges and overpasses are located within the mapped liquefaction zone.

Critical Services

Critical facilities include police stations, fire stations, hospitals, shelters, and other facilities that provide important services to the community. These facilities and their services need to be functional after an earthquake event.

The City is fortunate in that all its major facilities—City Hall, the Police Department headquarters, and the two main community centers—were built within the past fifteen years. However, this primarily means that these facilities shouldn't suffer catastrophic failures during design earthquakes; there's no guarantee that these facilities will still be usable following such an event. All the City's major facilities are also located in the mapped liquefaction zone, suggesting that they'll be subject to far greater ground shaking than structures outside the liquefaction zone.

The City hosts only one urgent care clinic. Hospitals providing emergency services and care servicing the Buena Park area are located in adjoining communities³⁵.

Businesses

Earthquakes can cause great loss to businesses large and small. The economic loss can be tremendous when a manufacturing firm is forced to stop production for just a day, especially if it serves a national or global market. Port or highway closures, electrical- or water-system damage, and disrupted telecommunications create economic losses from which retail businesses may struggle to recover.

Forty percent of businesses don't reopen after a disaster, and another twenty-five percent fail within one year³⁶. Similar statistics from the United States Small Business Administration indicate that over ninety percent of small businesses fail within two years after suffering a disaster.

Health Hazards

Death and injury can occur both inside and outside due to collapsed buildings, falling equipment, furniture, debris, and structural materials. Downed power lines and broken water and gas lines can also endanger human life. The shock of an earthquake can and has triggered heart attacks and other acute life-threatening ailments³⁷. Longer-term health hazards can include exposure to hazardous materials, smoke, contaminated water, increased incidence of zoonotic and vector-borne disease, and stress-related diseases.

³⁵ www.buenapark.com.

³⁶ Federal Emergency Management Agency.

³⁷ [European Heart Journal, 24 Aug 2012](#).



Fire

Downed power lines or broken gas lines can trigger fires. Quick response to extinguish fires is less likely when fire stations suffer building or lifeline damage. Furthermore, major incidents demand a larger share of resources, so smaller fires may receive few resources in the hours immediately following a major earthquake.

Damage to the City's water distribution system may cause localized losses of water pressure, hampering firefighting efforts. Electrical outages may also cause a loss of water pressure in neighborhoods in the City's far northern end.

Debris

Earthquakes generate tremendous volumes of debris, including brick, glass, wood, steel, or concrete building elements, office and home contents, destroyed vehicles, and other materials. Hazardous materials will contaminate some debris. If left in place, this debris will block roads and parking, attract rodents and other disease vectors, and ultimately retard recovery and rebuilding.

The Northridge Earthquake generated an estimated total of seven million cubic yards of debris, five to fifteen times the annual volume of waste generated by the communities involved³⁸.

6.8. Existing Mitigation Activities

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

Local Government Codes

Local governments are responsible for implementing most earthquake mitigation policies. Orange County Public Works/PC Planning enforces zoning ordinances, land-use regulations, and building codes related to earthquake hazards.

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

Coordination among Building Officials

The City of Buena Park Building Code sets the minimum design and construction standards for new buildings. In 2022, the City adopted the most recent seismic standards in its building code, which requires that new buildings be built to a higher seismic standard.

Since 2003, the City also requires site-specific seismic hazard investigations for new essential facilities, major structures, hazardous-materials facilities, and special-occupancy structures such as schools, hospitals, and emergency response facilities.

³⁸ [*Disaster Debris Management – Planning Tools*, University of Central Florida, 1999.](#)



Businesses/Private Sector

The Institute of Business and Home Safety has developed “[Open for Business-EZ](#),” a disaster-planning toolkit that helps guide businesses as they prepare for and deal with the adverse effects of natural hazards. The kit integrates protection from natural disasters into the company's risk reduction measures to safeguard employees, customers, and the investment itself. The guide helps businesses secure human and physical resources during disasters, and helps to develop strategies to maintain business continuity before, during, and after a disaster.

Individual Preparedness

Because the potential for earthquakes and earthquake-related property damage is relatively high in Orange County, residents need to be prepared. A few steps individuals can take to prepare for an earthquake include strapping down heavy furniture, water heaters, and expensive personal property, being insured against earthquakes, and anchoring buildings to foundations. The City maintains a suite of disaster preparedness-related pages on its website, highlighting what it considers some of the best preparedness materials available online.

California Earthquake Mitigation Legislation

California is painfully aware of the threats it faces from earthquakes. Earthquakes have killed or injured Californians and destroyed their property since the 19th century. The risk will continue to increase as the state's population grows and urban areas become even denser. For decades, the Legislature has passed laws to strengthen the built environment and protect residents and visitors. [Table 10](#) (page [63](#)) offers a sampling of these laws.

Table 10. Sampling of earthquake laws in California

Code Section	Description
Education Code Sections 17280-17317 and 80030-81149	Field Act: establishes minimum construction standards for school buildings
Education Code Section 35295-35297	Established emergency procedure systems in kindergarten through grade 12 in all the public and private schools
Government Code Section 8870-8870.95	Creates Seismic Safety Commission
Government Code Section 8876.1-8876.10	Established the California Center for Earthquake Engineering Research
Government Code Section 8875-8875.95	Established the California Earthquake Hazards Reduction Act of 1986
Government Code Section 8899.10-8899.16	Established the Earthquake Research Evaluation Conference
Government Code Section 8878.50-8878.52	Created the Earthquake Safety and Public Buildings Rehabilitation Bond Act of 1990

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Code Section	Description
Health and Safety Code Section 16100-16110	The Seismic Safety Commission and State Architect will develop a state policy on acceptable levels of earthquake risk for new and existing state-owned buildings
Health and Safety Code Section 130000-130025	Defined earthquake performance standards for hospitals
Health and Safety Code Section 19160-19169	Established standards for seismic retrofitting of unreinforced masonry buildings
Health and Safety Code Section 1596.80-1596.879	Required all child daycare facilities to include an Earthquake Preparedness Checklist as an attachment to their disaster plan
Public Resources Code Section 2800-2804.6	Authorized a prototype earthquake prediction system along the central San Andreas fault near the City of Parkfield
Public Resources Code Section 2810-2815	Continued the Southern California Earthquake Preparedness Project and the Bay Area Regional Earthquake Preparedness Project
Public Resources Code Section 2805-2808	Established the California Earthquake Education Project
Public Resources Code Section 2621-2630	Established the Alquist-Priolo Earthquake Fault Zoning Act
Public Resources Code Section 2690-2699.6	Seismic Hazards Mapping Act

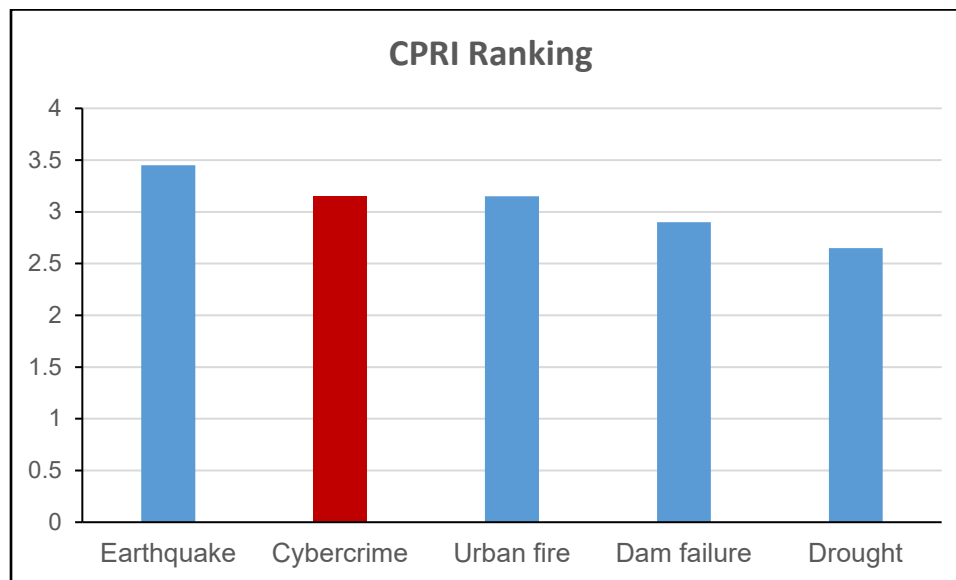
(Source: <https://www.leginfo.ca.gov/calaw.html>)

Earthquake Education

Several major Southern Californian universities conduct earthquake research and education activities, including Cal Tech, USC, UCLA, UCI, and UCSB. [SCEC](#), located at the University of Southern California, is the local clearinghouse for earthquake information. SCEC is a community of scientists and specialists who actively coordinate research on earthquake hazards at nine core institutions, and communicate earthquake information to the public. SCEC is a National Science Foundation (NSF) Science and Technology Center co-funded by USGS.



7. CYBERCRIME/CYBERTERRORISM



The United Nations defines *cybercrime* as “an act that violates the law, which is perpetrated using information and communication technology (ICT) to either target networks, systems, data, websites, and/or technology or facilitate a crime.”³⁹

Cyberterrorism is a subset of cybercrime. The FBI defines cyberterrorism as “the use of cyber tools to shut down critical national infrastructures (such as energy, transportation, or government operations) for the purpose of coercing or intimidating a government or civilian population.”⁴⁰ Cybercrime is typically committed for profit or personal gain; cyberterrorism is to make a statement.

7.1. Cybercrime/Cyberterrorism Risk Factors

Criticality of Information Systems

Digital information systems—a discrete set of information resources organized for the collection, processing, maintenance, use, sharing, dissemination, or disposition of information⁴¹—have over the past forty years become central to nearly every aspect of advanced society. Computers and networks facilitate virtually all commercial activity, telecommunications, transportation, process control, logistics, business and governmental situational awareness, mass entertainment,

³⁹ United Nations Office on Drugs and Crime. <https://www.unodc.org/e4j/en/cybercrime/module-1/key-issues/cybercrime-in-brief.html>

⁴⁰ “The Terrorist Threat Confronting the United States,” February 6, 2002. <https://archives.fbi.gov/archives/news/testimony/the-terrorist-threat-confronting-the-united-states>

⁴¹ [U.S. National Institute of Standards and Technology](#)



healthcare, and education. Entire industries now exist entirely in the digital realm, employing millions and generating trillions of dollars in wealth.

While this technological explosion has brought into everyday use capabilities that not so long ago were pure science fiction, it's also introduced an unprecedented vulnerability into the global economy. Anyone sufficiently skilled and equipped can, from anywhere in the world, attack the very underpinnings of our society without firing a shot or dropping a bomb, either for profit or in the service of ideology.

Proliferation of Threat Actors

Unlike natural disasters that occur because of some impersonal geophysical process—seismic activity, atmospheric conditions, climate change—cybercrime and cyberterrorism are the products of people willfully subverting our infrastructure to achieve their own ends. Over the past ten years, the number and type of threat actors have grown wildly as the know-how and tools have spread worldwide.

Cybercriminals can be individual thieves of various kinds, extortionists, blackmailers, vandals, members of organized crime groups, and spies (private- and public-sector). Cyberterrorists can be lone political or religious zealots, activists, members of organized terrorist groups, private hacking teams supported by or affiliated with governments, or military personnel conducting cyber warfare operations.

Each of these actors has a different motive, objective, and modus operandi. This makes prevention and protection (a.k.a. mitigation) exceptionally hard.

Proliferation of Threat Vectors

Just as the varieties of threat actors have proliferated over time, so have the ways they can attack information systems and their users. Each type of attack exploits a particular weakness in the system involved: a design or manufacturing flaw, incompetence or inattention on the part of the system's administrators, missing or insufficient security practices, or the endless ignorance and gullibility of the user community.

Over the past ten years, the number and type of threat actors have grown wildly as the know-how and tools have proliferated worldwide.

We can predict what areas a flood will damage or the kinds of buildings that will fail in an earthquake. However, there are far too many ways to misuse or abuse an information system, and far too many objectives to be served by doing so, to let us do anything more than guess at how and why any particular system may be attacked, and by whom.

7.2. Cybercrime/Cyberterrorism Terminology

Advanced persistent threat (APT). An adversary with sophisticated levels of expertise and significant resources that allow it to generate opportunities to achieve its objectives using multiple different attack vectors (e.g., cyber, physical, and deception). The APT pursues its objectives



repeatedly over an extended period to maintain the level of interaction it needs to execute its objectives.⁴²

Bot. Software that performs automated, repetitive, pre-defined tasks. Bots typically imitate or replace human user behavior, but can operate much faster.

Denial of service (DoS). An attacker attempts to prevent legitimate users from accessing online information or services. DoS perpetrators usually use bots to overwhelming a server or website with thousands or millions of access requests. This can slow the target below the point of usability, cause it to refuse legitimate access requests, or even crash the system.

- A **Distributed DoS (DDoS)** attack uses multiple separate computers to host the bots. These botnets can contain hundreds or even thousands of computers.
- A **Telephony DoS (TDoS)** attack does the same thing, except by using a flood of bogus phone calls to prevent access to one or more telephones. This attack is often used against 911 dispatch centers, customer call centers, or phone banks used by government or private industry.

Firmware. Computer programs and data stored in hardware—typically in read-only memory (ROM) or programmable read-only memory (PROM)—such that the programs and data can’t be dynamically written or modified during execution of the programs.

Hacking/Intrusion. The practice of modifying or altering computer software and hardware to accomplish a goal that’s considered to be outside of the creator’s original objective. Those individuals who engage in computer hacking activities are typically referred to as hackers.

- The hacker culture, law enforcement, and academia recognize several subtypes of hacker. **White hats** break computer security for beneficial purposes, such as finding network security flaws for clients or for developing security hardware or software. **Black hats** or **crackers** penetrate information systems to commit crimes, such as planting malware or stealing data for profit. **Hacktivists** use hacking as a way to publicize a social, ideological, religious, or political message, either by stealing confidential data and making it publicly available (freedom of information) or by defacing or shutting down opposing systems and websites (a variety of cyberterrorism).⁴³

Internet of Things (IoT) exploitation. The “Internet of Things” refers to any object or device that sends or receives data automatically through the Internet. This rapidly expanding set of “things” includes tags (also known as labels or chips) that automatically track objects, sensors, and devices that interact with people and share information machine-to-machine. Attackers take advantage of this scale to infect large segments of devices at a time, allowing them access to the data on those devices or, as part of a botnet, to attack other computers or devices with malicious intent.

⁴² [U.S. National Institute of Standards and Technology](#)

⁴³ https://en.wikipedia.org/wiki/Security_hacker



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Phishing. Tricking individuals into disclosing sensitive personal information through deceptive computer-based means.⁴⁴ Phishing is a form of social engineering. These attacks use email or malicious websites to solicit personal information by posing as a trustworthy organization.

Ransomware. A type of malicious software (malware) that prevents a person or organization from accessing its computer files, systems, or networks, and demands payment of a ransom for their return.⁴⁵ A growing variant of ransomware attacks also steal potentially sensitive or embarrassing data from the victim and threaten to distribute it publicly unless the victim pays a ransom that may or may not also unlock the victim's system.

Zero-day attack. An attack that exploits a previously unknown hardware, firmware, or software vulnerability. By definition, zero-day attacks evade most or all existing cybersecurity software and hardware. Most zero-day attacks are created by elite crackers or by well-funded, organized hacking organizations, such as those sponsored or run by organized crime, intelligence agencies, or national military establishments.

7.3. Severity

The severity of a cybercrime or cyberterrorist attack depends on two main elements:

- Attacker skill and goals
- Target system vulnerability

All cyberattacks have at least one goal: profit, revenge, exploitation, embarrassment, destabilization, or destruction of the victim. An attack with limited goals (such as planting a bot to use in a DDoS attack against a third party) may have minimal impact on the victim, while a scorched-earth campaign may bring the victim to its metaphorical knees.

The more ambitious the goal, the more damage the attacker needs to inflict on the victim to succeed. This also requires the attacker to be more skilled than usual. An ambitious hack by a novice attacker will probably fail to achieve its goals.

Likewise, the more vulnerable the system, the more damage an attack can do with the same amount of effort and skill. An attacker may launch an ambitious attack that fails against a well-fortified system but may be entirely successful against a highly vulnerable system. In this regard, the victim has to abet the attacker by leaving unpatched vulnerabilities exposed—the digital equivalent to someone leaving the house's back door unlocked when s/he goes out for the evening.

We can measure “severity” in various ways. Not all of them pertain to every kind of attack.

- If the attack causes virtual or real-world damage, such as loss of data, destruction of control systems, or contamination of a water system, the victims have to pay force-account labor, vendors, or contractors to clean up the mess.
- Attacks may cripple or shut down services that depend on the attacked systems. These services may be critical (air traffic control, access to medical records in a hospital) or amenities

⁴⁴ Ibid.

⁴⁵ FBI, [“The Cyber Threat.”](#)



(credit-card purchase processing, online reservation systems). The criticality of the service and the scope of its curtailment determine the attack's severity.

- Ransomware imposes a direct expense through charging the victim a ransom to regain access to his/her data and systems. These ransoms may run from the thousands to the millions of dollars, depending on the attacker's ambition and the victim's ability to pay.
- Cyberattack victims may suffer reputational loss or brand impairment through exposure of embarrassing information, publication of client data, or simply by becoming known as "those idiots who didn't patch their system." At its worst, the reputation hit can destroy an organization. Government agencies, financial firms, and healthcare providers are particularly vulnerable to this kind of loss.

Some examples of what differing measures of severity look like in the real world:

- The City of Atlanta suffered a massive ransomware attack in March 2018. The SamSam ransomware exploited well-known weaknesses in the city's IT infrastructure to compromise court systems, warrant issuances, water service requests, new inmate processing, court fee payments, and other online bill-pay programs across a range of city departments.⁴⁶ The incident threw more than a third of the city's 424 software systems offline or partially disabled them; data losses included ten years of legal documents and all stored police dash-cam recordings. The city's direct recovery costs totaled over \$9.5 million, not including productivity or data losses.
- The federal Office of Personnel Management (OPM) announced in June 2015 that it had been hacked not once, but twice by what appeared to be state-sponsored attackers who harvested the personal and security clearance files of over 22.1 million federal employees, contractors, and their families and friends. The records included Social Security numbers, names, dates and places of birth, and the names of family members—everything needed for identity theft on an industrial scale. The OPM director and CIO both resigned in the wake of congressional investigations.⁴⁷ No figures are available for the cost of the cleanup, system reconfiguration, and the still-ongoing identity-theft monitoring for those people whose records were compromised.
- On May 7, 2021, a ransomware attack hit Colonial Pipeline, a Texas-based firm that operates a fuel pipeline network in the southeastern U.S. The attack targeted the firm's billing systems, which caused Colonial to shut down its pipelines for six days. The hackers also stole 100 gigabytes of company data and threatened to release them to the public if the company didn't pay the 75 bitcoin (~\$4.4 million) ransom. Given Colonial's dominance in its market, the pipeline shutdown led to commercial flight interruptions, long lines at gas stations, fuel shortages, and price rises that extended past the reopening of the pipelines on 12 May. The U.S. President declared a state of emergency on May 9.⁴⁸ There are no estimates yet for the hack's total cost to the U.S. economy, but gas prices rose to their highest level in six years following the pipeline shutdown.⁴⁹

⁴⁶ Reuters, "[Atlanta ransomware attack throws city services into disarray](#)," March 23, 2018.

⁴⁷ https://en.wikipedia.org/wiki/Office_of_Personnel_Management_data_breach

⁴⁸ https://en.wikipedia.org/wiki/Colonial_Pipeline_ransomware_attack

⁴⁹ <https://abcnews.go.com/US/gas-hits-highest-price-years-fuel-outages-persist/story?id=77735010>



7.4. How are Cybercrime/Cyberterrorism Vulnerabilities Identified?

The typical information system uses components from dozens of manufacturers and hosts software sold by more dozens or even hundreds of publishers. A flaw in any one of these may cause a vulnerability in the overall system.

There's no central authority in charge of cataloguing hardware and software vulnerabilities or publicizing them to users. (If there were, it would be the number-one target for hackers worldwide.) Each individual manufacturer discovers these flaws through internal testing, customer trouble reports, hacking incidents, or notices issued by third parties, such as the makers of security hardware or software, academic researchers, or white hats. That manufacturer then has to devise a patch (if possible), notify its customers (if possible), and hope that the customers will quickly apply the fix to close the vulnerability. With this process, the wonder isn't that there are so many vulnerable information systems, but that there are any secure systems at all.

Some major hardware and software manufacturers aggressively test their products for vulnerabilities and push out regular updates to fix them. For example, Microsoft issues numerous security and quality updates every month for its Windows operating system and other products. Smaller companies may not patch their products regularly, or may wait to roll out security fixes with product updates they issue every few months or every year. Some vulnerabilities (such as passwords embedded in IoT device firmware) may never be fixed because the systems themselves aren't designed to allow it. Of course, patches and updates are only useful if the users or system administrators install them—a common failing that's been at the root of several major cyberattacks, such as the City of Atlanta case mentioned above.

There is no central authority in charge of cataloguing hardware and software vulnerabilities or publicizing them to users.

System administrators are ultimately responsible for the security of their systems. They may find vulnerabilities through manufacturers' notices, articles in the specialized press, alerts generated by cybersecurity software or hardware installed on the system, and bulletins issued by agencies such as the Department of Homeland Security's [National Cyber Awareness System](#).

System admins may also proactively hunt for vulnerabilities by contracting for security reviews from government agencies or private firms. These reviews may include an analysis of the network topology to discover weaknesses, review of security policies and practices, or penetration testing (in which a white hat tries to break into the system to reveal vulnerabilities).

7.5. Historic Cyberattacks in the United States⁵⁰

Cybercrime is geography-independent. Threat actors can carry out their attacks from anywhere in the world that has sufficiently robust information infrastructure to support their activities.

Profit-seeking threat actors may not even know or care where their victims are; their attacks seek out particular vulnerabilities in systems. Brett Callow, a threat analyst at Emsisoft, told the

⁵⁰ ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

B2a. Does the Plan include information on previous occurrences of hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))



Washington Post, “Most ransomware attacks are spray-and-pay in nature, and those hit are the ones with the weakest systems. Local governments seem to have the weakest systems.”⁵¹ For example, an August 2019 mass ransomware attack against 22 Texas state and local government information systems mauled Wilmer, a town of 4,000 people on the far fringes of Dallas that had neither the financial nor the personnel resources to meet the criminals’ demands.

DDoS and TDoS attacks are motivated by “an interest in obtaining financial reward, making an ideological statement, creating a geopolitical advantage, or exacting revenge for a particular government action, corporate campaign, or policy stance.”⁵² They’re still a favorite tool of ideological threat actors who often aim their attacks at government information and communication systems. The victimized government entity may not have done anything to earn the attackers’ ire other than being part of a class of disfavored entities (law enforcement, public health, military, foreign policy, etc.).

The bottom line is that Buena Park is in no way immune to cyberattacks by being small, semi-obscure, inoffensive, or in a “nice” neighborhood.

Another difficulty in sizing the threat is that victims report only some small fraction of cyberattacks. No one can even agree on how small that fraction is; estimates range from less than ten percent to perhaps 25%. What reporting there is, is fragmented among various public and private organizations and databases. We’re more likely to hear about attacks against public-sector victims because of state and federal transparency laws, though smaller agencies in states with weak transparency laws may be able to slide by without releasing this information.

With this in mind, we’ll look at some national statistics and specific cyberattacks against small-to-medium-sized jurisdictions to gain insight into the possible costs and consequences for Buena Park in a potential future attack.

- At the time of this writing (May 2022), there had been at least one reported ransomware attack against a U.S. city, county, or state government each month in 2022. Somerset County, NJ (population 330,151) and Quincy, IL (pop. 40,111) were May’s victims. Quincy spent over \$600,000 countering its attack and restoring its systems (out of a \$47.8 million budget) in an attempt to avoid paying a ransom of less than \$500,000⁵³.
- In 2020, at least 1,794 U.S. governmental and educational organizations reported experiencing a ransomware attack⁵⁴. At least 113 of these were against governmental organizations at all levels, including Tillamook County, OR (pop. 26,782), Hall County, GA (pop. 203,136), and Torrance, CA (pop. 145,000).
- Tillamook County lost the use of its network for nearly two weeks and eventually paid the hackers \$300,000 for a decryptor after discovering its backups were also compromised⁵⁵.
- The Hall County incident provides an unusually detailed view of the cost of responding to a ransomware attack. The attack started on October 7, 2020, causing the county to shut down

⁵¹ [“Ransomware poses threat to vulnerable local governments.”](#) *Washington Post*, Aug. 22, 2021.

⁵² [“The risks of DDoS attacks for the public sector.”](#) *Government Computer News*, Jan. 15, 2021.

⁵³ [“May ransomware attacks strike municipal governments, IT firms.”](#) *TechTarget*, Jun. 2, 2022.

⁵⁴ [“The State of Ransomware in the US: Report and Statistics 2020.”](#) Emsisoft Malware Lab, Jan. 18, 2021.

⁵⁵ [“Top 10 cybersecurity incidents in 2020.”](#) *ZDNetLive*, Sep. 4, 2020.



all its information systems...too late. While its public safety systems still worked, around 2,000 workstations needed to be wiped and reconfigured, leaving the parts of the county government not associated with public safety “back to 1980,” in the words of Assistant County Administrator Zach Propes—including the county’s response to Hurricane Zeta. The county’s network finally returned to service on December 15. All told, Hall County spent \$1.7 million to avoid paying ransom to restore its systems: \$1.13 million for infrastructure changes, \$478,000 for recovery activities, \$85,000 for security monitoring, and \$30,590 for force-account overtime⁵⁶. (The 2020 Hall County budget was \$103 million.)

- A ransomware attack on the City of Torrance on 1 March 2020 took down the city’s website, email system, and credit card processing system. The DopplePaymer attackers demanded 100 bitcoin (\$689,147) in ransom from the city, claiming they had encrypted 150 servers and 500 workstations to steal more than 200 gigabytes of files.⁵⁷ While the city claims it never paid the ransom, it spent \$50,000 on an insurance deductible, and DopplePaymer put over 200GB of stolen data on the dark web, including personal information about city employees⁵⁸. No estimates of lost revenues or productivity, excess overtime, or tort claims are available.
- An attack using Maze ransomware took down the email, phones, 311 customer service, and online electric and sanitation payment systems belonging to the City of Pensacola, FL (pop. 52,918) for several days in December 2019. While the attackers took pains to not affect 911 service—the city was still dealing with the NAS Pensacola mass shooting—they did steal 6GB of city data and demanded \$1 million in Bitcoin for a decryptor.⁵⁹ Pensacola didn’t pay the ransom, but it did pay for a systems audit by Deloitte & Touche and identity protection services for 57,000 people affected by the data loss⁶⁰. Similar attacks in June 2019 affected Lake City, FL (pop. 12,166), which paid \$460,000 to the cybergang that encrypted its systems, and Riviera Beach, FL (pop. 35,025), which paid \$600,000⁶¹.

Ransomware isn’t the only threat. DDoS and TDoS attacks against vital services can be as damaging but are easier to launch and harder to block. TDoS attacks can last for several days. As the transition to Next Generation 911 (NG911) proceeds, Public Safety Answering Points (PSAPs) will become more vulnerable to DDoS attacks as well as more traditional TDoS attacks; NG911 is based on Voice-over-IP architecture using the Internet, providing hackers with more avenues of attack.

- On Oct. 26, 2016, a junior hacker experimenting with Apple iOS exploits accidentally unleashed code that caused a TDoS attack against PSAPs in twelve states⁶². During that

⁵⁶ “[Hall County’s ‘crippling’ cyberattack last year cost \\$1.7M. Here’s what else we’ve learned since then.](#)” *Gainesville Times*, Dec. 18, 2021.

⁵⁷ “[Cyberattacks continue amid COVID-19 pandemic.](#)” *Daily Breeze*, Apr. 23, 2020.

⁵⁸ “[Hackers post Calif. city’s data online after it denied leak.](#)” *Statescoop*, Apr. 22, 2020.

⁵⁹ “[Maze Ransomware Behind Pensacola Cyberattack, \\$1M Ransom Demand.](#)” *Bleeping Computer*, Dec. 11, 2019.

⁶⁰ “[Cyberattack postmortem reveals Florida city lost 6GB of data.](#)” *Insurance Business America*, Feb. 12, 2020.

⁶¹ “[Pensacola Ransomware Attack Update: Cybercriminals Release Data.](#)” *MSSPA/ert*, Dec. 26, 2019.

⁶² “[DHS: Teenager’s malware disrupted 911 call centers in 12 states.](#)” *Cyberscoop*, Nov. 14, 2016.



attack, it took only a hundred spurious calls arriving in a few minutes to shut down 911 service for Surprise, AZ (pop. 139,007) and Peoria, AZ (pop. 172,109)⁶³.

While this discussion focuses on direct attacks against U.S. city and county governments, there's no need for cybercriminals or terrorists to go after a government agency's systems to damage that agency. Over 1,300 of those 2020 ransomware attacks mentioned previously affected public schools and colleges. Compromised system vendors (Microsoft Exchange Server, 2021), utilities (Delta-Montrose Electric Association, CO, 2021), communications providers (T-Mobile, 2018-21; Bandwidth.com, 2021), or hospitals (too many to mention) can interrupt vital services, expose confidential personal data, or both.

7.6. Cybercrime/Cyberterrorism Assessment

Hazard Identification

Hazard identification is the process of estimating the

- Presence and capability of threat actors
- Probability of cyberattack occurrence
- Vulnerability of City-related information systems to security breaches

The last bullet bears some clarification. "City-related" means information systems that, if compromised, may have a negative effect on the ability of the City to function as an entity. While City-owned information systems are the only ones the city government controls, every other public or private information system used within Buena Park's borders can affect the City as a whole.

An example: SC Fuels is the city government's contracted supplier of vehicle fuel, and is also a major player in supplying fuel to local independent gas stations and industrial users. A cyberattack on SC Fuels at the wrong time could lead to the gas pumps at the Civic Center and City Yard going dry and to shortages at independent gas stations across the region.

With this in mind, the entire city is at some level of risk to a significant cyberattack. The city government is especially at risk because it represents several critical infrastructure types.

Vulnerability Assessment

Vulnerability assessment combines the at-risk area defined through hazard identification with an inventory of the property within the zone. Understanding the population and property exposed to hazards helps us reduce risk and prevent loss from future events.

Because the impact of a cyberattack is so event-specific (involving the capabilities and goals of the attackers, their targets, the targets' ability to respond, and so on), calculating the City's vulnerability to these events isn't straightforward. We would need to calculate the costs of lost uptime; data, revenue, and productivity losses; contractor support to contain and recover from the attack; and equipment and software replacement to provide a working estimate for potential cyberattack losses.

⁶³ "[Young hacker arrested for disrupting 911 Service with a TDoS attack.](#)" *Security Affairs*, Oct. 31, 2016.



Risk Analysis

Risk analysis builds upon the hazard identification and vulnerability assessment. A cyberattack risk analysis for the City should include two components:

- The size of the losses and costs incurred by a cyberattack of a given size (defined through the vulnerability assessment)
- The number and type of attacks expected to occur over time

Unlike the other three hazards this Plan addresses, cybercrime isn't a property hazard *per se*. A successful cyberattack could have devastating consequences for the City's finances without damaging a single piece of real property or physically injuring a single person. The sheer variety of threat actors, types of attacks, and attack goals makes estimating the potential cost of a cyberattack extremely difficult. We can look to the experiences of other cities to see what's potentially in store for us while understanding that their finances, vulnerabilities, and response capabilities may not correspond to our own.

7.7. Impact of Cybercrime/Cyberterrorism in Buena Park⁶⁴

Cyberattacks and their impacts vary by location and the ambitions of their perpetrators. It's likely a single attack would affect only a single city or certain areas of the county at any given time. Based on recent trends and the risk assessment, the likeliest scenario the City needs to address is a major ransomware attack on the City's government or a critical infrastructure or services provider.

City Government

Depending on its thoroughness, a ransomware attack could take down any or all of the City government's databases and automated work processes for an indeterminate period. This is both not as bad as it sounds and potentially worse than it sounds.

While the city government uses a large number of automated systems, there's very little integration or shared data between them. Some critical applications are installed on individual workstations, others on the network servers, and still others on the cloud. Most are stovepiped, meaning they share no functions or data with other systems. As a result, an attack limited to (for example) the permitting system would have few impacts outside the Community Development Department. Also, many of the city government's work processes are either partially automated (such as procurement and training delivery) or mostly manual (plan check, special permit issuance). They would, in theory, be able to carry on in a fully analog environment.

However, a common response to a ransomware attack is to shut down all local systems and all workstations to contain the damage. This would bring city government operations to a screeching halt, since it would cut off all access to email, calendars, and the cloud-based systems that account for the bulk of the shared data. It would also affect critical functions such as police dispatch and 911, which would have to shift to a backup location. A shutdown extending to mobile

⁶⁴ ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

B3a. Is there a description of each identified hazard's impact on each jurisdiction? (Requirement §201.6(c)(2)(ii))



computers (such as the Mobile Data Computers in the police vehicles and the tablets used by department directors) would significantly degrade police field operations and department management. These disruptions could last for several days or weeks.

An attack that compromises the cloud-based systems or data would be even more serious. The amount of data at risk would be far greater, and functional loss would affect more employees and processes.

Loss of credit card processing services due to a cyberattack would significantly hinder the Finance Department's payment window (water bills, business licenses, and permit fees) and the Community Services front desk (facility rental and recreation registration fees).

The direct costs of an attack—ransoms paid, consultants hired, lost revenues, employee overtime—are only the start of what a major cyberattack could cost the city government. Other potential expenses include:

- Network reconfiguration
- Additional or different network security hardware and software
- Additional IT staff
- Legal settlements arising from the release of sensitive private information
- Force-account or consultant hours to reconstruct lost data
- Adverse judgments in legal cases due to loss of evidence or vital documents

Fire/EMS

The City contracts with the Orange County Fire Authority (OCFA) for firefighting and EMS services. The city government and OCFA information systems are completely separate. A significant cyberattack against OCFA would have similar affects to an analogous attack on the city government. Dispatch and 911 service may be compromised, as may systems that affect scheduling, equipment maintenance, and command communications.

Waste Disposal

Park Disposal/EDCO is the City's contractor for residential and commercial waste disposal and recycling. Any cyberattack that impairs Park Disposal's ability to schedule drivers, dispatch trucks, or accept and process waste could rapidly cause a potential public health emergency as garbage begins to pile up in the City.

Water/Wastewater Treatment Facilities

The City relies heavily on wells tapping the Orange County Groundwater Basin for its potable water. The computer that hosts the SCADA controls for the wells is physically separated from the City network and is unlikely to be affected by a cyberattack on city government information systems. However, work scheduling, dispatch, and spare parts procurement could be degraded depending on their dependence on city systems.

The City lies within the Orange County Sanitation District (OCSD). A cyberattack on OCSD that compromises the District's reclamation plant control systems could affect the treatment and disposal of most or all of Buena Park's sewage. Depending on the scope and duration of the



attack, this could lead to untreated sewage being dumped in the ocean or limits on water use in the affected areas.

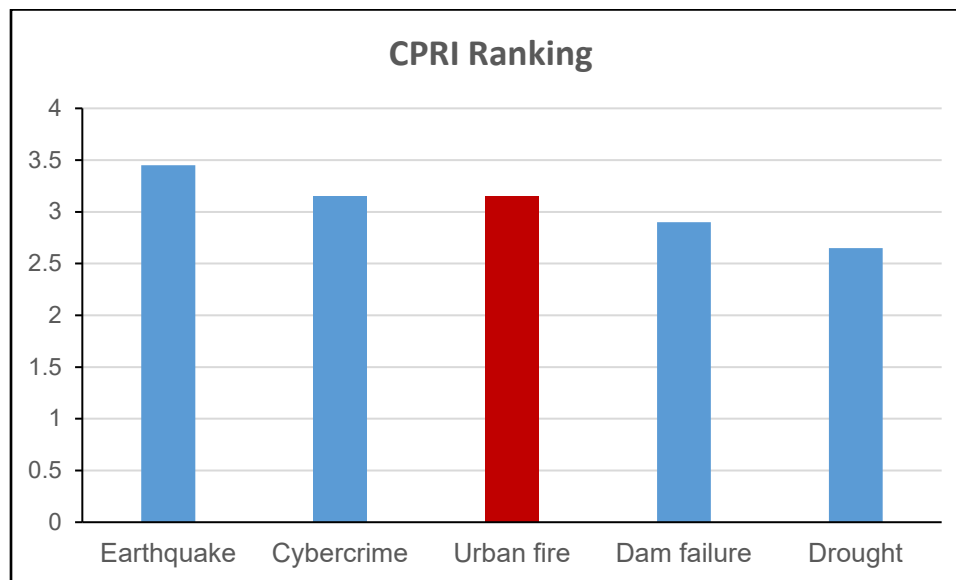
Business/Industry

Cyberattacks against most individual Buena Park businesses are unlikely to have serious consequences for more than a few employees and customers. That said, attacks against certain types of businesses could pose significant challenges for the City.

- Cyberattacks against contractors providing significant services for the city government (such as SC Fuels and Park Disposal) can, as discussed earlier, lead to serious consequences for the city government and the City as a whole.
- Cyberattacks that cause multi-day revenue losses for our major sources of sales tax (auto dealers, Walmart, Target) or transient occupancy tax (large hotels) would decrease city government's revenues.
- A number of City firms create, store, or use hazardous materials. A cyberattack against their industrial control or containment systems could cause HAZMAT spills or releases that would require evacuations and EMS response.
- Knott's Berry Farm relies on its utilities, security, ride control, and show control systems to keep its thousands of guests safe every day. A cyberattack targeting any of those systems could cause injuries, shut down rides or services, or force a park closure. Any park upset could require a sizable police and fire response that could last for hours. If the problems persist, the park may remain closed for days, decreasing city government revenues even as the City spends more on emergency response.



8. URBAN FIRE



An *urban fire* is a fire that causes damage to buildings or infrastructure in an urbanized area. In some minor situations, the fire prompts the evacuation of the building's occupants, and firefighting teams or the building's fire suppression systems contain the fire within a short time. In severe cases, the fire destroys the entire structure and can spread to other surrounding properties.

When urban fires go out of control, they may become *urban conflagrations*, burning hundreds or even thousands of structures. The two most likely causes of an urban conflagration are major earthquakes and wildfires that move through the urban-wildland interface (WUI). The twin firestorms in Pacific Palisades and Altadena in January 2025 graphically demonstrated what can happen when wildland fires driven by severe winds push through the WUI and reach developed areas.

8.1. Urban Fire Risk Factors

Proximity to Wildfire Hazards

Unless a city is unlucky enough to have a major oil refinery or fireworks factory in its heart, typical urban structure fires rarely grow into large, widespread urban conflagrations. Quick attack by nearby firefighters is usually enough to confine the fire to the primary structure and, perhaps, those immediately next to it. Fires need a running start to get far in an urban environment.

A nearby wildfire-prone area can give a fire that head start. Burning stretches of dry brush and trees can allow the fire to gain both size and momentum. The most recent urban conflagrations experienced in California have all started as wildfires.

It should be noted that a significant earthquake can start an urban conflagration. Ground shaking and liquefaction can cause hundreds or thousands of point ignitions by breaking natural gas



connections, rupturing pipelines, and breaching fuel storage tanks. [Earthquakes](#) (page 39) briefly discusses this aspect of earthquake damage.

Exposure to High Winds

High winds can also help create widespread urban fires; in fact, they're typically responsible for driving an existing wildfire into an urban area.

Buena Park is less exposed to high Santa Ana winds than are cities to its east, closer to Santa Ana Canyon and other wind channels. By the time the winds reach the City, they've spread out and lost some of their speed. However, this is *normal* wind behavior. Abnormal winds—such as those that drove the Palisades and Altadena fires—are becoming more common as temperatures continue rising throughout the West.

Fuel Load

The West Coyote Hills—the wildland that takes up much of the VHFHSZ—encompasses over 650 acres of mostly undeveloped, hilly terrain that borders suburban development in Fullerton, Brea, La Habra, La Mirada, and Buena Park. Vegetation is typical of Southern California coastal scrubland: a mix of native species (buckwheat, prickly pear) and invasive species (mustard, pepper trees, tobacco trees, eucalyptus, and pine trees).⁶⁵ All of it would provide ample fuel for a wildfire.

Suburban neighborhoods nestle against undeveloped areas in the City's north end. Some of these are multiunit condominium complexes; others are tightly packed, zero-lot-line developments; others fill the spaces between houses with trees, shrubs, patio covers, awnings, and outdoor furniture. Eucalyptus, pines, and palm trees are ubiquitous, and all are notorious for becoming torches when set afire. A wildfire intruding into these areas will find plenty of fuel to help the flames spread.

Natural firebreaks—major surface streets, channelized waterways, large expanses of parking lots—may help contain a major urban fire. Still, a new drought or simply a series of dry winters (such as the winter of 2024-5) can dry out domestic vegetation and create a combustible situation all around the City.

8.2. Severity

An urban firestorm driven by high winds can spread quickly and capriciously. Ember casting can send firebrands as far as one to two miles downwind of the fire line, igniting foliage or structures behind the firefighters on the line. Sufficiently large fires can create their own weather, which is usually more advantageous to the fire than to the people fighting it. Urban conflagrations destroy homes, businesses, and infrastructure on a potentially broad scale. Especially vulnerable are multi-unit residential and business developments (apartments, office buildings, strip malls); fires can spread through them quickly and displace dozens or hundreds of people at one time. Unlike most wildfires, urban fires also leave behind a legacy of toxic waste that can pose risks to residents for years.

⁶⁵ Wikipedia. "[West Coyote Hills](#)."



8.3. Historic Urban Fires in California⁶⁶

Unfortunately, California's history provides us with endless examples of wildfires and urban fires wreaking havoc all up and down the state. The following are a few relatively recent local examples of the ongoing threat to Irvine and its neighbors.

- The **Santiago Fire** began on October 21, 2007, in the foothills north of Irvine and east of the City of Orange. Over 28,000 acres burned, resulting in the destruction of 14 homes and 24 outbuildings. No fatalities were reported during this event.⁶⁷ This fire continued an ongoing cycle of fires followed by landslides in the resulting burn scar that's an annual ritual in this area.
- On November 15, 2008, the **Freeway Fire** started in the Santa Ana Riverbed along CA-91 in Corona. It spread quickly into Yorba Linda and the Anaheim Hills, burning homes and businesses. Two hours later, the **Landfill Fire** started south of the Olinda Landfill in Brea. The two merged early in the morning of November 16, eventually becoming the **Freeway Complex Fire**. By the time firefighters fully contained the fire on November 25, it had burned over 30,000 acres in Yorba Linda, Anaheim, Brea, Chino Hills, and Diamond Bar, destroying 314 homes, 43 outbuildings, and four commercial structures. No fatalities were reported during this event.⁶⁸
- Fire returned to the Anaheim Hills on October 9, 2017, when the **Canyon 2 Fire** broke out near CA-91 by Gypsum Canyon Road near the Riverside County line. The wildfire quickly climbed hills, jumped the 241 toll road, and spread into Anaheim Hills. In total, the fire burned 9,217 acres, destroyed 25 structures, and damaged another 55 before being fully contained on October 17.⁶⁹ In total, 16,570 people evacuated from their homes in Anaheim, Orange, and Tustin.⁷⁰
- The **Airport Fire** started in the early afternoon of September 9, 2024 in Trabuco Canyon. By 10 p.m., it had burned 5,432 acres and was threatening Rancho Santa Margarita. By the next day, it had burned over 19,000 acres and had climbed Santiago Peak on its way into Riverside County. Over the next 25 days, it scorched 23,526 acres, destroyed 160 structures, and displaced thousands of people in both Orange and Riverside counties. The Line and Bridge fires (in San Bernardino and Los Angeles counties respectively) were burning at the same time, creating a smoke plume that interfered with flight operations in Las Vegas.⁷¹
- On the evening of January 7, 2005, an extraordinarily strong Santa Ana event swept over the Los Angeles basin and San Gabriel Valley. An eight-month rainless period had parched vegetation throughout the region. The inevitable happened: wildfires broke out in Pacific

⁶⁶ ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

B2a. Does the Plan include information on previous occurrences of hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

⁶⁷ Wikipedia. "[Santiago Fire](#)."

⁶⁸ California Department of Forestry and Fire Protection (November 19, 2008). "Freeway Complex". California Department of Forestry and Fire Protection. Archived from the original on Dec. 7, 2008.

⁶⁹ Graham, Jordan (2017-10-15). "Canyon Fire 2 now 90 percent contained, full containment expected Tuesday." *Orange County Register*.

⁷⁰ Robinson, Alicia; Haire, Chris (11 October 2017). "Canyon Fire 2 Day 3: Lower temperatures help firefighters make progress on 9,217-acre blaze." *Orange County Register*.

⁷¹ Wikipedia. "[Airport Fire](#)."



Palisades and in the San Gabriel Mountains near Altadena. Thus began the **Palisades** and **Eaton** fires, 25 days of mayhem that burned a total of 37,469 acres, destroyed 16,255 structures, damaged another 2,088, killed 30 people, and displaced over 205,000 people. In both cases, the fires broke through the respective WUIs and burned deep into the nearby suburban development. The Palisades Fire was the most destructive in the City of Los Angeles's history.⁷² Thousands remain homeless at the time of this writing, and rebuilding is expected to take years and cost tens of billions of dollars.

8.4. Urban Fire Assessment

Hazard Identification

Hazard identification is the process of estimating the

- Presence of areas prone to fire starts
- Probability of a major fire occurring
- Vulnerability of the City's population, built environment, and key infrastructure to fire effects

According to California Public Resource Code 4202, the State Fire Marshal (part of CAL FIRE) maintains maps of Fire Hazard Severity Zones throughout the state. California Government Code 51178 requires the State Fire Marshal to identify areas in the state as moderate, high, and very high fire hazard severity zones.

The fire hazard severity model for wildland fire has two key elements:

- Probability of an area burning
- Expected fire behavior under extreme fuel and weather conditions

The zones reflect areas that have similar burn probabilities and fire behavior characteristics. The factors considered in determining fire hazard within wildland areas are:

- Fire history
- Flame length
- Terrain
- Local weather
- Potential fuel over a 50-year period.

Outside of wildlands, the model considers factors that might lead to buildings being threatened, including terrain, weather, urban vegetation cover, blowing embers, proximity to wildland, fire history, and fire hazard in nearby wildlands. FHSZs aren't a structure loss model; key information regarding structure ignition (such as roof type, etc.) isn't included.⁷³

The FHSZ maps cover both state and local responsibility areas. The FHSZs covering the West Coyote Hills are in the local responsibility area. This means that county and city governments are responsible for wildfire protection.

⁷² Wikipedia. "[Palisades Fire](#)" and "[Eaton Fire](#)."

⁷³ CAL FIRE. "[Frequently Asked Questions About: 2024 Fire Hazard Severity Zones](#)." Dec. 18, 2024.

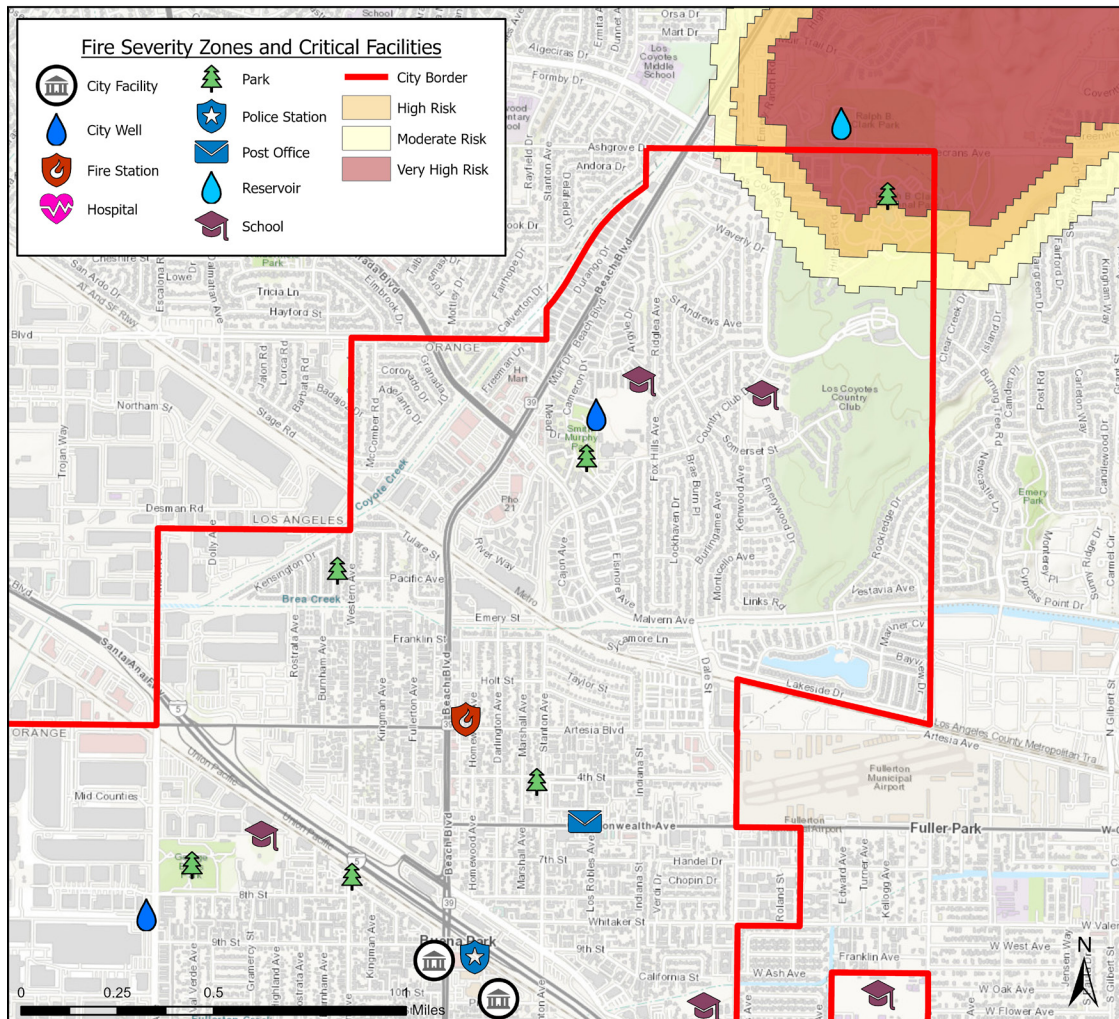
LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



Figure 12 (page 81) shows the FSHZs that impinge on City areas and the relative locations of certain types of critical City infrastructure.

Figure 12. Fire Severity Zones and critical facilities



(Source: City of Buena Park General Plan, Safety Element)

Vulnerability Assessment

Vulnerability assessment combines the at-risk area defined through hazard identification with an inventory of the property within the zone. Understanding the population and property exposed to hazards helps us reduce risk and prevent loss from future events.

Three FHSZs (Very High, High, and Moderate) cover 173 parcels within the City, representing an enrolled property tax value of \$40,138,627 for improvements and \$44,244,370 for land value.⁷⁴ Because of Proposition 13's long-term effects, these assessments are likely far less than the actual market value. For example, the following compares the latest assessed value (via

⁷⁴ Orange County Assessor's Office, 2022.

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



ParcelQuest) of eight parcels along the north side of Hillcrest Road (within the Moderate FHSZ) to the Zillow estimates of their current market value.

Address	Enrolled Tax Value (Land + Improvements)(ParcelQuest)	Estimated Market Value (Zillow)
8581 Hillcrest Rd.	\$1,851,912	\$2,546,900
8591 Hillcrest Rd.	\$328,114	\$1,579,500
8601 Hillcrest Rd.	\$725,699	\$1,704,400
8621 Hillcrest Rd.	\$1,327,466	\$2,246,300
8641 Hillcrest Rd.	\$1,006,596	\$2,718,100
8661 Hillcrest Rd.	\$761,423	\$2,062,300
8665 Hillcrest Rd.	\$916,868	\$2,540,700
8671 Hillcrest Rd.	\$759,238	\$2,064,400
Total Value	\$7,677,316	\$17,462,600

If the average gap between assessed and market values holds for all 173 parcels, the actual property value at risk is roughly \$191,550,000.

While structure fires usually don't affect the land value, the kind of high-intensity burn that accompanies an urban conflagration tends to destroy topsoil and leave behind toxins and heavy-metal wastes that require extensive remediation before any rebuilding can begin. (As of this writing, this has become an issue in Pacific Palisades). This could seriously impair the value of the lot.

Estimating the population of such a small area is tricky. The most granular U.S. Census data available is at the census block group level, and the tools available can make only fairly crude estimates. Using the average household size (2.78) for the census block group and an estimated 159 households among the 173 parcels, we estimate that roughly 442 people live within the Buena Park slice of the FHSZs.

The discussion above focuses only on the parcels within the FHSZs. A significant fire is unlikely to stop at the edge of the Moderate FHSZ. The Los Coyotes Country Club's golf course cuts all the way down to Malvern Avenue; while its fairways are extensively watered, they're also lined with pines and eucalyptus, which (as mentioned before) tend to burn readily. This could bring a sufficiently energetic fire to the doorsteps of homes 0.85 miles south of the Moderate FHSZ. An estimated 19,380 people live in Buena Park between Rosecrans Avenue and the BNSF railroad right-of-way south of Malvern⁷⁵, the closest thing to a natural firebreak that exists in that area. A fire of this scope is unlikely; then again, so was the Eaton Fire, which pushed farther into Altadena than anyone ever expected.

Risk Analysis

Risk analysis builds upon the hazard identification and vulnerability assessment. An urban fire risk analysis for the City should include two components:

- The size of the losses and costs incurred by an urban fire of a given size (defined through the vulnerability assessment)

⁷⁵ U.S. Census Bureau. American Community Survey 5-Year Estimate, 2019-2023.



- The number and type of fires expected to occur over time

Losses and Costs

Uncertainty about the scope of the event complicates estimating the size of losses and costs it will bring about. Two scenarios describe the lower and upper limits of what we can imagine:

- The unrealistic expectation that a fire will go no farther into the City than the outside edge of the Moderate FHSZ (the minimalist scenario)
- The unlikely (but no longer unthinkable) concept that a fire could burn all the way down to Malvern Avenue or the BNSF right-of-way (the maximalist scenario)

[Table 11](#) summarizes various aspects of these two scenarios.

Table 11. Comparison of Fire Scenarios

	Minimal	Maximal**
Estimated population	442	19,380
Number of parcels	173	2374
Estimated parcel value*	\$84,382,997	\$964,802,164
Critical City infrastructure nodes	1	5

* Orange County Assessor, 2022. Market value is almost certainly considerably higher.

** For this comparison, the maximal scenario includes all parcels in Buena Park from Rosecrans Avenue south to Malvern Avenue, plus the parcels between Beach Boulevard, Malvern Avenue, Brea Creek, and the BNSF right-of-way.

A relatively small amount of City critical infrastructure is at threat in the FHSZs. The most important is the reservoir on the north side of Rosecrans Avenue across the street from Ralph B. Clark Regional Park. The City's Water Utility has worked extensively to mitigate fire risks to this underground facility (see [Mitigation Actions Matrix](#), page 129). Clark Park belongs to the county and so isn't our asset.

Four more critical infrastructure nodes are involved in the maximal scenario: one municipal well, Friendship Park, and two schools (both owned by the Buena Park School District, and thus not our assets). Roads, traffic signals, and streetlights are everywhere and would be damaged or destroyed in a significant fire.

Aboveground private infrastructure at risk includes power and telephone lines, cell phone sites, banks and ATMs, food stores, and medical offices.

Fire History

The Risner Fire (September 8-9, 2015) is the most documented fire to happen in the West Coyote Hills. Over 80 acres burned, causing the evacuation of 40 homes along North Euclid Street in Fullerton. Thirty fire engines, 5 fire suppressing aircraft, and 250 firefighters were involved in fighting the fire.⁷⁶

⁷⁶ Schwebke, Scott. "[Coyote Hills area burned in fire targeted for home development](#)." *Orange County Register*, Sep. 10, 2015.



For an idea of the sort of fire activity we may expect as our weather becomes more variable and wildfires become more common and stronger, we look at an analogous nearby area: Santa Ana and Weir Canyons in eastern Anaheim. Like the West Coyote Hills, these two areas are split by major roads and fringed by suburban development of various vintages. Restricted access to some neighborhoods parallels that in and around the Los Coyotes Country Club and the surrounding development. [Table 12](#) (page [84](#)) lists fires that involved the Santa Ana or Weir Canyon areas in the past 60 years.

Between utility vehicles, hikers, street traffic, transient encampments, fireworks, dirt bikes, and the random arsonist, it's a minor miracle that the West Coyote Hills haven't burned more often. As we enter a time of extended droughts and increasingly extreme weather, we can't discount the possibility that our luck will eventually run out.

Table 12. Fire activity in and around Santa Ana and Weir Canyons⁷⁷

Fire	Acreage Burned	Fire	Acreage Burned
1967 Paseo Grande	51,076	2008 Freeway Complex	30,305
1982 Gypsum	20,142	2017 Canyon I	2,661
1984 Coal Canyon	449	2017 Canyon II	9,198

8.5. Impact of Urban Fire in Buena Park⁷⁸

Before the Fire

A High or Very High FHSZ imposes mitigation and preparedness costs on property owners inside the zones. California Building Code (CBC) Chapter 7A (the WUI standard) requires new construction to conform to a number of ignition-resistant and fire-safe standards. California Government Code (CGC) § 51182 mandates defensible space clearance and other wildland fire safety practices for all buildings inside a VHFHSZ. While these standards make sense in their context and few are truly onerous, they can be expensive for existing construction built before wildfire zones existed. They can also be challenging to apply to multi-unit housing, such as the condominium developments immediately to the west of Clark Park.

While FHSZs aren't officially tied to fire insurance rates, it's inevitable that property owners in the new Buena Park FHSZs will be hit by rate increases or policy cancellations. It's possible those rate hikes may include areas near to but not inside the FHSZs. This may cause property owners to go without insurance or to pay more for less coverage, as has happened through the state over the past few years.

Until now, Buena Park has never had to pay serious attention to wildfire monitoring and warnings. The City will now have to do so. It'll also need to educate the residents and businesses north of Malvern Avenue to become aware of wildfire and urban fires and to prepare for future fires. This will require designing and publicizing evacuation zones, marking evacuation routes, pressing

⁷⁷ CAL FIRE. "[Historical California Wildfires](#)."

⁷⁸ ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

B3a. Is there a description of each identified hazard's impact on each jurisdiction? (Requirement §201.6(c)(2)(ii))



residents to enroll in AlertOC, and stepping up safety inspections in the FHSZs. All this requires time and money on the City's part and that of the people in the affected areas.

During the Fire

A wind-driven fire in the wildlands near Rosecrans Avenue will cause a great deal of anxiety among the property owners in and near the FHSZs even if the blaze appears to be under control. Some number of residents are likely to evacuate spontaneously. Others may take unhelpful measures such as turning on all their sprinklers unnecessarily. Calls for police or fire service will likely spike.

The City will have to decide when to issue evacuation orders to the people closest to the fire and warnings to the rest. Once it does, the City government's day-to-day business will have to stop immediately while evacuations, road closures, mass care, and public information operations spin up rapidly and consume a large proportion of the City workforce. Evacuations are highly disruptive to everyone involved, especially when major streets such as Beach Boulevard are blocked or businesses have to close.

If the fire jumps Rosecrans Avenue, it may spread quickly through the neighborhoods around the country club. Embers may blow hundreds of yards or even over a mile ahead of the main fire line, causing spot fires in unpredictable places. As we've seen in other places, the City's evacuation plans may fall apart as people make decisions that may be neither useful nor safe. Some people may decide to stay in place to "fight the fire"; others may leave in a rush without taking anything with them or with no gas in their cars. Calls for service on 9-1-1 will explode.

Wildfires and urban fires generate a huge amount of smoke, much of it mixed with chemicals and particles hazardous to human and animal life. The smoke plume will go wherever the wind takes it. If the wind's blowing south—as it would to drive the fire into Buena Park—it will blanket the entire city and pose a threat to infants, seniors, and people with respiratory conditions. Residents and businesses outside the evacuation zones but in the thickest smoke may have to shelter in place, further disrupting normal routines.

After the Fire

An urban conflagration usually leaves behind a literal legacy of ashes. Flames may have levelled entire neighborhoods. Even if a house or business survives the flames, the ash and smoke intrusion may render the structure unusable until its owners can have it remediated. Basic wayfinding in the burn area can become a chore, as street signs may be destroyed and familiar landmarks may disappear. Continuing wind will blow ash and toxic chemicals outside the burn area into supposedly unaffected neighborhoods.

Debris and soil removal operations are loud, dirty, and may continue around the clock. Streets in and around the burn area may open and close with little warning, disrupting traffic flows. While most of the utilities in the Los Coyotes area are underground, aboveground utilities line both sides of Beach Boulevard; if they're damaged or destroyed, returning electricity and phone service to the burn area and its vicinity may take several days or even weeks.

The City will face having to rebuild its own infrastructure throughout the burn area. Streets will need to be repaved, signs and traffic signals replaced, streetlights reinstalled, its urban forest



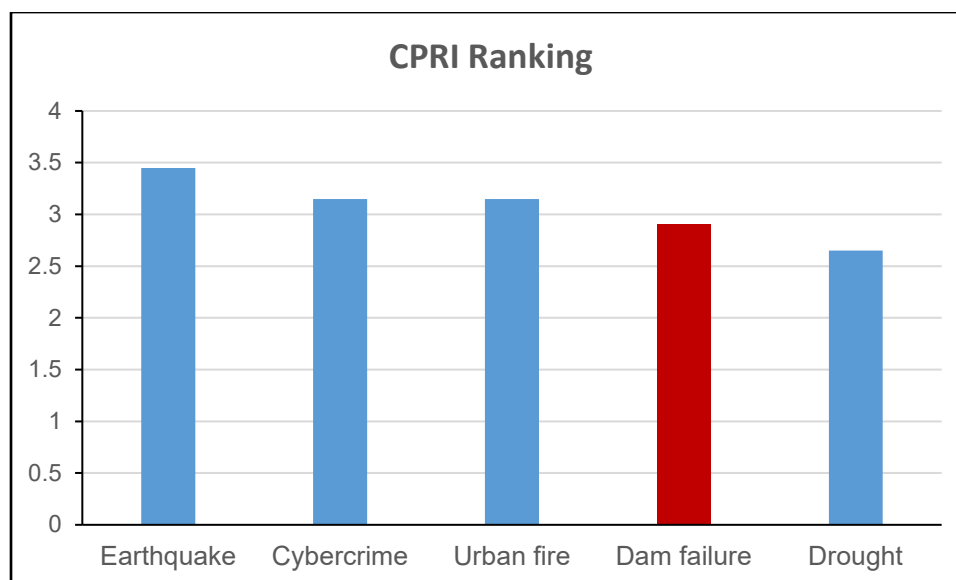
BASIC PLAN

replaced from scratch. As of this writing, it's unclear whether the federal Public Assistance funds that previously paid for this kind of reconstruction will still be available.

The fire may leave hundreds or even thousands of people homeless. Some proportion will simply leave and not return; others may be unable to rebuild for months or even years depending on insurance payouts and personal finances. Labor and material shortages may hobble even those reconstruction projects that get started early. Recovery will come after years, not months. Even if the burn area is rebuilt to be exactly as it was before, it will be a different place.



9. DAM FAILURE HAZARDS



Dam failures occur when the dam structures breach, when dam operators are forced to release outsized amounts of water through spillways, or when an associated reservoir overtops the dam and causes an uncontrolled release. The inundation areas for four local dams cross some amount of the City's area, placing the City at risk from a catastrophic flash flood.

9.1. Dam Failure Risk Factors

Dam Type and Age

While dams in general come in many varieties, the four that pose the greatest threat to Buena Park ([Table 13](#), page [88](#)) are all earth-fill dams of various sizes. *Earth-fill dams* are the most common type of dam in the U.S.⁷⁹, but they are also vulnerable to a large number of failure modes.

- **Overtopping.** Impounded water flows over the crest of the dam, rapidly eroding the dam structure. This may be caused by overfilling the impoundment, or by waves resulting from a major landslide or a nearby earthquake. Overtopping causes one-third of dam failures worldwide⁸⁰.
- **Seepage or piping.** Water infiltrates the dam structure over time, eroding the internal fill and eventually breaking out through the dam face. Seepage is usually a broader, lower-velocity breach. Piping is the result of water under pressure essentially boring a hole through the dam structure; once the hole is created, it can enlarge quickly and undermine the entire structure. This activity causes 20% of dam failures worldwide⁸¹, such as the catastrophic 1976 Teton Dam collapse in Idaho.

⁷⁹ U.S. Army Corps of Engineers, [National Inventory of Dams](#).

⁸⁰ University of Catalonia-La Mancha. ["How Dams Fail."](#)

⁸¹ Ibid.



- **Seismic damage.** Tectonic forces (such as the movement of a fault trace) can slowly tear apart a dam's structure or undermine its footings or abutments. This can happen over a long period of time, or suddenly during an earthquake.
- **Improper maintenance.** Earth-fill dams are essentially human-made hillsides and are vulnerable to all the forces that wear down hills. Left unchecked, rockslides, animal burrows, and vegetation can degrade the dam face and abutments, potentially compounding the problems of seepage and piping.

Table 13. Local dams posing the highest risk for Buena Park

Name	Location	Type	Built	Reservoir Size (acre feet)	Channel Capacity (cfs)	Spillway Peak Outflow (cfs)
Brea	Fullerton	Earth	1942	4018	2000-3000	27000
Carbon Canyon	Yorba Linda	Earth	1961	7033	Not Avail.	Not Avail.
Fullerton	Fullerton	Earth	1941	706	500-7500	5650
Prado	Chino Hills	Earth	1941	314400	5000	10100+

(Source: Orange County Operational Area Emergency Operations Plan)

As dams grow older, they suffer more deterioration and require more maintenance. The average U.S. dam is 56 years old⁸²; three of the four hazard dams listed in [Table 13](#) are over 78 years old. There's no data suggesting that these dams are inherently unsafe or have been inadequately maintained. Still, it's worth noting that the oldest ones were engineered using slide rules during a time when plate tectonic theory and seismic science were both in their infancies.

Highly Variable Reservoir Heights

As discussed in [Flood Hazards](#) (page 65), rainfall in Southern California is a feast-or-famine proposition. The annual rainfall in Orange County over the past 125 years has ranged from only 4.35 inches in 2001-2002 to 38.2 inches in 1883-1884. This means that dam impoundment basins in Southern California go from being entirely or mostly empty to being very full in short amounts of time, sometimes from year to year. Dry years expose both faces of earth-filled dams to the elements, vegetation growth, animal burrowing, wind scour, and erosion from brief rainstorms. Wet years can be very wet, indeed, and a rising reservoir can reveal problems in the dam structure at exactly the worst possible time.

California's periodic droughts historically have ended with one or more years of abnormally heavy rainfall. These deluges—which can often stretch over several months—can cause massive runoff from the mountains that form California's spine and rapidly fill reservoirs to worrying levels. This situation caused the near-disaster at Oroville Dam in early 2017, when its vast reservoir filled over a number of weeks to within a whisker of overtopping. Emergency releases by the dam's operators revealed that both spillways were under-engineered, leading to their failure when stressed.

⁸² Association of State Dam Safety Officials. "[Living with Dams: Know Your Risks.](#)"



Local Seismicity

Earthquake (page 39) discussed the seismic threat to Southern California in general and Buena Park in particular. Earthquakes formed our landscape, and they continue to change it. The Brea, Carbon Canyon, and Fullerton dams are within a short distance of the Norwalk or Whittier/Elsinore faults; the Chino Fault just misses the Prado Dam's eastern abutment. A significant rupture along any of these faults may cause severe damage to the nearest dams.

9.2. Flooding Following Dam Failure

Large dam failures are rare in the United States, although there's a history of them in Southern California. In general, dam breaches pose a hazard only when their reservoirs hold significant amounts of water, which hasn't been the case over the past several years of drought. However, a dam failure involving a full reservoir is the direst flooding situation the City faces: fast-moving water would inundate much of the City with very little warning. For example, a breach of Prado Dam in the Chino Hills could unleash a wall of water that would reach Buena Park within six hours⁸³. The warning times would be shorter for the other three dams.

Because dam failures can have such severe consequences, FEMA requires that all dam owners develop Emergency Action Plans (EAPs) for warning, evacuation, and post-flood actions. Although they may coordinate with county officials while developing the EAP, dam owners are responsible for developing potential flood inundation maps and facilitating emergency response.

Dam flooding scenarios are based on varying water levels behind the dam; the higher the water, the more potentially destructive the flooding. [Figure 13](#) (page 90) shows the relationship of the various model water levels used in developing flood scenarios.

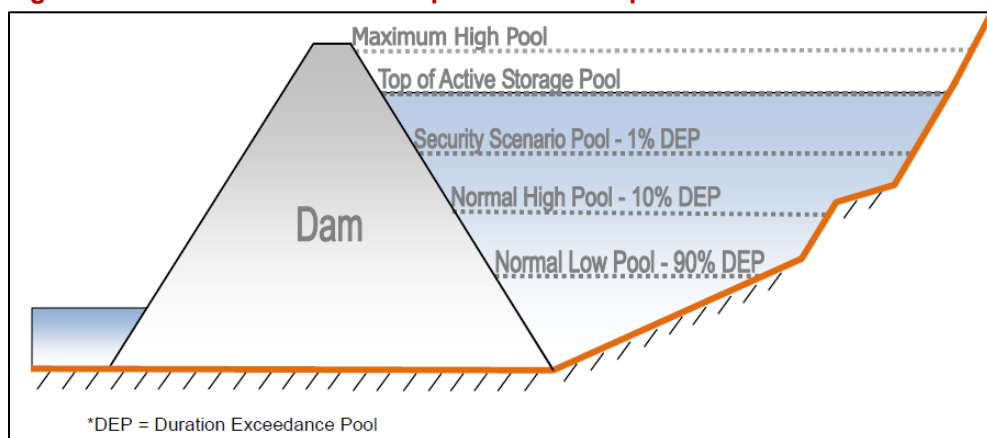
- **Maximum High Pool (MHP)** is an extreme flood event that uses all available capacity behind the dam and leaves a minimum of freeboard. Uncontrolled spillway discharges may begin at this level if the dam has spillways; wave runup may cause overtopping in dams without spillways. The resulting discharges may cause severe downstream flooding even if the dam doesn't fail.
- **Top of Active Storage Pool (TAS)** is the highest elevation that still allows for normal regulated operations without emergency spillway releases. Significant additional discharges will result if the water level rises above the TAS level. TAS is usually equal to the emergency spillway crest elevation in dams with uncontrolled spillways; in dams with controlled or gated spillways, TAS is at or near the top of the gates.
- **Security Pool (1% duration exceedance)** or the **Security Scenario Pool (SSP)** is the pool elevation exceeded about 1% of the time (3-4 days a year) that still allows for normal regulated operations. SSP is used for modeling security scenarios (such as terrorist attacks) and may or may not be associated with a flooding event.
- **Normal High Pool (NHP)** represents a relatively high but normal pool condition that can happen around 10% of the time (30-40 days annually). **Normal Low Pool (NLP)** is the pool

⁸³ U.S. Army Corps of Engineers. *Prado Dam Consequence Assessment Report*, January 2015.



elevation that is usually exceeded 90% of the time. NHP and NLP don't normally lead to flooding scenarios⁸⁴.

Figure 13. Dam flood scenarios – pool relationships



(Source: U.S. Army Corps of Engineers)

Dam-related flooding scenarios come in failure and non-failure varieties. *Failure scenarios* are based on a catastrophic failure of the dam structure that results in a simultaneous release of the entire reservoir pool. *Non-failure scenarios* assume the dam's structural integrity remains intact, but water levels or dam operators will cause emergency discharges that may overwhelm stream or flood-control channel capacities downstream.

Severity

A dam breach is essentially a large, human-caused flash flood. Because of their short warning time and their inherent violence, flash floods are especially hazardous to life and property. People and animals can be swept away and drown; structures and their contents are destroyed; roads, bridges, and railroad tracks can be washed out; and utilities are knocked offline. Floods in general can create health hazards due to the discharge of raw sewage from damaged septic tank leach fields, sewer lines, and sewage treatment plants, or due to hazardous materials carried off by raging waters.

Geography

A complex of hills and mountains fringe the northern and eastern edges of the Orange County coastal plain. Many of the county's resident dams—including the Brea, Carbon Canyon, and Fullerton dams—are located either in the foothills or on their verges, taking advantage of existing canyons as ready-made impoundment basins. This also means that should a dam experience an emergency or uncontrolled release, the water will almost certainly run downhill, gaining speed and power along its way.

⁸⁴ U.S. Army Corps of Engineers. *Prado Dam Consequence Assessment Report*, January 2015.



What is the Effect of Development on Dam Inundation Zones?

Essentially all of northwest Orange County is built out. Historic watercourses and drainage systems have been channeled or eliminated as a result. This development has often involved changing the area's topography, filling depressions, and slicing off natural rises to create more buildable land, potentially without regard to the downhill effects in a flash-flood scenario.

The mass of water involved in an emergency or uncontrolled release will try to follow existing natural or human-created topographical contours and will take advantage of new channels formed by streets and structures. Because the inundation zones for all four dams of concern to Buena Park are fully developed, a major release will cause catastrophic damage for miles before the full force of the water is spent.

What is the Effect of Climate Change on Dam Breaches?

Because of the high variability in the scenarios that result from competing climate models, it's currently difficult to settle on a single set of possible impacts climate change may have on Buena Park's flood threat. Two opposing outcomes may be possible.

- If climate change brings to Southern California a general decrease in rain and snowpack, then the City's risk from dam breaches may go down. In this scenario, there will be fewer rainstorms and less water runoff, so reservoir pools will remain low, greatly decreasing the possibility of a serious dam breach or uncontrolled release.
- On the other hand, a warmer climate and increased sea-surface temperatures may promote the longevity of the tropical storms and hurricanes that currently hit the west coast of Mexico and Baja California. In this case, Southern California may suffer periodic torrential downpours from the fringes of these storms as they move farther north during the summer and fall hurricane season. This could present an increased probability of overfilling impoundments or stressing dam structures, leading to a greater possibility of emergency or uncontrolled dam releases.

How are Inundation Areas Identified?

While writing their EAPs, dam operators use many of the same tools developed to determine flood-prone areas for the National Flood Insurance Program (NFIP). Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FIS) identify flood-prone areas and are the basis for implementing floodplain regulations and for delineating flood insurance purchase requirements.

FEMA combines water surface elevations and topographic data to develop FIRMs. FIRMs illustrate areas that would be inundated during a 100-year flood, floodway areas, and elevations marking the 100-year-flood level. In some cases, they also include base flood elevations and areas located within the 500-year floodplain. These are all factors that influence where the water released during a dam breach will go, and what depths that water is likely to achieve along the way. Inundation mapping also takes into account the speed and mass of the water movement, which is less of an issue in normal flood mapping. In normal riverine or urban flooding, the water goes where the land allows it to; physics governs a flash flood or dam-related inundation more than does topography.



9.3. Historic Dam Failures in Southern California⁸⁵

At midnight on March 12, 1928, the St. Francis concrete gravity-arch dam failed catastrophically. Located in the San Francisquito Canyon approximately ten miles north of present-day Santa Clarita, the Los Angeles Bureau of Water Works and Supply (now the Department of Water & Power) built the St. Francis as a major component of its water system. The poorly engineered dam leaked from the moment the reservoir filled. In March 1928, the reservoir reached what we now call “maximum high pool.” When the dam suddenly failed, 12.4 billion gallons of water rushed down the canyon in a wave that was initially 120 feet high. This wave killed roughly 425 people on its way through Valencia, Newhall, and the Santa Clarita Valley⁸⁶.

The earth-fill Baldwin Hills Dam created a 250 million-gallon reservoir overlooking the Los Angeles neighborhood of Baldwin Hills. It straddled the trace of a tributary to the Newport-Inglewood Fault. Fault creep compounded by ground subsidence from nearby oilfield pumping eventually tore the dam apart. The December 14, 1963 release killed five people and destroyed 277 homes⁸⁷.

A M_w 6.7 earthquake struck the San Fernando Valley on February 9, 1971, killing 64 people and causing \$553 million (\$3.86 billion in 2022 dollars) in damage. The Lower Van Norman Dam in Mission Hills was one of the casualties. The top thirty feet of the earth-fill dam collapsed, leaving the half-full reservoir less than six feet from the crumbling crest. Authorities evacuated 80,000 people from the area below the dam and pumped out the reservoir. A later UCLA study later estimated that a total collapse of the dam could have killed over 71,000 people⁸⁸.

9.4. Dam Inundation Hazard Assessment

Hazard Identification

Hazard identification is the process of estimating the geographic extent of the floodplain (i.e., the area at risk from inundation), intensity of the flooding that can be expected in specific areas of the floodplain, and probability of occurrence of inundation events.

This process usually informs the creation of an inundation map.

Vulnerability Assessment

Vulnerability assessment combines the inundation zone boundary generated through hazard identification with an inventory of the property within the zone. Understanding the population and property exposed to hazards helps us reduce risk and prevent loss from future events. Because the impact of a dam breach or emergency release is so event-specific (involving the height of the pool, the mode of failure, the volume and timing of the release, and so on), calculating the City’s vulnerability to these events isn’t straightforward. We would need to calculate the amount of

⁸⁵ ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

B2a. Does the Plan include information on previous occurrences of hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

⁸⁶ https://en.wikipedia.org/wiki/St._Francis_Dam.

⁸⁷ https://en.wikipedia.org/wiki/Baldwin_Hills_Dam_disaster.

⁸⁸ http://articles.latimes.com/1996-02-04/news/mn-32287_1_san-fernando-quake.



property in the zone, as well as the type and value of structures on those properties, to provide a working estimate for potential inundation losses.

Risk Analysis

Risk analysis builds upon the hazard identification and vulnerability assessment. A risk analysis for the City should include two components:

- The life and value of property that may incur losses from a dam-related inundation event (defined through the vulnerability assessment)
- The number and type of inundation events expected to occur over time

It's possible to predict the severity of damage from a range of events within the broad components of a risk analysis. Flow velocity models assist in predicting the amount of damage expected from different magnitudes of inundation events.

Local Conditions

Inundation maps identify the areas in Buena Park that a dam-related failure is more likely to affect. It's also possible to pinpoint the effects of certain inundation events on individual properties. At the time of publication of this Plan, data was insufficient to conduct a full risk analysis for inundation events in Buena Park. Insurance estimates for City-owned property give insight into the potential costs of a dam failure. This Plan includes recommendations for building partnerships that will support the development of an inundation risk analysis in Buena Park.

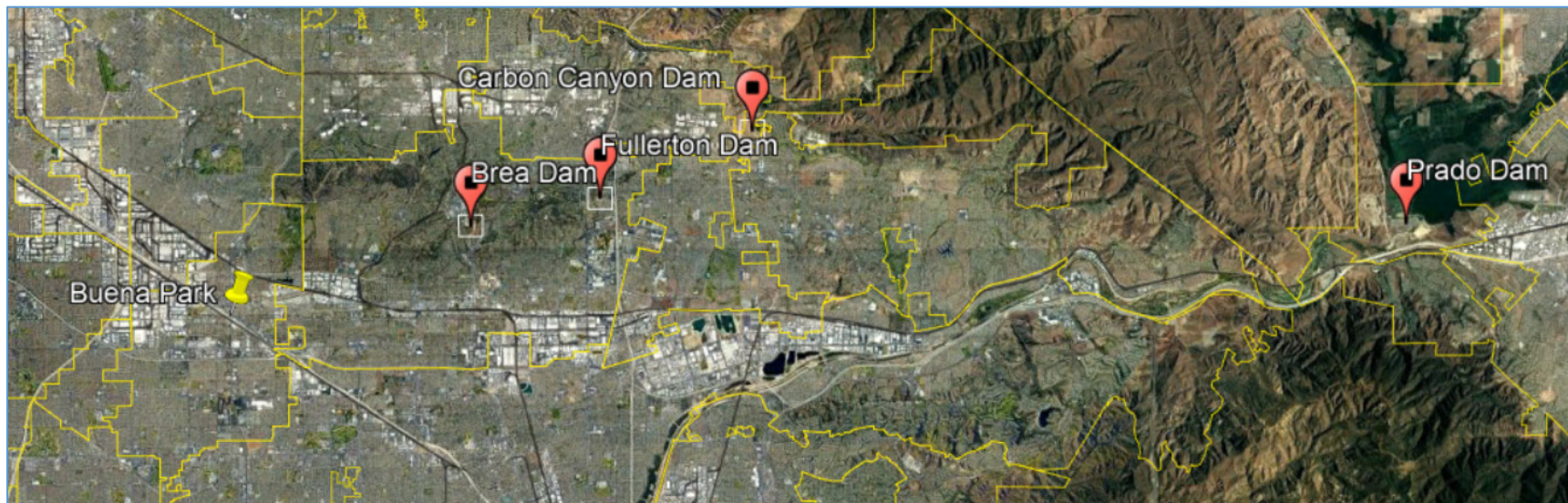
We measure the magnitude of a dam-related inundation in terms of its peak discharge. This is the maximum volume of water passing a point along a channel in a given amount of time, usually expressed in cubic feet per second (cfs).

The City lies within the inundation zones of four local dams: Brea, Carbon Canyon, Fullerton, and Prado ⁸⁹. [Figure 14](#) (page 94) shows the locations of these four dams relative to Buena Park. USACE owns and operates all four dams. [Figure 15](#) (page 95) through [Figure 18](#) (page 96) show the potential for inundation resulting from a failure in any of these four dams.

⁸⁹ USACE Consequence Assessment Reports for Brea Dam (Nov 2015), Carbon Canyon Dam (Mar 2012), Fullerton Dam (Jun 2012), and Prado Dam (Jan 2015).

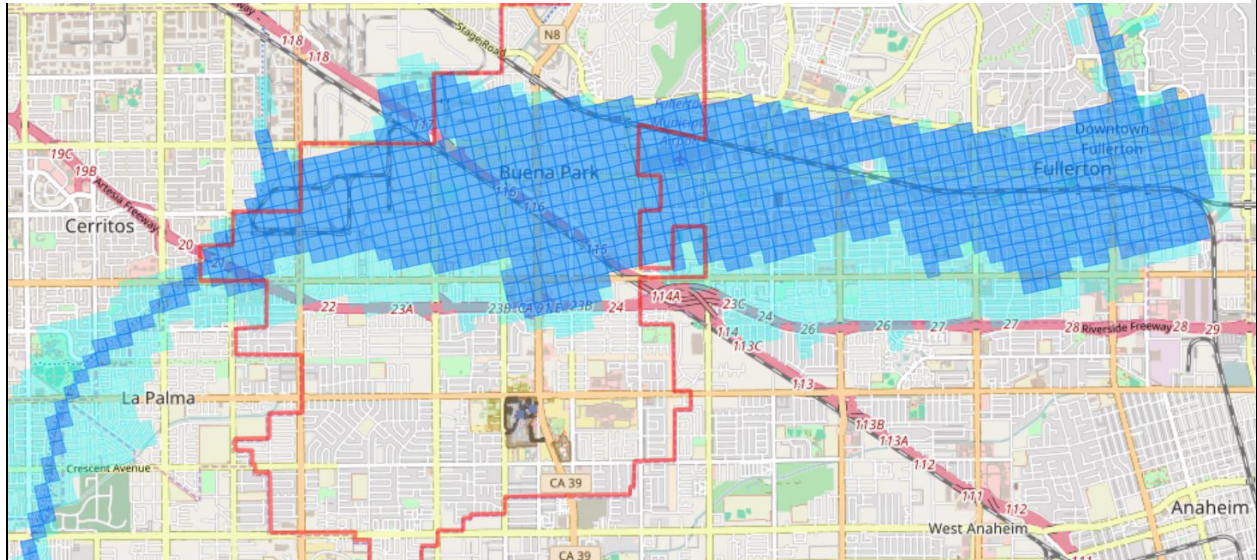


Figure 14. Orientation map of dam locations relative to Buena Park



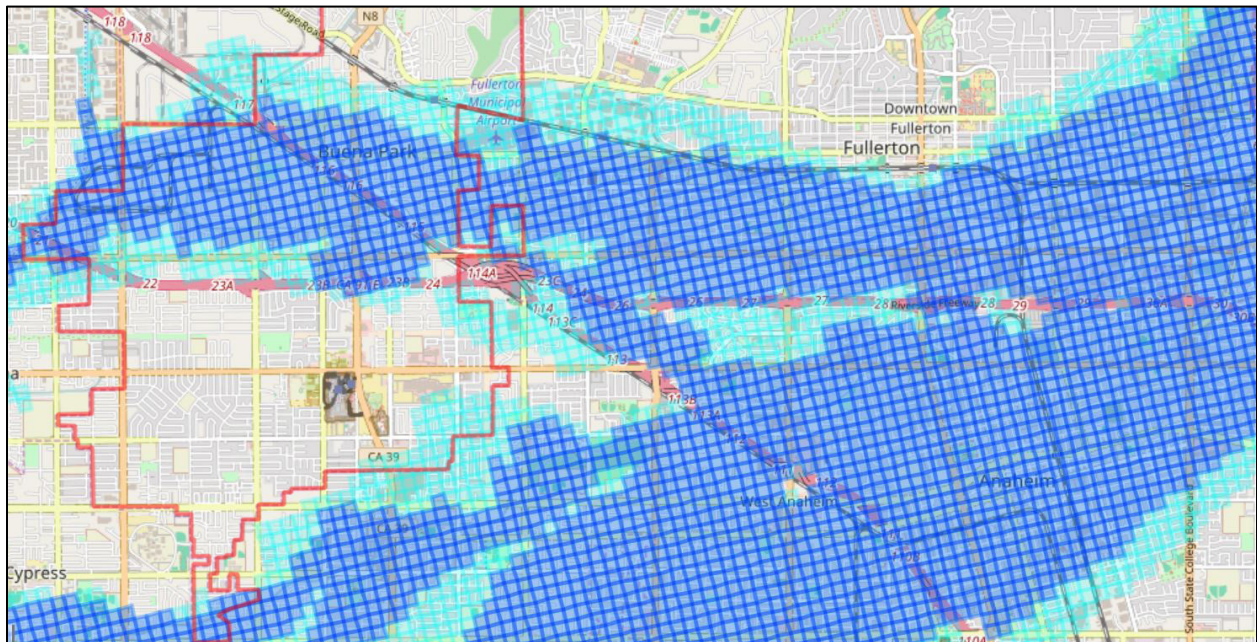
(Source: USACE National Inventory of Dams)

Figure 15. Brea Dam MH and TAS inundation zones



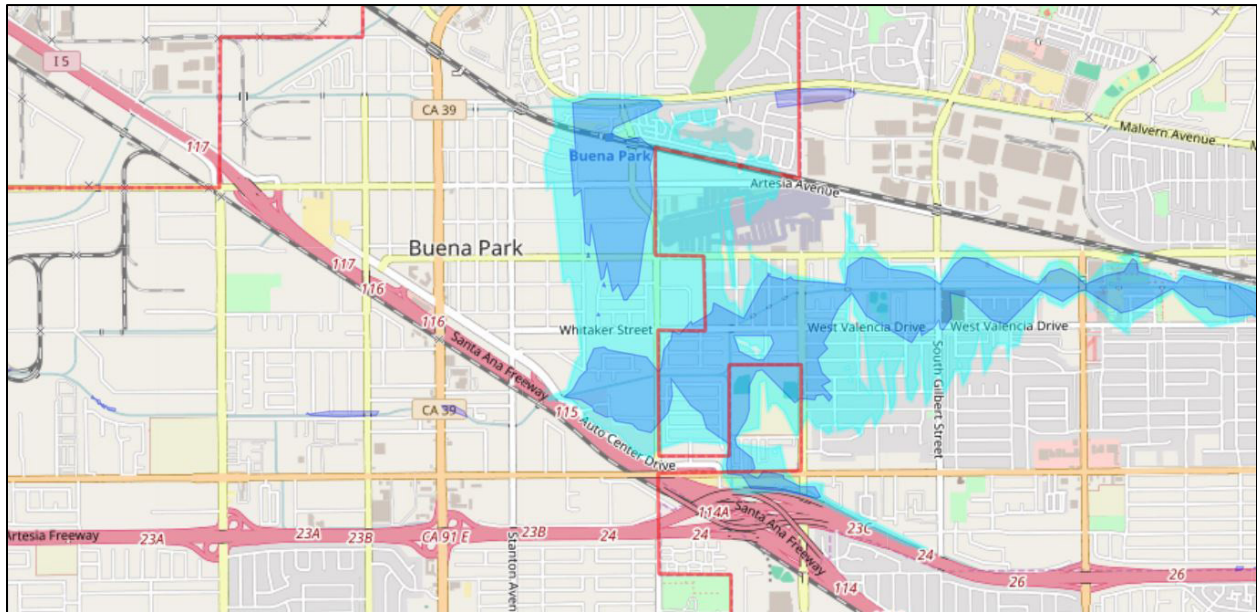
Source: U.S. Army Corps of Engineers) (Light blue = Maximum High Pool; dark blue = Top of Active Storage)

Figure 16. Carbon Canyon Dam MH and TAS inundation zones



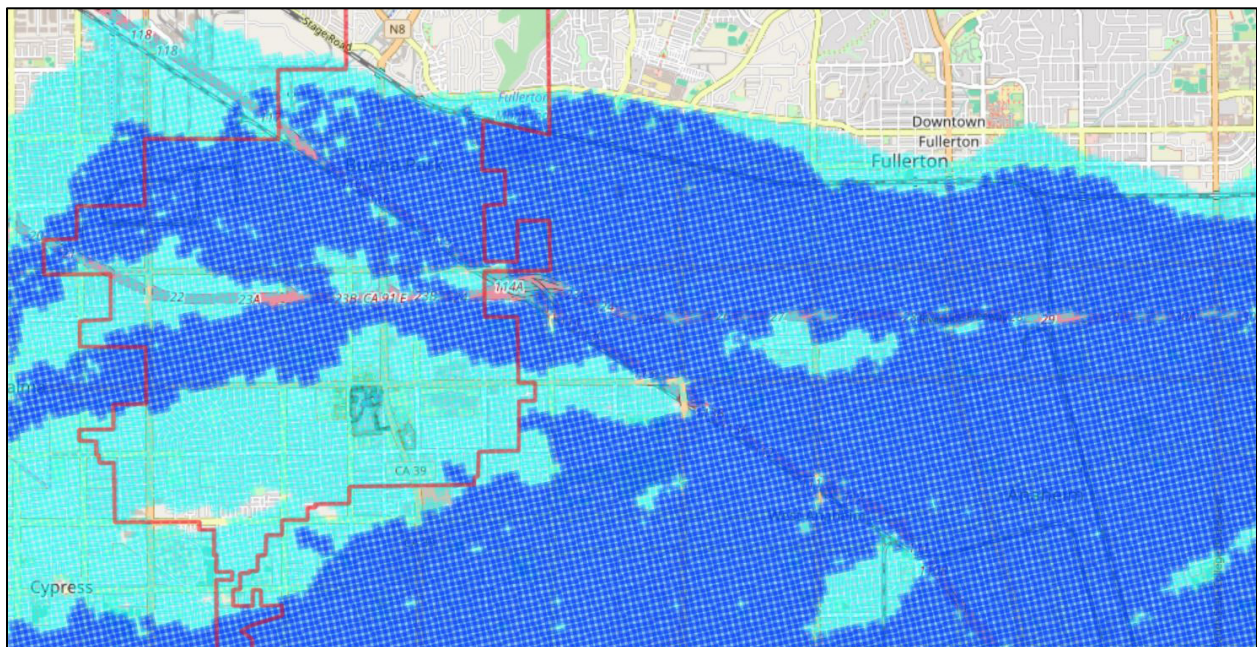
(Source: U.S. Army Corps of Engineers)

Figure 17. Fullerton Dam MH and TAS inundation zones



(Source: U.S. Army Corps of Engineers) (Light blue = Maximum High Pool; dark blue = Top of Active Storage)

Figure 18. Prado Dam MH and TAS inundation zones



(Source: U.S. Army Corps of Engineers)



9.5. Impact of Dam Failure in Buena Park⁹⁰

Any of the four dam failure scenarios would cause a regional disaster affecting much of northwestern Orange County, resulting in widespread damage and loss throughout the City. The greatest threat comes from a breach of the Prado Dam at maximum high pool, which would inundate most of the City.

The dam failure scenarios also pose the greatest risk of injury or death among Buena Park residents. Each would happen with very little warning and would send fast-moving water across wide areas, including areas potentially full of people trying to escape the resulting flash flood. People might also find themselves trapped in homes or businesses by fast-rising water, unable to escape.

[Table 14](#) (page [97](#)) shows how quickly floodwaters from a full breach of each dam will arrive in Buena Park.

Table 14. Floodwater arrival times for dam breach scenarios

Dam	Floodwater Entry Location	Time of 1 st Arrival*	Time of Peak Elevation*	Avg. Over Bank Depth (ft)
Brea	I-5 @ Beach Blvd.	4.25	5	2
Carbon Canyon (North Fork)	Malvern @ Dale	4.25	5.25	2
Carbon Canyon (South Fork)	Magnolia @ Crescent	5.75	5.75	2
Fullerton	I-5 @ Beach Blvd.	4.25	5.0	2
Prado	Malvern @ Dale	6.25	7.5	4

* Hours following initial breach

(Source: County of Orange & Orange County OA Hazard Mitigation Plan, 2015)

Property Loss Resulting from Inundation Events

The type of property damage caused by inundation events depends on the depth and speed of the floodwaters. Fast-moving water can wash buildings off their foundations and sweep cars downstream. High water combined with flood debris can damage pipelines, bridges, and other infrastructure. Most flood damage consists of water saturating water-intolerant materials such as wood, insulation, wallboard, fabric, furnishings, floor coverings, and appliances. In many cases, flood damage renders homes unlivable.

⁹⁰ **ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3**

B3a. Is there a description of each identified hazard's impact for each jurisdiction? (Requirement §201.6(c)(2)(ii))



Business/Industry

Inundation events affect businesses by damaging property and by interrupting normal commerce. Inundation events can cut off customer access to a business as well as close a business for repairs. A quick response to the needs of businesses affected by inundation events can help a community maintain economic vitality in the face of widespread damage.

Roads and Bridges

Road networks often cross floodplain and floodway areas. Inundation events can block or damage roads with standing or moving water, by depositing mud and debris in the traffic lanes, or by undermining the roads' foundations and causing the surface to collapse or displace.

Bridges are key points of concern during flash floods. They are important links in road networks and they can be obstructions in watercourses, inhibiting the flow of floodwater. The combination of fast-moving water and waterborne debris has damaged or destroyed bridges and causeways elsewhere. In Buena Park, a severe rainstorm on January 4, 1995, washed out bridges across the Fullerton Creek storm water channel on Beach Boulevard and Western Avenue, causing damage that took nearly two months to repair.⁹¹

The City's highest-priority bridges have been reinforced to better withstand potential natural disasters. High-priority bridges include the freeway bridges located at the intersections of I-5/Beach Boulevard, Hwy 91/Beach Boulevard, and I-5/Orangethorpe Avenue.

Storm Water Systems

Storm-water pollution is urban runoff water that picks up pollutants as it flows through the storm drain system—a network of channels, gutters, and pipes that collects runoff from city streets, neighborhoods, construction sites, and parking lots—and empties directly into local waterways.

Unlike sewage, which goes to treatment plants, urban runoff flows untreated through the storm drain system. Anything thrown, swept, or poured into the street, gutter, or a catch basin (the curbside openings that lead into the storm drain system) can flow directly into our channels, creeks, and then into the ocean. This includes trash, pet waste, cigarette butts, motor oil, antifreeze, runoff from pesticides and fertilizers, paint from brushes and containers rinsed in the gutter, and toxic household or industrial chemicals. Storm drains and flood-control channels are natural catch basins during dry times as well as wet.

A sudden flash flood caused by a dam breach or emergency discharge will blast this accumulated debris out of the storm drains and flood-control channels, then force it into the streets. The resulting flooding will push contaminated water into nearby homes or businesses. Storm-water pollution complicates the cleanup after the floodwater recedes; what would have been a straightforward demolition job becomes a HAZMAT remediation project, with the attendant increase in cost and effort.

⁹¹ http://articles.latimes.com/1995-02-10/local/me-30540_1_buena-park.



Water/Wastewater Treatment Facilities

The City relies on two major water supply sources: imported water from the Municipal Water District of Orange County, and local groundwater from the Orange County Groundwater Basin (see [Figure 19](#), page [100](#)). Both wells and water distribution systems are vulnerable to floodwater infiltration and pollution, which can contaminate the potable water supply and require lengthy and costly remediation. Fast-moving water or water-driven debris can damage aboveground water-related facilities.

The City lies within the Orange County Sanitation District (OCSD). A regional flood, such as the result of a local dam breach, will likely damage or destroy OCSD's reclamation and treatment plants in the impact area. This will affect the treatment and disposal of most or all of Buena Park's sewage, and may spread raw sewage through flooded parts of the City.

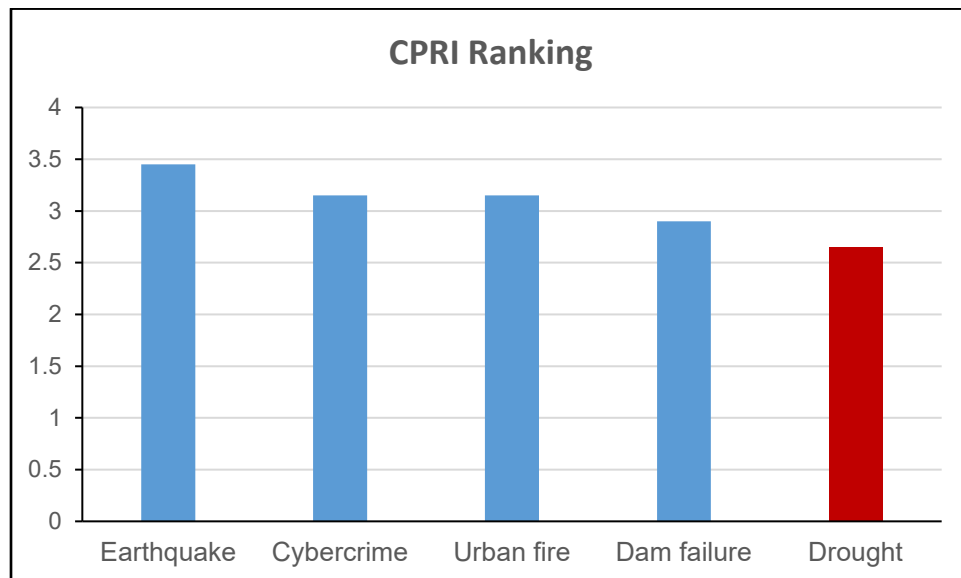
Because the potable water and wastewater systems are so interdependent, the component that takes the longest to fix will determine how long the City may have to do without the entire system.

The map displays the Orange County Water Service Areas, categorized into five distinct zones: Zone 1 (blue), Zone 2 (yellow), Zone 3a (green), Zone 3b (brown), and Zone 3c (pink). The zones are situated within the boundaries of several cities: City of La Mirada, City of Cerritos, City of La Palma, City of Cypress, City of Anaheim, and City of Fullerton. The map also shows major roads such as Interstate 5, Interstate 10, and various local streets. Key wells and connections are marked, including the Smith Murphy Well, Artelia Well, Caballero Well, Holder Well, and the Buena Park Well No. 2 (replaced). A legend in the bottom right corner defines the symbols used: a green triangle for MWD Connection, a brown circle for Well, a red circle for Well (Inactive), a black circle for PRV, and a red line for Water Service Area Boundary. A scale bar at the bottom right indicates distances of 0, 2000, and 4000 feet.

Local Hazard Mitigation Plan | Basic Plan | December 2022
New changes in green 2022 & 2024 changes in gold



10. DROUGHT



10.1. Hazard Identification and Risk Assessment

Drought is a deficiency of rain over an extended period, usually a season or more. This results in a water shortage for some activity, group, or environmental sector. “Drought” as a condition is relative to some long-term average balance between precipitation, evaporation, and transpiration in a particular area—what residents consider “normal.” It’s also related to the timing (e.g., principal season of occurrence, delays in the start of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness of the rains (such as rainfall intensity and the number of rainfall events). Drought is often associated with other climatic factors—such as high temperatures, high wind, and low relative humidity—that can significantly aggravate its severity.

Drought isn’t merely a physical phenomenon or natural event. Its impacts on society result from the interplay between a natural event (less precipitation than expected resulting from climatic variability) and the demand people place on the water supply. Humans often aggravate drought’s impact. The economic and environmental effects and personal hardships caused by recent droughts in both developing and developed nations have underscored the vulnerability of all societies to this “natural” hazard.

One dry year does not a drought make in California, but it serves as a reminder of our need to plan for droughts. California’s extensive water supply infrastructure—its reservoirs, groundwater basins, pipelines, aqueducts, and so on—mitigates the effect of short-term dry periods for most water users.

Defining when a drought begins is a function of drought impacts to water users. Drought is highly variable depending on location. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users having a different water supply. Individual water suppliers may use criteria such as rainfall/runoff, amount



of water in storage, or expected supply from a water wholesaler to define their water-supply conditions.

The National Oceanic and Atmospheric Administration (NOAA), the California Department of Water Resources (DWR), and academic institutions such as the University of Nebraska-Lincoln's National Drought Mitigation Center, generally agree that there's no clear definition of when a drought begins or ends.

Types of Drought

Drought can be defined in four different ways:

- **Meteorological.** A departure of precipitation rates from normal levels.
- **Agricultural.** The amount of moisture in the soil no longer meets the needs of a particular crop.
- **Hydrological.** Surface and subsurface water supplies fall below normal levels.
- **Socioeconomic.** A physical water shortage begins to affect people.

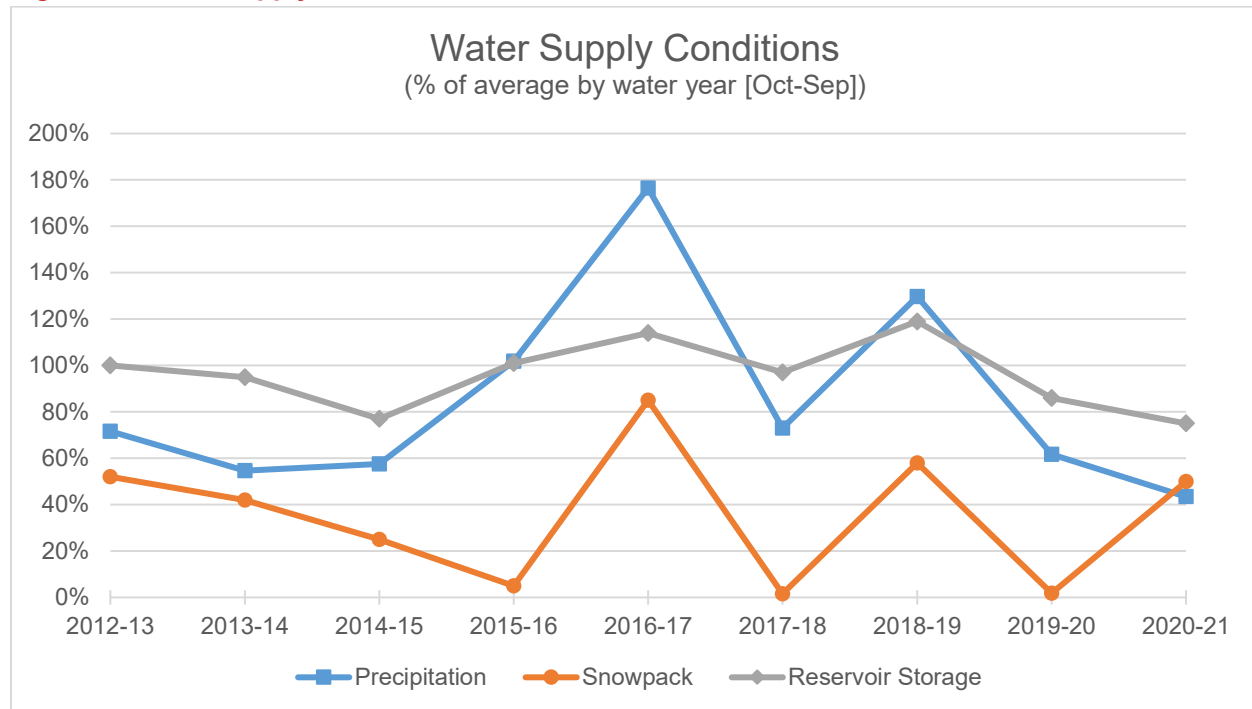
General Situation

[Figure 20](#) (page [103](#)) illustrates several indicators commonly used to evaluate California water conditions. The percent-of-average values are determined for measurement sites and reservoirs in each of the state's ten major hydrologic regions. Snowpack is an important indicator of runoff from Sierra Nevada watersheds, the source of much of California's developed water supply.

Drought is a gradual phenomenon. Although we sometimes call droughts “emergencies,” they differ from typical emergency events. Most natural disasters—such as floods or forest fires—occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, often over many years. Impacts of drought are typically felt first by those most reliant on annual rainfall: ranchers engaged in dry-land grazing, rural residents relying on wells in low-yield rock formations, or small water systems lacking a reliable source. The criteria used to identify statewide drought conditions don't address these localized impacts. Drought effects increase with the length of a drought as we deplete carry-over supplies in reservoirs and water levels decline in groundwater basins.



Figure 20. Water supply conditions



(Source: California Department of Water Resources)

Drought Threat

Southern California's Mediterranean climate makes the region especially susceptible to variations in rainfall. The potential risk to Buena Park is in no way unique. Severe water shortages will affect the economic well-being of our community and that of all our neighbors.

Comparison of rainfall records from Los Angeles with water well records beginning in 1930 from the San Gabriel Valley indicates the existence of wet and dry cycles on a 10-year scale as well as for much longer periods. The climate record for the Los Angeles region beginning in 1890 suggests drying conditions over the last century. Climate data also suggests that the last significant wet period was the 1940s. Well-level data and other sources seem to indicate the historic high groundwater levels (reflecting recharge from rainfall) occurred in the same decade. Since that time, rainfall and groundwater level trends appear to have declined. This decline may be part of a naturally occurring long-term wet/dry cycle, evidence of overuse of groundwater, or a harbinger of accelerating climate change; there's not yet clear evidence one way or another.

Climatologists compiled rainfall data from 96 stations in the state that spanned a 100-year period between 1890 and 1990. An interesting note: during the first 50 years of the reporting period, only one year (1890) had more than 35 inches of rainfall, but the second 50-year period recorded 5-year intervals (1941, 1958, 1978, 1982, and 1983) that exceeded 35 inches of rainfall in a single year. The year of maximum statewide rainfall was 1890, when the average annual rainfall was 43.11 inches; the second-wettest year on record occurred in 1983, when the state's average was 42.75 inches. The driest year of the 100-year study period was 1924, when the state's average rainfall was only 10.50 inches.



Historically, California's significant multi-year droughts have ended with an above-average water year in which statewide precipitation was in the range of 150 percent of average. Because only a small number of winter storms determine California's annual water budget, having a significantly above-average year means having a few very large winter storms. On average, about half of California's average annual precipitation occurs from December through February, which coincides with the typical timing of the largest winter storms.

Long-term stream-flow measurements began at a few California locations in the 1890s. Of the varied indexes used to measure drought, the "Palmer Drought Severity Index" (PDSI) is the most commonly used drought index in the United States. Developed by meteorologist Wayne Palmer, the PDSI measures dryness based on recent temperature compared to the amount of precipitation. It uses a numerical index centered on zero ("normal"), with drought shown as negative numbers and wetness shown in positive numbers. The PDSI is most effective at analyzing long-range drought forecasts or predictions. As such, the PDSI is very effective at evaluating trends in the severity and frequency of prolonged periods of drought, and conversely wet weather. NOAA publishes weekly Palmer maps that scientists use to analyze the long-term trends associated with global warming's effect on drought conditions. [Figure 21 \(page 105\)](#) shows PDSI map visualizations for the American Southwest from 2015, 2018, and 2021.

While climate scientists have largely agreed that global climate change is occurring, there is less agreement on the degree to which it will have an effect on local microclimates. If Southern California is destined to become hotter and drier, as some climate models suggest, drought will likely become a chronic scourge we endure rather than a periodic condition we manage.

10.2. Previous Occurrences of Drought⁹²

The historical record of California hydrology is brief in comparison to geologically modern climatic conditions. Not only must we infer climatic conditions from indirect evidence, but the onset or extent of changed conditions may vary with geographic location. Readers interested in the subject of paleoclimatology should seek out the extensive body of popular and scientific literature on this subject.

The following sampling of droughts known to have affected the area we now call Southern California helps put the state's twentieth-century droughts into perspective. Most of the dates shown below are necessarily approximations.

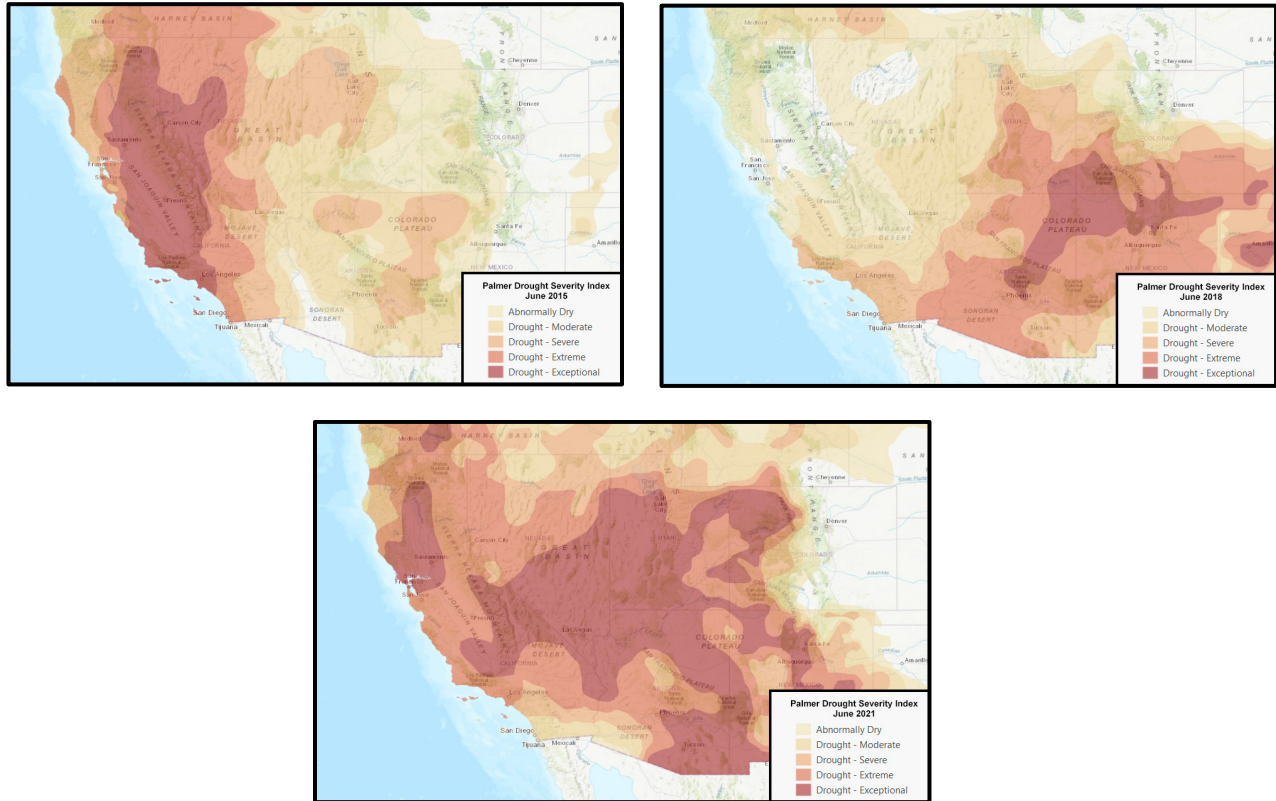
- According to dendrochronology, a severe, sustained drought affected much of the continental U.S. during the mid-1500s. This drought may have been a contributing factor in the failure of European colonies at Parris Island, South Carolina and Roanoke Island, North Carolina. The Anasazi culture in the Southwest, which began to decline about 1300, vanished by 1600, its demise attributed in part to the collapse in agriculture aggravated by this continental drought.
- Griffin & Anchukaitis (2014) used reconstructed tree-ring data to estimate annual precipitation for California since 1200. Their study indicates there was a prolonged dry spell from about

⁹² ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

B2a. Does the Plan include information on previous occurrences of hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

1755 to 1820. Floods in 1825 were followed by a severe drought in 1827-9; drought returned in 1844-6.⁹³

Figure 21. Palmer Drought Severity Index visualizations, 2015-21



(Source: National Drought Mitigation Center, University of Nebraska-Lincoln)

- The drought of 1862-4, following on the heels of the epic floods of 1861-2, drove home the final nail in the coffin of the *rancho* system in Southern California. More than 70% of cattle in Los Angeles County died of disease or starvation.⁹⁴
- The great western drought of 1928-34 that gave us the term "Dust Bowl" was geographically centered in the Great Plains, yet ultimately affected water supplies in California. The drought conditions in the Plains resulted in a large influx of people to the West Coast. Approximately 350,000 people from the Great Plains emigrated mainly to California's Central Valley. As more people moved into California—including Los Angeles County—increases in intensive agriculture led to overuse of the Santa Ana River watershed and groundwater, resulting in regional water shortages.
- Yet another statewide drought began in 2012, featuring record-low Sierra snowpack, massive drawdowns of the State Water Project reservoirs, and rapid depletion of groundwater stocks

⁹³ J.M. Guinn: *Exceptional Years: A History of California Drought and Flood*.
<https://www.jstor.org/stable/pdf/41167825.pdf>.

⁹⁴ https://articles.latimes.com/1991-06-13/news/nc-780_1_cattle-industry.



that has led in some places (such as the San Joaquin Valley) to significant ground subsidence. A weak El Niño condition partly broke the drought in Northern California during the winter of 2015-6, but the drought continued in the southern part of the state for the better part of another year. According to the California Natural Resources Conservation Service, among the many effects of this drought was the extensive devastation of forests in the San Bernardino, San Jacinto, Palomar, and Sierra mountain ranges. The lack of rain and snow weakened millions of trees, making them susceptible to infestation by bark beetles⁹⁵. In turn, dry vegetation and beetle-infested trees are more susceptible to fire than are healthy forests.

DWR-recorded hydrology shows that the most significant statewide droughts in the past century occurred during 1928-34 (mentioned above), 1976-77, 1987-92, 2007-09, and 2012-16.⁹⁶

The University of Nebraska-Lincoln has published many PDSI maps analyzing trends over the past hundred years⁹⁷. In coastal Southern California, severe droughts occurred ten to fifteen percent of the time from 1895 to 1995. As recently as 1989, a severe drought was documented that lasted for six years. More recently, between 1999 and 2004, a six-year drought on the Colorado River basin resulted in a drawdown of Colorado River water storage by more than fifty percent. Based on these trends, it's clear that severe droughts can readily occur in Southern California.

Southern California—being largely desert—has an even more fraught relationship with rain and water supplies. A good rain year for California as a whole isn't necessarily a good rain year for Southern California, as shown in [Figure 22](#) (page [107](#)). If we consider a drought to be two or more consecutive years in which the regional precipitation is significantly below the average (as depicted in the graph), then Southern California was in drought for much of the 20th century.

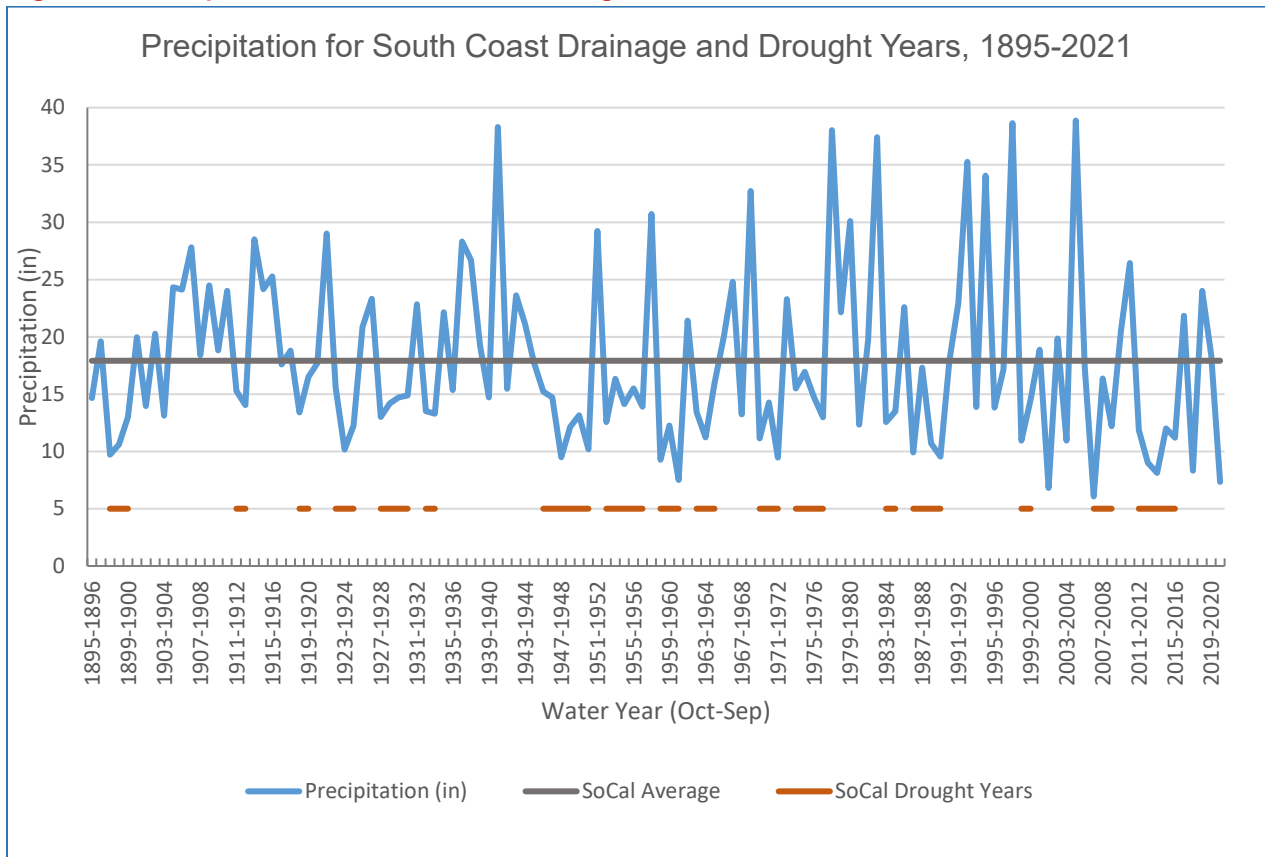
⁹⁵ http://www.sbcounty.gov/calmast/sbc/cms/Docs/BarkBeetle112906ProgramLaunchFINAL_2_.pdf.

⁹⁶ <https://water.ca.gov/Water-Basics/Drought>.

⁹⁷ National Drought Mitigation Center, 2005.



Figure 22. Precipitation for South Coast Drainage Area



(Source: CA NCEI Climate Division, 2022)

The very short history of climate observation and reporting in the area complicates studying the effect of historical droughts on Buena Park. There's no reason to think that the area now called Buena Park was in any way immune to the consequences of statewide or regional droughts known to have preyed on the rest of Southern California.

[Figure 23](#) (page [108](#)) is the NOAA Climate Prediction Center's most current snapshot of drought conditions across the U.S. Negative values indicate precipitation shortfalls.

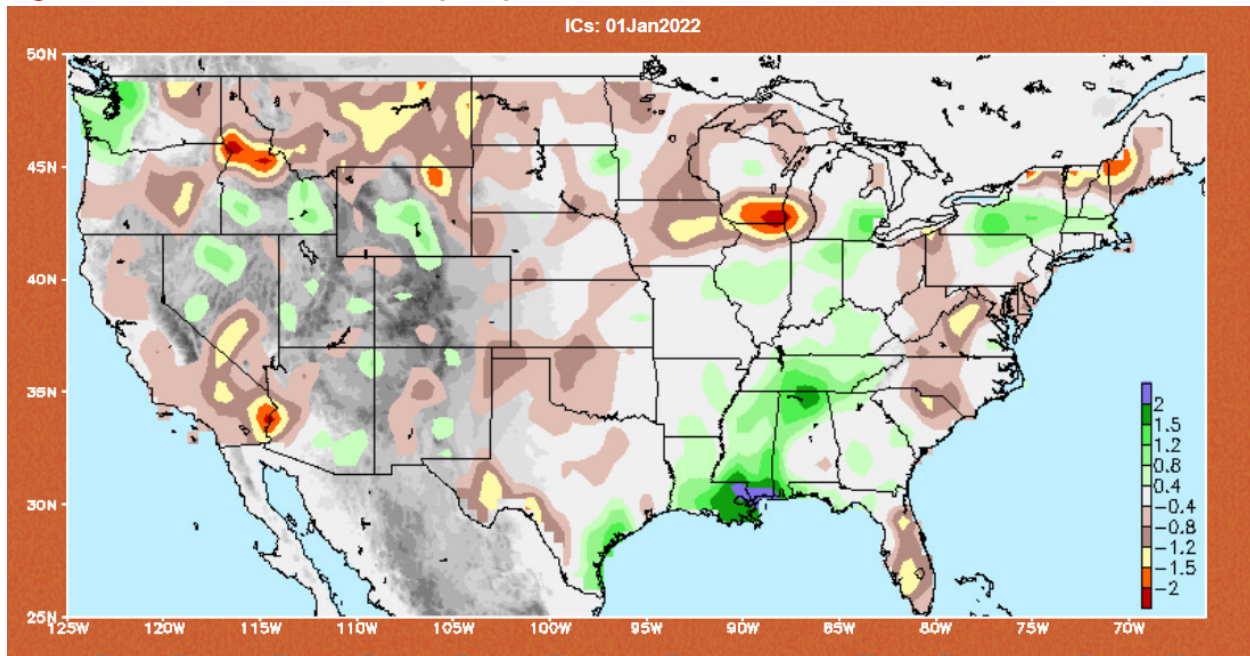
10.3. Impact of Drought on Buena Park⁹⁸

Drought is a chronic hazard, not an acute one. Its effects accumulate over months and years and are often subtle. Since there's no universally accepted definition for the beginning (or end) of a drought, we can be in the middle of a drought emergency before we know it's begun. The previously discussed hazards' damage modes can be described as *demolition*; drought's damage mode is closer to *erosion*.

⁹⁸ ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

B3a. Is there a description of each identified hazard's impact on each jurisdiction? (Requirement §201.6(c)(2)(ii))

Figure 23. 12-month standardized precipitation index, from 1 Jan 2022



(Source: [NOAA Climate Prediction Center](#))

Nearly every functioning process within the City depends on a reliable, safe water supply. This includes infrastructure, homes, businesses, places of employment, industry, and recreation.

Drought poses different levels of risk depending on the type of community it affects. A drought in an agricultural community may cause extensive—even fatal—damage to the local economy by killing crops or livestock. In a typical urban or suburban community such as Buena Park, drought’s main effects are the slow degradation of the quality of life, a slowdown or end to development, and a loss of water-intensive industries.

Human Impact

Behavior change is the main human impact of drought in an urban area in an advanced economy. No one in Buena Park will die because of drought. However, as climate and weather changes bring longer and more severe droughts to the area, regulatory and financial pressures will slowly make life as we’ve come to know it more difficult and costly. Legal restrictions on personal water use, landscaping, and recreational or decorative water use (swimming pools, fountains, ponds) will force lifestyle changes. Increases in water rates, penalties, and water rate-driven price hikes in goods and services will concentrate these forced lifestyle changes on society’s lower income segments, which may already be stressed by changing employment opportunities also driven by our response to drought.

Southern Californians have historically responded to calls to conserve water during periods of drought. For example, Buena Park residents and businesses decreased their water usage by 21% from 2013 levels during the last drought⁹⁹. However, these efforts have required only minor

⁹⁹ Buena Park Water Utility.



sacrifices of discretionary activities (such as washing cars or watering lawns) and have lasted for limited periods. Long-term or more drastic conservation rules may spur residents to leave the City for wetter locales.

A drier climate and less watering of outside spaces often leads to increased dust and other air pollutants. This in turn aggravates allergies and respiratory diseases in people who already have them, and increases their prevalence among the general population¹⁰⁰.

Drought can also shrink open bodies of water (such as lakes and ponds) and, by limiting replenishment and circulation, cause them to become stagnant, creating breeding areas for mosquitos¹⁰¹. The California Department of Public Health documented a rise in West Nile Virus cases during the 2013-6 drought; decreased availability of open water forced birds and mosquitos into closer contact, promoting spread of the disease to humans¹⁰².

Property Impact

Drought doesn't tend to have a significant impact on urban and suburban buildings. However, it can rapidly destroy landscaping and promote the growth of nuisance vegetation (weeds). Dead or non-existent landscaping can have a serious effect on the market value of both residential and commercial property, eventually leading to decreasing property-tax assessments and receipts.

Dry flowerbeds and dead lawns can promote the infiltration of dust and plant spores into homes and businesses, leading to chronic heat and abrasive stress on electronics, appliances, and machinery, as well as increases in disease (as discussed above).

Drought also has a serious effect on the urban forest. It can either kill shade and ornamental trees outright, or weaken them to the extent that they become more vulnerable to parasites and destructive insects, such as bark beetles. Buena Park's urban forest consists of 11,305 trees worth \$23.9 million¹⁰³. The City currently replaces only 10-15 trees a year. If the City's trees begin to suffer increased mortality due to drought's primary and secondary effects, this number will go up along with its associated cost.

Economic Impact

As mentioned earlier, water is part of everything we do, whether or not we realize it. Changes in water's availability or cost will have direct and indirect knock-on effects on the City's economy. These effects won't be unique to Buena Park—a drought won't stop at the city limits. This fact can be a mixed blessing. None of our neighboring cities will be able to gain much of an economic advantage over Buena Park because of our responses to the drought; they'll be grappling with the same problems, with the same limited tool set. On the other hand, the total area- or region-wide impact may be more severe for each city involved over and above the city-specific effect. To paraphrase John Donne, no Orange County city is an island entire of itself.

¹⁰⁰ Centers for Disease Control and Prevention. "[Health Impacts of Drought](#)."

¹⁰¹ Ibid.

¹⁰² Rocha, Veronica. "[California drought leads to increase in West Nile virus cases](#)." *Los Angeles Times*, Apr. 8, 2015.

¹⁰³ Buena Park Public Works Department.



While there are many ways a drought can affect the local economy, the two main means are through increased utility costs and decreased access to water.

Tier pricing is one of the few tools water utilities have for decreasing water demand. Tier pricing (also called conservation pricing) establishes tiers or bands of monthly water use for classes of customers, then imposes escalating prices on each tier to discourage overuse. Many public water utilities imposed tier pricing during the 2013-6 drought, though the state Supreme Court ruled against tier pricing that isn't tied to the cost of service¹⁰⁴.

However it's established, tier pricing increases the per-gallon cost for water-intensive businesses and for homeowners who are especially profligate in their water use. In the former case, the businesses are likely to pass on their increased costs to customers. If these businesses cater to other businesses, this can lead to wide-ranging price increases.

Water utilities can set the tiers to match whatever conservation goals have been set for them by the state government or by their suppliers, which can change over time as the drought becomes more or less severe. Consumers who were once comfortably in the bottom price tier may find themselves in a higher tier as the limits ratchet down. Because water is so central to our daily lives and there are limits to how much anyone can conserve, most consumers will have no choice but to pay these higher rates, depressing demand for other goods and services. The burden may fall especially heavily on the poor.

The City will experience a shortage of water during a drought, either because of physical shortfalls (there's no more water to be had) or financial pressure (water is too expensive to waste). This supply shortage will have outsized effects on certain business sectors in the City.

- Hospitality, for instance, is a water-intensive industry. Hotels consume large amounts of water for laundry, dining (cooking and dishwashing), and entertainment (swimming pools, spas), while restaurants use goodly amounts of water for cooking, cleaning, and consumption. Health regulations and basic hygiene concerns limit the amount of conservation hotels and restaurants can achieve. Buena Park hosts twenty-two hotels and motels (with **one** more on the way) and over three hundred restaurants.
- Commercial air conditioning units often use water as coolant. Most medium and large commercial facilities have no alternative to HVAC for interior air circulation. Some types of facilities (such as grocery stores, electronics manufacturing, or cold storage) must maintain consistent temperatures and humidity levels. Enforced cuts in water usage may confront business owners and landlords with a stark choice: keep HVAC running as normal and cut much of the business' non-core usage, or cut HVAC use and possibly compromise health or quality control.
- Businesses that depend on water use—their own or their customers'—may find their business models upended or may actually collapse when water becomes scarce and expensive. Bottling plants (one in Buena Park), swimming pool cleaning services (at least four in Buena Park), and car washes (at least six in Buena Park) are especially vulnerable to this problem. Landscapers (at least ten in Buena Park) and nurseries (at least six) may find a severe drought a mixed blessing; they may lose revenue as homeowners and businesses give up on their plantings, but the ones that sell drought-tolerant plants or design low-water gardens may see

¹⁰⁴ <https://www.sacbee.com/news/state/california/water-and-drought/article28414762.html>.



an initial uptick in sales. If the drought becomes unusually severe or long-lasting, these businesses will start to leave or fail, taking their jobs with them.

- Acre for acre, golf courses are among the most water-intensive real estate in California. The average 18-hole golf course consumes up to 130,000 gallons of water each day¹⁰⁵. Buena Park has one golf course—Los Coyotes Country Club—and it's unlikely to be able to bear the cost of that much water use during a severe shortage. Shutting down the course or letting it go brown will have a significant value effect on some of the priciest homes in the City.

Many businesses and homeowners may install water-wise appliances and fixtures in an attempt to cut their water consumption. Encouraging people to do this may cost the Buena Park Water Utility or the Municipal Water District of Orange County a significant amount of money over the life of the drought. New faucets and dishwashers won't be an option for low-income people or people in rented housing.

Faced with a water shortage that has no foreseeable end, the City may have to enact a moratorium on new water hookups or on new development in general. This may kill housing or commercial projects that were years in the making, subject the City to legal action, and deprive the City of future economic benefits from the foregone development.

None of these drought effects—human, property or financial—are catastrophic by themselves. Buena Park won't fail as an enterprise or entity because of any foreseeable drought. However, the cumulative effect over time may create a smaller, poorer, less dynamic Buena Park that offers less economic and personal opportunities to its residents, visitors, and businesses.

¹⁰⁵ <https://www.insidescience.org/news/face-drought-golf-tries-reduce-water-use>.



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PART III: MITIGATION STRATEGIES

11. OVERVIEW OF MITIGATION STRATEGY

The nationwide cost of disaster-related damage continues to increase every year. The City recognizes the importance of identifying effective ways to reduce our vulnerability to disasters. Mitigation plans will help the City reduce risk from hazards by identifying resources, information, and strategies for risk reduction that will guide and coordinate mitigation activities throughout the City.

This Plan provides a set of action items for reducing risk through capital projects, education and outreach programs, and by fostering the development of partnerships. The Plan also provides for the implementation of preventative activities, including programs that restrict or control development in areas subject to damage from natural and technological hazards.

The resources and information within the Mitigation Plan:

- Establish a basis for coordination and collaboration among agencies and the public in the City of Buena Park
- Identify and prioritize future mitigation projects
- Help us meet the requirements of federal assistance programs

The Mitigation Plan integrates with other City plans, including the City of Buena Park *Emergency Operations Plan*, the *General Plan* and its associated Environmental Impact Report, and the *Capital Improvement Plan*, as well as department-specific standard operating procedures.

11.1. Planning Approach

The Planning Team used the four-step planning approach outlined in *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies* ([FEMA 386-3](#)) to develop this Plan.

- **Develop mitigation goals and objectives.** The Planning Team used the risk assessment (hazard characteristics, inventory, and findings), along with municipal policy documents, to develop mitigation goals and objectives.
- **Identify and prioritize mitigation actions.** The Planning Team identified mitigation activities for each hazard based on the risk assessment, goals and objectives, existing literature/resources, and input from participating entities. The Planning Team qualitatively evaluated activities against the goals, objectives, and other criteria; identified activities as high-, medium-, or low-priority; and presented these activities in a series of hazard-specific tables.
- **Prepare implementation strategy.** Generally, we should implement high-priority activities first. However, based on community needs and goals, project costs, and available funding, the City may implement some medium- or low-priority activities before some high-priority items.
- **Document mitigation planning process.** This Plan documents the mitigation planning process.



The planning process on the **LHMP update** began in **2021** with the following departments represented on the Planning Team:

- City Manager
- **Community Development & Economic Development**
- **Community Services**
- Finance
- Orange County Fire Authority
- Police
- Public Works

11.2. 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.

- **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 removing them from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness.** Actions that inform and educate residents, 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 protecting 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.

11.3. Mitigation Goals¹⁰⁶

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

¹⁰⁶ ELEMENT C. MITIGATION STRATEGY | C3

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

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



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

Mitigation action items support each goal. 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 their descriptions follow. **The goals and priorities haven't changed since the 2017 version of this Plan.** The Planning Team also developed hazard-specific mitigation goals that appear in [11.7, Mitigation Actions Matrix](#).

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

FEMA defines Mitigation Activities as specific actions that help us achieve our goals and objectives.

Protect Life and Property

Implement activities that help to protect 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 encourage preventative measures for existing development in areas vulnerable to natural, human-caused, and technological hazards.

Enhance Public Awareness

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

Preserve Natural Systems

Support management and land-use planning practices to preserve, rehabilitate, and enhance natural systems to serve hazard mitigation functions.

Encourage Partnerships and Implementation

Strengthen communication and coordinate participation with public agencies, residents, nonprofit organizations, and businesses to support implementation.

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

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

Strengthen Emergency Services

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

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



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

11.4. Public Participation

Public input assisted in creating plan goals during development of this Plan. Meetings with the Mitigation Planning Team, stakeholder interviews, and two workshops served as methods to obtain input and identify priorities in developing goals for reducing risk and preventing loss from natural hazards in the City of Buena Park (see [Section 12: Planning Process](#) for more detail).

11.5. How are the Mitigation Action Items Organized?¹⁰⁷

The action items are activities City agencies and residents can do to reduce risk. Each action item includes an estimated implementation timeline.

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 Plan. Data collection and research and the public participation process resulted in the development of these action items ([Planning Process](#)). The Matrix includes the following information for each action item.

Funding Sources

The City can fund the action items through a variety of sources, including:

- Operating budget/general fund
- Development fees
- Community Development Block Grant
- Hazard Mitigation Grant Program
- Other mitigation-related grants
- Private funding
- City Capital Improvement Plan

Coordinating Organization

The Mitigation Actions Matrix assigns primary responsibility for each of the action items. The hierarchies of the assignments vary—some are positions, others departments, and other committees. The “Coordinating Organization” has the primary responsibility for implementing the action items. It’s the agency with regulatory responsibility to address hazards, or the willingness and ability to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

¹⁰⁷ ELEMENT C. MITIGATION STRATEGY | C5

C5a. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))



Plan Goals Addressed

Each action item includes the plan goals it addresses. This helps us monitor and evaluate how well the mitigation plan is achieving its goals once implementation begins.

We organized the plan goals into the following five areas:

- Protect life and property
- Enhance public awareness
- Preserve natural systems
- Encourage partnerships and implementation
- Strengthen emergency services

Benefit/Cost Ratings

The City weighed the benefits of proposed projects against estimated costs as part of its project prioritization process. This benefit/cost analysis wasn't as detailed as the kind required by FEMA for HMGP and PDM project grant eligibility. The City used a less-formal approach because some projects may not be implemented for up to ten years, and associated costs and benefits could change dramatically in that time. Instead, the City compared the apparent benefits to the apparent cost of each project, assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

Cost ratings are defined as follows:

- **High:** Existing jurisdictional funding won't cover the cost of the action item, so the City will need other sources of revenue.
- **Medium:** The action item could be funded through existing City funding but would require budget modifications.
- **Low:** The action item could be funded under existing City funding.

Benefit ratings are defined as follows:

- **High:** The action item will provide short-term and long-term reduction of risk exposure to life and property.
- **Medium:** The action item will accomplish only long-term reduction of risk exposure to life and property.
- **Low:** The action item will accomplish only short-term reduction of risk exposure to life and property

Ranking Priorities

The Planning Team adopted the following process for ranking mitigation action items to help implement the Hazard Mitigation Plan. It assigned "High," "Medium," and "Low" priorities to each action item using the following criteria:

Does the action

- solve the problem?
- address vulnerability assessment?
- reduce the exposure or vulnerability to the highest-priority hazard?
- address multiple hazards?



- have 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?
- implemented by existing state or federal grant programs?
- completed within the five-year life cycle of the LHMP?
- 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?
- have a 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?

Department representatives used worksheets for each of their assigned action items during the Task Force's prioritization meeting. 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

11.6. City of Buena Park General Plan 2010¹⁰⁸

The Planning Team went to great lengths to examine the various regulatory documents influencing the City's ability to mitigate against the identified hazards. The City's *General Plan*, last adopted in 2010, is perhaps the most important of those documents. In turn, the 2017 LHMP's hazard information informed the recent update to the *General Plan Safety Element*. The Community Development Department's Planning Division intends to ask the City Council to adopt the 2022 LHMP into the updated General Plan Safety Element.

Many development projects require a determination of "General Plan conformity" prior to approval; aligning the Mitigation Plan and General Plan will better ensure both the sustainability and implementation of the Mitigation Plan.

¹⁰⁸ ELEMENT C. MITIGATION STRATEGY | C6

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



The failure of plans to actually affect the built environment and cause a reduction in risk has frustrated FEMA and other regulators since the establishment of the DMA 2000 regulations. The Planning Team believes that the most effective way to break the build-damage-rebuild cycle is to link the Mitigation Plan to the regulations and policy guidelines that allow for construction and land use.



Table 15. General Plan policies and Mitigation Plan goals

GENERAL PLAN POLICIES (Note: Each of the policies includes a brief explanation of the applicability to the Hazard Mitigation Plan)	Mitigation Plan Goals				
	Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnerships and Implementation	Strengthen Emergency Services
SAFETY ELEMENT					
Goal SAF-1: Decrease in the potential risk of seismic and geologic hazards. Policies:					
1.1: Seek to avoid or minimize seismic risk by appropriately designating land uses and adhering to current building codes.	X		X	X	
1.2: Enforce the requirements of current building codes relative to seismic design for all new development or redevelopment.	X	X			
1.3: Require geologic and soils reports for all new development or redevelopment, especially in identified areas of the Norwalk Fault Zone and areas with high liquefaction potential.		X	X		
1.4: Require appropriate mitigation measures and/or conditions of approval relative to terrain, soils, slope stability, and erosion for new development or redevelopment in order to reduce hazards.	X		X		
1.5: Ensure that schools, hospitals, and critical facilities, such as fire, police, or emergency service facilities, meet the standards outlined in Title 24 of the California Administrative Code.	X			X	X
Goal SAF-2: Provision of adequate flood protection to protect the community. Policies:					
2.1: Seek to provide adequate flood protection from 100-year flood frequency storms (or other state-defined scenario) flood frequency storms.	X		X	X	

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GENERAL PLAN POLICIES (Note: Each of the policies includes a brief explanation of the applicability to the Hazard Mitigation Plan)	Mitigation Plan Goals				
	Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnerships and Implementation	Strengthen Emergency Services
2.2: Improve defensive measures against 100-year (or other state-defined scenario) flood conditions through land use regulation and design, such as increased pervious surfaces, onsite water capture and re-use, minimized building footprints, etc.	X	X	X	X	
2.3: Require that new development or redevelopment located within areas identified within a 100-year floodplain meet the requirements of the current building code and the National Flood Insurance Protection Program.	X	X			
2.4: Work with the Orange County Flood Control District and the U.S. Army Corps of Engineers, Los Angeles District, to ensure future flood control plans incorporate adequate seismic safety measures.	X			X	
2.5: Continue to implement adopted flood control programs and regulations.	X	X	X	X	
2.6: Continue to monitor regional flood hazard improvements in the Santa Ana River Basin area to understand impacts of 100- and 500-year storms within the City.	X			X	
2.7: Continue planning evacuation operations in the City's forecast dam inundation zones.	X				X
2.8: Manage future flood risk by prioritizing the use of nature-based solutions.	X		X		
Goal SAF-3: A reduction in the potential for loss of life and property from natural and human-caused disasters.					
Policies:					
3.1: Strengthen coordination among and between City officials and other agencies that provide disaster response or relief services.	X			X	X



GENERAL PLAN POLICIES (Note: Each of the policies includes a brief explanation of the applicability to the Hazard Mitigation Plan)	Mitigation Plan Goals				
	Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnerships and Implementation	Strengthen Emergency Services
3.2: Coordinate with local and regional jurisdictions to conduct emergency and disaster preparedness exercises to test operational and emergency plans.	X			X	X
3.3: Monitor alerts, warnings, and advisories issued by local, state, and federal law enforcement, intelligence, public health, and emergency management agencies, and take appropriate actions to prepare for or prevent imminent threats as required.	X			X	X
3.4: Improve emergency preparedness and planning with a particular focus on disproportionately vulnerable populations.	X	X			
Goal SAF-4: Minimize the threat posed by a release of hazardous materials to public health and safety and to the environment. Policies:					
4.1: Strictly enforce federal, state, and local laws and regulations relating to the use, storage, and transportation of toxic, explosive, and other hazardous and extremely hazardous materials to prevent unauthorized discharges.	X			X	
4.2: Periodically review and amend the appropriate ordinances that regulate the storage and handling of hazardous materials to conform to the standards and definitions of the state and other regulatory agencies.	X			X	
4.3: Continue to monitor the operations of businesses and individuals that handle hazardous materials using the planning and business permit processes.	X	X		X	
4.4: Periodically review the emergency plans of transportation and flammable gas/liquid distribution companies.	X			X	
4.5: Explore the possibility of identifying specific routes for the transport of hazardous materials.	X				X



GENERAL PLAN POLICIES (Note: Each of the policies includes a brief explanation of the applicability to the Hazard Mitigation Plan)	Mitigation Plan Goals				
	Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnerships and Implementation	Strengthen Emergency Services
4.6: Develop an educational awareness program for residents and businesses about the dangers of hazardous materials.	X	X			
4.7: Maintain cooperative relationships with the chemical handlers, response agencies, and community representatives to ensure an informed and coordinated response to chemical emergencies.	X			X	X
Goal SAF-5: Minimize the economic and physical threats posed by climate change and the attendant extreme weather and climatic events. Policies:					
5.1: Identify populations that will disproportionately experience the consequences of climate change.	X	X			
5.2: Address underlying health inequities for all residents, including those related to hazards such as localized air pollution, extreme heat, and flooding.	X				
5.3: Prioritize solutions towards reducing climate change risks for vulnerable populations and communities.	X				
5.4: Incorporate adaptation initiatives that provide multiple co-benefits, including reduction in greenhouse gas emissions, support for the local economy, enhancements to the natural environment, or alleviating underlying health inequities.	X		X		
5.5: Incorporate inclusive decision making in climate-adaptation planning efforts.	X				
5.6: Promote the integration of economic development and climate adaptation to provide sustainable benefits.	X			X	
5.7: Leverage land use planning to reduce exposure to climate hazards.	X			X	

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	Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnerships and Implementation	Strengthen Emergency Services
5.8: Design and implement nature-base projects and green infrastructure to protect and enhance the adaptive capacity of natural resources and urban environments.	X		X		
5.9: Consider short- and long-term actions in the capital improvement program that would promote resilience of physical infrastructure to climate change impacts.	X				
5.10: Prioritize efforts to restore residents' access to basic services such as electricity, gas, water, sewage treatment, public transportation, telephone lines, and wireless communication during and after climate hazard events.	X	X			
5.11: Align public infrastructure and investment decisions with the Buena Park Climate Action and Adaptation Plan.	X		X		
5.12: Participate in regional planning efforts related to climate change adaptation.	X			X	
Goal SAF-6: Decrease wildfire hazards to the community.					
Policies:					
6.1: Minimize new residential development within a VHFHSZ unless fire protection plans are submitted to harden structures against possible wildfires.	X				
6.2: Place all new essential public facilities outside of any VHFHSZ, unless infeasible.	X				X
6.3: Enforce City and State building and fire codes within the VHFHSZ, and incorporate new techniques and best practices as they become available to reduce future risks to all new development or redevelopment within a VHFHSZ.	X				X

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	Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnerships and Implementation	Strengthen Emergency Services
6.4: Require appropriate mitigation measures and/or conditions of approval relative to areas of varying fire hazard severity based upon the proximity of terrain, soils, slope stability, and erosion for new development or redevelopment in order to reduce hazards.	X			X	
6.5: Ensure existing access points to open space areas within a VHFHSZ are maintained for fire suppression with respect to roadway widths, obstructions, and other criteria.	X				X
6.6: Continue to leverage the City's fire service provider's review of new development to ensure development complies with any fuel modification requirements, creation of defensible space, and habitat restoration by replacing invasive and fire-susceptible plants with indigenous species, thus reducing baseline fire risk in the City's VHFHSZ and elsewhere as applicable.	X				X
6.7: Work with the City's fire service provider and surrounding jurisdictions that are subject to the continuous VHFHSZ that may impact the City to coordinate vegetation management strategies and wildfire hazard protection and prevention services.	X			X	X
6.8: Maintain a weed abatement program to ensure clearing of dry brush areas.	X				
6.9: Provide for the long-term maintenance of fire hazard reduction projects and activities, such as fuel clearing and vegetation management, with the City administering these activities on public lands and working with fire protection agencies and landowners to ensure maintenance of privately held parcels.	X		X	X	

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GENERAL PLAN POLICIES (Note: Each of the policies includes a brief explanation of the applicability to the Hazard Mitigation Plan)	Mitigation Plan Goals				
	Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnerships and Implementation	Strengthen Emergency Services
6.10: Following major wildfire events, reevaluate development standards and current building codes for new development or redevelopment in order to reduce hazards for the VHFHSZ and apply stricter standards for redevelopment as needed to maintain high levels of wildfire protection.	X				X
6.11: The City will continue to work with property owners on street and building addressing as required in the Municipal Code and California Building Code. Street signage shall follow the latest edition of the California Manual on Uniform Traffic Control Devices.	X	X			X
6.12: The City shall identify residential developments within VHFHSZ areas lacking at least two available and identified emergency evacuation routes, and recommend appropriate improvements to enhance evacuation capacity and safety.	X				X
6.13: Proposed developments within a VHFHSZ shall be located in areas with a minimum of two distinct and reliable ingress and egress routes.	X				X
6.14: Public roads within a VHFHSZ that do not meet current roadway width and fire access standards shall be evaluated and improved, where feasible, to enhance emergency access and evacuation. Hazardous vegetation conditions shall be mitigated in accordance with applicable defensible space and vegetation management regulations.	X				X
6.15: For proposed new development located within a VHFHSZ, require upkeep of landscaped areas as per OCFA standards detailed in <i>Vegetation Management Guideline: Technical Design for New Construction Fuel Modification Plans and Maintenance Program</i> .	X		X		

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	Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnerships and Implementation	Strengthen Emergency Services
6.16: New development within a VHFHSZ shall be designed to ensure adequate and reliable ingress and egress for emergency response and evacuation, with multiple access points where feasible, consistent with California Fire Code.	X				X
6.17: Residential development within a VHFHSZ shall be designed to provide multiple unobstructed evacuation routes with sufficient capacity to support community evacuation while maintaining emergency responder access.	X				X
6.18: The City shall conduct periodic assessments of residential areas within all VHFHSZ to identify deficiencies in access and evacuation routes, and shall develop and prioritize mitigation measures and capital improvement plans to enhance emergency egress and emergency responder access where feasible.	X				X
6.19: Maintain educational programs and continue public outreach efforts to all members of the community pertaining to defensible space and evacuation routes.	X	X			
6.20: The City will continue to update and follow best practices for fire safety such as vegetative clearance maintenance of all roads and community fire breaks, as adopted in Ordinance 1713.	X				
6.21: The City shall continue to work with OCFA to ensure the highest level of firefighting and emergency service training to current and best practices.	X				X
COMMUNITY FACILITIES ELEMENT					
Goal CF-2: Responsive and efficient fire protection and emergency medical services. Policies:					
CF2.1: Continue to work with the OCFA to improve the performance and efficiency of fire protection services for the City.	X			X	X

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	Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnerships and Implementation	Strengthen Emergency Services
CF2.2: Ensure adequate firefighting and emergency medical service (EMS) infrastructure, equipment, and personnel to provide a high level of fire and emergency medical service in Buena Park to meet growing demands.	X			X	X
CF2.3: Provide cost-effective EMS service levels for the protection of residents, businesses, and visitors.	X			X	X
CF2.4: Ensure that sufficient water service and pressure are available throughout the City for use in firefighting.	X			X	X
CF2.5: Explore funding sources, such as impact fees from development or parcel taxes, to ensure a high level of fire services for the City.	X			X	X
CF2.6: Maintain adequate fire training facilities, equipment, and programs for firefighting and inspection personnel and educational programs for the community, including fire safety and prevention and emergency medical-related information.	X			X	X
CF2.7: Proactively plan for increases in population and employment growth and changes in the use and types of buildings in Buena Park.	X				X
CF2.8: Require that new development or redevelopment provide adequate access for fire service vehicles and personnel.	X				X
CF2.9: While seeking to maintain access, fire safety, and adequate response times, the City and the OCFA will work together to develop creative solutions that allow for mixed-use and compact development, pedestrian-friendly streets, and other elements of a walkable and bikeable City.	X			X	X

(Source: City of Buena Park General Plan 2010)



11.7. Mitigation Actions Matrix^{109 110 111 112 113}

[Table 16](#) (page [131](#)) identifies the existing and future mitigation activities developed by the Planning Team.

¹⁰⁹ ELEMENT C. MITIGATION STRATEGY | C1

C1ab. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

¹¹⁰ ELEMENT C. MITIGATION STRATEGY | C4

C4abc. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

¹¹¹ ELEMENT C. MITIGATION STRATEGY | C5

C5ab. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))

¹¹² ELEMENT D. MITIGATION STRATEGY | D2

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

¹¹³ ELEMENT D. MITIGATION STRATEGY | D3

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



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Table 16. Mitigation Actions Matrix

(Coordinating Organizations: CM=City Manager's Office; CD=Community Development; CS=Community Services; ESC=Emergency Services Coordinator; F=Finance, FD=OC Fire Authority; MPT= Mitigation Planning Team; IT=Information Technology Unit; PD=Police Department; PW=Public Works)

Mitigation Action	New/substantially revised for 2022 Matrix	Coordinating Organization	Timeline	Plan Goals Addressed					Funding Source (* = not yet identified; B = Bonds; CIP=Capital Improvement Program; GF = General Fund; GR = Grants)	Benefit (L=Low; M=Med; H=High; n/a=not applicable)	Cost (L=Low; M=Med; H=High; n/a=not applicable)	Priority (L=Low; M=Med; H=High; n/a=not applicable)	Planning Mechanism (BC=Building Code; GF=General Fund; GP=General Plan; ZO=Zoning Ordinance)
				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
Multi-Hazard Action Items													
MH-1, Public Education. The City will continue to provide information describing local hazards, methods for preventing damage resulting from hazardous conditions, and how to respond when a hazard threatens.		CD, CM, CS, ESC, FD, PD, PW	Ongoing	X	X	X	X	X	GF, GR	M	L	H	GF
MH-2, Disaster Preparedness. Continue to provide disaster preparedness information on the City website, including material relating to individual and business planning, mitigation, preparedness, and recovery. Some materials are also available in Spanish and Korean.		ESC	Ongoing		X				GF	M	L	M	GF

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				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
MH-3, Personal Preparedness. The City will encourage residents to prepare themselves by understanding their local hazards, stocking up with necessary items, and planning how family members should respond if any of a number of possible emergency or disaster events strike. These activities are currently supported through the City's website and employee training.		ESC	Ongoing	X	X				GF	M	L	H	GF
MH-4, MyHazards. The California Office of Emergency Services maintains a "MyHazards" website that allows residents to look up individual addresses and determine their vulnerability to various major hazards. The City will continue to maintain a link to MyHazards on the Disaster Preparedness section of the City's website.		ESC	Ongoing	X	X				GF	M	L	H	GF

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				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
MH-5, Land Use Planning. The City will update its General Plan to (a) guide development away from hazard areas, (b) reduce density in the hazard areas, or, (c) encourage greater development restrictions on properties in hazard areas.		CD, PW	Ongoing	X	X				GF	H	L	H	BC, GP, ZO
MH-6, Continuity of Operations (COOP) planning. COOP plans ensure that the critical and essential functions of an organization can continue to operate during and after an emergency. The City will encourage businesses and other organizations to prepare themselves by securing their vital records, planning for alternatives to electronic business processes, and planning for ongoing operations after a major disruption. The City will also continue to update its existing COOP.		CM	Ongoing		X			X	GF, GR	H	L	H	GF

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				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
MH-7, Site Emergency Plans. The City encourages the development and testing of site emergency plans for schools, factories, office buildings, shopping malls, recreation areas, and other public and private venues.		ESC	Ongoing	X	X			X	GF	M	L	H	GF
MH-8, Emergency Response Plans. Preparation of organizational emergency response plans can ensure an efficient and effective response to a major emergency or disaster.		CM, FD, PD	Ongoing	X				X	GF, GR	H	L	H	GF
MH-9, Evacuation Transportation Planning. Populations with access or functional needs (AFN) face special challenges during a general evacuation. The City will endeavor to identify and secure permission to use any available resources for helping AFN populations to safely evacuate with their support systems and technology.		CS, CM, ESC	Ongoing	X				X	GF	M	L	M	GF

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				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
MH-10, Emergency Response Training & Exercises. City emergency response personnel need to be trained and plan for various contingencies and response activities, such as evacuation, traffic control, search, and rescue.		CM, FD, PD	Ongoing	X				X	GF, GR	H	M	H	GF
MH-11, Community Emergency Response Team (CERT). CERT is a volunteer group trained and equipped to respond if emergency services are unable to meet all of the immediate needs of the community following a major disaster. <i>The City will continue to recruit new CERT members and refer them to CERT teams in La Palma, Fullerton, or Cypress.</i>		CM, ESC	Ongoing		X			X	GF	L	L	L	GF
MH-12, Early Warning Systems. The City will continue to work with local, state, and federal organizations investing in public early warning systems/networks. The City will continue to support and use AlertOC as its primary mass-notification system.		ESC	Ongoing	X	X			X	GF, GR	H	L	M	GF

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				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
MH-13, Building Construction. The City encourages public and private buildings to be designed with structural bracing, shutters, and laminated glass in windowpanes to minimize damage. Such construction standards are particularly beneficial during storms and earthquakes.		CD	Ongoing	X	X				GF	H	L	H	BC, GP
MH-14, Heating and Cooling Centers. The City will continue to provide heating and/or cooling centers to vulnerable populations during extreme temperatures. Center information will continue to be forwarded to the county and 2-1-1 OC to encourage at-risk populations to use the centers.		CS	Ongoing	X				X	GF	M	L	M	GF
MH-15, Debris Management Plan. The City will develop a Debris Management Plan, identifying the amount and types of debris produced during a hazardous event, the regulations pertaining to removal, vendors, costs, and timelines.		PW, ESC	1-5 years	X					GF	M	M	M	GF

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MH-16, Bridge Strengthening. Caltrans inspects state- and city-owned bridges once a year and provides a list of recommended improvements.	X	PW	Ongoing	X	X				GF, GR	H	H	H	GF
MH-17, Loss Estimation Studies. Loss estimation requires the use of spatial analysis to determine the number and types of properties a particular hazard is likely to affect. Currently, that data is fragmented or incomplete. The City will endeavor to (a) consolidate and restructure existing spatial data, and (b) obtain additional data needed to enable more detailed and accurate spatial analysis of the City's built environment.	X	CD, CM, IT, PW	Ongoing	X	X			X	GF, GR	M	M	M	GF
MH-18, Smoke Detectors. The City supports and encourages the American Red Cross' efforts to install smoke detectors in properties facing the highest risk of structure fires.		CM, CD, FD	Ongoing	X	X				GF, GR	L	L	M	GF

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				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
MH-19, Fireplace and Chimney Maintenance. OCFA actively encourages residents to inspect chimneys at least once a year. Safe fireplace/chimney use and maintenance includes spark arrestors and emphasis on proper storage of flammable items.		FD	Ongoing		X				GF	L	L	L	GF
MH-20, Hazardous Materials: Safety Procedures and Policies. Regulations require training in and compliance with all safety procedures and systems related to the manufacture, storage, transport, use, and disposal of hazardous materials. The City desires to maintain its compliance with such regulations.		CD, FD, PW	Ongoing	X					GF	M	M	L	GF

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				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
MH-21, Hazardous Materials: Risk Management Plans. U.S. EPA regulations require development of Risk Management Plans for sites that manufacture, store, or handle hazardous materials. The City desires to maintain compliance with these regulations through coordination with OCHCA and OCFA.		FD	Ongoing	X				X	GF	M	L	M	GF
MH-22 Hazardous Materials: Public Awareness and Worker Education. The Emergency Planning and Community Right-to-Know Act, also known as SARA Title III, provides an infrastructure at the state and local levels to plan for chemical emergencies. OCFA desires to maintain its practice of conducting yearly inspections in order to maintain compliance with such regulations.		FD, PW	Ongoing	X	X				GF, GR	M	L	M	GF

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				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
MH-23, Hazardous Materials: Emergency Plans. The City's emergency plan must include the following: - Procedures for immediate response in case of an accident, including a community-wide evacuation plan - A plan for notifying the public that an incident has occurred - A plan for conducting exercises that test the plan The City desires to maintain compliance with this standard.		CM, ESC	Ongoing	X	X			X	GF, GR	M	L	H	GF, GP
MH-24, Hazardous Materials: Security. Security considerations include preparedness for terrorism, sabotage, or civil disturbances. The City will encourage owners of facilities containing reportable quantities of hazardous materials to plan for heightened facility security measures.		FD, PD	Ongoing	X	X			X	GF	H	L	L	GF

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MH-25, Hazardous Materials: Transportation. The U.S. Department of Transportation (USDOT) administers a labeling and placarding system for identifying the types of hazardous materials transported on U.S. highways, railways, and waterways. City police and Public Works vehicles and the City EOC use digital versions of the USDOT “Orange Book” to aid in identifying and responding to HAZMAT incidents.		FD, PD, PW	Ongoing		X			X	GF	M	L	M	GF
MH-26, Hazardous Materials: Industrial Site Buffering. Hazardous material exposure can be prevented or reduced through separation and buffering between industrial areas and other land uses. Industrial areas should be located away from schools, nursing homes, hospitals, and other facilities with large or vulnerable populations. The City desires to continue to maintain such standards through ordinances and code enforcement.		CD, FD	Ongoing	X					GF	H	L	H	BC, ZO

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MH-27, Hazardous Materials: Transportation Accident Traffic Control. Road closures and traffic control in accident areas become especially critical during a HAZMAT incident response. The City desires to identify tools, equipment, and training to mitigate against unnecessary delays and gridlock.		FD, PD, PW	Ongoing	X				X	GF	M	M	L	GF
MH-28, Utility Failure: Water & Sewer. The City desires to continue to improve the location, design, and maintenance of water and sewer systems. Sewer and storm water systems should be expanded to handle anticipated storm water volumes.		PW	Ongoing	X					CIP, Ent. Funds, GR	M	H	M	GF
MH-29, Utility Failure: Electrical Lines. The City will continue to expedite planning and permitting support for SCE's utility undergrounding program. Burying electrical lines protects them from severe winds, lightning, and other hazards.	X	CM, PW	Ongoing	X				X	GF	M	H	L	GF

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MH-30, Utility Failure: Microgrid Implementation. A microgrid is a local electrical grid with defined electrical boundaries, acting as a single and controllable entity. It is able to operate in grid-connected and in island mode. Using battery arrays and renewable energy, these microgrids can continue to power their nodes (homes, businesses, or facilities such as schools) even if the macrogrid fails during a disaster. The City wishes to pursue grant opportunities to encourage the development of microgrids within the city.	X	CM, CD, PW	1-5 years	X			X	X	CIP, GF, GR	H	M	M	GF
MH-31, Utility Failure: System Redundancies. The City chooses to establish redundant connections across utility services attained through private utilities. The City will continue to adjust means and methods of creating redundant communications with the SCADA system.	X	CM, IT, PW	Ongoing					X	CIP, Ent. Funds, GR	M	M	M	GF

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MH-32, Utility Failure: Backup Power. Generators are in place now for limited-capacity backup power at isolated locations. The City desires to conduct a capability assessment and identify shortfalls.		CM, PW	1-3 years	X				X	GF	M	L	M	GF
MH-33, Utility Failure: Maintenance. Continue regular maintenance and equipment checks, along with replacement or renovation of aging structures and equipment that should be made as hazard-resistant as economically possible.		CM, PW	Ongoing	X				X	CIP, GF	M	M	M	GF
MH-34, Utility Failure: Tree Trimming. Tree trimming and maintenance is important for preventing limb breakage and for safeguarding nearby utility lines. The City operates a community forestry program with a goal of creating and maintaining a disaster-resistant landscape in public right-of-ways.		PW	Ongoing	X					GF	L	M	M	GF

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MH-35, Utility Failure: DigAlert Hotline. Continue to promote the Underground Service Alert 8-1-1 that people can call before digging.		PW	Ongoing	X	X				GF	M	L	L	GF
MH-36, Utility Failure: Vulnerable Populations. Continue to promote 2-1-1 OC, a system that provides residents and businesses with post-disaster information and assistance.		CM	Ongoing	X	X				GF	M	L	L	GF
MH-37, Site Planning: CPTED. Crime Prevention Through Environmental Design is a multi-disciplinary approach to deterring criminal behavior through environmental design. The City will continue its CPTED program.		CD, PD	Ongoing	X	X			X	GF	M	L	L	BC, GF, ZO
MH-38, Sabotage, Terrorism, Weapons of Mass Destruction: School Violence. The City will continue to assist public, private, and nonprofit schools through encouraging school safety and violence-prevention programs. An example is the 2015 BPPD Active Shooter Training.		PD	Ongoing	X	X				GF, GR	M	L	H	GF

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MH-39, Sabotage, Terrorism, Weapons of Mass Destruction: Public Gatherings. The City will consider heightening security at certain public gatherings, special events, and critical community facilities and industries.		PD	Ongoing	X	X			X	GF, GR	M	M	H	GF
MH-40, Public Health Emergencies: Immunization. The City will continue to maintain two Points of Dispensing to respond to pandemics and biological attacks, in coordination with OCHCA.		CM, HR	Ongoing	X	X				GF	M	L	M	GF
MH-41, Public Health Emergencies: Water and Sewer. The City is dedicated to maintaining water and sewer infrastructure at acceptable operating standards. Backup generators for water production can help maintain acceptable operating levels during power failures.		PW	Ongoing	X				X	CIP, Ent. Funds	H	M	H	GF

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MH-42, Public Health Emergencies: Vacant Structures. The City has enacted ordinances to assure demolition and clearance of vacant condemned structures to prevent safety and health violations.		CD	Ongoing	X					GF	M	L	L	BC
MH-43, Upgrade City Hall Traffic Management Center. Upgrade the traffic management center to current standards and promote safety. <i>The December 2021 TMC Evaluation and Recommendations report proposed several needed upgrades.</i>		PW	1-5 years	X				X	CIP, GR	L	M	L	GF
MH-44, Water Well Rehabilitation. Rehabilitate the existing City wells to ensure uninterrupted water supply.		PW	Ongoing	X				X	CIP, GF	M	M	M	GF
MH-45, Pressure Reducing Valve (PRV) Replacement and Relocation. Replace PRVs that are 50 years old. This will provide adequate water pressure for reliable water service. Relocate the PRV station at Beach Blvd. for easier accessibility.		PW	Ongoing	X				X	CIP, GF	M	M	M	GF

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MH-46, Infrastructure Replacement Program. Comprehensive replacement of water-related infrastructure at various locations within the City per <i>Water Master Plan</i> . The project will upgrade the City water system to current standards, keep City infrastructure in shape, and provide high water-quality standards.		PW	Ongoing	X				X	CIP, Ent. Funds	M	H	M	CIP
MH-47, Annual Pavement Rehabilitation Program. Upgrade roadways to current standards, better condition, and improve drivability and the structural integrity of the pavement, extend street lifespan, and keep City infrastructure in good shape.		PW	Ongoing	X					CIP, GF	M	M	M	GF
MH-48, Pre-Disaster Recovery Plan. A Pre-Disaster Recovery Plan establishes goals and guidelines for the City's recovery from a major damaging disaster. It includes debris management, housing replacement, economic recovery, and changes to the cityscape to make the City more resilient in the future.	X	CD, ESC	1-3 years		X	X	X		GF, GR	M	L	L	GF

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Earthquake Mitigation Action Items													
EQ-1, Seismic Hazards: Mapping. The City can use information gained from seismic hazard mapping to assess risk. The City uses state-produced Seismic Hazard Maps in planning, and will also continue to encourage the public to increase its own hazard awareness via MyHazards.		CD, ESC, PW	Ongoing	X	X			X	GF	M	L	H	GF
EQ-2, Seismic Hazards: Tilt-Up Buildings. Tilt-up buildings erected before the January 1996 IBC update may be at higher risk of collapse during earthquakes. There are 24 such buildings in Buena Park. The City intends to contract a survey of these buildings to determine the level of seismic risk they pose to the public.	X	CD	1-4 years	X					GF, GR	H	L	M	GF

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EQ-3, Seismic Hazards: Soft-Story Buildings. The Sylmar and Northridge earthquakes exposed serious life-safety hazards inherent in soft-story, multi-household buildings erected prior to Nov. 1980. The City intends to (a) create an inventory of multi-household buildings erected under pre-Nov. 1980 codes, (b) conduct a survey determining which of these structures have soft stories, and (c) contract a survey of these structures to determine the level of seismic risk they pose to the public.	X	CD	1-4 years	X					GF, GR	H	M	M	GF
EQ-4, ATC-20/45 Safety Assessment. The City uses the ARC-20/45 process to determine if buildings are safe to re-enter in a post-disaster setting. The City will continue to support and fund City employees qualified to attend ATC-20/45 training (e.g. CD Building Division, Public Works).		CD, PW	Ongoing	X				X	GF	H	L	M	GF

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EQ-5, Non-Structural Seismic Hazards. Many injuries in earthquakes are caused by nonstructural hazards, such as lighting fixtures, window glass, furniture, appliances, etc. There are excellent consumer-oriented materials available explaining how to find and secure these potential missile hazards. The City will continue to make these materials available to residents and businesses through links in the Disaster Preparedness pages on the City's website.		ESC	Ongoing	X	X				GF	M	L	L	GF
EQ-6, Earthquake Building Codes. Due to the City's underlying geology, it is largely impossible to build outside seismic hazard zones. The City will continue to adopt and enforce updated building code provisions as structural engineering standards evolve to make buildings more earthquake-resistant.		CD	Ongoing	X	X				GF	H	L	M	GF

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EQ-7, Seismic Code Compliance. The City reviews proposed plans and specifications for new construction and renovations/expansions to ensure compliance with building codes and seismic safety requirements.		CD	Ongoing	X	X				GF	M	L	L	GF
EQ-8, Seismic Code Training. The City is committed to tracking legislation enacting seismic building provisions. Conducting information sessions or other forms of outreach on seismic code provisions for new and existing buildings can enhance code use and enforcement by local architects, engineers, contractors, and code enforcement personnel.		CD, PW	Ongoing	X	X				GF	M	L	L	BC, GF
EQ-9, Retrofit Ehlers Event Center. The City will evaluate the three original Ehlers Event Center buildings for seismic safety and incorporate any needed seismic retrofit measures into any planned renovations.	X	CS, PW	1-5 years	X					CIP, GR	M	H	M	GF

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EQ-10, Financial Incentives. The City's Home Improvement Program provides low-interest loans to low-income households for home improvements. Loan recipients agree to perform mitigation actions to remedy common health and safety issues in their homes, such as lead and asbestos removal and bracing hot water heaters.	X	CD, CM	Ongoing	X					GR	M	H	L	GF
Cyberterrorism Mitigation Action Items													
CT-1, Cybersecurity Plan. Improve cyberterrorism/security implementation. Develop procedural and technological measures to secure the City's information technology infrastructure.	X	CM, IT	Ongoing		X			X	GR	H	H	M	GF

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CT-5, Security Awareness Training. User actions account for the bulk of network infections. Require all City network users to take online cybersecurity training to familiarize themselves with possible cyber threats they may encounter.	X	HR, IT	Ongoing					X	GF	M	L	H	GF
CT-6, Penetration Testing. Testing available through CISA involves white-hat hackers attempting to break into an organization's networks to find security shortfalls. This test will ensure security of the City's IT infrastructure by safely trying to exploit any network vulnerabilities.	X	IT	6-12 months					X	GF	H	L	M	GF
CT-7, Cyber Incident Response Plan. A CIRP details an organization's response to a hostile network penetration. It identifies roles and responsibilities, timelines, response procedures, notification, and recovery.	X	IT	1-2 years					X	GF, GR	H	M	H	GF

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Urban Fire Mitigation Action Items													
UF-1, Vegetation Removal. Remove highly flammable vegetation in Very High FHSZs and the WUI, and replant with fire-adapted specimens.	X	FD	1-2 years	X					GF, GR	H	L	H	GP
UF-2, Fire Retardant Inspection. Upgrade and regularly inspect fire retardant infrastructure such as sprinklers, fire hose terminals, and fire suppression systems in City facilities.	X	PW	Ongoing	X				X	GF	M	L	M	GF
UF-3, Fire-Safe Construction. Require all new development in Very High FHSZs and WUI to use noncombustible building materials such as masonry, brick, stucco, concrete, steel, or others as appropriate. Establish zones of defensible space around homes in Very High FHSZs and the WUI.	X	CD, FD	1-3 years	X					H	H	L	M	BC

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UF-4, Vegetation Management. Coordinate and educate property owners on the regular vegetation management strategies to reduce fire hazard risks, such as clearing out dead vegetation in parks, open spaces, right-of-way embankments, and creating a larger buffer through weed abatement in FHSZs and adjacent areas.	X	CM, ESC, FD	1-2 years	X	X		X		GF	M	L	H	GF
UF-5, Fire Prevention Awareness. Create and promote a fire hazard prevention awareness campaign to the residents in FHSZs.	X	CM, ESC, FD	1-2 years	X	X		X		GF	M	L	H	GF
UF-6, Wildfire Preparedness Planning. Routinely participate in the update of the <i>Orange County Community Wildfire Preparedness Plan</i> for areas within the Very High, High, and Moderate FHSZs.	X	FD	1 year	X				X	GF, GR	H	L	L	GF

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UF-7, Monitor Climate Change Impacts. Closely monitor changes within the boundaries of mapped hazard areas resulting from climate change. Adopt new mitigation actions or revise existing ones to ensure continued resiliency for new development and redevelopment.	X	CD	Ongoing	X		X			GF	M	L	L	GF, GP
UF-8, Evacuation Planning. Define and implement evacuation zones for the area of Buena Park north of the BNSF right-of-way. Prepare a "Know Your Zone"-type public education program to inform the residents and businesses in the evacuation zones what they should expect for alert and warning and how to evacuate safely.	X	CM, ESC, FD, PD	12-18 months	X	X			X	GF, GR	H	M	H	GF
UF-9, Reservoir Hardening, Stage 1. Install a fire sprinkler system on the roof of the Rosecrans Reservoir booster station. The system will blanket the building, the courtyard, and the property outside the fence with a continual spray of water.	X	PW	Complete May 2025	X					Ent. Funds	H	M	H	GF

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UF-10, Reservoir Hardening, Stage 2. Carry out further fire hardening actions for the Rosecrans Reservoir booster station, including: install flame-diffusing and ember-resistant vent screening; install fire shielding outside gauges and equipment; and cut back foliage.	X	PW	6-12 months	X					Ent. Funds	H	M	H	GF
Dam Failure Mitigation Action Items													
DF-1, Water Supply Hardening. The City will make flood-proofing improvements as part of well rehab projects and as deemed feasible.		PW	1-5 years	X				X	Ent. Funds, GR	M	M	H	CIP
DF-2, Floodplain Building Standards. The City will continue to enforce these floodplain standards: (a) that residential structures be elevated; and (b) that nonresidential structures be elevated or flood-proofed.		CD	Ongoing	X	X	X	X	X	GF	M	L	H	GF

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				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
DF-3, Storm Drainage Systems. The City will enhance flood mitigation by installing, re-routing, or increasing the capacity of the existing storm drainage system in concert with Orange County Public Works. This will enhance flow capacity throughout the City.		PW	Ongoing	X					CIP, Ent. Funds, GR	M	H	M	GF
DF-4, Floodproofing Roads. The City designs new roadways with the intention to meet drainage laws. There are various construction and placement factors to consider when building roads to maintain dry access. An area of special concern to the City is the lack of adequate drainage on Beach Blvd.		PW	Ongoing	X				X	CIP, GF, GR	M	H	M	GF
DF-5, Drain Grates. Add drain grates to existing City storm drains.		PW	Ongoing	X					GF, GR	L	L	M	GF
DF-6, Storm Drain Improvement. The City will continue to upgrade its storm drain system to current standards, keep City drainage infrastructure in good shape, and maintain high water-quality standards.		PW	Ongoing	X					CIP, GF	M	M	M	GF

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



Mitigation Action	New/substantially revised for 2022 Matrix	Coordinating Organization	Timeline	Plan Goals Addressed					Funding Source (* = not yet identified; B = Bonds; CIP=Capital Improvement Program; GF = General Fund; GR = Grants)	Benefit (L=Low; M=Med; H=High; n/a=not applicable)	Cost (L=Low; M=Med; H=High; n/a=not applicable)	Priority (L=Low; M=Med; H=High; n/a=not applicable)	Planning Mechanism (BC=Building Code; GF=General Fund; GP=General Plan; ZO=Zoning Ordinance)
				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
DF-7, Permeable Paving Materials. The City will continue to use permeable paving materials to conform to NPDES regulations. These materials are suited for uses such as parking lots, footpaths, and playgrounds, and allow water to seep through paving into the groundwater basin.		PW	Ongoing	X					GF	L	L	L	GF
Drought Mitigation Action Items													
DR-1, Install New Well. This well will supplement the existing municipal wells, but if production is sufficient, it will replace an existing low-performing well that will be retired.		PW	2-3 years	X					CIP, Ent. Funds, GR	M	H	M	GF

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



Mitigation Action	New/substantially revised for 2022 Matrix	Coordinating Organization	Timeline	Plan Goals Addressed					Funding Source (* = not yet identified; B = Bonds; CIP=Capital Improvement Program; GF = General Fund; GR = Grants)	Benefit (L=Low; M=Med; H=High; n/a=not applicable)	Cost (L=Low; M=Med; H=High; n/a=not applicable)	Priority (L=Low; M=Med; H=High; n/a=not applicable)	Planning Mechanism (BC=Building Code; GF=General Fund; GP=General Plan; ZO=Zoning Ordinance)
				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
DR-2, Water Conservation. The City will encourage property owners to make their properties more water-efficient. This may include incentives to retrofit low-flow, water-saving showerheads, toilets, and appliances, replacing lawns with drought-tolerant landscaping, smart timer rebates , and ensuring water sprinklers function correctly and don't water hardscape.		CD, CM, PW	Ongoing		X				GF	M	L	M	GF
DR-3, Water Storage. Although not the primary consumer of water, human consumption is the primary reason to store water in bulk. The City will continue to maintain and operate the reservoir on Rosecrans Av.		PW	Ongoing	X					CIP, GF	M	M	M	GF
DR-4, Water-Use Ordinance. The City uses the 2009 Water Conservation and Water Supply Shortage Program (Ordinance 1533) to prioritize and control water use, particularly for emergencies such as firefighting.		PW	Ongoing	X				X	CIP, GF	M	L	M	GF

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



Mitigation Action	New/substantially revised for 2022 Matrix	Coordinating Organization	Timeline	Plan Goals Addressed					Funding Source (* = not yet identified; B = Bonds; CIP=Capital Improvement Program; GF = General Fund; GR = Grants)	Benefit (L=Low; M=Med; H=High; n/a=not applicable)	Cost (L=Low; M=Med; H=High; n/a=not applicable)	Priority (L=Low, M=Med; H=High; n/a=not applicable)	Planning Mechanism (BC=Building Code; GF=General Fund; GP=General Plan; ZO=Zoning Ordinance)
				Protect Life and Property	Enhance Public Awareness	Preserve Natural Systems	Encourage Partnership and Implementation	Strengthen Emergency Services					
DR-5, Fire Flow Improvements. Improve various recommended pipelines to mitigate insufficient fire flows.		PW	Ongoing	X				X	CIP, GF	M	H	H	GF
DR-6, Water Plan. Establish emergency interconnections with nearby water suppliers and cities to bring in additional water during a short- or long-term emergency.		PW	Ongoing	X					CIP, Ent. Funds	M	M	H	GF



Table 17. Completed or Removed Mitigation Actions

Mitigation Action	Status
CT-2, Network Security Fabric. Implement a new network security fabric. This fabric provides broad visibility and protection in an integrated solution that reduces network management complexity.	Complete
CT-3, Email Security and Protection. Implement advanced cloud-based email protection. This solution provides necessary email protection and intelligence to stop email-borne threats.	Complete
CT-4, Endpoint Security. Deploy a next-generation endpoint protection. A centrally managed security solution is in place to provide protection for the City's IT infrastructure.	Complete
FLD-1, Floodplain Ordinance: Determining and enforcing acceptable land uses through planning and regulation may not prevent flooding, but planning and regulation can limit exposure in flood-prone areas. The City maintains a Floodplain Ordinance and uses FEMA Flood Insurance Rate Maps (FIRM) to determine flood status for property owners.	Ongoing Flood hazard removed from the LHMP Action item not relevant to current LHMP hazards
FLD-2, Capital Improvement Plan: Infrastructure planning decisions can affect flood hazard mitigation. For example, decisions to extend roads or utilities to an area may increase exposure. The City will continue to regulate construction in flood-prone areas.	Ongoing Flood hazard removed from the LHMP Action item not relevant to current LHMP hazards
FLD-3, Zoning: The City will consider zoning methods that affect flood hazard mitigation, such as adopting ordinances that limit development or density in the floodplain, or requiring that floodplains be kept as open space.	Ongoing Flood hazard removed from the LHMP Action item not relevant to current LHMP hazards

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Mitigation Action	Status
FLD-4, Subdivision Design: The City will continue to enforce subdivision design standards that require elevation data collection during the platting process. Lots may also be required to have buildable space above the base flood elevation.	Ongoing Flood hazard removed from the LHMP Action item not relevant to current LHMP hazards
FLD-7, Master Plan for Storm Drainage. The City completed its <i>Master Plan for Storm Drainage in 2015</i> . This Plan regulates development in areas prone to produce or be impacted by storm waters.	Complete
FLD-8, Flood Insurance: FEMA's National Flood Insurance Program (NFIP) policies are only available in communities that participate in the program. The City will continue its NFIP participation.	Ongoing Flood hazard removed from the LHMP Action item not relevant to current LHMP hazards
FLD-8, Storm Drainage Systems: The City will enhance flood mitigation by installing, re-routing, or increasing the capacity of the existing storm drainage system in concert with Orange County Public Works. This will enhance flow capacity throughout the City.	Ongoing Action belongs to OC Public Works
DR-6, Water Meter Replacement Program. The City replaced all existing water meters with AMI meters to promote conservation and detect leaks. Project completed in 2019.	Complete



12. PLANNING PROCESS

12.1. Plan Methodology¹¹⁴

DMA 2000 emphasizes the importance of participatory planning in the development of mitigation plans. The Planning Team wrote this Mitigation Plan using the best available information from a wide variety of sources.

Disaster Mitigation Act of 2000

Requirement §201.6(c) (1)

[The plan shall include...:]
the planning process used
to develop the plan,
including how it was
prepared, who was
involved in the process,
and how the public was
involved.

Throughout the initial planning process, the City made a concerted effort to gather information from City and county departments, external agencies, the Whole Community Working Group, and other stakeholders.

The Planning Team solicited information from internal and external departments and agencies with specific knowledge of natural hazards and past historical events, as well as planning and zoning codes, ordinances, and recent planning decisions. The extensive initial planning process involving local businesses and residents helped develop the hazard mitigation strategies contained in this Plan.

Planning Team

The Planning Team served as the primary stakeholders throughout the update process. The Planning Team first met on **April 26, 2022** to review the calculated priority risk assessment to determine whether the threats facing Buena Park have changed. A second meeting occurred on **June 16, 2022** to review and evaluate the Mitigation Actions Matrix. The final meeting took place on **August 17, 2022** to review the public comments on and changes to the Plan and determine the way forward to complete a Plan draft for submission to Cal OES.

Who Participated in Developing the Plan?

The Mitigation Plan is the result of a collaborative planning effort between Buena Park residents, public agencies, nonprofit organizations, the private sector, regional, and state and federal organizations. Public participation played a role in developing goals and action items. The general public, external agencies, and the Whole Community Working Group all served as secondary stakeholders with opportunities to contribute to the Plan update. [Table 18](#) (page [166](#)) shows the various Planning Team members' levels of participation.

¹¹⁴ ELEMENT A: PLANNING PROCESS | A1

A1abc. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

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Table 18. Planning Team level of participation¹¹⁵

Name	Department/ Agency	Research and Writing of Plan	Attend Planning Team Meetings	Attend Whole Community Working Group	Planning Team Review and Comment on Draft Plan	Invite public, stakeholders, and external agencies to review and contribute to the Plan	Submit Plan for preliminary review by Cal OES/FEMA	Attend City Council Public Meeting
Lance Charnes	Chair	X	X	X	X	X	X	X
Eddie Fenton	City Manager	X	X	X	X			
Swati Meshram	Comm. Dev.*	X	X		X			
Ian McAleese	Comm. Dev.*	X	X		X			
Mark Saucedo	Comm. Serv.	X	X		X			
Sung Hyun	Finance	X	X		X			
Sergio Lepe	Police	X	X		X			
Deepthi Arabolu	Public Works**	X	X		X			
Michael Yeun	OCFA	X	X		X			

* Includes code enforcement, zoning, and city planning** Includes floodplain administrator

Planning Team Involvement

The Mitigation Planning Team, with support from other City staff and local organizations, carried out the following tasks:

- Established plan development goals
- Prepared a timetable for plan completion
- Ensured the plan meets DMA 2000 requirements, and federal and state guidelines
- Organized and oversaw public involvement
- Solicited participation of government agencies, businesses, residents, and other stakeholders
- Participated in committee meetings and City Council meetings
- Identified and profiled hazards
- Determined hazard rankings
- Assessed risks
- Identified critical facilities
- Estimated potential exposure or losses
- Evaluated development trends and specific risks
- Developed mitigation goals, objectives, and activities
- Gathered and shared information
- Provided continuity throughout Plan development to ensure the Plan addresses jurisdiction-specific hazard vulnerabilities and mitigation strategies

¹¹⁵ ELEMENT A: PLANNING PROCESS | A1

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



Members communicated regularly by phone and email between group meetings.

The Planning Team will meet annually after the plan is adopted. Members will provide project direction and oversight, assist with plan evaluation, and convene supplementary meetings as needed.

Outside Agency Involvement¹¹⁶

A variety of agencies and individuals provided data and expertise during plan-writing process. The City invited external agencies with an interest in Buena Park's Mitigation Plan development to participate in reviewing and contributing to the Mitigation Plan. Before the City sent the second Draft Plan to Cal OES, the Planning Team made the Plan available by invitation to external agencies. [Figure 30](#) (page [182](#)) and [Figure 31](#) (page [183](#)) show the list of invited external reviewers and invitation.

To facilitate communication between the Planning Team and Buena Park residents, and to involve the public in ongoing planning and evaluation, this plan will be available to the public through a variety of channels.

12.2. State and Federal Guidelines and Requirements for Mitigation Plans

Following are the federal requirements for approval of a mitigation plan.

- Opportunities for public involvement in identifying and assessing risk, drafting a plan, and in approval stages of the plan
- Community cooperation with an opportunity for other local government agencies, the business community, educational institutions, and nonprofits to participate in the process
- Incorporation of local documentation, including the local General Plan, the Zoning Ordinance, the building codes, and other pertinent documents

The following components must be part of the planning process:

- Complete documentation of the planning process
- A detailed risk assessment on hazard exposures in the City
- A comprehensive mitigation strategy that describes the goals and objectives, including proposed strategies, programs, and actions to avoid long-term vulnerabilities
- A plan maintenance process that describes the method and schedule of monitoring, evaluating, and updating the plan, and integration of the Mitigation Plan into other planning mechanisms
- Formal adoption by the City Council
- Plan review by Cal OES
- Plan approval by FEMA

These requirements are identified in greater detail in the following Plan sections and supporting documentation.

¹¹⁶ ELEMENT A: PLANNING PROCESS | A2

A2ab. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))



The Whole-Community Working Group provided public participation opportunities. In addition, the makeup of a Planning Team ensured a constant exchange of data and input from outside organizations. The City had access to numerous existing mitigation plans from around the region as well as the State of California Mitigation Plan Guidance.

Other reference materials consisted of state, county, and city mitigation plans, including:

- [County of Orange and OCFA Local Hazard Mitigation Plan \(2021\)](#)
- [State of California Hazard Mitigation Plan \(2018\)](#)

City staff collected data and compiled hazard-specific research on earthquakes, floods, wildfires, landslides, and windstorms.

Research materials came from the City's *General Plan*, the City's Hazard Analysis (contained in the *Emergency Operations Plan*), state agencies including Cal OES and CAL FIRE, and from the U.S. Army Corps of Engineers. City staff conducted research by referencing long-time City employees and locating City information in historical documents. Information was also incorporated from after-action documentation provided for previous proclaimed and declared disasters. The City staff identified current mitigation activities, resources, and programs, and potential action items from research materials and stakeholder interviews.

12.3. Hazard Mitigation Programs

The City adheres to the Stafford Act, the California Emergency Services Act, and DMA 2000, which require local governments to develop and implement mitigation plans. Cities and counties have intimate knowledge of local geography, and they're on the front line with personnel and equipment during a disaster. Local governments are in the best position to assess their strengths, weaknesses, opportunities, and constraints.

National Flood Insurance Program^{117, 118}

The City joined the NFIP on October 15, 1974. NFIP helps the City receive funding for flood insurance and flood mitigation projects. The Planning Team used NFIP data in the risk assessment, resulting in a number of mitigation activities. The City adopted a floodplain management ordinance on April 9, 1976 and has revised it periodically to maintain compliance with NFIP regulations. The City does not participate in the Community Rating System, but it has Flood Insurance Rate Maps (FIRMs) that show floodways, 100-year flood zones, and 500-year flood zones, and regulates development in Special Flood Hazard Areas. Buena Park's Public Works Director is the designated floodplain administrator. The City has no repetitive-loss properties. The City's continued involvement in NFIP supports this Plan.

¹¹⁷ ELEMENT B: PLANNING PROCESS | B4

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

¹¹⁸ ELEMENT B: PLANNING PROCESS | C2

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



Current Mitigation Programs

The City intends to incorporate mitigation planning as an integral component of daily operations. The Planning Team will work to integrate mitigation strategies into the general operations of the City and partner organizations. After conducting a capability assessment ([Risk Assessment](#), page [29](#)), the Planning Team will identify additional policies, programs, practices, and procedures that could be modified to address mitigation activities. In addition, the City intends to implement the Plan through its involvement in FEMA and Cal OES programs. [Table 19](#) (page [169](#)) identifies existing processes/programs through which the Plan could be implemented, and as appropriate, any opportunities to expand or improve these processes and programs to enhance mitigation (shown in *italics*).

[Plan Maintenance](#) (page [197](#)) identifies implementing the Plan through existing programs as a mitigation action. This section also provides a description of the implementation process and potential funding sources.

Table 19. Existing processes and programs¹¹⁹

Process	Action	Implementation of Plan
Administrative	Departmental or organizational work plans, policies, and procedural changes	• City Manager's Office • Community & Economic Development Department • Public Works Department • Police Department • Other departments as appropriate All above: determine the need for additional staffing to design or manage proposed mitigation projects
Budgetary	Capital and operational budgets	Include line-item mitigation measures in budget as appropriate
Outreach & Education	Mass communication outlets	• City website: preparedness information; EOP and LHMP posted for public access • Event-related social media posts (i.e. ShakeOut) • In-person events promoting preparedness • Expand preparedness outreach to Spanish- and Korean-speaking communities

¹¹⁹ ELEMENT C. MITIGATION STRATEGY | C1

C1ab. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

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Process	Action	Implementation of Plan
Regulatory	Executive orders, ordinances, and other directives	• Building Code ○ Study applicable flood-related code requirements used elsewhere for possible inclusion • Capital Improvement Plan ○ Require hazard mitigation in design of new construction • General Plan ○ Institutionalize hazard mitigation in land use and new construction • National Flood Insurance Program ○ Investigate joining CRS • Water Master Plan ○ Determine whether deficiencies identified in Section ES.6 qualify as mitigation projects • Sewer Master Plan ○ Determine whether deficiencies identified in Section 8 qualify as mitigation projects • Zoning Ordinance ○ Investigate the use of special development overlays and special development standards
Funding	Traditional and nontraditional sources	• Local funding ○ Seek authority to use bonds, fees, loans, and taxes to finance mitigation projects • State/federal/other public funding ○ Research grant opportunities through USHUD CDBG; the FEMA HMGP; and other state and federal programs • Non-traditional funding sources ○ Seek assistance from foundation, nonprofit, and private sources
Partnerships	Creative funding and initiatives	• In-kind resources • Public-private partnerships
Partnerships	Advisory bodies and committees	• Disaster Council (city and county) • Inter-Agency Coordination Group



12.4. Use of Existing Data¹²⁰

The Planning Team gathered and reviewed numerous electronic and hardcopy sources to support the planning process. Examples:

- City of Buena Park General Plan (2010)
 - Aligned hazard descriptions; included BPGP maps in the LHMP; used economic data from the BPGP; adopted the LHMP into the BPGP
- County of Orange and Orange County Fire Authority Hazard Mitigation Plan (2021)
 - Used historical data from the County LHMP
- Local Flood Insurance Rate Maps
 - Used to determine locations of 100- and 500-year floodplains in the City
- U.S. Census data
 - Obtained demographic data from the decennial census and American Community Survey
- Federal, state, and county open data portals (such as the National Weather Service Climate Portal and the CA DWR California Data Exchange Center)
 - Obtained hydrologic, meteorological, geologic, and climate-related data
- National Oceanic and Atmospheric Administration data
 - Obtained hydrologic, meteorological, and climate-related data
- U.S. Army Corps of Engineers Consequence Assessment Reports
 - Obtained inundation maps and failure/non-failure scenarios

The Planning Team also examined public laws and programs (such as the National Flood Insurance Program) during plan development.

12.5. Public Participation¹²¹

To facilitate communication between the Planning Team and Buena Park residents, and to involve the public in ongoing planning and evaluation, the Planning Team made the draft Plan available to the public through a variety of channels. Community involvement increases the likelihood that hazard mitigation will become a standard consideration in the City's evolution.

Whole-Community Working Group

The City of Buena Park invited and convened a Whole-Community Working Group (WCWG) to review and comment on the Hazard Mitigation Plan update. The Emergency Services Coordinator sent email invitations to the Police Chief's Community Stakeholders Advisory Group for each meeting.

- During the meeting on August 8, 2022 (Figure 32, page 184), City staff presented an overview on hazard mitigation planning and an introduction to the hazards in the region.

¹²⁰ ELEMENT A: PLANNING PROCESS | A4

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

¹²¹ ELEMENT A: PLANNING PROCESS | A3

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



- The **September 14, 2022** meeting ([Figure 35](#), page [188](#)), conducted by City staff members, was dedicated to hazard mitigation actions and some of the tradeoffs involved in carrying out a mitigation program. **An attendee suggested adding a microgrid-related mitigation action. The Planning Team approved this proposal, leading to Mitigation Action MH-30.**

[Figure 32](#) through [Figure 37](#) show the WCWG agendas, roll sheets, and meeting minutes.

Public Input on Draft Plans

During the planning process, the City invited members of the Whole Community Working Group to participate by reviewing the document and providing input.

On **August 17, 2022**, the City posted the draft LHMP on the City website (<https://www.buenapark.com/residents/city-documents/>) for public review and comment. The Planning Team emailed an invitation to the WCWG and the Police Chief's Community Stakeholders Advisory Group ([Figure 38](#), page [192](#)), informing them of the draft LHMP's availability. The Planning Team also posted flyers at City Hall, Ehlers Event Center, and the Buena Park Library announcing the public online review ([Figure 39](#), page [196](#)). **Notices also appeared on the City's Facebook and Twitter feeds.**

The Emergency Services Coordinator sent invitations on August 17, 2022, to external agencies to review and provide feedback on the draft Plan ([Figure 30](#), page [182](#), and [Figure 31](#), page [183](#)). We received only one non-actionable comment from the invited agencies.

City Council Public Meeting

The Buena Park City Council conducted one public meeting on **December 13, 2022** to hear and discuss the Mitigation Plan. The City Clerk's Office posted the agenda item concerning the Plan's presentation to the City Council on the City website, at City Hall, and at the Buena Park Library. **The City Manager's Office posted reminders on the City's Facebook and Twitter feeds.**

12.6. Plan Adoption Process¹²²

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

The Planning Team prepared for City Council the staff report on the Plan ([Figure 25](#), page [175](#)), including an overview of the Plan's intent and contents.

The staff report 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.

122 ELEMENT E: PLANNING PROCESS | E1

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



The Council was supportive of the overall goal established by the Planning Team to become a more disaster-resistant community. The City Council commended the Planning Team representatives for their dedication and efforts to satisfy the DMA 2000 requirements. The City Council voted unanimously for the adoption of the Mitigation Plan.

The City Council's resolution of adoption appears in [Figure 26](#) (page [177](#)).

Plan Approval

Following the planning process and review by the Planning Team, Whole Community Working Group, external agencies, and the public, the City submitted the third Draft Plan to Cal OES for review and forwarding to FEMA for conditional approval. FEMA issued a conditional approval on **November 17, 2022**, pending adoption by the City Council.

With the City Council adoption in hand, FEMA granted final approval on **December 20, 2022** ([Figure 24](#), page [174](#)).



Figure 24. FEMA approval letter

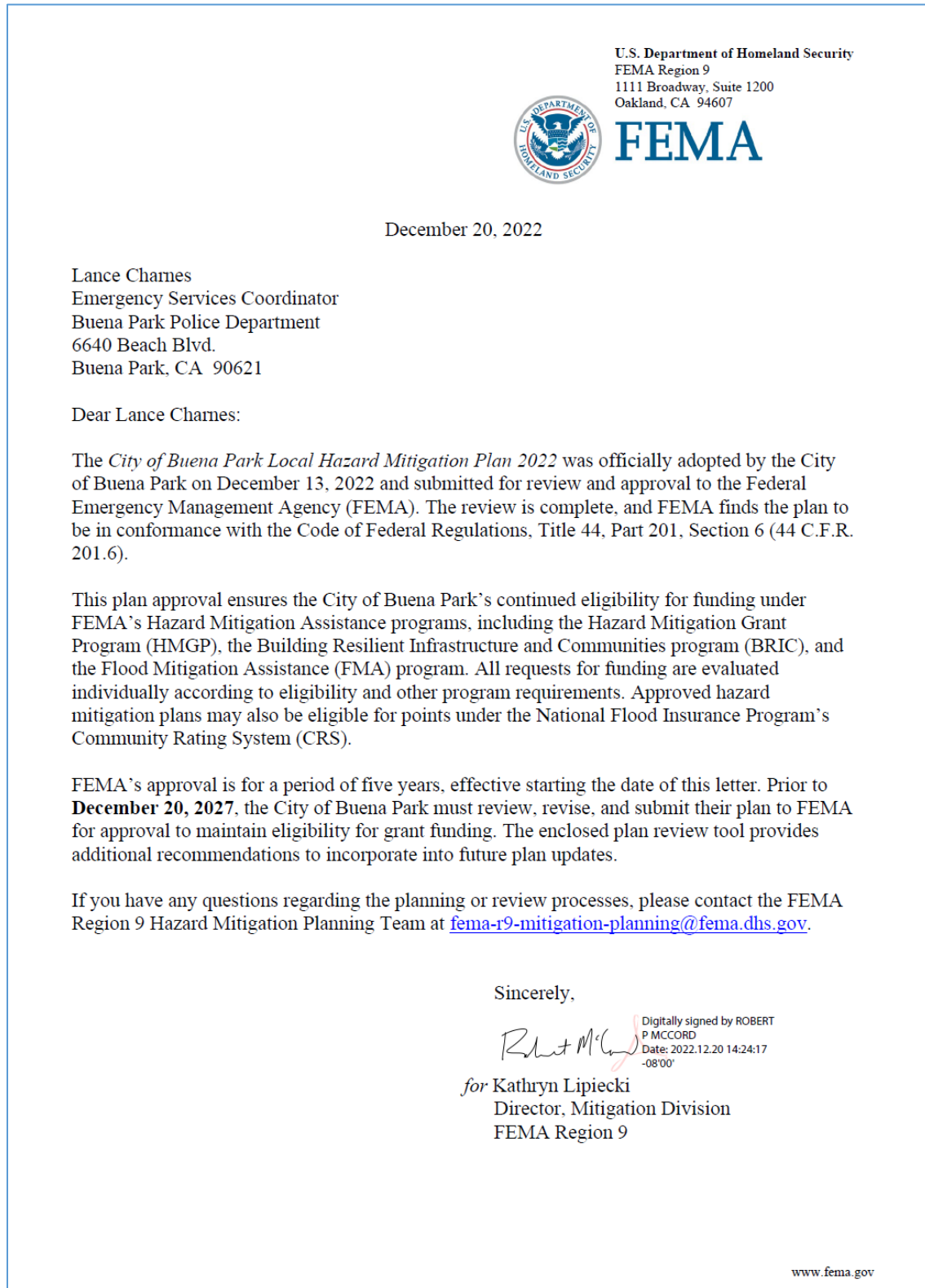




Figure 25. City Council Agenda Report



City of BUENA PARK

AGENDA REPORT TO CITY COUNCIL

MEETING DATE: December 13, 2022

TO: The Mayor and City Council

TITLE: RESOLUTION APPROVING THE UPDATED CITY OF BUENA PARK LOCAL HAZARD MITIGATION PLAN (LHMP)

RECOMMENDED ACTION: 1) Adopt a Resolution adopting the City's updated Local Hazard Mitigation Plan (LHMP); and 2) Authorize staff to make any necessary, non-monetary changes to the Plan from time to time at the discretion of the City Manager.

PURPOSE: Adopt the City's updated LHMP, which documents the City's mitigation planning process to identify hazards and potential losses. There is no budget impact with the adoption of this resolution.

PREVIOUS COUNCIL/COMMISSION/COMMITTEE ACTION: At the March 13, 2012, City Council meeting, the City Council approved an application for funding and the execution of a grant agreement from the 2008 Disaster Recovery Initiative (DRI), which allowed the City to prepare and submit a LHMP. On November 12, 2014, the City Council approved a Professional Services Agreement with Emergency Planning Consultants to develop a LHMP pursuant to the DRI grant award. The City Council adopted the initial completed LHMP on November 14, 2017.

DISCUSSION:

The City prepared this LHMP in response to Public Law 106-390, the Disaster Mitigation Act of 2000 (DMA 2000). DMA 2000 requires state and local governments to prepare mitigation plans to document their mitigation planning process, and to identify hazards, potential losses, mitigation needs, goals, and strategies. This type of planning supplements the City's comprehensive emergency management program. Under DMA 2000, each state and local government must have a federally-approved mitigation plan to be eligible for hazard mitigation grant funding. The original 2017 LHMP was due for review and revision this year; the proposed Plan is the revision to the current plan.

The LHMP includes: an introduction that discusses the reasons for creating the LHMP; a profile of the City, identification of its climate, geography, and development patterns; a general risk assessment that identifies the major natural and technological hazards to which the City is vulnerable; hazard-specific analyses detailing the characteristics of four leading chronic hazards threatening the City; a discussion of mitigation strategies and a list of proposed mitigation measures; a review of the planning process; and, information about how the LHMP will be reviewed and maintained.

The process of updating the LHMP included several meetings with the Emergency Services Coordinator and representatives from each City department, including the Police Department, the Orange County Fire Authority (OCFA), and other organizations and interest groups in the City.

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City Council Agenda Report (continued)

Page 2 AGENDA REPORT TO CITY COUNCIL
Meeting Date: December 13, 2022
Subject: RESOLUTION APPROVING THE UPDATED CITY OF BUENA PARK
 LOCAL HAZARD MITIGATION PLAN

Planning followed a "whole community strategy," in which residents, emergency management representatives, organizational and community leaders, and government officials met together to discuss, understand, and assess the needs of their respective organizations and community groups to organize and strengthen their resources, capabilities, and interests. This process involved two community meetings in which staff presented the LHMP planning regime, facilitated discussions, and received input from these groups. The draft LHMP is the result of this effort.

The California Governor's Office of Emergency Services reviewed the LHMP and approved it on September 28, 2022. The Federal Emergency Management Agency subsequently reviewed the Plan and approved it on November 10, 2022, pending City Council adoption of the proposed resolution. Staff recommends adopting the proposed resolution, which adopts the revised Plan.

BUDGET IMPACT: There is no budget impact associated with this action. The LHMP revision was accomplished entirely within the Police Department's existing budget.

Prepared by: Frank Nunes, Police Chief
Approved by: Aaron France, City Manager

Presented by: Lance Charnes, Emergency Services Coordinator

ATTACHMENTS:

- 1) Revised City of Buena Park Local Hazard Mitigation Plan
- 2) Resolution - Hazard Mitigation Plan



Figure 26. City Council Adoption Resolution

RESOLUTION NO. 14610

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF
BUENA PARK, CALIFORNIA, ADOPTING THE UPDATED BUENA
PARK LOCAL HAZARD MITIGATION PLAN

WHEREAS, the City Council is greatly concerned with the health, safety, and well-being of its citizens, and desires to protect them from the many natural and technological hazards that threaten the City; and

WHEREAS, the City Council wants to ensure the City remains eligible for state and federal grant funding to help identify and mitigate these hazards before and after an emergency; and

WHEREAS, Public Law 106-390, the Disaster Mitigation Act of 2000, requires state and local governments to prepare mitigation plans to document their mitigation planning process, and to identify hazards, potential losses, mitigation needs, goals, and strategies; and

WHEREAS, the Disaster Mitigation Act of 2000 requires each state and local government to have a federally-approved mitigation plan to be eligible for hazard mitigation grant funding; and

WHEREAS, the City of Buena Park Local Hazard Mitigation Plan identifies, analyzes, and locates the hazards that threaten the City, and specifies possible mitigation measures to lessen or eliminate these threats; and

WHEREAS, the City Council adopted the first City of Buena Park Local Hazard Mitigation Plan on November 14, 2017; and

WHEREAS, the Federal Emergency Management Agency (FEMA) requires all Hazard Mitigation Plans to be reviewed and updated every five years; and

WHEREAS, the City's Mitigation Planning Team has completed its review and revision of the 2017 City of Buena Park Local Hazard Mitigation Plan, and both the California Governor's Office of Emergency Services and FEMA have reviewed and approved these revisions; and

WHEREAS, once adopted by the City Council, the Federal Emergency Management Agency will officially approve the revised City of Buena Park Local Hazard Mitigation Plan. The Plan will be reviewed periodically, and revised as necessary to meet changing conditions. The Plan will also be considered an essential part of the Buena Park General Plan Safety Element.

NOW, THEREFORE, BE IT RESOLVED that the City Council does hereby adopt the updated Local Hazard Mitigation Plan and gives its full support to this Plan, and urges officials, employees, and residents, individually and collectively, to do their share to make the City a safer and more resilient place to live and work.

LOCAL HAZARD MITIGATION PLAN

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City Council Adoption Resolution (continued)

RESOLUTION NO. 14610
Page 2

PASSED AND ADOPTED this 13th day of December 2022, by the following called vote:

AYES: COUNCILMEMBERS: Castañeda, Sonne, Ahn, Traut, Brown

NOES: COUNCILMEMBERS: None

ABSENT: COUNCILMEMBERS: None

ABSTAIN: COUNCILMEMBERS: None

Arthur C. Brown

Mayor

ATTEST:



City Clerk

I, Adria M. Jimenez, MMC, City Clerk of the City of Buena Park, California, hereby certify that the foregoing resolution was duly and regularly passed and adopted at a regular meeting of the City Council of the City of Buena Park, held this 13th day of December 2022.



City Clerk



Figure 27. Mitigation Planning Team sign-in sheet – April 26, 2022

City of Buena Park

Mitigation Planning Team: Mitigation Actions Matrix
1000-1200, 16 June 2022

1	Michael Yeun - OCFA
2	Im McAlister - Com Dev
3	ADRIAN GARCIA
4	Mah Sanh
5	Deepthi Arapoly
6	LANCE CHAMBERS
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Figure 28. Mitigation Planning Team sign-in sheet – June 16, 2022

City of Buena Park

Mitigation Planning Team: Mitigation Actions Matrix
1000-1200, 16 June 2022

1	Michael Yeun - OCFA
2	Im McAlister - Com Dev
3	ADRIAN GARCIA
4	Mah Samh
5	Deepthi Arapolu
6	Lance Charles
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Figure 29. Mitigation Planning Team sign-in sheet – August 17, 2022

City of Buena Park	
Mitigation Planning Team: Draft LHMP Review 0900-1200, 17 August 2022	
1	LANCE CHARLES
2	Michael Yeun - OCFA
3	Eddie Fenton
4	Sung Hyun
5	Deepti Anabolu BPPW
6	Im Myeong
7	Mah Saeed CS
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Figure 30. External agency reviewers

Anaheim Union High School District
Buena Park Library District
Buena Park School District
Centralia Elementary School District
City of Anaheim
City of Brea
City of Cypress
City of Fullerton
City of La Habra
City of La Mirada
City of La Palma
Cypress School District
Fullerton Joint Union High School District
Orange County Fire Authority
Orange County Sheriff's Department, Emergency Management Division
Rossier Park School
St. Pius School
Savanna School District
Southeast Area Animal Control Authority
Speech & Language Development Center



Figure 31. Invitation to external agency reviewers – August 17, 2022

Charnes, Lance

To: Dohman, Chief Steve (OCFA); Yuen, Michael (OCFA); Wilmoth, Janine (Anaheim); Erpelding, Loree (Cypress PD); Fleming, Ed (La Palma); Merina, Emily (Cerritos); Rounds, Mark (La Mirada); Roy, Erik (La Habra); Keyworth, Lisa (Brea); Batiste, Kristi Hofstetter (Fullerton FD); Evans, Jim (Centralia ESD); Hernandez, Chuck (AUHSD); Johnson, Dr. Sue (Savanna SD); Lennox, Teresa (Cypress SD); RMiramontes@bpsd.k12.ca.us; Tollette, Brian (Rossier Park); Kessler, Dr. Adrienne (SLDC); awatanabe@stpius5school.net; Soriano, Donna (SEAACA); Medina, Helen (Buena Park Library District); Anderson, Michelle L

Subject: Buena Park Local Hazard Mitigation Plan: external agency review

The Buena Park Local Hazard Mitigation Plan is now in its final stages before going to Cal OES. One of the last steps is for us to seek your feedback on the plan as representatives of external agencies who may be affected by it in some way.

You can find the draft LHMP here: https://www.buenapark.com/residents/city_documents/index.php.

Please take a look through the Plan and let me know if you have any comments, concerns, or suggestions. Email your input to me by **COB 15 September**. If more than one person from your agency gets this message (for instance, the school districts), I need only one input from your agency.

Thank you in advance for your time and support.

Lance Charnes
Emergency Services Coordinator
City of Buena Park
714-562-3960
www.BuenaPark.com
6640 Beach Blvd. | Buena Park, CA | 90621



Figure 32. Whole Community Working Group sign-in sheet – August 8, 2022

[illegible]



Figure 33. Whole Community Working Group Agenda – August 8, 2022



BUENA PARK WHOLE COMMUNITY WORKING GROUP

8 August 2022, 6:00-8:00 p.m.
Buena Park City Council Chambers

AGENDA

1. Introduction to mitigation
2. Local hazards overview
3. Personal/private-sector mitigation
4. Local Hazard Mitigation Planning
5. Questions/discussion

Moderator: Lance Charnes, Emergency Services Coordinator, City of Buena Park
714-562-3960; lcharnes@bppd.com

Questions we'll discuss:

- Which aspects of mitigation do you understand best? Which do you understand least?
 - What would help you understand better?
- How can the City best encourage property owners to carry out mitigation actions?
- Can / will you take any of the personal mitigation actions?
 - If so, which are you most likely to do? Why?
 - How will you choose which actions to take?
- Would you support mandatory earthquake retrofitting for the most vulnerable building types (soft-story; non-ductile concrete)?
 - Why or why not?
 - How would you pay for these retrofits?
- Would you support a bond issue or sales-tax increase to fund public mitigation efforts?
 - If not, how would you fund public mitigation programs?
 - If so, what would you be willing to do to convince your neighbors to do so also?

City of
BUENA PARK

Department of Public Works

- Ms. Serpas responded that the most important action is to get the word out to the public via social media and other sources.



Whole Community Working Group Minutes – August 8, 2022 (continued)

Page: Two
Date: August 9, 2022
Subject: Minutes from Whole Community Working Group Public Meeting of August 8, 2022

3. How can the City get the word out to businesses and get them to participate?

- Ms. Serpas commented that "safety first" is ingrained in the employees at The Gas Company.
- Mr. Stoeffel responded that a quarterly publication in some form should be sent to get business leaders thinking about this issue. Mr. Charnes commented about the mailing list used to notify the public of this meeting.

4. Do you plan to take any actions in your home?

- Mr. Stoeffel responded that yes, he will endeavor to expand his preparations at home and in his office. He included items such as securing cabinets to walls, etc.
- Mr. Stoeffel commented that the basic "stuff" has been done at KBF but he wants to revisit the issue of the various chemicals and cleaners that are stored on the worksite.
- Ms. Serpas commented that she has secured cabinets and bookshelves to walls. She is interested in reviewing the issue of reinforcing older cinder-block walls.

5. Would you support mandatory earthquake retrofit projects? How would we pay for this?

- Ms. Serpas responded that this would depend on the cost of the projects. She would not support tax increases for this. She suggested that the City or businesses should research any grants that may be available.

6. Would you support a bond issue for public improvements?

- Ms. Serpas responded that she would probably vote "no."
- Mr. Stoeffel responded if there are obvious improvements that really need to be done, then yes. But we should not attempt to increase the sales tax because those efforts rarely succeed. We should look for FEMA grants.

Following these comments, Mr. Charnes announced that an additional meeting on the subject of Hazard Mitigation will be conducted in mid-September and that a copy of the Local Hazard Mitigation Plan Draft 2022 Update will be available in late August for the public's review.

The meeting ended at 7:27 p.m.

[illegible]



Figure 36. Whole Community Working Group Agenda – September 14, 2022



BUENA PARK WHOLE COMMUNITY WORKING GROUP

14 September 2022, 1:00-3:00 p.m.
Buena Park City Council Chambers

AGENDA

1. Introduction to mitigation
2. Local hazards overview
3. Proposed mitigation actions
4. Questions/discussion

Moderator: Lance Charnes, Emergency Services Coordinator, City of Buena Park
714-562-3960; lcharnes@bppd.com

Read the draft plan online at https://www.buenapark.com/residents/city_documents/



Figure 37. Whole Community Working Group Minutes – September 14, 2022



Memorandum

Department of Public Works

DATE: September 15, 2022

TO: Lance Charnes, Emergency Services Coordinator

FROM: Doug Brodowski, Operations Manager

SUBJECT: Minutes from Local Hazard Mitigation Plan Public Meeting

Meeting Date and Time: Wednesday, September 14, 2022, 1:00 p.m.

Location: Buena Park City Council Chambers

In Attendance:

- City Staff
 - Lance Charnes, Emergency Services Coordinator
 - Doug Brodowski, Operations Manager
- Public
 - Dona Del Rio, Centralia School District
 - Waldomar Sadowinski, resident
 - Elsie Scamonski, Buena Park School District
 - Robert Stoeffel, representing Knotts Berry Farm
 - Leticia Zaragoza, Buena Park School District
 - Shanin Ziemer, resident

Meeting Minutes:

The meeting began at 1:07 p.m.

Mr. Charnes made a comprehensive presentation on the topic of the Local Hazard Mitigation Plan and presented the draft version of the Plan. This included information about disasters we may experience, including natural, technological, biological, and human-caused disasters.

Mr. Charnes then proceeded to review the nine hazards that were rated for the Draft Plan. These include:

1. Cyberterrorism
2. Dam Upsets
3. Drought
4. Earthquake
5. Floods
6. Hazmat
7. Heat
8. Blackouts/brownouts
9. Terrorism



Whole Community Working Group Minutes – September 14, 2022 (continued)

Page: Two
Date: September 14, 2022
Subject: Minutes from Local Hazard Mitigation Plan Public Meeting

Of these nine hazard types, the Plan specifically addresses the four that are determined to be most likely to occur and most critical to plan for. These include:

1. Earthquake
2. Cyberterrorism
3. Dam Upset
4. Drought

Mr. Charnes proceeded to discuss these four hazards in more depth. During the discussion, Ms. Ziemer asked if the Plan considered establishing microgrids at the neighborhood level. As she explained it, a microgrid is a localized solar/battery system that could potentially provide emergency power for cooling centers and access to electrical power for residents who are dependent upon electric devices, such as oxygen systems. Such a system could provide these services locally, thus lessening the dependency on other medical facilities during a black/brown-out scenario.

Mr. Charnes stated that the Plan does not currently address microgrids but that he would consider adding this topic to the Plan.

Mr. Sadowinski asked if the Plan addresses development of homes over a SuperFund Cleanup Site. Mr. Sadowinski was specifically referring to the condominium development that is occurring at the Los Coyotes Country Club. Mr. Sadowinski suggested that the development was within the area of concern for the McColl Dumpsite SuperFund Cleanup Project. Mr. Charnes responded that this topic does not fall within the scope of the LHMP and referred him to the City's Community Development Department for more information regarding the Country Club development project.

Ms. Ziemer then asked if the Plan addresses turf replacement rebates for homeowners in order to deal with a drought emergency. Mr. Charnes responded that it does not but that such rebates are available through the Metropolitan Water District of Orange County (MWDOC) and referred her to that agency.

Ms. Del Rio asked if MWDOC also provides turf replacement rebates to commercial properties such as the school district. Mr. Charnes again referred her to MWDOC for more information.

Mr. Charnes then provided a recap of his presentation and asked for any further comments or questions. There being none, Mr. Charnes ended the meeting at 2:35 p.m.

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



Figure 38. Notice of the Draft LHMP public posting – August 25, 2022

From: Cota, Lorraine
Sent: Thursday, August 25, 2022 17:08
To: Cota, Lorraine
Cc: Charnes, Lance
Subject: City of Buena Park's Local Hazard Mitigation Plan

Hello Everyone!

I am reaching out to you on behalf of our Emergency Services Coordinator, Lance Charnes. He asked I share the following information with you:

Please join us on September 14 to help us plan how we can make Buena Park safer in a disaster.

The city's Local Hazard Mitigation Plan (LHMP) outlines the hazards that most threaten our city, and discusses ways we can decrease our risks or even prevent the hazards. We have to update it every five years. **We now have a draft LHMP update for you to review and comment on.**

You can find the draft LHMP here: https://www.buenapark.com/residents/city_documents/index.php. Scroll to the bottom of the page.

Please take a look through the Plan and let us know if you have any comments, concerns, or suggestions. **Email your input to this address by close of business on September 14th.** If more than one person from your organization gets this message (for instance, the school districts), we need only one input from your organization.

If you'd rather ask questions or present your ideas in person, join us on **Wednesday, September 14, from 1 p.m. to 3 p.m.** We'll gather in the City Council Chambers in City Hall to review the hazards the new LHMP addresses and talk about the mitigation actions included in the updated LHMP.

Please RSVP to Lance Charnes by email at lcharnes@bppd.com or by telephone at 714-562-3960.

Let us know if you need any accommodations.

We look forward to seeing you on the 14th!

Lance Charnes

Emergency Services Coordinator

City of Buena Park

714-562-3960

www.BuenaPark.com

6640 Beach Blvd. | Buena Park, CA | 90621

This email was sent to members of the Police Chief's Community Stakeholder Group, as follows:

Contact	Organization
Ahn, Ellen	Korean Community Services
Alvarez, Frank	Premier Jeep
Arrendondo, John	Marriott Hotels
Babbitt, Lalaine Lim	Farmers Insurance
Bang, Hosung	AutoNation
Beard, Kelly	Starbucks

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



Contact	Organization
Berg, Sonje	Fullerton Joint Union High School District - BPHS
Bianchi, Janine	Amada
Brown, Ray	
Bruce, Camilo	Marriott Hotels
Bryson, Drew	Giving Childen Hope
Cancellieri, Jack	Legacy Produce
Carmack, Bryan	McDonald's
Casella, Nicholas	
Castellanos, Israel	Black Angus
Chae, Min	M+D Properties
Chang, Jamie	Radisson Hotels
Chhabra, Manmohan	
Choi, Erik (President)	BP Downtown
Copping, Sara	Visit Buena Park
Davis, Michael	
Davisson, Shawn	AutoNation
Dorazio, Don (GM)	Walmart
Duncan, Claudius	Chase Bank
Dunster, Liz	Erika Records
Foiles, Richard	Dickey's BBQ
Fuentes, Andy	Allstate Insurance
Galbraith, Daniel	Amway
Ganahl, Pete	Ganahl Lumber
Green, David	Anaheim Union High School District
Hanneman, Lara	The Cauldron Bar
Harris, Noemi	Motel 6
Hashim, Pete	Kentucky Fried Chicken
Henkle, Robert	
Hernandez, Lanae	Southern California Gas
Hoffman, Scott	Superior Signs and Graphics
Hollins, Steve	Chick-Fil-A
Houlemard, Michael	Starbucks
Huegel, George	Simpson Buick GMC
Huizar, Antonio	Portillo's
Hung, Jennifer	Anaheim Union High School District - Hope School
Imai, Jeffrey	Target
Jang, Michael	BP Mall
Jeewa, Mohamed	
Jeff Morin	Comprehensive Emergency Management Services
Johnson, Dr. Sue	Savanna School District
Kaprelyan, Raffi	Knott's Berry Farm
Kelly, Bob	Unique Garage Door
Kessler, Dr. Adrienne	Speech & Language Development Center
Kim, Michael	
Kim, Yeun	Wagyu Meat and Grill
King, Wayne	Ganahl Lumber

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



Contact	Organization
Kinoshita, Chieko	M+D Properties
Lamar Hanger	Southwest Carpenters Union
LeCompte, Mark	House of Imports
Lee, Yohan	Law Offices of Yohan Lee
Lemonnier, Louie	Anaheim Union High School District - Hope School
Lennox, Teresa	Cypress School District
Lockhart, Bill	OCFA
Lopez, Jacob	Southwest Carpenters Union
Maldonado, Natalie	Boys & Girls Club BP
Maletych, Kurt	Ken Grody Ford
Malik, Inderjot	Gudwara Temple
Maneerod, Patty	Olive Garden
Martinez, Norma	Centralia Elementary School District
Mauricio J. Diaz	Isla Cuban Kitchen
McCarney, Kevin	Poquito Mas
McClelland, Matt	Chili's
McPhillips, Erin	Buena Park School District
Medina, Helen	Buena Park Library District
Miramontes, Ramon	Buena Park School District
Munns, Thomas	BP Downtown
Myers, Andrew	Walmart
Nehal, Nadine	Hookah Lounge
Nelson B.	Island Snacks
Oberly, Matt	Premiere Automotive
Okewolelawal, Oladimeji	CarMax
Parent, Artie	America's Printer
Park, Young	AutoNation
Parlet, John	John's Incredible Pizza
Passage, John	
Porto, Betty	Porto's Bakery
Price, Jasmin	New Moon Restaurant
Quinn Delacroix	Rock & Brews
Ramirez, Efrain	EDCO Disposal
Reazuddin, Michael	
Record, Ricky	Target
Rehnborg, Sam	Amway
Salazar, Silvia	U.S. Department of Labor
Salehzadeh, Sean	Buena Park Honda
Salvatore, Bernie	Orora
Schrader, Cathi	OC Parks (Ralph B. Clark Regional Park)
Serpas, Clarissa	Southern California Gas
Simpson, Dave	Simpson Automotive
Solis, Javier	Holiday Inn Buena Park
Song, Garry	Town House Motel
Spiegl, Reid	Fitness 19
Robert - Steadfast Security	Steadfast Security (VV & Orangethorpe Strip Mall)

LOCAL HAZARD MITIGATION PLAN

BASIC PLAN



Contact	Organization
Storbeck, Jon	Knott's Berry Farm
Struck, Janice	Knott's Berry Farm
Struiksma, Mike	West Coast Sand & Gravel
Sutter, Russ	Amway
Suzuki, Shoko	Town House Motel
Tollette, Brian	Rossier Park School
Torres, Paul	Artistic Car Wash & Detail
Trinidad, Anatolio	Black Bear Diner
Trout, Todd	Boys & Girls Club BP
Wanamaker, Katie	GLP Management
Watanabe, Andrea	St. Pius School
Webb, John	State Farm Insurance
Wergler, Brian	Net Trophy
Whalen, Evelyn	Marriott Hotels
Wilkes, Alan	OCFA
Williamson, Sean	Knott's Berry Farm
Wise, Dustin	The Wise Team OC
Zambrano, Fran	Southwest Carpenters Union



Figure 39. Flyer posted to announce the Draft LHMP online posting and call for comment

Buena Park Local Hazard Mitigation Plan

The Local Hazard Mitigation Plan is a plan to reduce our city's physical vulnerabilities before a disaster strikes.

The plan has information about the disasters we may experience, what we're doing to lessen their impacts, and how you might help.

You have a chance to review a draft of the updated plan and comment on what's in it.

Read the plan online at
https://www.buenapark.com/residents/city_documents/

Send your comments to city@buenapark.com.

Or, attend the
PUBLIC MEETING
Wednesday, September 14 at 1:00 p.m.
Buena Park City Hall, City Council Chamber

This flyer was posted as follows on August 18, 2022:

- Inside and outside the City Hall main entrances
- Inside the Buena Park Police Department lobby
- Inside Ehlers Event Center



13. PLAN MAINTENANCE

This section details the formal process that will ensure that the Mitigation Plan remains an active and relevant document. 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.

13.1. Method and Scheduling of Plan Implementation¹²³

The Planning Team that was involved in research and writing of the Plan will also be responsible for implementation. The Emergency Services Coordinator will lead the Team. Please refer to the Part I [Credits](#) section (page 5) for a full list of Planning Team members.

	Year 1	Year 2	Year 3	Year 4	Year 5
Monitoring	X	X	X	X	X
Updating (as needed)	x	x	x	x	X
Evaluating					
Internal Planning Team evaluation	X	X	X	X	X
Cal OES and FEMA evaluation					X

13.2. Monitoring and Implementing the Plan

Plan Adoption

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

Once the City Council adopts the Plan, the City Manager will submit it to the State Hazard Mitigation Officer at California Governor's 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 addresses the requirements set forth in 44 CFR Section 201.6 (Local Mitigation Plans). Upon FEMA acceptance, the City will gain eligibility for Hazard Mitigation Grant Program funds.

Mitigation Planning Team

The Mitigation Planning Team will take responsibility for Plan maintenance once it's adopted. The Emergency Services Coordinator will serve as chairperson to facilitate the Mitigation Planning

¹²³ ELEMENT A: PLANNING PROCESS | A6

A6a. 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))



Team meetings and will assign tasks such as updating and presenting the Plan. Plan implementation and evaluation will be a shared responsibility among all of the Mitigation Planning Team members. The Emergency Services Coordinator will have authority to prepare and approve future amendments to the Mitigation Plan, with five-year updates to FEMA resubmitted to the City Council for adoption.

The Chairperson may assign representatives to the Mitigation Planning Team from City departments, divisions, and agencies, including but not limited to the current Mitigation Planning Team. In order to make the Mitigation Planning Team as broad and useful as possible, the Chairperson may choose to involve other relevant organizations and agencies in hazard mitigation discussions, such as:

- The American Red Cross
- OCSD Emergency Management Division
- The local business community

The Mitigation Planning Team will meet no less than annually. Meeting dates will be scheduled once the final Mitigation 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.

Implementation through Existing Programs¹²⁴

The City addresses statewide planning goals and legislative requirements through its *General Plan*, its *Capital Improvement Plan* (CIP), City building and safety codes, and the City's zoning ordinance. 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's Building Division is responsible for adhering to the State of California's Building and Safety Codes. In addition, the Mitigation Planning Team will work with other agencies at the state level to review, develop, and ensure Building and Safety Codes are adequate to mitigate or prevent damage by hazards. This ensures that new construction meets life-safety criteria.

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

Within six months of formal adoption of the Mitigation Plan, the recommendations listed above will be incorporated into the process of existing planning mechanisms at the City level.

¹²⁴ ELEMENT C. MITIGATION STRATEGY | C6

C6ab. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))



Economic Analysis of Mitigation Projects

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

Conducting benefit/cost analysis for a mitigation activity can help communities to determine whether a project is worth undertaking now to avoid disaster-related damages later.

Cost-effectiveness analysis evaluates how we can best 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.

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 we estimate the future benefits of a mitigation project and compare them to its cost. The result is a benefit-cost ratio (BCR) 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. We consider a project "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 help with estimating the expected future benefits over the useful life of a retrofit project. It's imperative to conduct a BCA early in the project development process to ensure the likelihood of meeting the cost-effectiveness eligibility requirement in the Stafford Act.

The BCA program consists of guidelines, methodologies, and software modules for a range of major natural hazards. The ones most applicable to the City include:

- Flood (Riverine, Coastal Zone A, Coastal Zone V)
- Damage-Frequency Assessment
- Earthquake

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.



13.3. Evaluating and Updating the Plan¹²⁵

Formal Review Process

The City will evaluate the Mitigation Plan annually to determine the effectiveness of programs and to reflect changes in land development or programs that may affect mitigation priorities. The Mitigation Planning Team Chairperson or designee will be responsible for contacting team members and organizing the annual meeting. Planning Team members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan for their respective organizations.

The Planning Team will review the goals and action items to determine their relevance to changing situations in the City, as well as changes in state or federal policy, and to ensure they're addressing current and expected conditions. The Planning Team will also review the Plan's [Risk Assessment](#) to determine if the City should update this information, given any new available data. The coordinating organizations responsible for the various action items will report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies the Team should revise.

Plan review may include the following:

- Discussion of hazard events that occurred during the prior year and their effect on the City
- Impact of potential grant opportunities on the implementation of mitigation actions
- Re-evaluation of the Mitigation Action Matrix to determine if the timelines for identified actions need to be revised (for instance, changing a long-term action to a short-term action because of funding availability)
- Recommendations for new mitigation actions
- Impacts of other planning programs or initiatives that involve hazard mitigation

The Planning Team Chairperson will assign the duty of updating the Plan to one or more of team members. The designated Planning Team members will have three months to make appropriate changes to the Plan before submitting it to the entire team. The Planning Team will also notify all holders of the City plan when changes have been made. Every five years, the City will submit the updated plan to the Cal OES State Hazard Mitigation Officer and to FEMA for review.

Continued Public Involvement¹²⁶

The City is dedicated to involving the public directly in the continual review and updates to the Mitigation Plan. We will post copies of the plan on the City website, make it available at City Hall, and publicize the existence and location of these copies in City publications and on the City website. This site will also contain an email address where people can direct their comments and concerns. The Planning Team may hold a public meeting when deemed necessary. City Council meetings may also serve as a forum for soliciting public comment.

¹²⁵ ELEMENT A: PLANNING PROCESS | A6

A6bc. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

¹²⁶ ELEMENT A: PLANNING PROCESS | A5

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



The City Manager's Office will maintain public involvement through the public access channel, City website, **social media**, and newspapers.