CITY OF BUENA PARK

LOCAL HAZARD MITIGATION PLAN

November 2017

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Credits

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Acknowledgements

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Mandated Contents

In an effort to assist the reader and reviewer of this document the jurisdiction has inserted the mandated contents as identified in the Disaster Mitigation Act of 2000 (Public Law 106-390). Following is an example of those references inserted as footnotes throughout the 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))

Part I: BACKGROUND

Executive Summary

The City of Buena Park prepared this Local Hazard Mitigation Plan (Mitigation Plan, or 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. This is the first mitigation plan prepared for the City of Buena Park.[1]

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

This plan uses the following 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."

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 a community
- Use of limited resources on hazards posing the greatest threat to a 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.

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

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.

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 compendium of hazards facing the City, the built environment at risk, the personal property that may be damaged by hazard events, and most of all, the people who live in the shadow of these hazards.

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, are not 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 Office of Emergency Services (Cal OES) is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds after a major disaster declaration.
- Southern California Earthquake Center (SCEC) gathers information about earthquakes, integrates information on earthquake phenomena, and communicates this to end-users and the general public to increase earthquake awareness, reduce economic losses, and save lives.
- California Department of Forestry and Fire Protection (CAL FIRE) is responsible for all aspects of wildland fire protection on private and state properties. 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.
- United States Census Bureau (USCB) provides demographic data on the populations affected by natural disasters.
- United States Department of Agriculture (USDA) provides data on matters pertaining to land management.

- United States Geological Survey (USGS) is responsible for geologic hazard characterization, public education, and the development of partnerships aimed at reducing risk throughout the nation.
- The 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.

How is the Plan Organized?

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

Following is a description of each part and section of the plan.

Part I: Background

Executive Summary

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

Section 1: Introduction

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

Section 2: 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

This section provides information on the process used to assess the demographics and development patterns for the community along with an assessment of the hazards.

Section 3: Risk Assessment

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

Sections 4-7: 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. The chronic hazards addressed in the plan include:

- Section 4: Earthquake
- Section 5: Dam failure
- Section 6: Flood
- Section 7: Drought

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

Part III: Mitigation Strategies

Section 8: Mitigation Strategies
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.

Section 9: 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.

Section 10: Plan Maintenance
This section provides information on plan implementation, monitoring and evaluation.

Part IV: Appendix

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

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 natural disaster situations. The City is subject to earthquakes, floods, and drought. Any disaster scenario can only be assessed through careful planning and collaboration between 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, and drought.

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 is now an entirely urban City, the exposure to hazards (natural and otherwise) creates a greater risk than previously experienced.

Mitigation Planning

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

The Plan provides a set of action items to reduce risk from hazards, such as education and outreach programs and the development of partnerships. 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:

1. establish a basis for coordination and collaboration among agencies and the public in the City of Buena Park;
2. identify and prioritize future mitigation projects; and,
3. 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 areas within the City's boundaries, with emphasis on City-owned facilities and land. The Plan provides a framework for planning for natural, technological and human-caused hazards. The resources and background information in the Plan address 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 requirements of DMA 2000 only apply to natural hazards, which are the primary focus of this Plan, 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 involved 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. Emphasis was given to the effectiveness of the activities with respect to their estimated cost.

Mitigation Planning Process

The 2016 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 risk 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. The final Mitigation Plan will be implemented through various projects, changes in day-to-day City operations, and through continued hazard mitigation development.

Public Input[2]

Emergency Planning Consultants (EPC) prepared the LHMP with the assistance of City staff. EPC also made documents available to the public, and the City intends to continue to engage the public by involving it in ongoing planning, evaluation, and facilitated communications. The Planning Team presented overviews of the mitigation planning process and hazard analyses at Whole Community Working Group meetings on May 28 and October 12, 2015. 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 during the plan-writing phase. A number of external organizations also reviewed the draft Mitigation Plan in advance of the City Council public meeting.

Plan Review

The first Draft Plan was distributed to the Planning Team for review. Following that review, an email invitation was sent to the Whole Community Working Group members along with a link to the Plan posted on the City's website. Simultaneously, external organizations were invited via email to review the plan and provide input. All reviewer comments were noted in the second Draft Plan, which was then forwarded to Cal OES and FEMA for review and conditional approval pending adoption by the City Council.

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2 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))

Plan Adoption[3]

The 2016 Mitigation Plan was presented to City Council for adoption on November 14, 2017. A copy of the City Council resolution is located in *Section 9: Planning Process*.

Plan Approval

Following the adoption by City Council, the City submitted the Final Draft Plan to FEMA with a request for approval. FEMA issued a final approval on November 22, 2017. A copy of the FEMA Letter of Approval is located in *Section 9: Planning Process*.

Point of Contact

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

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Plan Maintenance

Mitigation Planning is an ongoing process. It involves changes as new hazards occur, as the area develops, and as more is learned about 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. In addition, the Planning Team will review after-action reports generated after any disaster that affects the City and revise the Mitigation Plan as needed.

[3] 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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Section 1: Introduction

Founded in 1887 and incorporated in 1953, the City of Buena Park is a place known for tourism with its many attractions, a vibrant residential community with its population of over 83,000, and, thanks to its Economic Development Department, an industrious business community. Buena Park is the 97th most populous city in California and offers the benefits of living in a Mediterranean type of climate. The City is characterized by the unique and attractive landscape that makes the area so popular. However, the potential impacts of natural hazards associated with the terrain make the environment and population vulnerable to natural disaster situations[4].

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

- Earthquakes
- Flooding
- Drought
- Dam failures
- Blackouts
- Hazardous materials releases
- Serious transportation accidents, involving trains, aircraft, or heavy trucks
- Severe heat
- Domestic and international terrorism

It's impossible to predict exactly when these disasters will occur, or the extent to which they will affect the City. However, with careful planning and collaboration among public agencies, private-sector organizations, and residents within the community, it *is* possible to minimize the losses that can result from these disasters.

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. Mitigation plans will help the City reduce risk by identifying resources, information, and strategies for risk reduction, while helping to guide and coordinate hazard-mitigation activities throughout the City.

This will be the City's first Local Hazard Mitigation Plan (LHMP). It will provide a set of action items to reduce risks from hazards through education and outreach programs, foster the development of partnerships, 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 agencies and the public of City of Buena Park;

[4] City of Buena Park General Plan.

- identify and prioritize future mitigation projects; and,
- assist in meeting the requirements of federal assistance programs.

The Mitigation Plan works in conjunction with other City plans, including the City General Plan, Emergency Operations Plan, and General Plan Environmental Impact Report.

Why Plan for Hazards?

Hazards impact Buena Park's residents, businesses, property, environment, and economy. The hazards listed previously have exposed 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 event, can assist in protecting life and property. Local residents and businesses can work together with the City to create a Mitigation Plan that addresses the potential impacts of hazard events.

Hazard Mitigation Legislation

Hazard Mitigation Grant Program

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

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

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

- Property acquisition and relocation projects
- Structural retrofitting to minimize damages from earthquake, flood, high wind, wildfire, or other natural hazards

- Elevation of flood-prone structures
- Vegetation management programs, such as:
  - Brush control and maintenance
  - Fuel break lines in shrubbery
  - Fire-resistant vegetation in potential wildland fire areas

Pre-Disaster Mitigation Program

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

Starting in Fiscal Year 2009, the PDM program offered two types of grants (planning and competitive).

- *Planning grants* allocate funds to each state for mitigation plan development.
- *Competitive grants* provide funds to states, local governments, and federally recognized tribal governments via a competitive application process. FEMA reviews and ranks the submittals based on pre-determined criteria. The minimum eligibility requirements for competitive grants include participation in good standing in the National Flood Insurance Program (NFIP) and a FEMA-approved mitigation plan[5].

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.

"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,
FEMA Director

Three types of grants are available under FMA: planning, project, and technical assistance.

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

Communities that receive planning and/or project grants must participate in the NFIP. Examples of eligible projects include elevation, acquisition, and relocation of NFIP-insured structures[6].

[5] http://www.fema.gov/fima/pdm.shtm.

[6] http://www.fema.gov/fima/fma.shtm.

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 Interim Final Rule for planning provisions (44 CFR Part 201) was published in the Federal Register twice, on February 26, 2002 and October 1, 2002. The mitigation planning requirements are implemented via 44 CFR Part 201.6.

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/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 procedures
- Specific state requirements

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)
- 44 CFR Parts 201 and 206, *Mitigation Planning and Hazard Mitigation Grant Program, Interim Final Rule*, October 1, 2002

- 44 CFR Parts 201 and 206, *Mitigation Planning and Hazard Mitigation Grant Program, Interim Final Rule*, February 26, 2002
- *How-To Guide for Using HAZUS-MH for Risk Assessment*, (FEMA 433), February 2004
- Mitigation Planning "How-to" Series (FEMA 386-1 through 9 available at: http://www.fema.gov/fima/planhowto.shtm)
- *Getting Started: Building Support For Mitigation Planning* (FEMA 386-1)
- *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA 386-2)
- *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies* (FEMA 386-3)
- *Bringing the Plan to Life: Implementing the Mitigation Plan* (FEMA 386-4)
- *Using Benefit-Cost Review in Mitigation Planning* (FEMA 386-5)
- *Integrating Historic Property and Cultural Resource Considerations into Mitigation Planning* (FEMA 386-6)
- *Integrating Manmade Hazards Into Mitigation Planning* (FEMA 386-7)
- *Multi-Jurisdictional Mitigation Planning* (FEMA 386-8)
- *Using the Mitigation Plan to Prepare Successful Mitigation Projects* (FEMA 386-9)
- *State and Local Plan Interim Criteria Under the DMA 2000*, July 11, 2002, FEMA
- *Mitigation Planning Workshop For Local Governments-Instructor Guide*, July 2002, FEMA
- *Report on Costs and Benefits of Natural Hazard Mitigation*, Document #294, FEMA
- *LHMP Development Guide – Appendix A - Resource, Document, and Tool List for Local Mitigation Planning*, December 2, 2003, Cal OES

Hazards U.S. – Multi-Hazard

HAZUS-MH uses Geographic Information System technology to produce detailed maps and analytical reports on physical damage to building stock, critical facilities, transportation systems, and utilities.

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.

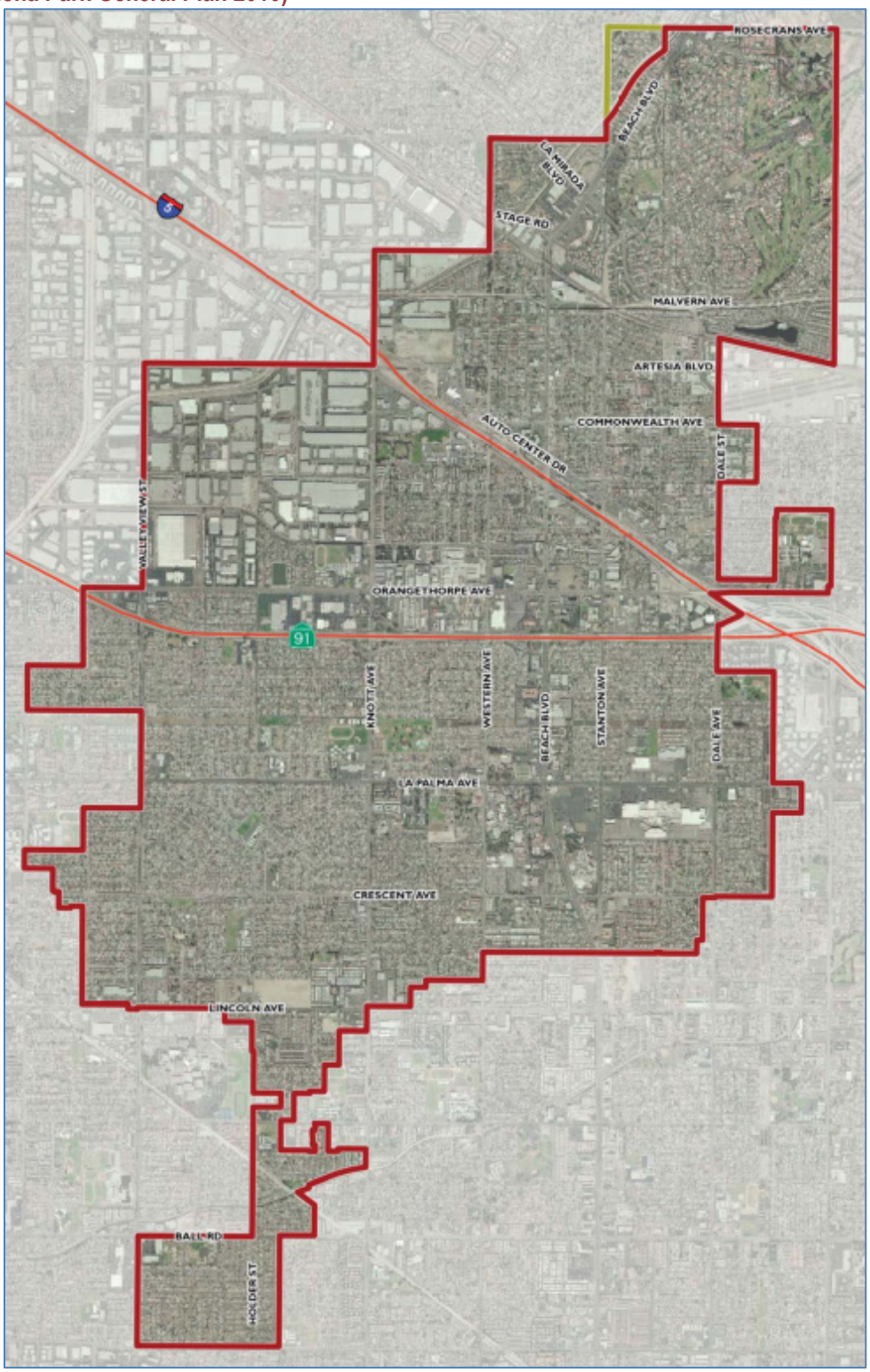
EPC used HAZUS to identify potential problem areas and guide further research into hazard effects. However, well-known quality deficits in both the standard datasets and the geotechnical modeling rendered the earthquake-related HAZUS results suspect, and they were not used for more detailed planning.

Who Does the Mitigation Plan Affect?

The Mitigation Plan affects the areas within the City of Buena Park boundaries and City-owned facilities and land. This Plan provides a framework for planning for natural, technological and human-caused hazards. The resources and background information in the Plan are applicable citywide and to City-owned facilities outside of the City boundaries. The goals and recommendations provide groundwork for local mitigation plans and partnerships. Figure 1 shows the City in context with its adjoining communities.

Figure 1. Buena Park's situation in Northern Orange County (Source: Google Maps)

Figure 2. Buena Park city boundary
(Source: Buena Park General Plan 2010)



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Section 2: Community Profile

Geography and the Environment

Figure 3. Buena Park City Hall
(Source: Buena Park General Plan)

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 Habra and La Mirada to the north.

History

Spanish explorers originally settled *ranchos* on land grants made by the King of Spain. 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 the City of Buena Park. The *rancho's* adobe headquarters lay on what is now Los Coyotes Country Club's golf course. The area transferred from Spanish to Mexican authority in 1822; Mexico ceded it to the United States in 1848 at the end of the Mexican-American War. California gained statehood in 1850.

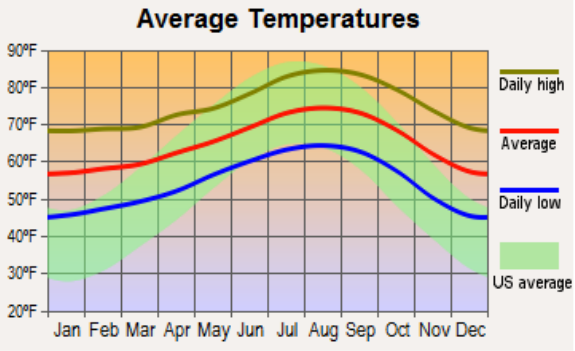
Figure 4. Emery Borrow Pit, Ralph Clark Regional Park
(Source: Buena Park General Plan)

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 County[7].

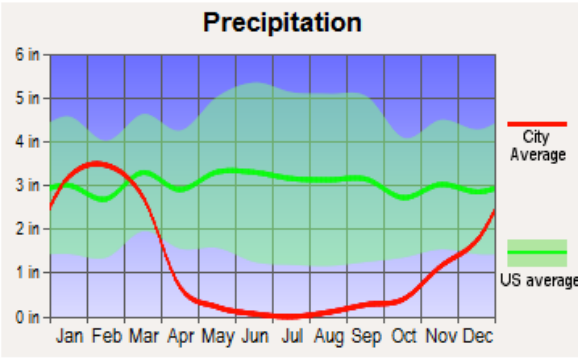
[7] Buena Park Historical Society.

Climate[8]

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 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.



(Source: www.City-Data.com)

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 might be characterized as feast or famine within a single year. Because the metropolitan basin is largely built out, water originating in higher-elevation communities can have a sudden impact on adjoining communities that have a lower elevation.

Climate Change

Climate change appears to be an ongoing fact of life, as 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 and bigger wildfires, 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 and longer heat waves, and decreased regional water supplies. This Plan discusses drought – one of the chief regional hazards of climate change – in *Section 7: Drought* (page 97).

However, specific data needed to assess risk, such as maps of extent and location and applied damage functions, are only slowly coming available for these climate effects, and the City is as yet unable 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.

[8] www.city-data.com

Population and Demographics

According to the 2015 estimates from the U.S. Census Bureau, the City of Buena Park has a residential population of about 83,270 in an area of 10.6 square miles. The population grew by 3.2% between 2010 and 2015 according to the 2015 estimates. Buena Park ranks as the 12th most populated city among the 34 cities that comprise Orange County. According to Southern California Association of Governments (SCAG) forecasts, the City's forecast 2035 population is 90,295 persons, representing an approximately 8.4 percent increase between 2015 and 2035.

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 (Source: 2010 U.S. Census)

Racial/Ethnic Group	Population (%)*
Non-Hispanic White	27.7
Hispanic	39.3
Asian	26.7
African American	3.8
American Indian/Alaska Native	1.1
Some Other Race	0.6

* Total can be greater than 100% because Hispanics may be counted in other races

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 2014-5 Fiscal Year, the City was awarded $720,654 in CDBG funds[9].

There is an increased concentration of resources and capital in the City. The best indicator of this fact is the increasing per capita personal income in the region since the 1970s. Per capita income is an estimate of total personal income divided by the total population. According to the 2014 U.S. Census American Community Survey, the City of Buena Park had a per capita income of $24,525.

[9] City of Buena Park 2014-2015 Consolidated Annual Performance Evaluation Report.

Table 2. City of Buena Park housing
(Source: 2010 Census)

	Number	Percent %
Housing Type:		
1-unit, detached	14,181	66.5%
1-unit, attached	1,911	7.9 %
Multi-Residential (20+ units)	6,376	26.3%
Mobile homes	291	1.2 %
Housing Statistics:		
Total Available Housing Units	24,623	100 %
Owner-Occupied Housing	13,428	56.7 %
Renter-Occupied	10,258	43.3 %
Vacant Housing units	937	3.8 %
Average Household Size:	3.37 persons	
Median Home Price:	$ 419,800	

This estimate can be used to compare economic areas as a whole, but it does not reflect how the income is distributed among residents of the area being examined. There are pockets of relative affluence in Buena Park; however, 9.9% of Buena Park's families live below the poverty line. The City's per capita personal income make it the sixth-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.
- The amount of property owned per capita increases over time for certain parts of the community, but not others.

Employment and Industry

Buena Park's principal employment and industrial activities are management/business/science/ art professions, sales and office, and service occupations. The City's business climate has been strong and growing, with concentrations in educational, health and social services, as well as management/administrative services and manufacturing. The City provided over 37,046 jobs in 2010, a 0.76% increase since 2000. Management/business/science/art occupations accounted for the largest percentage (31.0%), followed by sales and office (31.1%), and services (17.6%). the educational, health and social assistance industry is the largest of these fields at 18.7% of

the workforce. The City also had significant employment in production, transportation, and logistics operations (13.5%).

Businesses need to participate in and initiate onsite mitigation activities to ensure the safety and welfare of their workers and limit future damage to commercial infrastructure. Employees are highly mobile, commuting from surrounding areas to industrial and business centers. This creates a greater dependency on roads, communications, accessibility and emergency plans to reunite people with their families. Before a natural hazard event, large and small businesses can develop strategies to prepare for local hazards, respond efficiently, prevent loss of life and property, and ensure the survival of the businesses themselves.

Table 3. Buena Park industry segments
(Source: 2010 Census)

Industry	Number	Percent %
Civilian employed population	37,046	100.0 %
Agriculture, forestry, fishing and hunting, and mining	41	0.10%
Construction	2,100	5.7 %
Manufacturing	5,077	13.7 %
Wholesale trade	1.852	5.0 %
Retail trade	4,375	11.8 %
Transportation, warehousing, and utilities	2,208	6.0 %
Information	912	2.5 %
Finance and insurance, and real estate and rental and leasing	2,746	7.4 %
Professional, scientific, and management, and administrative and waste management services	3,644	9.8 %
Educational services, and health care and social assistance	6,940	18.7 %
Arts, entertainment, and recreation, and accommodation and food services	4,234	11.4 %
Other services, except public administration	1,746	4.7 %
Public administration	1,171	3.1 %

Table 4. Buena Park occupational distribution (Source: 2010 Census)

Occupation	Number	Percent
Civilian employed population (16 years and over)	37,046	100.0 %
Management, business, science, and arts occupations	11,617	31.4 %
Service occupations	6,536	17.6 %
Sales and office occupations	11,146	30.1 %
Natural resources, construction, and maintenance occupations	2,733	7.4 %
Production, transportation, and material moving occupations	5,014	13.5 %

Transportation and Commuting Patterns

Buena Park is approximately the 34th largest city in the Los Angeles Metropolitan Statistical Area (LAMSA). Over the past decade, the LAMSA experienced rapid growth in employment and population. There has been a steady increase in vehicle licensing levels within the City, as well as an increase in the vehicle miles traveled within City borders.

The City of Buena Park is well served by public transit systems. Local and regional bus service is provided by Orange County Transportation Authority (OCTA). Additionally, there is a Metrolink regional commuter rail line station located at Lakeknoll Drive and Dale Street in the northeast portion of the City.

Many City residents work outside the City. This may suggest that population growth is a more suburban phenomenon, where residents work in Buena Park but live in other communities.

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 at Whittier Boulevard 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-5[10].

[10] General Plan Economic Impact Report 2010.

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Part II: HAZARD ANALYSIS

Section 3: Risk Assessment

What is a Risk Assessment?

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

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

1) Hazard Identification

This level 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, tsunami, climate-related hazards, volcanoes, and other hazards.

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

The Planning Team identified the geographic extent of each of the 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 Hazard Mitigation Plan served as valuable resources. Using the Calculated Priority Risk Index (CPRI) ranking technique, the Planning Team concluded that four of the identified hazards posed a significant threat against the City: **earthquake, dam breach, flood, and drought**. Table 5 (page 32) describes the hazard-ranking system, while Table 6 (page 33) shows the rankings for the City.

Table 5. Calculated Priority Risk Index (Source: Federal Emergency Management Agency)

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%
	Possibly	Rare occurrences. Annual probability of between 1 in 100 years and 1 in 1,000 years.	2	
	Likely	Occasional occurrences with at least 2 or more documented historic events. Annual probability of between 1 in 10 years and 1 in 100 years.	3	
	Highly Likely	Frequent events with a well-documented history of occurrence. Annual probability of greater than 1 every year.	4	
Magnitude/ Severity	Negligible	Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure). Injuries or illnesses are treatable with first aid and there are no deaths. Negligible loss of quality of life. Critical public facilities shut down for less than 24 hours.	1	30%
	Limited	Slight property damage (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). Injuries or illnesses do not result in permanent disability, and there are no deaths. Moderate loss of quality of life. Critical public facilities shut down for more than 1 day and less than 1 week.	2	
	Critical	Moderate property damage (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). Injuries or illnesses result in permanent disability and at least 1 death. Critical public facilities shut down for more than 1 week and less than 1 month.	3	
	Catastrophic	Severe property damage (greater than 50% of critical and non-critical facilities and infrastructure). Injuries and illnesses result in permanent disability and multiple deaths. 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	
Duration	< 6 hours	Disaster event will last less than 6 hours.	1	10%
	< 24 hours	Disaster event will last less than 6-24 hours.	2	
	< 1 week	Disaster event will last between 24 hours and 1 week.	3	
	> 1 week	Disaster event will last more than 1 week.	4	

Table 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	3	*1.35*	4	*1.2*	4	*0.6*	4	*0.4*	**3.55**
Prado Dam Failure	2	*0.9*	4	*1.2*	3	*0.45*	4	*0.4*	**2.95**
Flood	3	*1.35*	2	*0.6*	1	*0.15*	4	*0.4*	**2.5**
Drought	3	*1.35*	1	*0.3*	1	*0.15*	4	*0.4*	**2.2**

2) Hazard Events Profiles

This process describes the causes and characteristics of each hazard and what part of the City's facilities, infrastructure, and environment may be vulnerable to each specific hazard. A profile of each hazard discussed in this plan is provided in the hazard-specific sections (Sections 4-7, starting on page 38). 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.

3) 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. The critical facilities are identified in Attachment A.

4) Risk Analysis

Estimating potential losses involves assessing the damage, injuries, and financial costs likely to be sustained in a geographic area over a given period of time. This level of analysis involves using mathematical models. The two measurable components of risk analysis are magnitude of the harm that may result and the likelihood of the harm occurring. Describing vulnerability in terms of dollar losses provides the community and the state with a common framework in which to measure the effects of hazards on assets. For each hazard where data was available, quantitative estimates for potential losses have been included in the hazard assessment. Data was not available to make vulnerability determinations in terms of dollar losses for all of the identified hazards. The Mitigation Actions Matrix (*Section 8: Mitigation Strategies*, page 107) includes an action item to conduct such an assessment in the future.

Table 7. Vulnerability: Location, extent, and probability for City of Buena Park[11,12][13]

Hazard	Location (Where)	Extent (How Big an Event)	Probability (How Often)[1]
Earthquake – Newport/Inglewood	Entire project area	SCEC in 2007 concluded that there is a 99.7% probability that an earthquake of M_w 6.7 or greater will hit California within 30 years.[2]	Moderate
Dam Failure – 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.	Moderate
Flood	4x 100-year floodplains in northern half of City; properties adjacent to flood-control channels	Up to 164 structures in the four 100-year floodplains could be damaged, plus an unknown number of properties adjacent to flood-control channels.	Moderate
Drought	Entire project area	Droughts of varying severity affect California regularly.	High

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

[2] Uniform California Earthquake Rupture Forecast

Source: Buena Park General Plan/EIR 2010

5) Vulnerability Assessment / Development Trends Analysis

This step provides a general description of City facilities and contents in relation to the identified hazards so that mitigation options can be considered in land-use planning and future land-use decisions. This Mitigation Plan provides an overview of the character of the City of Buena Park in *Section 2: 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 components of the City can help in identifying potential problem areas and can serve as a guide for incorporating the goals and ideas contained in this Plan into other community development plans.

[11] **ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B1**

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

[12] **ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2**

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

[13] **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))

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

Regardless of the data available for hazard assessments, there are numerous strategies the City can take to reduce risk. The Mitigation Actions Matrix (*Section 8: Mitigation Strategies*, page 107) 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.

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; and,
- hospitals.

Figure 5. Buena Park HS (Source: Buena Park General Plan)

Also, facilities that, if damaged, could cause serious secondary impacts are also considered critical. A hazardous materials facility is one example of this type of critical facility.

Essential facilities are those facilities that are vital to the continued delivery of key City services or that may significantly affect the City's ability to recover from the disaster. These facilities include but are not 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; and,
- 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 is not available to the public.

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 virtually built out. 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, including residential, industrial and commercial areas, as demonstrated in Figure 6 (page 37). This Plan is one of the City's most important tools in addressing environmental challenges, including transportation and air quality, growth management, conservation of natural resources, clean water, and open spaces.

The environment of most 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

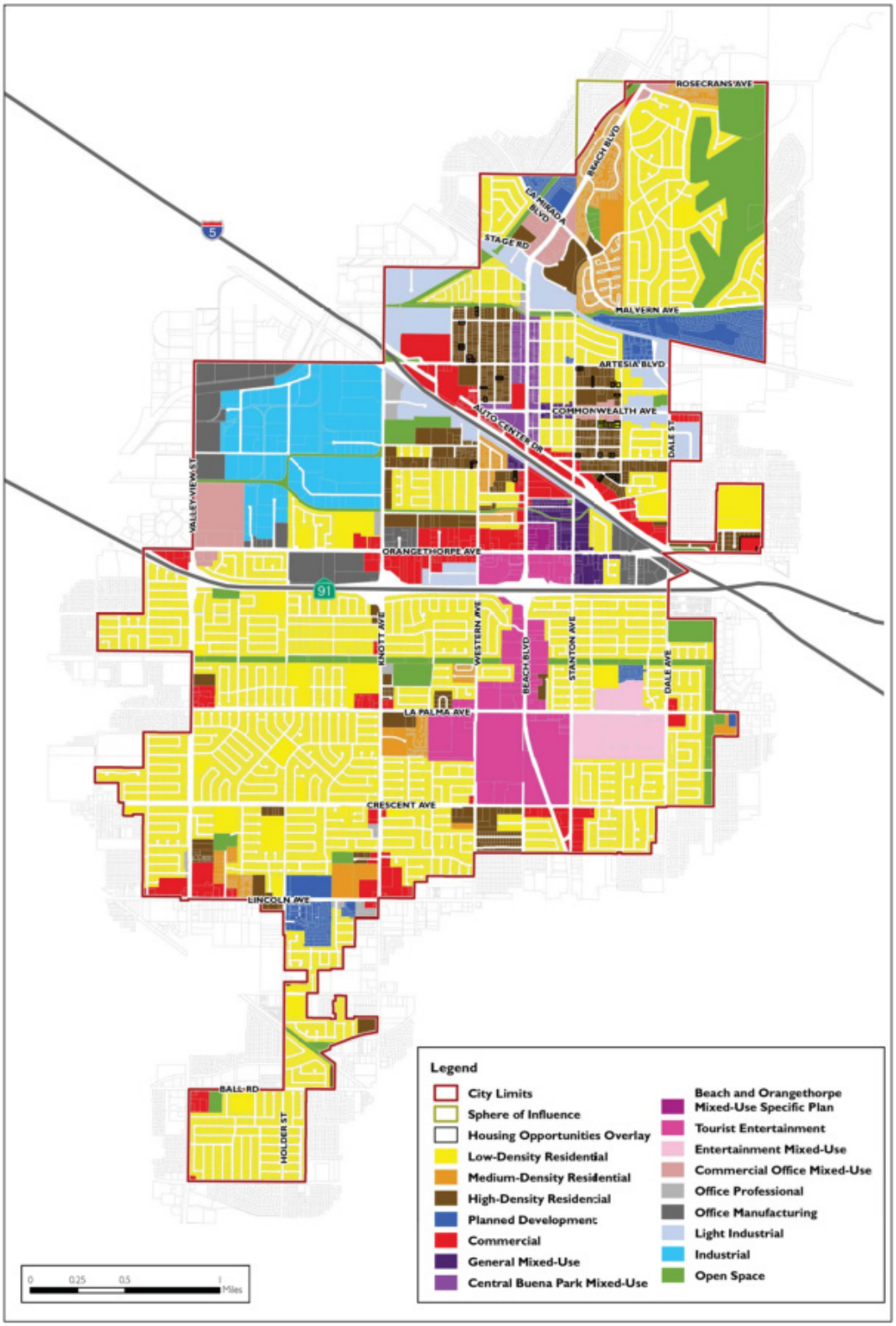
The City identifies key focus areas in which the majority of change and growth associated with the General Plan is anticipated to occur over an assumed 25-year period. They are:

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

Summary

Hazard mitigation strategies can reduce the impacts concentrated at 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 among the public and private sector to create mitigation plans and actions can reduce the impacts of hazards.

Figure 6. Land Use Plan Map
(Source: Buena Park General Plan 2010)



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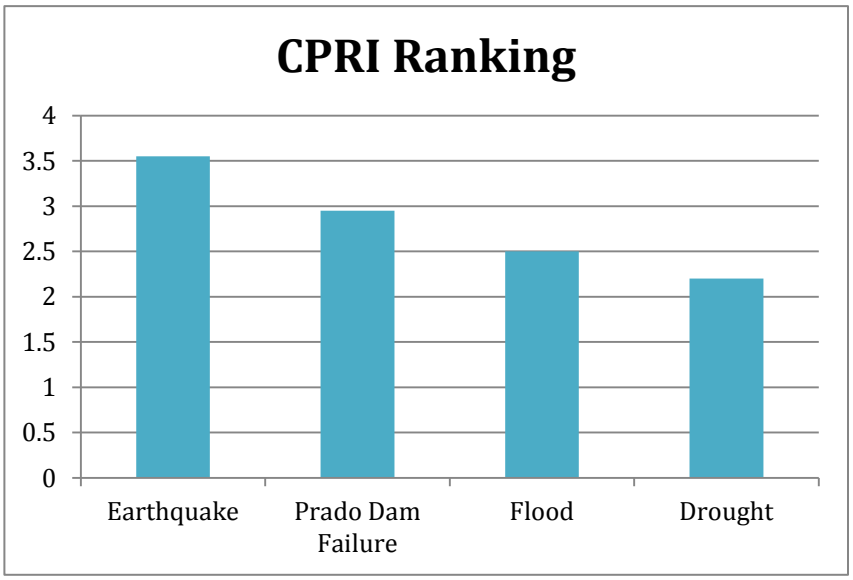
Section 4: Earthquake Hazards



Earthquake Characteristics

A recent Southern California Earthquake Center report (SCEC, 1995) indicated an 80-90% probability of an earthquake of Magnitude 7 or larger in Southern California before the year 2024. A significant earthquake along one of the major faults could cause substantial casualties, extensive damage to buildings, roads and bridges, fires, and other threats to life and property. The effects could be aggravated by aftershocks and by secondary effects such as fire, landslides and dam failure. A major earthquake could be catastrophic in its effect on the population, and could exceed the response capability of the local communities and even the state.

Extensive search-and-rescue operations may be required to assist trapped or injured persons following major earthquakes. Emergency medical care, food and temporary shelter would be required for injured or displaced persons. In the event of a truly catastrophic earthquake, identification and burial of the dead would pose difficult problems. Mass evacuation may be essential to save lives, particularly in areas below dams. Many families could be separated, particularly if the earthquake should occur during working hours, and a personal inquiry or locator system would be essential to maintain morale.

Emergency operations could be seriously hampered by the loss of communications and damage to transportation routes within, to, and from the disaster area and by the disruption of public utilities and services.

Extensive federal assistance could be required and could continue for an extended period. Efforts would be required to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities, and provide continuing care and welfare for the affected population, including temporary housing for displaced persons.

In general, the population is less at risk during non-work hours (if at home) as wood-frame structures are relatively less vulnerable to major structural damage than are typical commercial and industrial buildings. Transportation problems are intensified if an earthquake occurs during work hours, as significant numbers of employees would be stranded in place. An earthquake occurring during work hours would clearly create major transportation problems for those displaced workers.

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 can be felt far beyond the site of its occurrence. They usually occur without warning and, after just a few seconds, can cause massive damage and extensive casualties.

Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. Ground motion is the vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and 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 phenomena such as the severe damage the 1989 Loma Prieta Earthquake inflicted on San Francisco's Marina District, over sixty miles from the epicenter.

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.

One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. The acceleration due to gravity is often called "g". A ground motion with a peak ground acceleration of 100% g is very severe. Peak Ground Acceleration (PGA) is a measure of the strength of ground motion. PGA is used to project the risk of damage from future earthquakes by showing earthquake ground motions that have a specified probability (10%, 5%, or 2%) of being exceeded in 50 years. These ground motion values are used for reference in construction design for earthquake resistance. The ground motion values can also be used to assess relative hazard between sites when making economic and safety decisions.

Another tool used to describe earthquake intensity is the Moment Magnitude Scale (MMS). The Moment Magnitude Scale replaced the better-known Richter Scale among seismologists and was adopted as a standard by the U.S. Geological Survey (USGS) in January 2002. The two scales are similar but not exactly the same. The MMS is a means of rating earthquake strength and is an indirect measure of released seismic energy. The MMS is logarithmic, with each one-point increase corresponding to a 10-fold increase in the amplitude of the seismic shock waves generated by the earthquake. In terms of actual energy released, however, each one-point increase on the MMS corresponds to about a 32-fold increase in energy released. Therefore, a Magnitude 7 (M_w 7) earthquake generates seismic waves 100 times (10 X 10) larger than those of an M_w 5 earthquake and releases 1,024 times (32 X 32) the energy.

An earthquake generates different types of seismic shock waves that travel outward from the focus or point of rupture on a fault. Seismic waves that travel through the earth's crust are called *body waves* and are divided into primary (P) and secondary (S) waves. Because P waves move 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 magnitude for the earthquake.

The duration of an earthquake is related to its magnitude, but not in a perfectly strict sense. There are two ways to think about the duration of an earthquake: the first is the length of time it takes for the fault to rupture, and the second is the length of time shaking is felt at any given point. When someone says "I felt it shake for 10 seconds," they are 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 the amount of damage and perceived shaking.

Table 8. Modified Mercalli Intensity Scale (Source: USGS Earthquake Hazards Program)

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.
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.

MMI Value	Description of Shaking Severity	Summary Damage Description Used on 1995 Maps	Full Description
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.

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) that are based on proximity to known active faults and the potential for future earthquakes and intensity of seismic shaking. Seismic zones range from 0 to 4, with areas mapped as Zone 4 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 4[14].

Historical Earthquakes in Orange County

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 first 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 43) lists a number of damaging earthquake events that have affected Los Angeles and Orange counties.

Table 9. Earthquakes causing damage in Los Angeles or Orange Counties[15]

1769	Los Angeles Basin (M_w ~6.0)	1986	Oceanside (M_w 5.4)
1812	Wrightwood (M_w ~7.5)	1987	Whittier Narrows (M_w 5.9)
1857	Ft. Tejon (M_w ~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 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.

[14] www.seismic.ca.gov.

[15] http://www.scedc.caltech.edu.

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.

Previous Occurrences of Earthquakes in the City of Buena Park[16]

Although there are several active or potentially active faults near or in the City, Buena Park has not been severely impacted by an earthquake during its recorded history. However, it should be noted that the City's recorded history is fairly short. It's likely that the area has been involved in nearby earthquakes, but there were no residents present to be affected.

Earthquake Hazard Assessment

Hazard Identification

The 2007 Working Group on California Earthquake Probabilities (WGCEP 2007), a multi-disciplinary collaboration of scientists and engineers, has released the Uniform California Earthquake Rupture Forecast (UCERF), the first comprehensive framework for comparing earthquake possibilities throughout all of California. In developing the UCERF, the 2007 Working Group revised earlier forecasts for Southern California (WGCEP 1995) and the San Francisco Bay Area (WGCEP 2003) by incorporating new data on active faults and an improved scientific understanding of how faults rupture to produce large earthquakes. It extended the forecast across the entire state using a uniform methodology, allowing for the first time meaningful comparisons of earthquake probabilities in urbanized areas such as Los Angeles and San Francisco Bay Area, as well as comparisons among the large faults in different parts of the state. SCEC, USGS and the CGS jointly organized the study, which received major support from the California Earthquake Authority, which is responsible for setting earthquake insurance rates statewide. According to the new forecast, California has a 99.7% chance of having 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 46%.

Figure 7 (page 46) 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

16 **ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2**
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

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 of Buena Park has generally been spared a major destructive earthquake. However, based on a search of earthquake databases of the United States Geological Survey (USGS) National Earthquake Information Center (NEIC), several major earthquakes (M_w 6.0 or more) have been recorded within approximately 100 kilometers of the project area since 1769.

The City of Buena Park lies within a metropolitan area that has historically been seismically active. 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 that is likely to move within the next approximately 100 years. Active faults are the primary focus of concern in attempting to prevent earthquake hazards. A potentially active fault is one that has shifted but not in the recent geologic period (or, between 11,000 and 3,000,000 years ago) and is therefore 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 the community falls under the State Earthquake Fault Zoning Act and the State Hazards Mapping Act (SHMA). These Acts basically require that local governments, in the general plan update process, adopt policies and criteria to ensure the structural adequacy of buildings erected across active faults for human occupancy. In some cases, the development of structures must be prohibited. A 2004 update to the SHMA requires identification of areas of amplified ground shaking, liquefaction, or earthquake-induced landslides. The above Acts pertain to Buena Park[17].

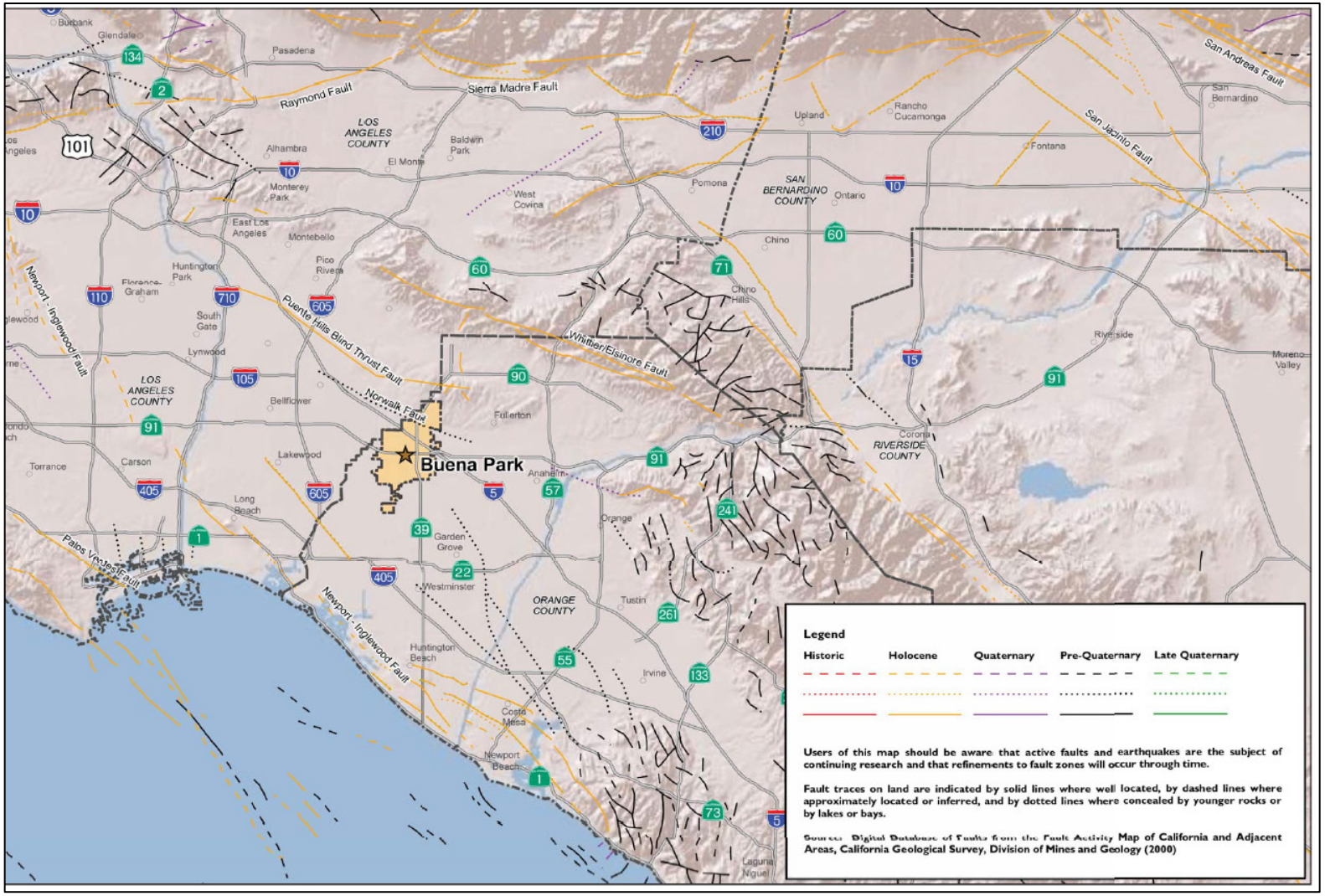
Buena Park faces limited threats from interior seismicity. However, earthquakes that could affect the City will most likely originate from regional faults that could potentially move and thus result in hazards to the community. Also, SHMA products indicate that the southern 80% of the City lies on soils 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 Whittier-Elsinore, Newport-Inglewood, Los Alamitos, San Gabriel and Raymond faults. A significant earthquake originating along any of these or other regional faults could cause damage to buildings and infrastructure as well as injuries and fatalities in Buena Park.

Figure 10 through Figure 13 (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.

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

Figure 7. Regional fault map
(Source: Buena Park General Plan 2010)



Impact of Earthquakes in the City of Buena Park[18]

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

- Injury and loss of life;
- Commercial and residential structural damage;
- Disruption of and damage to public 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, e.g., dust, asbestos, mold and mildew;
- Damage to roads and bridges, resulting in loss of mobility;
- Significant economic impact (lost jobs, sales, tax revenue) upon the community;
- Significant damage to the City's hospitality and entertainment industry, a major economic engine;
- Negative impact on commercial and residential property values; and,
- Significant disruption to residents and workers as relocations and temporary housing or business facilities would likely be needed.

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, business and the population 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 Cal OES. Support for damage control and disaster relief could be required from mutual aid partners, private organizations, and the state and federal governments.

Extensive search-and-rescue operations could be required to assist trapped persons. Mass evacuation could be essential to save lives, particularly in areas downwind from hazardous material releases. Injured and displaced persons will need emergency medical care, food, and temporary shelter.

Emergency operations could be seriously hampered by a loss of communications, damage to transportation routes, and/or disruption of public utilities and services.

[18] **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))

The economic impact on the City could be considerable 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 be facing 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.

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.

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. One of these modifications is *amplification*. Amplification increases the magnitude of the seismic waves generated by the earthquake. 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 state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Research and historical data indicate 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

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

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% g[19].

Buildings located on soils such as silt or sand may experience significant damage during an earthquake due to the instability of structural foundations caused by liquefying soil losing its weight-bearing capacity. 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 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 Creek[20]. Figure 8 (page 51) shows the results of these studies.

Fault Rupture

The potential for fault rupture in the City is considered low[21]. 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 42). 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, rock slides, soil lateral spreads, soil slumps, soil block slides, and soil avalanches. Areas having the potential for earthquake-induced landslides generally occur in areas of previous landslide movement, or where local topographic, geological, geotechnical, and subsurface water conditions indicate a potential for permanent ground displacements.

USGS maps potential landslide zones. Mapped potential earthquake-induced landslide zones are intended to 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

[19] USGS Earthquake Hazards Program.

[20] Buena Park General Plan 2010.

[21] Buena Park Environmental Impact Report 2010.

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 failure[22].

Structure Failure

Buena Park is fortunate that most of its buildings were built under 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, were built under 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:

- 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, which are known to be 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, the wholesale complete collapse of buildings is not likely to occur. Building damage is likely to be widespread but highly variable in its severity. However, partial to total collapse could occur among the very few remaining pre-1933 concrete block buildings. The City's 24 pre-1997 concrete tilt-ups are also at risk, based on evidence from the Loma Prieta and Northridge earthquakes. The majority of construction has followed modern building codes.

If current state-of-the-art seismic standards can be enforced for all future development, and if disaster preparedness is maintained, it is possible to survive the maximum expected earthquake with relatively moderate losses.

[22] Buena Park Environment Impact Report 2010.

Figure 8. Landslide and liquefaction potential (Source: Buena Park General Plan 2010)

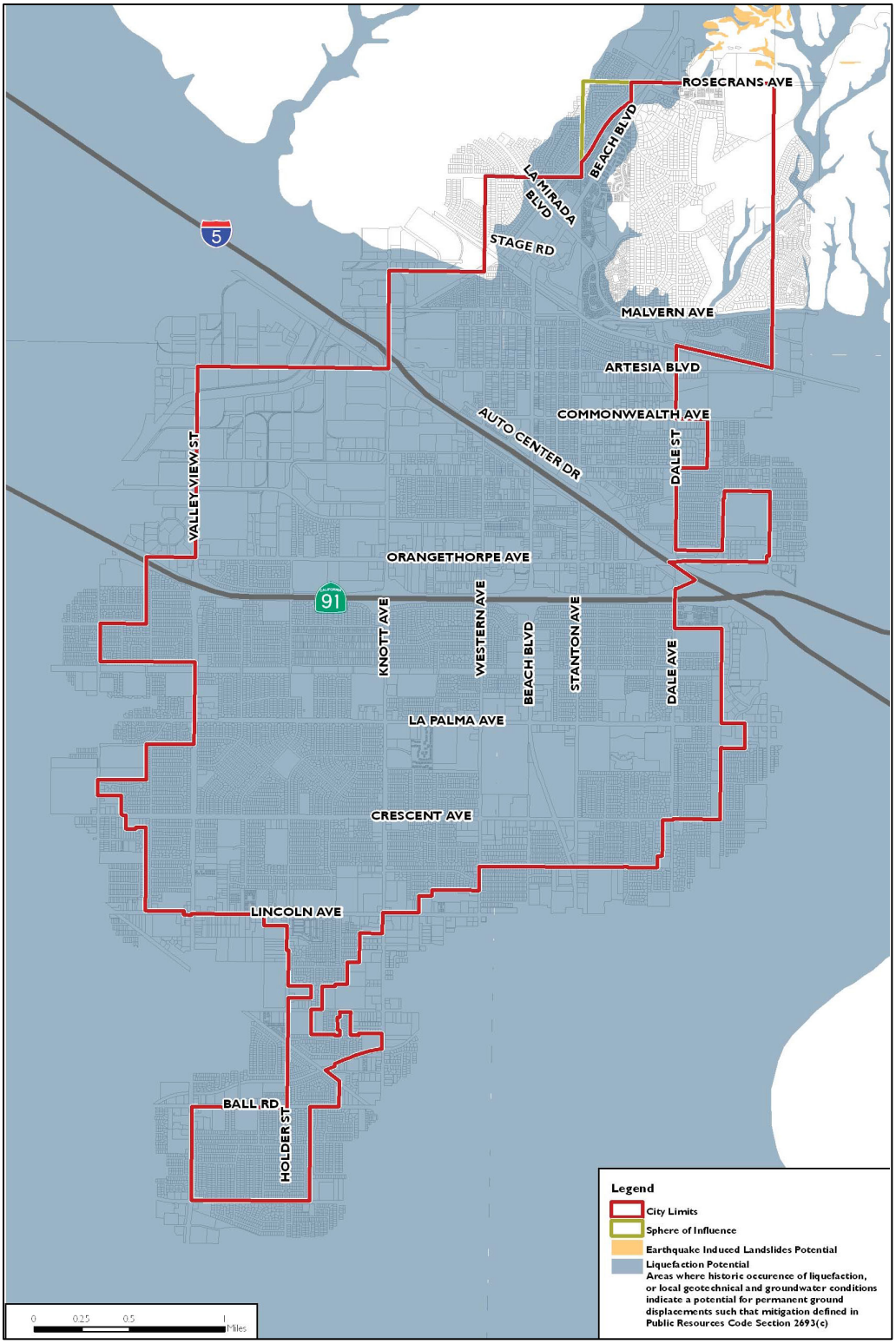
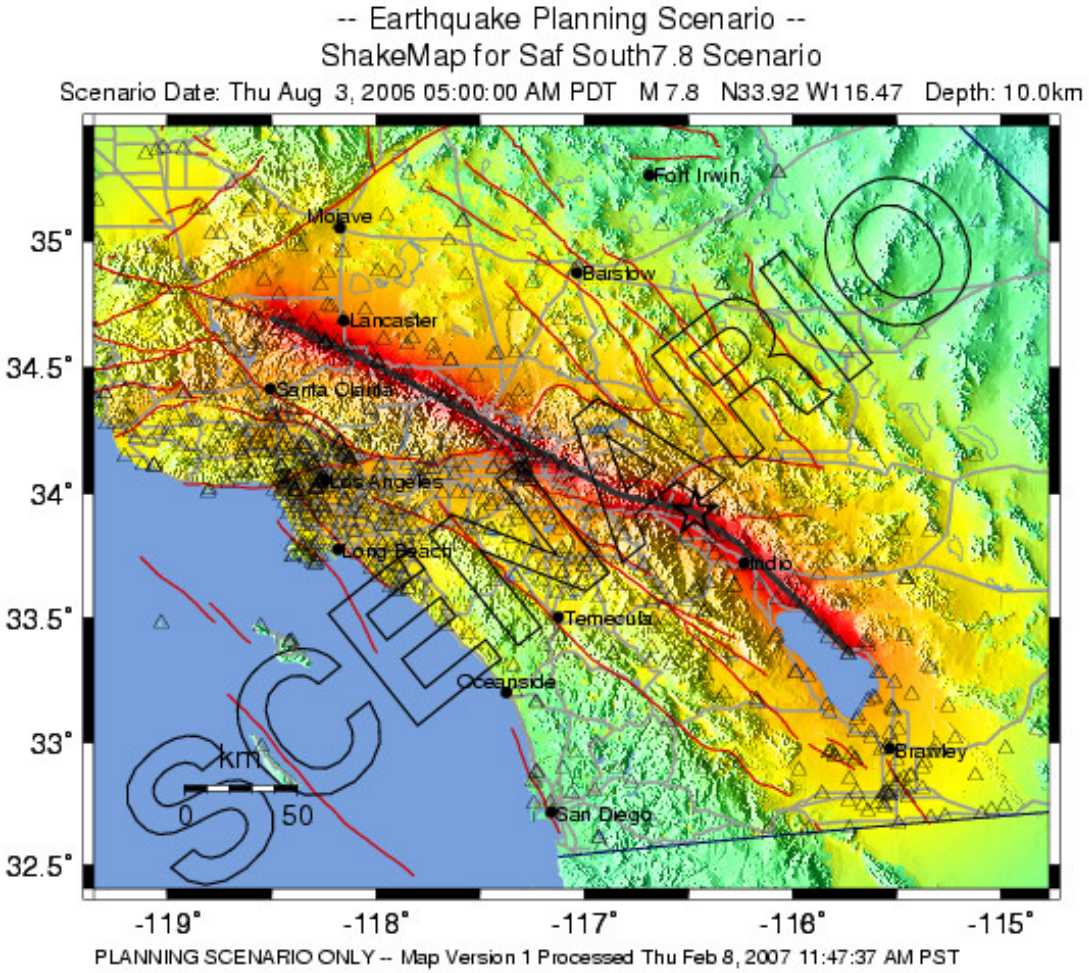


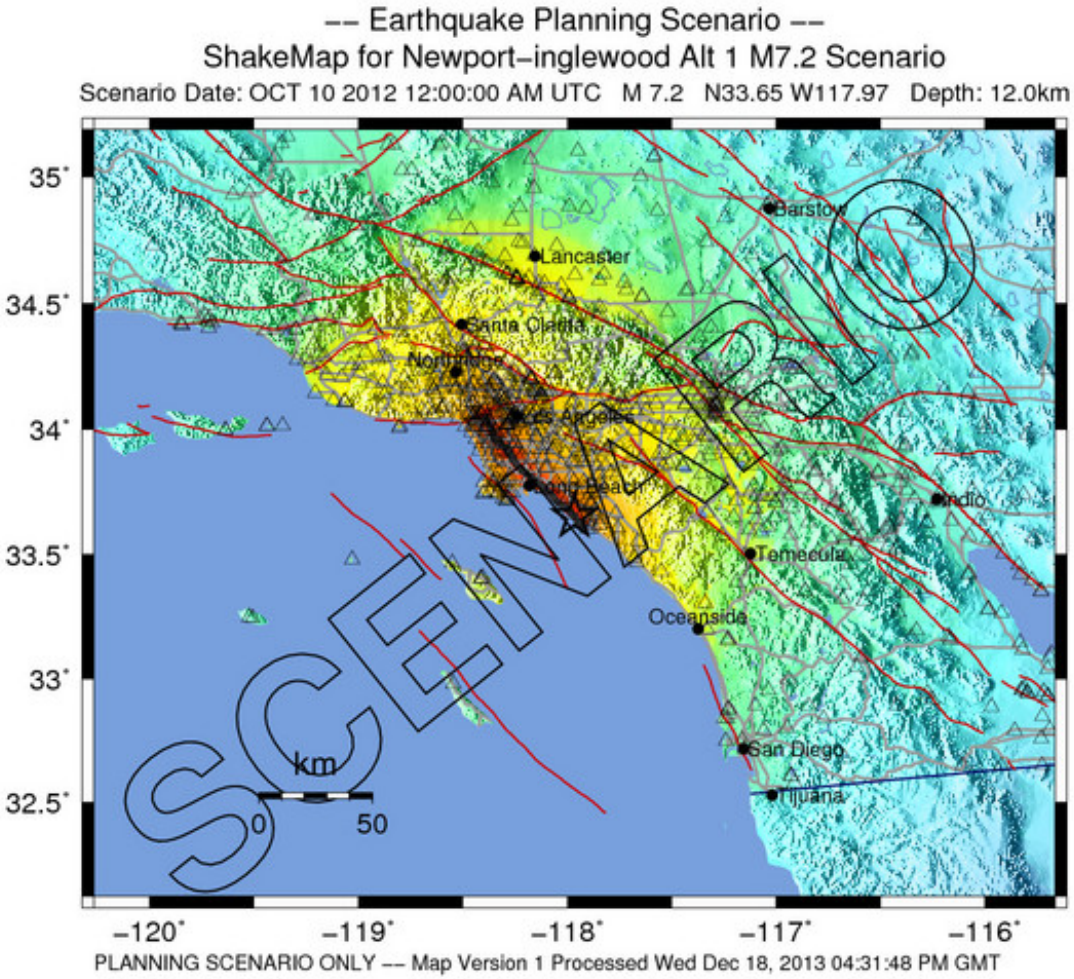
Figure 9. Orange County fault zones
(Source: County of Orange Hazard Mitigation Plan, 2010)

Figure 10. Seismic shaking intensities for the San Andreas Fault, Southern Segment, M7.8 (Source: USGS Earthquake Hazards Program)



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+

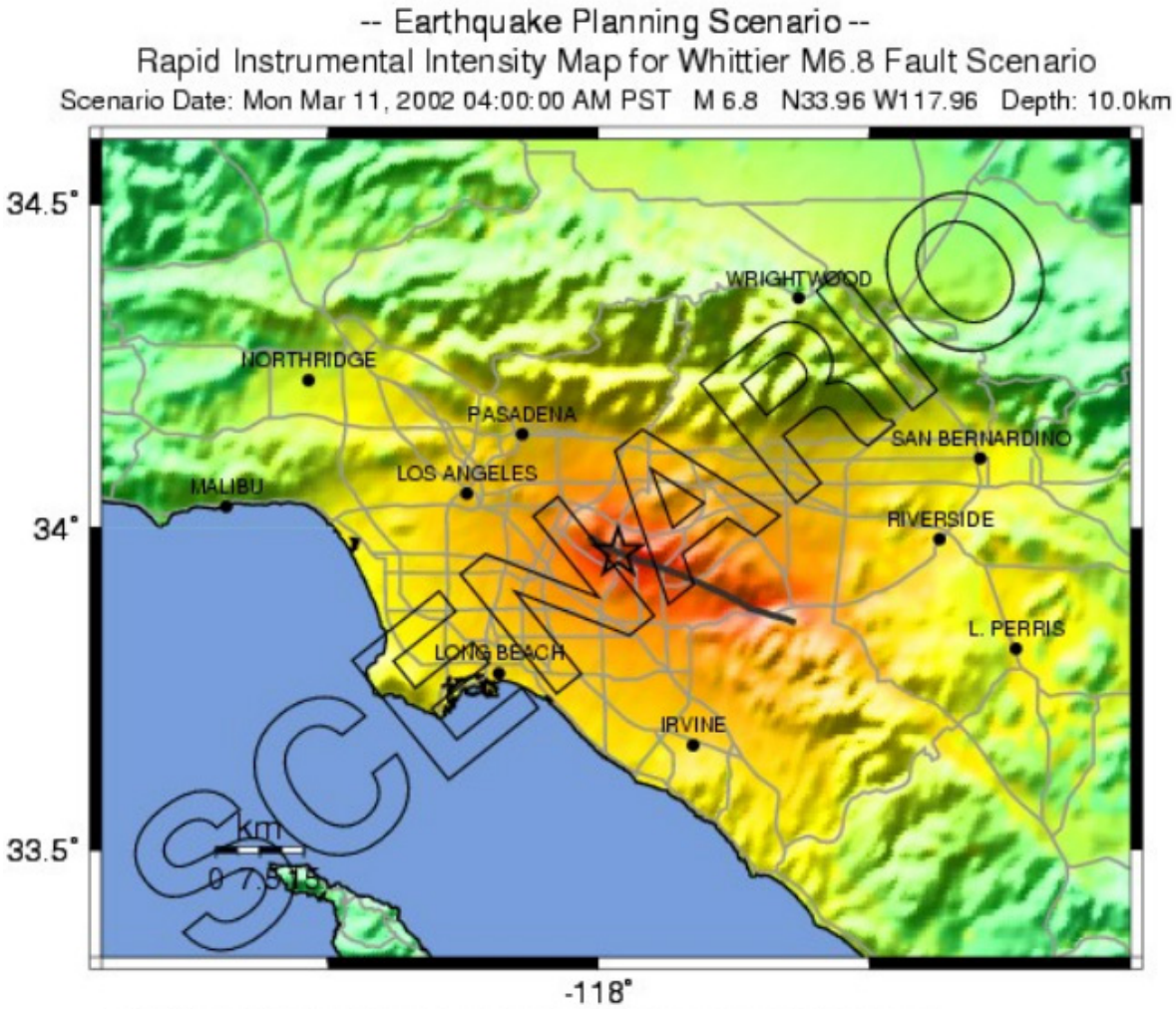
Figure 11. Seismic shaking intensities for the Newport-Inglewood Fault M7.2 (Source: USGS Earthquake Hazards Program)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<0.1*	*0.5*	*2.4*	*6.7*	*13*	24	44	83	>156
PEAK VEL.(cm/s)	<0.07	0.4	1.9	5.8	*11*	*22*	*43*	*83*	*>160*
INSTRUMENTAL INTENSITY	I	II–III	IV	V	VI	VII	VIII	IX	X+

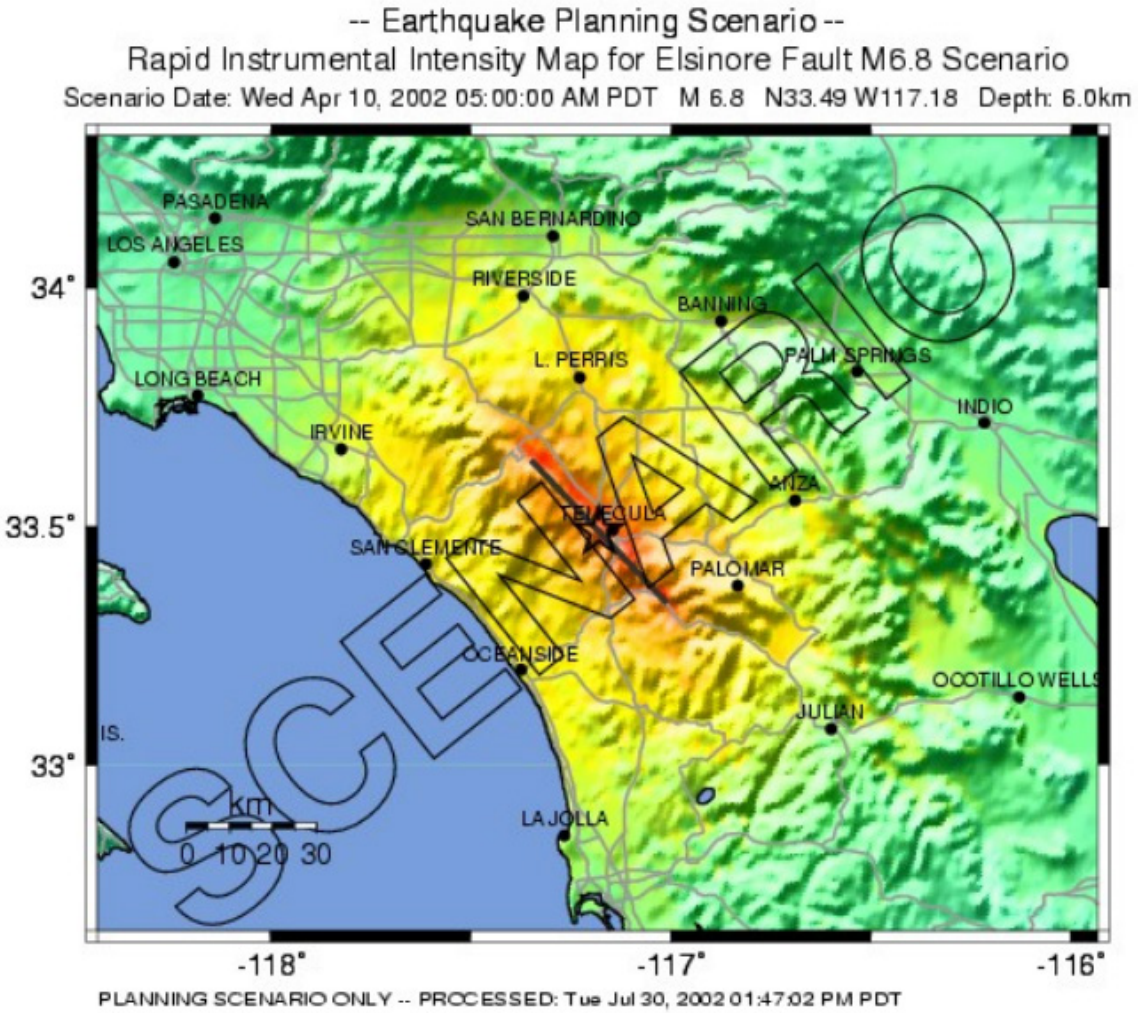
Scale based upon Wald, et al.; 1999

Figure 12. Seismic shaking intensities for the Whittier Fault M6.8 (Source: USGS Earthquake Hazards Program)



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+

Figure 13. Seismic shaking intensities for the Elsinore Fault M6.8 (Source: USGS Earthquake Hazards Program)



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+

Risk Analysis

Risk analysis is the third phase of a hazard assessment. Risk analysis involves estimating the damage and costs likely to be experienced in a geographic area over a period of time. Factors included in assessing earthquake risk include population and property distribution in the hazard area, the frequency of earthquake events, landslide susceptibility, buildings, infrastructure, and disaster preparedness of the region. This type of analysis can generate estimates of the damages to the region due to an earthquake event in a specific location.

Community Earthquake Issues

What is Susceptible to Earthquakes?

Earthquake damage occurs because humans have built structures that cannot 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 individuals 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, and the resultant flooding could cause widespread casualties and property damage[23].

Prado Dam in Corona is the largest reservoir within close proximity 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 were not as strict. In addition, retrofitting can be expensive and isn't required except under certain conditions. Therefore, the number of buildings at risk remains high. The California Seismic Safety Commission makes annual reports on the progress of retrofitting unreinforced masonry buildings[24].

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

[23] 2010 Orange County Hazard Mitigation Plan.

[24] Ibid.

  - There is a large but unquantified number of pre-1976 buildings in the City, primarily single-family houses and small businesses.
- Pre-1997 tilt-up structures
  - The City contains 24 pre-1997 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.
- Soft-story buildings
  - These buildings are known to 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.

Additional structures in Buena Park that are vulnerable to earthquake damage are unreinforced chimneys, and 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.

The potential for structural failure capable of injuring large numbers of people in a given area exists at Knott's Berry Farm, the Entertainment Zone, Buena Park Downtown, and several of the large businesses in the commercial area[25].

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.

- 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 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.

[25] 2007 Buena Park EOP.

- 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. Earthquake damage to the road and rail networks will hinder or prevent regular resupply of these 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 will lead 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 all of the City's 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 suppliers[26].

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; with even minor damages, some areas may become inaccessible. 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 bridges that are not retrofitted. The FHWA requires that bridges on the National Bridge Inventory be inspected every 2 years. Caltrans checks when the bridges are inspected because they administer 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.

[26] 2010 Orange County Hazard Mitigation Plan.

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 should not suffer catastrophic failures during design earthquakes; there's no guarantee that these facilities will still be usable following such an event. Also, all the City's major facilities are located in the mapped liquefaction zone, which suggests that they will 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 communities[27].

Businesses

Seismic activity can cause great loss to businesses, both large corporations and small retail shops. The economic loss can be tremendous when a company is forced to stop production for just a day, especially when its market is at a national or global level. Seismic activity can create economic loss that presents a burden to large and small shop owners who may have difficulty recovering from their losses.

Forty percent of businesses do not reopen after a disaster, and another twenty-five percent fail within one year[28]. Similar statistics from the United States Small Business Administration indicate that over ninety percent of small businesses fail within two years after being struck by a disaster.

Health Hazards

Death and injury can occur both inside and outside of buildings 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 has been shown to trigger heart attacks and other acute life-threatening ailments[29]. 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.

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, and smaller fires or problems receive little or insufficient resources in the initial hours after a major earthquake event.

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.

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[27] www.buenapark.com.

[28] Federal Emergency Management Agency.

[29] *European Heart Journal*, 24 Aug 2012.

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 involved[30].

Existing Mitigation Activities

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

City of Buena Park Codes

Implementation of earthquake mitigation policies most often takes place at the local government level. 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 and/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 2003, 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.

Businesses/Private Sector

The Institute of Business and Home Safety has developed *Open for Business*, a disaster planning toolkit, that helps guide businesses in preparing for and dealing with the adverse effects of natural hazards. The kit integrates protection from natural disasters into the company's risk reduction measures to safeguard employees, customers, and the investment itself. The guide helps businesses secure human and physical resources during disasters, and helps to develop strategies to maintain business continuity before, during, and after a disaster.

[30] *Disaster Debris Management – Planning Tools*, University of Central Florida, 1999.

Individual Preparedness

Because the potential for earthquake occurrences and earthquake-related property damage is relatively high in Orange County, increasing individual preparedness is a significant need. 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 continues to grow 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 62) offers a sampling of these laws.

Table 10. Sampling of earthquake laws in California (Source: http://www.leginfo.ca.gov/calaw.html)

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 8871-8871.5	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.
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.

Code Section	Description
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.

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.

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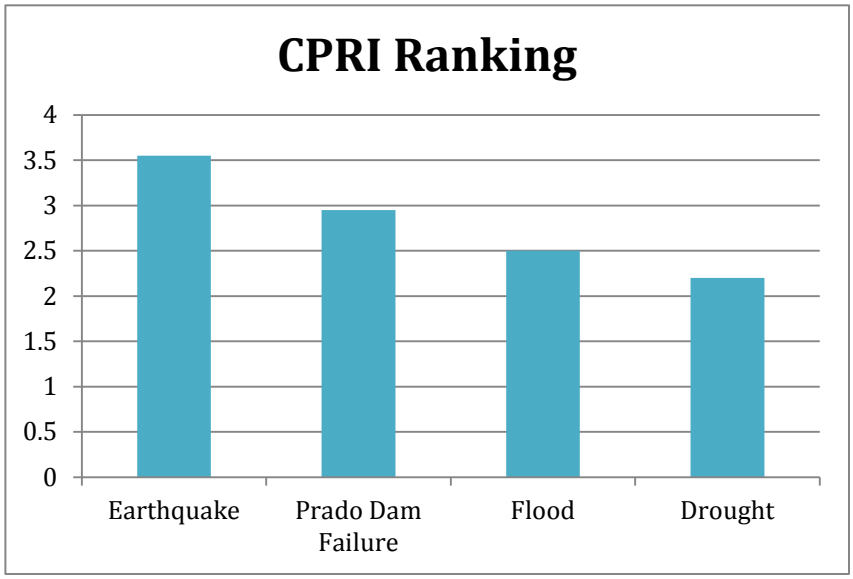
Section 5: Dam Failure Hazards



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.

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 11, page 66) are all earth-fill dams of various sizes. Earth-fill dams are the most common type of dam in the U.S.[31], but they are also vulnerable to a large number of failure modes, such as:

- **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 worldwide[32].
- **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, while 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

[31] U.S. Army Corps of Engineers, National Inventory of Dams.

[32] University of Catalonia-La Mancha. "How Dams Fail."

undermine the entire structure. This activity causes 20% of dam failures worldwide[33], such as the catastrophic 1976 Teton Dam collapse in Idaho.

- **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 man-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 11. Local dams posing the highest risk for Buena Park (Source: Orange County Operational Area Emergency Operations Plan)

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+

As dams grow older, they suffer more deterioration and require more maintenance. The average U.S. dam is 56 years old[34]; three of the four hazard dams listed in Table 11 are over 75 years old, and the youngest is exactly the average U.S. dam's age. 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 *Section 6: Flood Hazards* (page 77), 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 periods of time, sometimes from year to year. During dry years, both faces of earth-filled dams are exposed 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

[33] Ibid.

[34] Association of State Dam Safety Officials. "Living with Dams: Know Your Risks."

releases by the dam's operators revealed that both spillways were under-engineered, leading to their failure when stressed.

Local Seismicity

Section 4: Earthquake Hazards (page 39) discussed the seismic threat to Southern California in general and Buena Park in particular. Our landscape was formed by earthquakes, 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.

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 has not 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 hours[35]. 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.

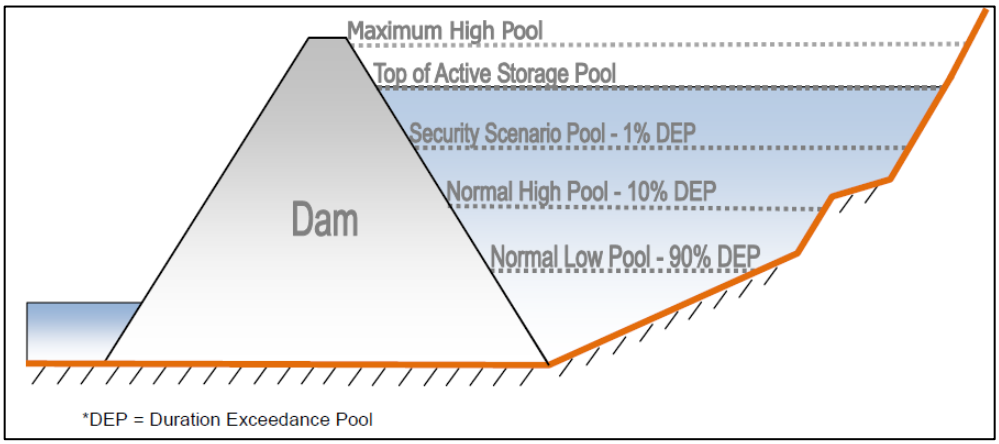
Dam flooding scenarios are based on varying water levels behind the dam; the higher the water, the more potentially destructive the flooding. Figure 14 (page 68) shows the relationship of the various model water levels used in developing flood scenarios.

- **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.

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

- **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 elevation that is usually exceeded 90% of the time. NHP and NLP don't normally lead to flooding scenarios[36].

Figure 14. 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, man-made 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.

[36] 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 attempt to follow existing topographical contours (natural or man-made), 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. See *Section 6: Flood Hazards* (page 83) for a more in-depth discussion of the NFIP and flood mapping.

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; a flash flood or dam-related inundation is governed more by physics than topography.

Historic Dam Failures in Southern California[37]

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 dam was poorly engineered and leaked from the moment the reservoir filled. In March 1928, the reservoir reached what would now be called 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 Valley[38].

The earth-fill Baldwin Hills Dam created a 250 million-gallon reservoir overlooking the Los Angeles neighborhood of Baldwin Hills. It was built on 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 release killed five people and destroyed 277 homes[39].

A M_w 6.7 earthquake struck the San Fernando Valley on February 9, 1971, killing 64 people and causing $553 million (1971 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 people[40].

Flood Hazard Assessment

Hazard Identification

Hazard identification is the first phase of a hazard assessment. Identification is the process of estimating: 1) the geographic extent of the floodplain (i.e., the area at risk from inundation); 2) the intensity of the flooding that can be expected in specific areas of the floodplain; and, 3) the probability of occurrence of inundation events. This process usually results in the creation of an inundation map.

Vulnerability Assessment

Vulnerability assessment is the second phase of an inundation-hazard assessment. It 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 assists in reducing risk and preventing loss from future events. Because the impact of a dam breach or

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[37] ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

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

[38] https://en.wikipedia.org/wiki/St._Francis_Dam.

[39] https://en.wikipedia.org/wiki/Baldwin_Hills_Dam_disaster.

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

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 is not straightforward. The amount of property in the zone, as well as the type and value of structures on those properties, should be calculated to provide a working estimate for potential inundation losses.

Risk Analysis

Risk analysis is the third and most advanced phase of a flood hazard assessment. It builds upon the hazard identification and vulnerability assessment. A risk analysis for the City should include two components: 1) the life and value of property that may incur losses from a dam-related inundation event (defined through the vulnerability assessment); and, 2) 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 that could be incurred should a dam failure occur. This Plan includes recommendations for building partnerships that will support the development of an inundation risk analysis in Buena Park.

The magnitude of a dam-related inundation is measured in terms of its peak discharge, which 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: Prado, Fullerton, Brea, and Carbon Canyon[41]. USACE owns and operates all four dams. Figure 15 (page 72) through Figure 18 (page 73) show the potential for inundation resulting from a failure in any of these four dams.

[41] Buena Park General Plan 2010.

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)

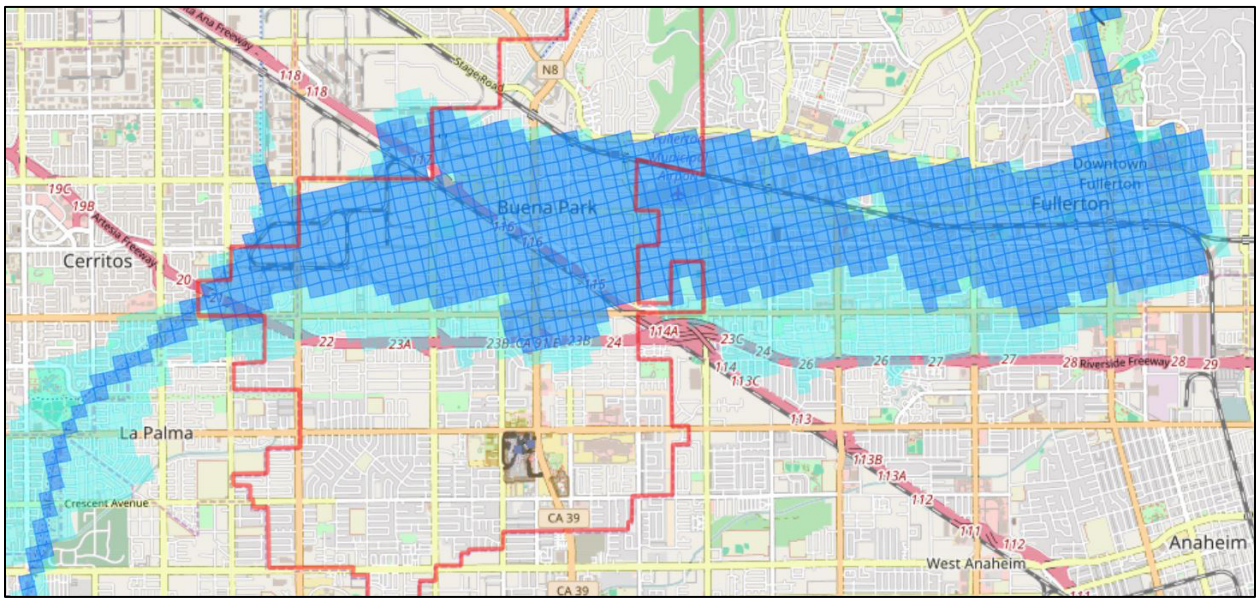


Figure 16. Carbon Canyon Dam MH and TAS inundation zones
(Source: U.S. Army Corps of Engineers)

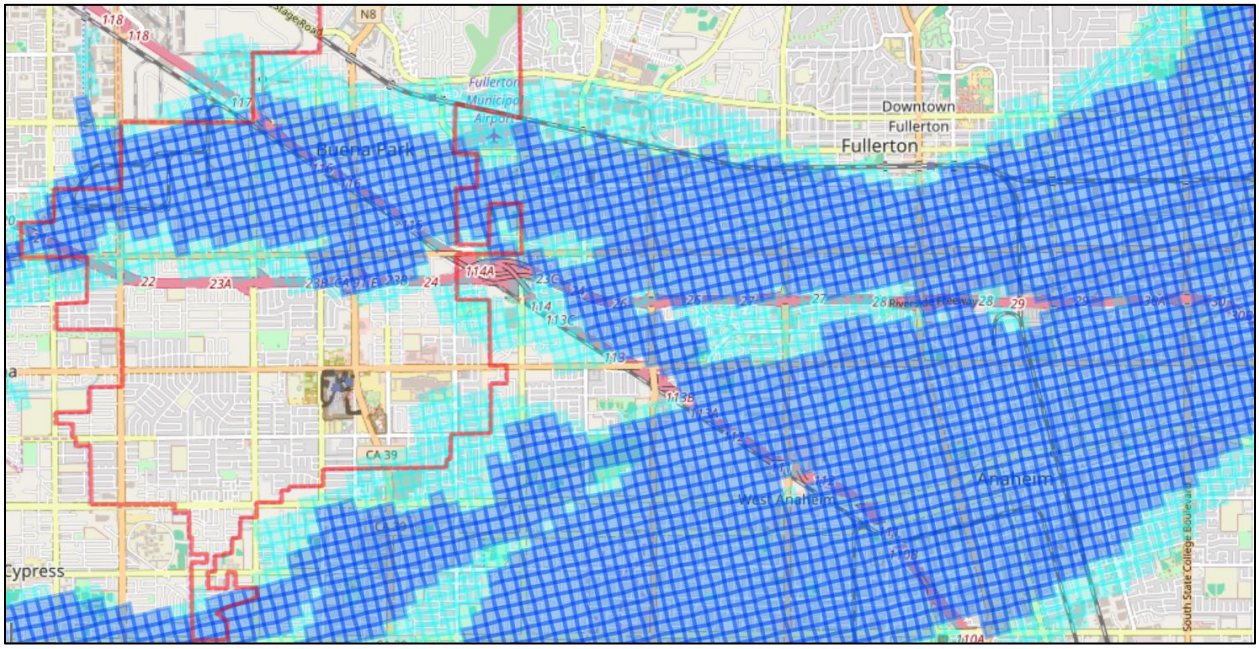


Figure 17. Fullerton Dam MH and TAS inundation zones
(Source: U.S. Army Corps of Engineers) (Light blue = Maximum High Pool; dark blue = Top of Active Storage)

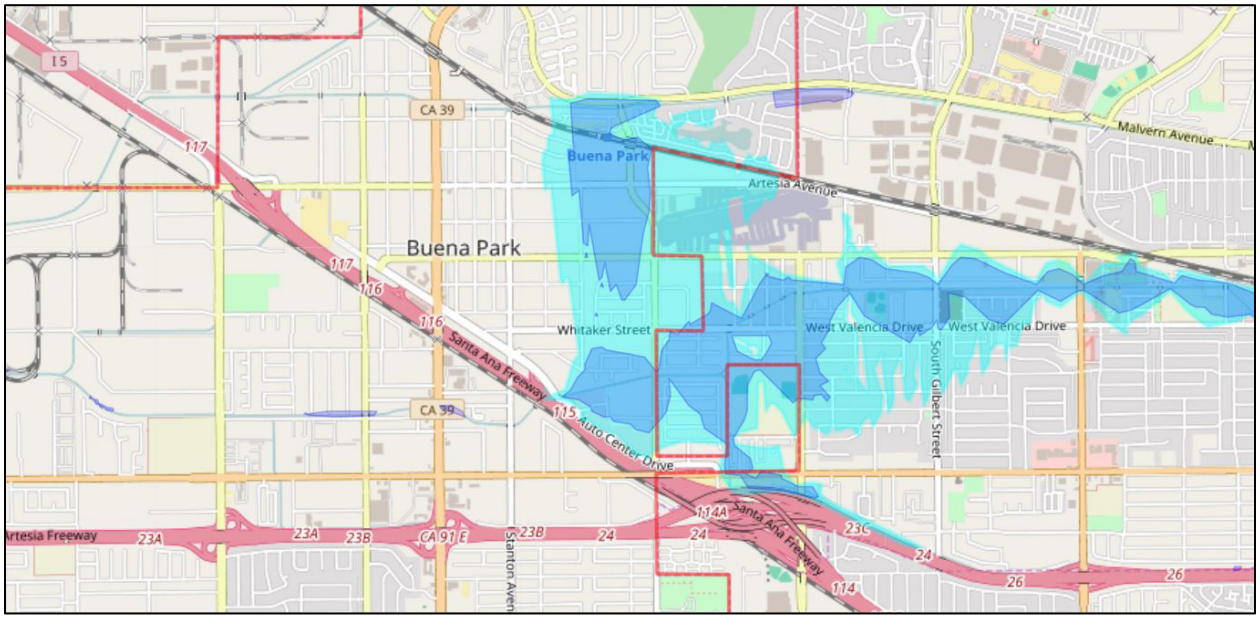
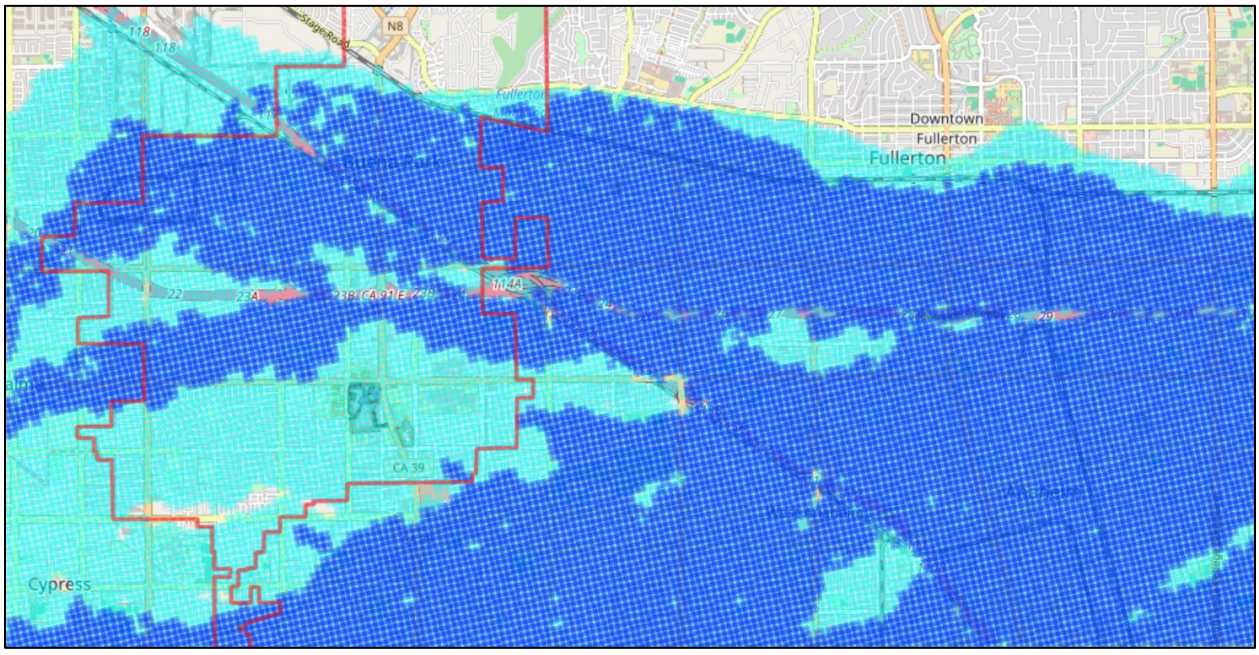


Figure 18. Prado Dam MH and TAS inundation zones
(Source: U.S. Army Corps of Engineers)



Impact of Dam Failure in Buena Park[42]

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 12 (page 74) shows how quickly floodwaters from a full breach of each dam will arrive in Buena Park.

Table 12. Floodwater Arrival Times for Dam Breach Scenarios
(Source: County of Orange & Orange County OA Hazard Mitigation Plan, 2015)

Dam	Location	Time of 1st 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

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.

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.

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[42] **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))

Roads and Bridges

Dependable road connections are critical for providing emergency services during any type of emergency or disaster. Road networks often traverse floodplain and floodway areas. Inundation events can block or damage roads with standing or moving water, or 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 because 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.[43]

The highest priority bridges in the City are currently mitigated to more fully 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 collect 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, bays and ocean. This includes pollutants like 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 out 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.

Water/Wastewater Treatment Facilities

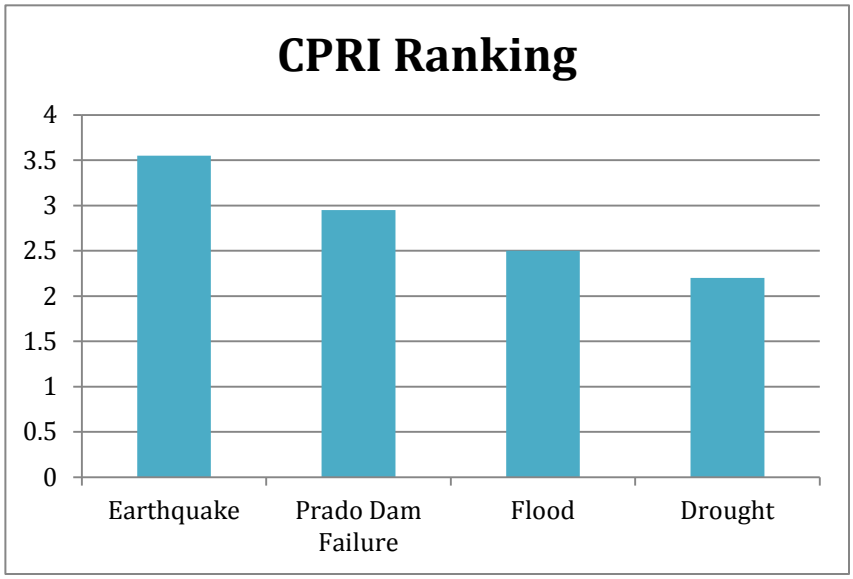
The City relies on two major water supply sources: imported water from the Municipal Water District of Orange County, and local groundwater from the Orange County Groundwater Basin (see Figure 26, page 95). Both wells and water distribution systems are vulnerable to floodwater infiltration and pollution, 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.

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

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 amount of time to fix will determine how long the City may have to do without the entire system.

Section 6: Flood Hazards



Flooding occurs when climate, geology, and hydrology combine to create conditions where water flows outside of its usual course.

Flood Risk Factors

Winter Rainfall

Orange County is a land of precipitation extremes. The average annual rainfall in Orange County has been 13.03 inches over the last 125 years; however, the term “average” means very little. The annual rainfall during this period has ranged from only 4.35 inches in 2001-2002 to 38.2 inches in 1883-1884.

Monsoons

Summer tropical storms are another relatively regular source for heavy rainfall, particularly in nearby mountains and foothills. These tropical storms usually coincide with El Niño years.

El Niño

El Niño is the warm phase of the El Niño Cyclic Oscillation (ENSO), a periodic warming of waters in the central and east-central Pacific that can cause significant disruption of the ocean-atmosphere system. Among the consequences: increased rainfall across the southern tier of the U.S. and the Pacific nations of northwest South America (which has caused destructive flooding), and drought in the West Pacific (sometimes associated with devastating wildfires in Australia). Meteorologists use satellite and surface observations of conditions in the tropical Pacific to predict short-term (a few months to one year) climate variations. La Niña, ENSO’s cooling phase, is the mirror-image of El Niño in both causative conditions and their consequences.

El Niño initially referred to a weak, warm current appearing annually around Christmas along the coast of Ecuador and Peru, lasting only a few weeks to a month or more. Every three to seven years, an El Niño event can last for many months, causing significant economic and atmospheric dislocations worldwide. Ten of these major El Niño events have occurred during the past forty years, the worst of which happened in 1997-1998. Before this event, the El Niño event in 1982-1983 was the strongest. Some El Niño events have persisted for more than a year.

Flood Terminology

Floodplain

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

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

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

Floodway

The floodway is one of two main sections that make up the floodplain. Unlike floodplains, floodways don't reflect a recognizable geologic feature. The National Flood Insurance Program (NFIP) defines *floodway* as the channel of a river or stream and the overbank areas adjacent to the channel. The floodway carries the bulk of the floodwater downstream; it's usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures that would obstruct or divert flood flows onto other properties. Figure 19 (page 79) shows the relationship of the floodplain and the floodway.

Flood Fringe

The flood fringe consists of lands outside the floodway that are at or below the Base Flood Elevation and that store, but do not effectively convey, floodwaters. In other words, both the floodway and flood fringe may be inundated, but the flood fringe does not have a significant current.

Base Flood Elevation (BFE)

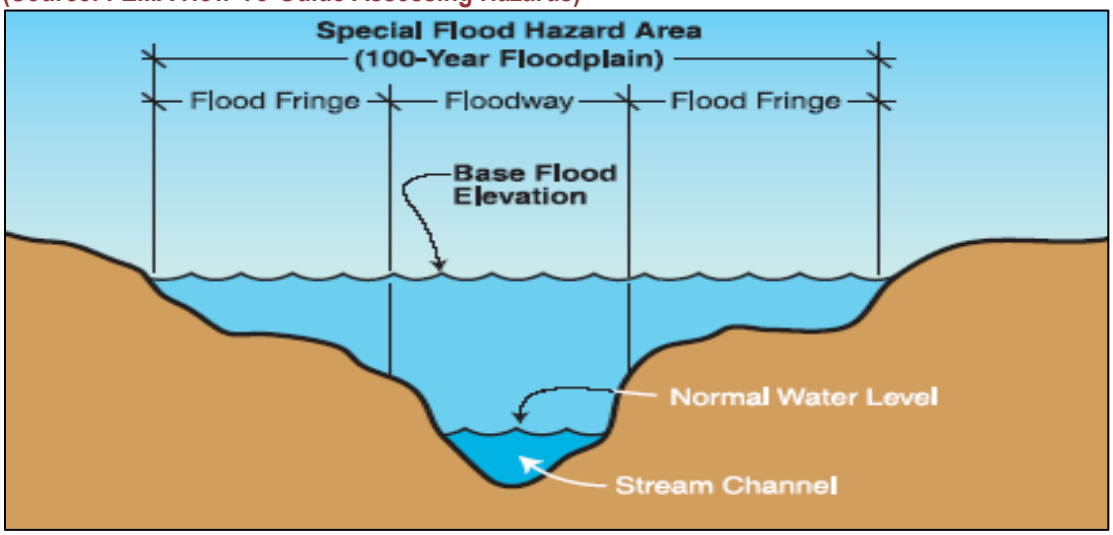
The term "Base Flood Elevation" refers to the elevation (normally measured in feet above sea level) that the base flood is expected to reach. Base flood elevations can be set at levels other than the 100-year flood. Some communities use higher-frequency flood events as their base flood elevations for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

Most of Buena Park lies within NFIP Flood Zones X and D (500-year floodplain). However, as shown in Figure 20 (page 81), certain isolated areas are in Flood Zone AE or AO (100-year floodplain).

100-Year Flood

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

Figure 19. Floodplain and Floodway
(Source: FEMA How-To-Guide Assessing Hazards)



Types of Flooding

Two types of flooding primarily affect the City of Buena Park: urban and riverine flooding.

- *Urban flooding* may follow a warning period of hours or days. Evacuation and sandbagging for urban floods have often effectively lessened flood-related damage.
- Conversely, *riverine flooding* is more difficult to prepare for, due to limited, if any, advance warning and preparation time and the variability of the conditions that lead to it.

Urban Flooding

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

Buena Park has a high concentration of impermeable surfaces that either collect water or concentrate the flow of water in unnatural channels. Streets can become swift-moving rivers during periods of urban flooding. Storm drains often back up with human-caused and vegetative debris, causing additional, localized flooding. The City has updated its drainage systems, and

while we anticipate that these systems will be fully functional in an emergency[44], the volume of rainfall, flowing water and debris may overwhelm them.

Riverine Flooding

Riverine flooding is the overbank flooding of rivers and streams. The natural processes of riverine flooding add sediment and nutrients to fertile floodplain areas. Flooding in large river systems typically results from large-scale weather systems that generate prolonged rainfall over a wide geographic area, causing flooding in hundreds of smaller streams, which then drain into the major rivers.

Shallow-area flooding is a special type of riverine flooding. FEMA defines *shallow flood hazards* as areas inundated by the 100-year flood to depths of only one to three feet, generally by low-velocity sheet flows of water.

Other than Coyote Creek, the City is sufficiently far from rivers and streams that traditional riverine flooding isn't a major threat. However, various storm channels maintained by OC Public Works cris-cross the City. Blockages or overcapacity can cause these channels to overflow their banks during periods of heavy rainfall, causing something very much like riverine flooding.

Severity

Floods threaten life and property. People and animals can drown; structures and their contents are destroyed; roads, bridges, and railroad tracks can be washed away; utilities are knocked out. Floods 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.

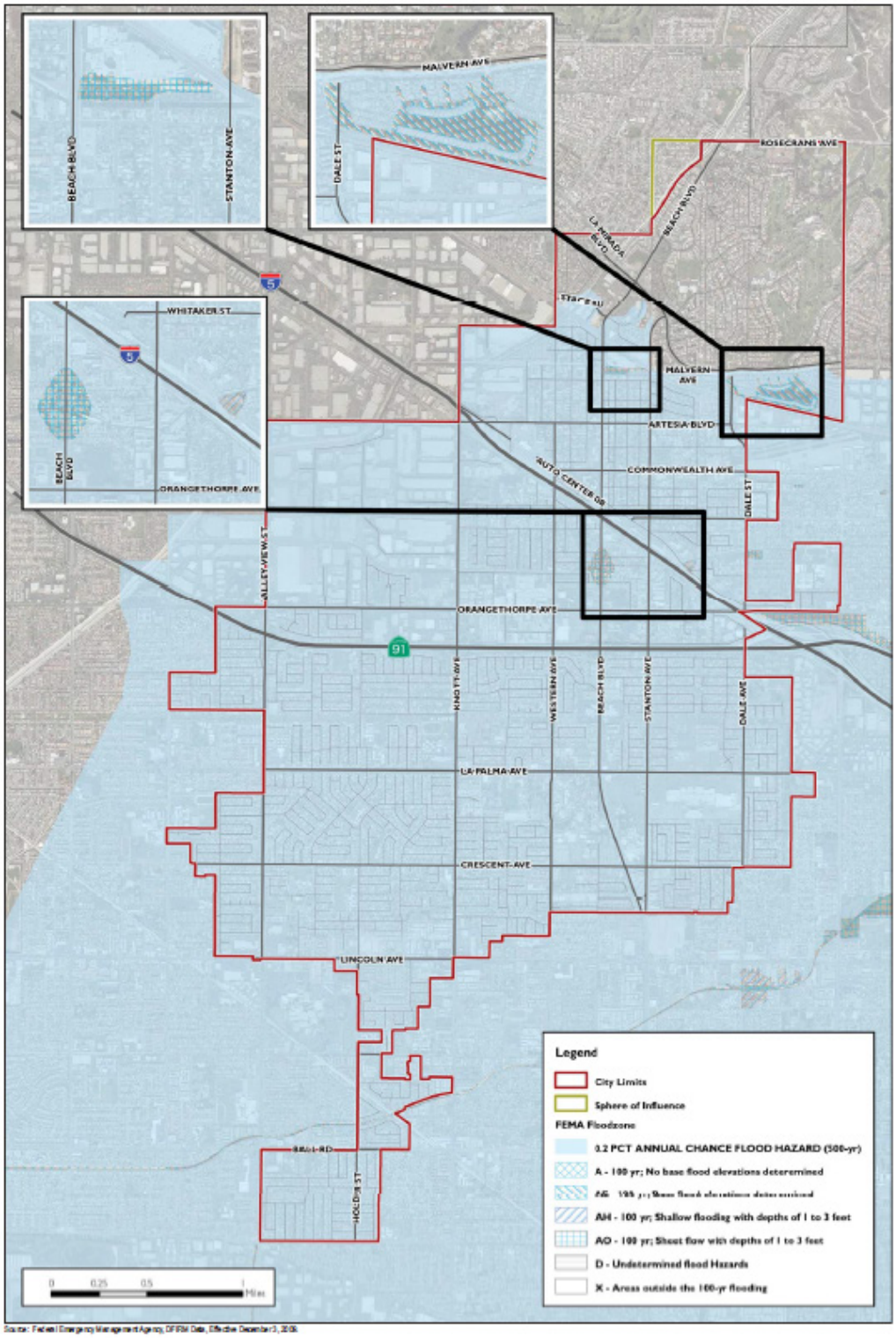
Geography and Geology

Southern California is the product of rainstorms and erosion occurring over millennia. Most of the mountains surrounding the valleys and coastal plain are deeply fractured faults. As the mountains grew taller, their brittle slopes eroded. Rivers and streams carried boulders, rocks, gravel, sand, and silt down these slopes to the valleys and coastal plain. Today, much of the coastal plain rests on the ancient rock debris and sediment washed down from the mountains.

This sediment can act like a sponge, absorbing vast quantities of rain in years when heavy rains follow a dry period. Like a sponge near saturation, the same soil fills up rapidly when heavy rain follows a period of relatively wet weather. Even so, flooding is minimal in some years of heavy rain because the ground is relatively dry, while the same amount of rain following a wet period causes extensive flooding.

[44] Buena Park General Plan 2010.

Figure 20. Buena Park Flood Zones AE and AO
(Source: City of Buena Park General Plan 2010)



Essentially all of northwest Orange County is built out, leaving little open land to absorb rainfall. Water rapidly accumulates on the surface because of the lack of open land. Flooding would occur more frequently if it were not for the area's massive flood-control system, with its concrete-lined rivers and streambeds. However, open land is rapidly disappearing. Higher-density infill building is becoming much more common in many areas. Developers tear down an older home – typically covering up to 40 percent of the lot – and replace it with three or four townhomes or apartments that cover 90-95 percent of the lot.

Another potential source of flooding is "asphalt creep". The street space between the curbs of a street is a part of the flood-control system. When water accumulates in the street, it's directed toward the underground portion of the flood-control system. The width of the street and the height of its curbs determines the carrying capacity of the street. A one- to two-inch layer of asphalt is often laid over the existing asphalt when streets are resurfaced. This added layer of asphalt subtracts from the rated capacity of the street to carry water. Over time, this marginally reduces the original engineered capacity of the entire storm-drain system. Subsequent repaving of the street will further reduce the engineered capacity.

What is the Effect of Development on Floods?

Water is displaced when structures or fill are placed in the floodway or floodplain. Development raises river levels by forcing rivers to compensate for the flow space obstructed by the inserted structures or fill. Adding structures or materials to the floodway or floodplain can cause serious problems if fill isn't removed to compensate. Floodwaters may be forced away from historic floodplain areas. As a result, other existing floodplain areas may experience floodwaters that rise above historic levels. Displacement of only a few inches of water can mean the difference between no structural damage occurring in a given flood event, and the inundation of many homes, businesses, and other facilities.

Cities should give serious attention to development that occurs within floodways to ensure that structures are prepared to withstand base flood events. In highly urbanized areas, increased paving can lead to an increase in runoff volume and velocity after heavy rainfall, exacerbating the potential flood hazards. Care should be taken in the development and implementation of storm-water management systems to ensure that these runoff waters are dealt with effectively.

What is the Effect of Climate Change on Floods?

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 flood risk may go down. In this scenario, there will be fewer rainstorms and less water flowing down storm control channels, so the chances are much smaller that overflows or excess water will gather in the City's 100-year floodplains.
- 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 more slow-rise and flash flooding in the area.

How are Flood-Prone Areas Identified?

Congress established the NFIP 1968 as a means of providing low-cost flood insurance to the nation's flood-prone communities. It uses Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FIS) to identify flood-prone areas. The NFIP also reduces flood losses through regulations that focus on building codes and sound floodplain management. NFIP regulations (44 CFR §60.3) require all new construction in floodplains to be elevated to or above base flood elevation.

FIRMs and FIS maps are the basis for implementing floodplain regulations and for delineating flood insurance purchase requirements. A FIRM is an official FEMA map that delineates Special Flood Hazard Areas (SFHAs) in communities where NFIP regulations apply. Insurance agents and mortgage lenders also use FIRMs to determine if flood insurance is required and what insurance rates should apply.

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 BFEs and areas located within the 500-year floodplain.

FIS and FIRMs produced for the NFIP provide assessments of the probability of flooding at a given location. FEMA conducted many Flood Insurance Studies in the late 1970s and early 1980s; however, FEMA has not mapped all 100-year or 500-year floodplains.

NFIP Participation[45]

The City participates in NFIP. Unfortunately, FEMA flood maps are not entirely accurate. These studies and maps represent flood risk at the time when FEMA completed the studies, and don't incorporate future planning for floodplain changes due to new development. Although FEMA is considering changing that policy, it's optional for local communities. The FEMA last updated the FIRMs for the City on December 3, 2009. Human-caused and natural changes to the environment have changed the dynamics of storm-water runoff since then. The FIRMs in Figure 21 through Figure 23 below (starting page 86) represent the current status of the FIRMs.

Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS) Floodplain maps are the basis for implementing floodplain regulations and for delineating flood insurance purchase requirements.

SFHAs are areas at or below a flood elevation that have a one percent or greater probability of being equaled or exceeded during any given year (also known as a 100-year flood event). This *base flood* is the national standard on which the floodplain management and insurance requirements of the NFIP are based.

45 **ELEMENT C. MITIGATION STRATEGY | 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))

Definitions of FEMA Flood Zone Designations

Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk. A community's FIRM depicts these zones. Each zone reflects the severity or type of flooding in the area.

Moderate- to Low-Risk Areas

In NFIP-participating communities, flood insurance is available to all property owners and renters in these zones:

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

High-Risk Areas

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

ZONE	DESCRIPTION
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new-format FIRMs instead of A1-A30 Zones.
A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from one to three feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from one to three feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.

ZONE	DESCRIPTION
AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
A99	Areas with a 1% annual chance of flooding that will be protected by a federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.

Undetermined Risk Areas

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

Figure 21. Flood Insurance Rate Map #1 (Source: FEMA, NFIP)

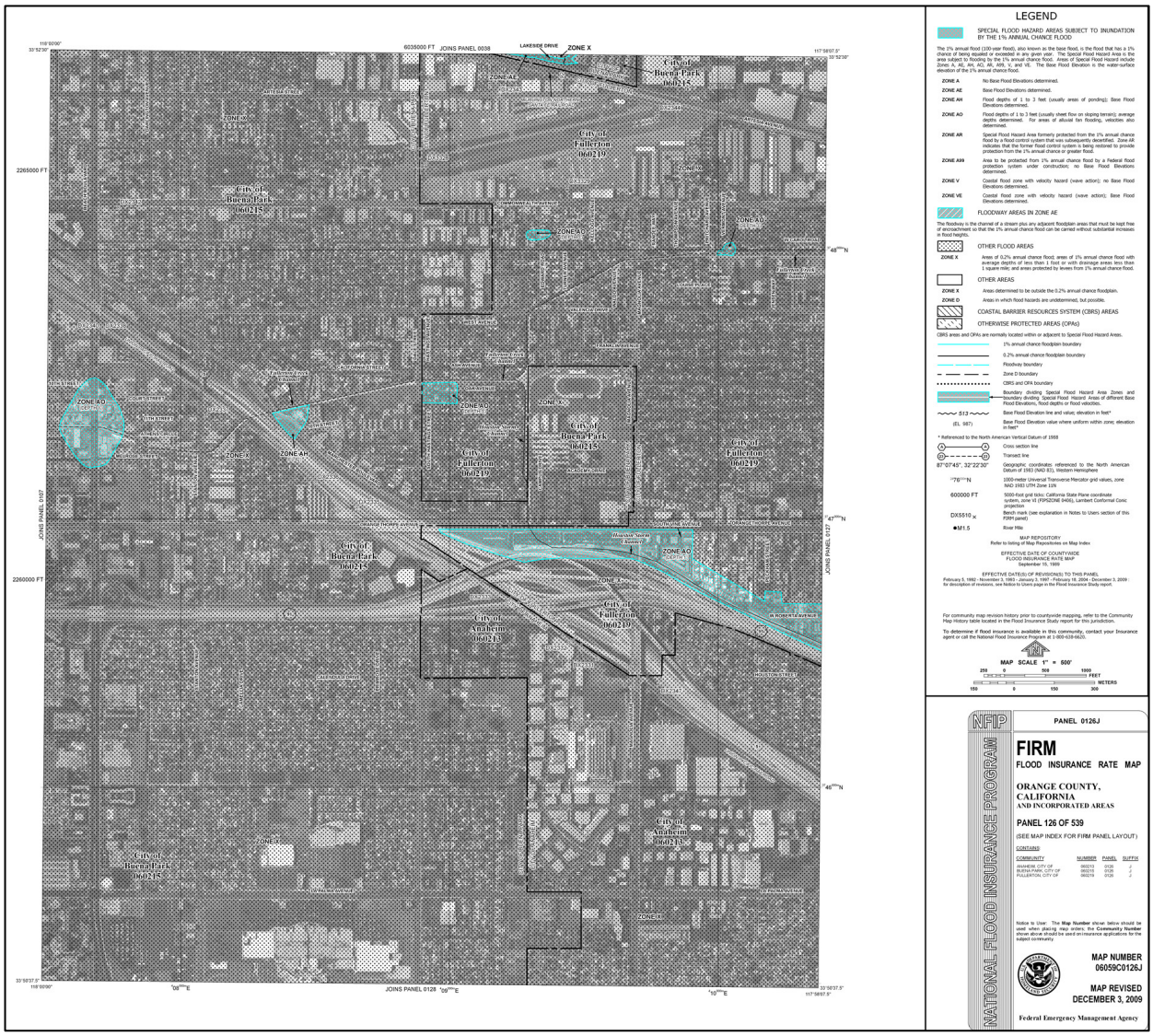


Figure 22. Flood Insurance Rate Map #2 (Source: FEMA, NFIP)

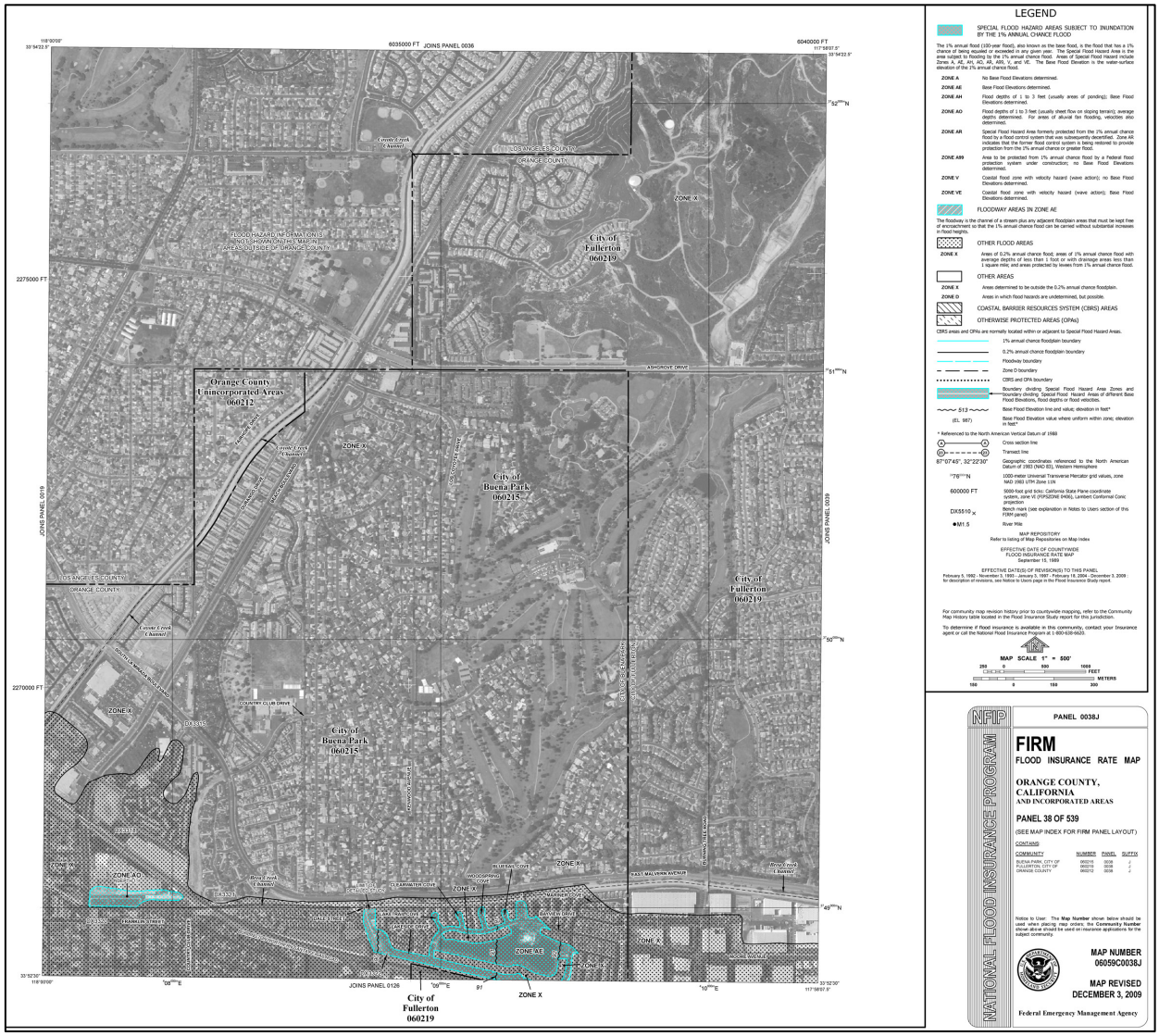
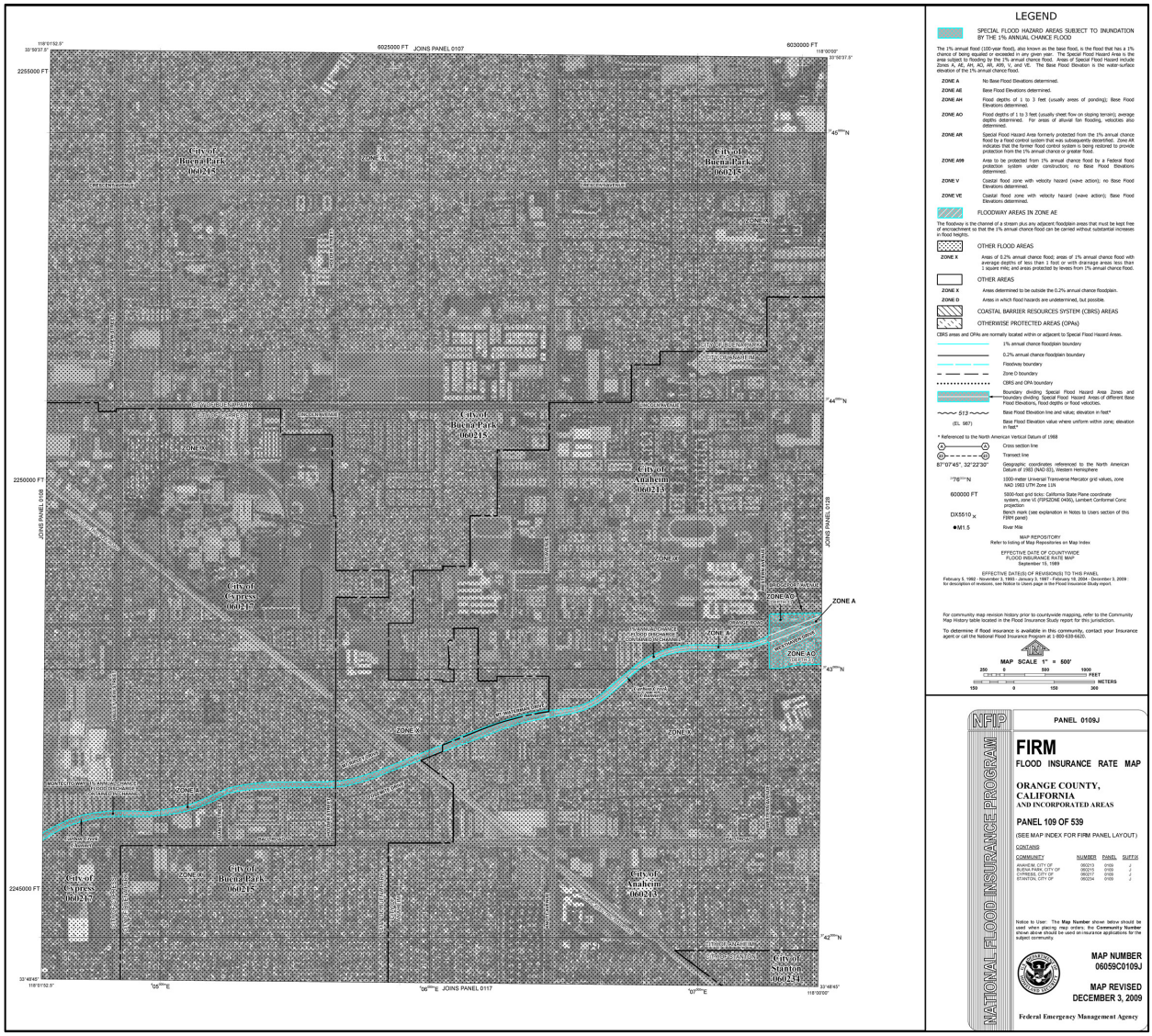


Figure 23. Flood Insurance Rate Map #3 (Source: FEMA, NFIP)



Flood-Mapping Methods and Techniques

Although many communities rely exclusively on FIRMs to characterize the risk of flooding in their area, some flood-prone areas aren't mapped but remain susceptible to flooding. These areas include locations next to small creeks, local drainage areas, and areas susceptible to manmade flooding.

Coordination between FEMA and local planning jurisdictions is the key to making a strong connection with GIS technology for the purpose of flood hazard mapping.

Communities find it particularly useful to overlay flood hazard areas on tax assessment parcel maps. This allows a community to evaluate the flood hazard risk for a specific parcel during review of a development request. Coordination between FEMA and local planning jurisdictions is the key to making a strong connection with GIS technology for the purpose of flood hazard mapping.

Historic Flooding in Southern California

Orange County lies next to Los Angeles, San Bernardino, Riverside, and San Diego counties. Heavy rain affecting any one of these counties can easily affect Orange County. In addition, the towering mountains trap east-moving winter storms and draw out the rain. The rainwater moves rapidly down the steep slopes and across the coastal plains on its way to the ocean. Orange County averages about thirteen inches of rain a year, yet some mountain peaks in the county receive more than forty inches of precipitation annually.

Naturally, this rainfall moves rapidly downstream, often with severe consequences for anything in its path. Flood-generated debris flows roar down canyons at speeds near 40 miles per hour, carrying with them walls of mud, debris, and water tens of feet high.

Residents reported damaging floods caused by the Santa Ana River, known as "Great Floods," as early as 1770. Father Juan Crespi, who accompanied the 1769 Portola expedition through then-Alta California, recorded a massive flood on January 7, 1770. Major floods on the Santa Ana River in Orange County have occurred in 1810, 1815, 1825, 1884, 1891, 1916, 1927, 1938, 1969, 1983, and 1993. The greatest flood in terms of water flow was in 1862, with an estimated flow rate of 317,000 cubic feet per second (cfs). This was three times greater than the Great Flood of 1938, estimated at 110,000 cfs. The most damaging flood in terms of cost was the Great Flood of 1969. The County's population had significantly increased by then, creating greater potential for loss[46].

Previous Occurrences of Flooding in the City of Buena Park[47]

The Santa Ana River, flowing through the heart of Orange County to the Pacific Ocean, is the county's greatest flood threat. Research of flooding in Orange County illustrates these flood hazard issues, citing loss of life as well as damage to personal and public property.

[46] Orange County Hazard Mitigation Plan 2010.

[47] **ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2**

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

One such flood occurred in March 1938, wiping out roads, bridges, and railroads near the river when an eight-foot wall of water swept out of the Santa Ana Canyon. Anaheim, Santa Ana, and Garden Grove were hardest hit. Over two feet of water hit Buena Park's nascent downtown (Figure 24). The flood caused eight fatalities and over $350,000 (1938 dollars) in damage, including severe damage to the roadways as well as to many homes and the Buena Park Colleges.

The 1938 flood and its damage were a catalyst for construction of Prado Dam, developed as part of USACE's flood-control protection plan. Government officials estimate that without the Prado Dam, a 1938-sized flood today would cause as many as 3,000 deaths and top $25 billion in damages. More than 110,000 acres would be flooded with three feet of water and 255,000 structures would be damaged[48].

Figure 24. Grand Av. & Manchester Blvd., Buena Park, March 1938

USACE also completed Upland's San Antonio Dam in 1956 in order to prevent the widespread flood damage that occurred throughout Riverside and Orange counties in previous years. This was part of an extensive project that saw flood-control channels run across much of northern Orange County.

This system was put to the test in January 1969. Mount Baldy received a record 50.85" of rainfall over ten days in that month. While Buena Park experienced some flooding (Figure 25), the damage was far less severe than in 1939.

Figure 25. Knott's Berry Farm, 1969

Since the flood-control improvements, the City's vulnerability to flooding stems mainly from the possibility of dam inundation, or urban flooding resulting from heavy, sustained rains. An example of the latter is the flooding that resulted from a series of severe rainstorms that dumped over a foot of rain on Buena Park during January 4-14, 1995. The Fullerton Creek flood-control channel overflowed, leading to the flooding of approximately seventy properties in and around the 100-year floodplain centered on Beach Boulevard north of Orangethorpe and $3 million in damage.

Perhaps because of the 1995 incident, a public survey released in August 2004 showed that Buena Park residents share statewide concerns about flood issues despite the protection that the four local dams offer.

[48] "1938 Flood: A Watershed for the County" by Scott Gold, in the October 3, 1999 *Los Angeles Times*.

Large winter storms can lead to localized flooding in the City, especially in its north-central portion. The majority of the City is located outside the 100-year base flood. However, certain portions of the City lie in Zone AO, identified as having a 100-year shallow flooding with average depths between one to three feet.

Flood Hazard Assessment

Hazard Identification

Hazard identification is the first phase of a hazard assessment. Identification is the process of estimating: 1) the geographic extent of the floodplain (i.e., the area at risk from flooding); 2) the expected intensity of the flooding in specific areas of the floodplain; and, 3) the probability of occurrence of flood events. This process usually results in the creation of a floodplain map. Floodplain maps provide detailed information that can assist jurisdictions in making policies and land-use decisions.

Vulnerability Assessment

Vulnerability assessment is the second phase of a flood-hazard assessment. It combines the floodplain boundary generated through hazard identification with an inventory of the property within the floodplain. Understanding the population and property exposed to hazards will assist in reducing risk and preventing loss from future events. Because site-specific inventory data and inundation levels given for a particular flood event (10-year, 25-year, 50-year, 100-year, and 500-year) are not readily available, calculating a community's vulnerability to flood events is not straightforward. The amount of property in the floodplain, as well as the type and value of structures on those properties, should be calculated to provide a working estimate for potential flood losses.

Risk Analysis

Risk analysis is the third and most advanced phase of a flood hazard assessment. It builds upon the hazard identification and vulnerability assessment. A flood-risk analysis for the City should include two components: 1) the life and value of property that may incur losses from a flood event (defined through the vulnerability assessment); and, 2) the number and type of flood 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 flood events.

Local Conditions

Floodplain and inundation maps identify the areas in Buena Park that are more likely to be flooded. It's also possible to pinpoint the effects of certain flood events on individual properties. Data was insufficient to conduct a full risk analysis for flood events in Buena Park at the time of publication of this Plan. Insurance estimates for City-owned property give insight into the potential costs that could be incurred should severe flooding occur. This Plan includes recommendations for building partnerships that will support the development of a flood risk analysis in Buena Park.

The size and frequency of a flood in a particular area depends on a complex combination of conditions, including the amount, intensity, and distribution of rainfall, previous moisture condition, and drainage patterns. The magnitude of a flood is measured in terms of its peak discharge, which 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).

According to FEMA, most of the City's developed area south of Malvern Avenue is in Flood Zone X. This means the area is not located within a 100-year floodplain, but *is* within the 500-year floodplain.

There are no repetitive-loss properties in Buena Park as defined by the NFIP.[49] FIRMs showing areas that require flood insurance are available at City Hall.

Impact of Flooding in Buena Park[50]

Floods and their impacts vary by location and the severity of any given flood event, and likely only affect certain areas of the county during specific times. Based on the risk assessment, the likeliest scenario the City needs to address is urban flooding leading to sheet flows in the City's four 100-year floodplains (Figure 20, page 81).

Property Loss Resulting from Flooding Events

The type of property damage caused by flood 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.

In the urban flooding scenario, damage is likely to be localized and, while significant to the people directly involved, moderate as far as its overall impact on the City. Approximately 164 privately owned parcels (142 residential, 22 commercial) are exposed to flooding risks in the City's 100-year floodplains, for a total exposure of $40.4 million in land value and $79 million in improvements.

Because of the nature of this particular flood hazard, it's unlikely any of the improvements on these parcels would be destroyed; rather, the losses would consist of standing-water damage to or contamination of structures, personal property, vehicles, inventory and fixtures. Using the 2011-15 average flood insurance claim amount of $43,000 for residential losses and $90,000 for

[49] **ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | 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))

[50] **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))

commercial losses[51], the potential insured property loss is approximately $8 million. This does not include damage to vehicles, landscaping, public roads or infrastructure, utilities, or loss of business.

Since these losses would be confined to relatively small, separated pockets, the overall direct loss to the City's economy would be similarly small. City government expenses would rise because of cleanup and repairs to public facilities and infrastructure.

Business/Industry

Flood events affect businesses by damaging property and by interrupting normal commerce. Flood 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 flood events can help a community maintain economic vitality in the face of flood damage.

The 22 commercial properties mentioned above are likely to suffer losses not only from cleanup and refurbishment, but also from business interruption expenses (loss of revenue, inventory replacement, and so on). How fast these businesses can reopen will be determined mostly by the speed with which their landlords complete cleanup and repairs, not by availability of materials or labor. This in turn will depend on how quickly the landlords' insurance companies complete their inspections and settle on awards.

Roads and Bridges

Dependable road connections are critical for providing emergency services during any type of emergency or disaster. Road networks often traverse floodplain and floodway areas. Floods can block or damage roads with standing or moving water, or 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 floods because 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.[52]

The highest priority bridges in the City are currently mitigated to more fully 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 collect runoff from city streets, neighborhoods, construction sites and parking lots – and empties directly into local waterways.

[51] http://www.floodsmart.gov.

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

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, bays and ocean. This includes pollutants like 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.

When litter, leaves and other debris clog catch basins during heavy rains, the resulting flooding pushes 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.

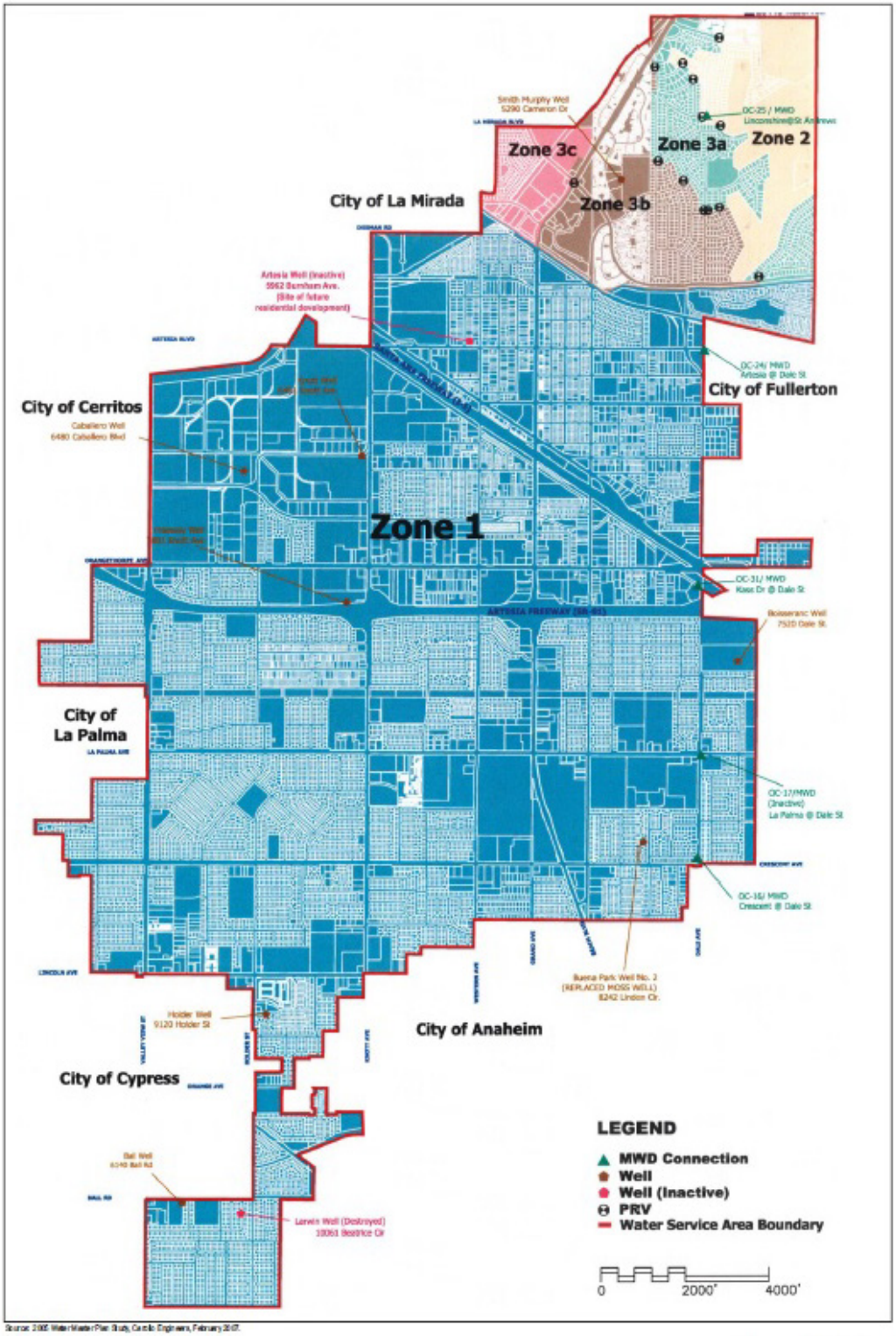
Water/Wastewater Treatment Facilities

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. 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. Moving water or waterborne 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 amount of time to fix will determine how long the City may have to do without the entire system.

Figure 26. Buena Park Water System
(Source: Buena Park General Plan 2010)



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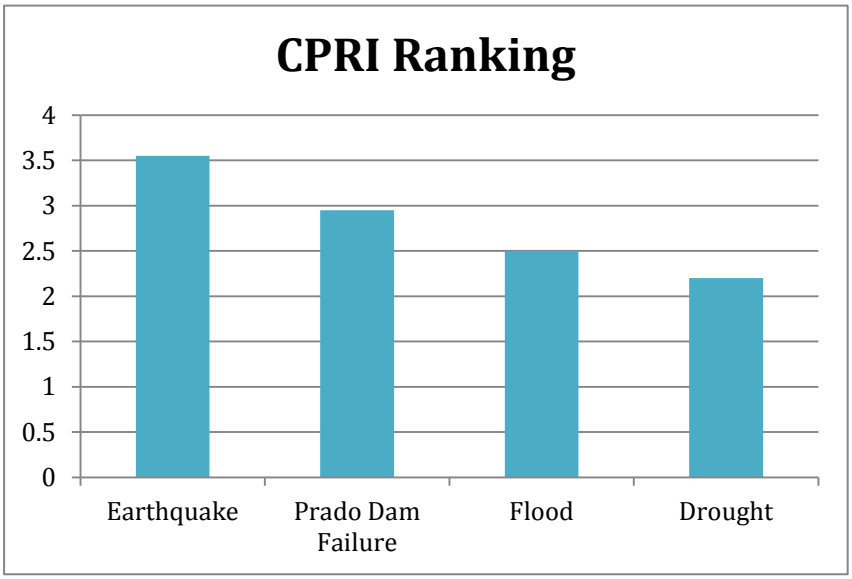
Section 7: Drought



Hazard Identification and Risk Assessment

Definition

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, which 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. Human beings often aggravate drought’s impact. The economic and environmental impacts 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:

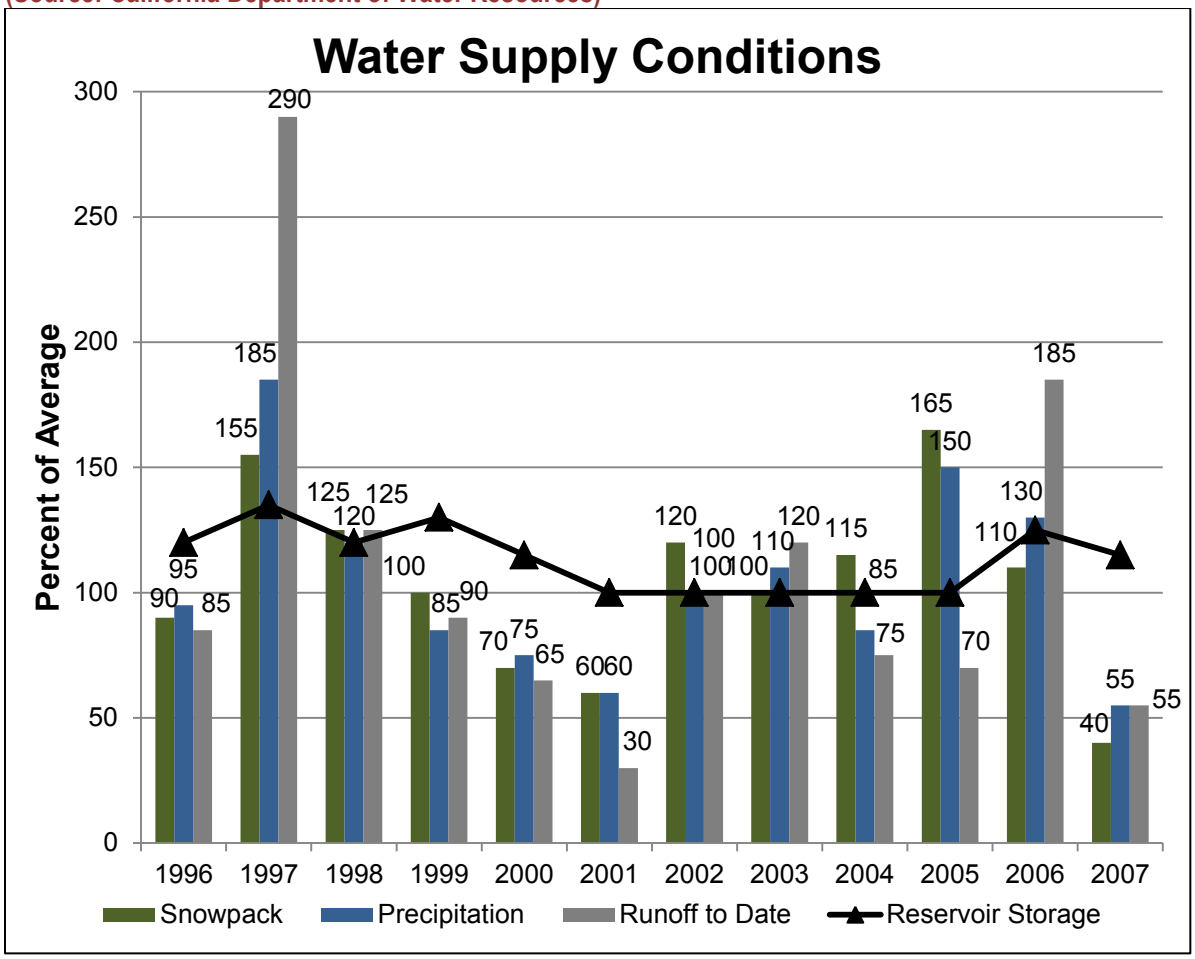
- **Meteorological**. A departure of precipitation rates from normal levels.
- **Agricultural**. The amount of moisture in the soil no longer meets the needs of a particular crop.
- **Hydrological**. Surface and subsurface water supplies fall below normal levels.
- **Socioeconomic**. A physical water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

General Situation

Figure 27 (page 99) 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 droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters – such as floods or forest fires – occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, 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 27. 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 be in decline. This decline may be part of a naturally occurring long-term wet/dry cycle, or may be 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 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. The San Francisco Bay Area had the most stations reporting their driest year in 1924. The second-driest year was 1977, when the average was 11.57 inches. The last major drought (1987-1990) occurred at the end of a sequence of very wet years (1978-1983). The semi-arid Southwest is particularly susceptible to variations in rainfall.

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. Thus, 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, which other scientists also use to analyze the long-term trends associated with global warming its effect on drought conditions.

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 to be endured rather than a periodic condition to be managed.

Previous Occurrences of Drought[53]

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.

[53] **ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2**
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

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 1755 to 1820. Floods in 1825 were followed by a severe drought in 1827-9; drought returned in 1844-6.[54]

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.[55]

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.

DWR-recorded hydrology shows that the most significant statewide droughts in the past century occurred during 1928-34 (mentioned above), 1976-77, 1987-92, and 2007-09.[56] The 2012-2016 drought is still underway but may eventually join this list.

The University of Nebraska-Lincoln has published many PDSI maps analyzing trends over the past hundred years[57]. 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.

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 that

[54] J.M. Guinn: *Exceptional Years: A History of California Drought and Flood*. https://www.jstor.org/stable/pdf/41167825.pdf.

[55] http://articles.latimes.com/1991-06-13/news/nc-780_1_cattle-industry.

[56] http://www.water.ca.gov/waterconditions/background.cfm.

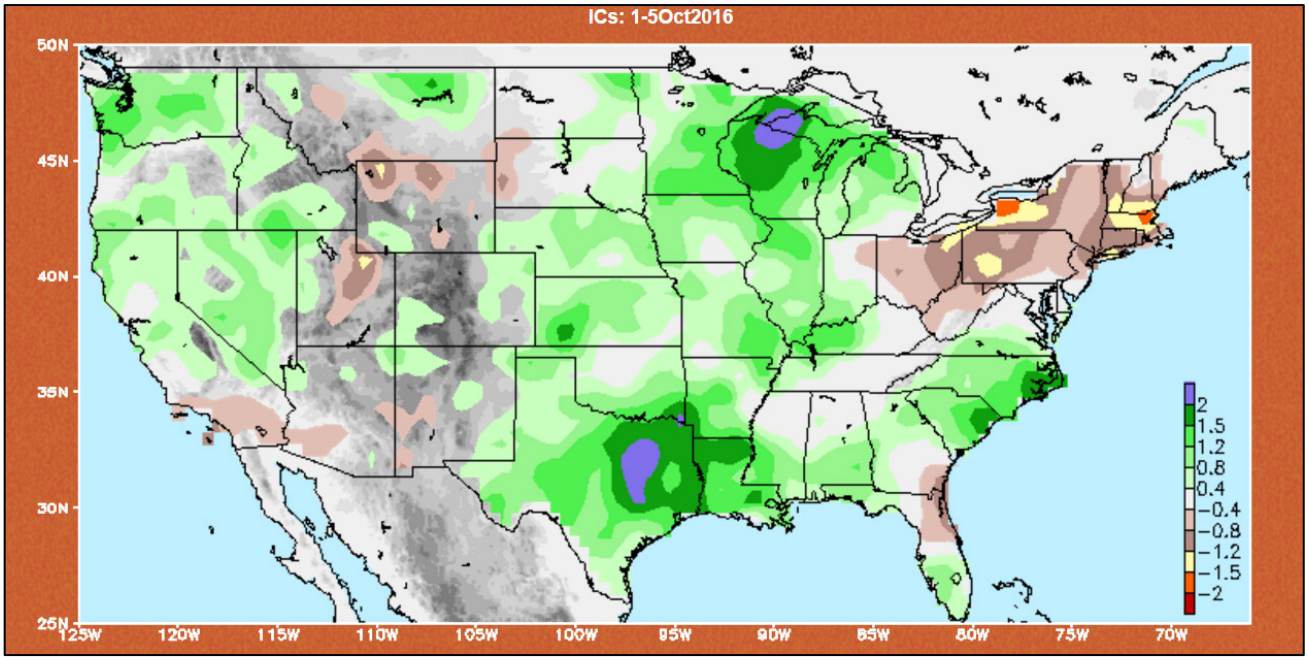
[57] National Drought Mitigation Center, 2005.

has led in some places (such as the San Joaquin Valley) to significant ground subsidence. While a weak El Niño condition partly broke the drought in Northern California during the winter of 2015-6, this drought is still underway in the southern part of the state as of the writing of this Plan. Among the many effects of the current drought, according to the California Natural Resources Conservation Service, is the extensive devastation of forests in the San Bernardino, San Jacinto, Palomar and Sierra mountain ranges. The lack of rain and snow has weakened millions of trees, making them susceptible to infestation by bark beetles[58]. In turn, dry vegetation and beetle-infested trees are more susceptible to fire than are healthy forests.

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 we now call 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 28 (page 102) is the NOAA Climate Prediction Center's most current snapshot of drought conditions across the U.S. Negative values indicate precipitation shortfalls.

Figure 28. 12-Month Standardized Precipitation Index, from 1 Oct 2016 (Source: NOAA Climate Prediction Center)



[58] http://www.sbcounty.gov/calmast/sbc/cms/Docs/BarkBeetle112906ProgramLaunchFINAL_2_.pdf.

Impact of Drought on Buena Park[59]

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*.

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 have 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 our current drought[60]. However, these efforts have required only minor 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 pollutants in the air. This in turn aggravates allergies and respiratory diseases in those who already have them, and increases their prevalence among the general population[61].

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

[59] **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))

[60] Buena Park Water Utility.

[61] http://www.cdc.gov/nceh/drought/.

mosquitos[62]. The California Department of Public Health has documented a rise in West Nile Virus cases during the current drought; decreased availability of open water has forced birds and mosquitos into closer contact, promoting spread of the disease to humans[63].

Property Impact

Drought tends to not 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 million[64]. 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 will 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.

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 current drought, though the state Supreme Court ruled against tier pricing that isn't tied to the cost of service[65].

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62 https://www.cdc.gov/nceh/drought/animals.htm.

63 http://www.latimes.com/local/lanow/la-me-ln-california-drought-mosquito-activity-20150408-story.html.

64 Buena Park Public Works Department.

65 http://www.sacbee.com/news/state/california/water-and-drought/article28414762.html.

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 four 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 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 day[66]. 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.

[66] https://www.insidescience.org/news/face-drought-golf-tries-reduce-water-use.

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.

PART III: MITIGATION STRATEGIES

Section 8: Mitigation Strategies

Overview of Mitigation Strategy

As the cost of damage from disasters continues to increase nationwide, the City of Buena Park recognizes the importance of identifying effective ways to reduce vulnerability to disasters. Mitigation plans will assist the City in reducing risk from hazards by identifying resources, information, and strategies for risk reduction that will help guide and coordinate mitigation activities throughout the City.

This Plan provides a set of action items for reducing risk through education and outreach programs, and by fostering the development of partnerships. The Plan further 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; and,
- assist in meeting the requirements of federal assistance programs.

The Mitigation Plan is integrated 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.

Planning Approach

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

- **Develop mitigation goals and objectives.** The risk assessment (hazard characteristics, inventory, and findings), along with municipal policy documents, were used 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, high-priority activities are recommended for implementation 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 throughout its length.

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 protection of critical facilities.
- **Structural Projects.** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, retaining walls, and safe rooms.

Goals[67]

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

[67] **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))

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 are compatible with community needs and goals expressed in other planning documents prepared by the City.

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.

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

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

Protect Life and Property

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

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

Enhance Public Awareness

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

Preserve Natural Systems

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

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

Encourage Partnerships and Implementation

Strengthen communication and coordinate participation with public agencies, 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.

The Planning Team also developed hazard-specific mitigation goals, which appear in Section 9: Mitigation Strategies.

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 8: Planning Process* for more detail).

The planning process on this project began in 2015 with the following departments represented on the Planning Team:

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

How are the Mitigation Action Items Organized?

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

The action items are organized within the following Mitigation Actions Matrix, which lists all of the multi-hazard (actions that reduce risks for more than one specific hazard) and hazard-specific action items included in the Plan. Data collection and research and the public participation process resulted in the development of these action items (*Section 9: Planning Process*). The Matrix includes the following information for each action item.

Funding Source

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

- operating budget/general fund
- development fees
- Community Development Block Grant (CDBG)
- Hazard Mitigation Grant Program (HMGP)
- 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 primary responsibility for implementing the action items falls to the entity shown as the "Coordinating Organization." The coordinating organization is the agency with regulatory responsibility to address hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

Plan Goals Addressed

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

The plan goals are organized into the following five areas:

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

Benefit/Cost Ratings[68]

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 project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant programs. 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 will not cover the cost of the action item, so other sources of revenue would be required.
- **Medium:** The action item could be funded through existing jurisdictional funding but would require budget modifications.
- **Low**: The action item could be funded under existing jurisdictional funding.

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68 **ELEMENT C. MITIGATION STRATEGY | C5**

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

Benefit ratings are defined as follows:

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

Ranking Priorities[69]

The Planning Team adopted the following process for ranking mitigation action items to assist with implementing the Hazard Mitigation Plan. "High," "Medium," and "Low" priorities have been assigned to each action item using the following criteria:

Does the action:

- solve the problem?
- address vulnerability assessment?
- reduce the exposure or vulnerability to the highest-priority hazard?
- address multiple hazards?
- 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 5-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?

69 **ELEMENT C. MITIGATION STRATEGY | C5**

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

Is there:

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

During the prioritization meeting of the Task Force, department representatives were provided worksheets for each of their assigned action items. Answers to the criteria above determined the priority according to the following scale.

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

City of Buena Park General Plan 2010

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 updated in 2010, was perhaps the most important of those documents. The Planning Team intends to link the Mitigation Plan actions items as closely as possible to the City's General Plan. 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.

The ineffectiveness of mitigation plan implementation –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 13. General Plan Policies and Mitigation Plan Goals
(Source: City of Buena Park General Plan 2010)

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 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, are constructed with the standards outlined in Title 24 of the California Administrative Code.	X			X	X
Goal 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).	X		X	X	
2.2: Improve defensive measures against 100-year, or other state-defined scenario, flood conditions through land use and design, such as increased pervious surfaces, on-site 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 the 100-year floodplain meet the requirements of the current building code and the National Flood Insurance Protection Program.	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
2.4: Work with OC Flood (a division of OC Public Works) 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-year storms within the City.	X			X	
Goal 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
3.2: Coordinate with local and regional jurisdictions to conduct emergency and disaster preparedness exercises to test operational and emergency plans.	X			X	X
COMMUNITY FACILITIES ELEMENT					
Goal 2: Responsive and efficient fire protection and emergency medical services. **Policies:** 2.1: Continue to work with the Orange County Fire Authority (OCFA) to improve the performance and efficiency of fire protection services for the City.	X			X	X
2.2: 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
2.3: Provide cost-effective EMS service levels for the protection of residents, businesses and visitors.	X			X	X
2.4: Ensure that sufficient water service and pressure are available throughout the City for use in firefighting.	X			X	X
2.5: 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

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
2.6: 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
2.7: Proactively plan for increases in population and employment growth and changes in the use and types of buildings in Buena Park.	X				X
2.8: Require that new development or redevelopment provide adequate access for fire service vehicles and personnel.	X				X
2.9: 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

Mitigation Actions Matrix[70] [71] [72] [73] [74]

Table 14 (page 119) identifies the existing and future mitigation activities developed by the Planning Team.

[70] **ELEMENT C. MITIGATION STRATEGY | C1**

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

[71] **ELEMENT C. MITIGATION STRATEGY | C4**

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

[72] **ELEMENT C. MITIGATION STRATEGY | C5**

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

[73] **ELEMENT D. MITIGATION STRATEGY | D2**

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

[74] **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 14. 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; HMPT=Hazard Mitigation Planning Team; IT=Information Technology Unit; PD=Police Department; PW=Public Works)

Action Item	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 damages 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	GP
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
MH-3, 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

Action Item	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					
MH-4, Continuity of Operations (COOP) planning: COOP plans ensure that the critical and essential functions of an organization, including government, can continue to operate during and after an emergency incident. 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
MH-5, 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				GF	M	L	H	GF
MH-6, 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

Action Item	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					
MH-7, 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 safety evacuate with their support systems and technology.	CS, CM, ESC	1-3 years	X				X	GF	M	L	M	GF
MH-8, 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-9, 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. The City will engage its existing CERT volunteers and revitalize its CERT program.	CM	2-3 years		X			X	GF, GR	L	L	L	GF

Action Item	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					
MH-10, 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-11, MyHazards: 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
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

Action Item	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					
MH-13, Building Construction: The City encourages public and private buildings to be designed with structural bracing, shutters, and laminated glass in window panes 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 maintain heating and/or cooling centers to serve 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	1-5 years	X					GF	M	M	M	GF

Action Item	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					
MH-16, Bridge Strengthening: The City will assess City-owned bridges (such as those passing over the flood control channels) to determine their susceptibility to collapse. Problem bridges should be identified and funded for retrofitting.	PW	5 years	X	X				GF, GR	H	H	H	GF
MH-17, Loss Estimation Studies: Hazards United States (HAZUS) is a FEMA system that uses specific hazard scenarios to estimate losses to people, property, and infrastructure. HAZUS was used in the City's 2016 LHMP; however, well-known deficits in the quality of data and geotechnical simulations limited the usefulness of the results. The City will endeavor to (a) establish an in-house capability to use HAZUS, and (b) enhance the default datasets to achieve more realistic simulation results.	CD, CM, IT, PW	1-5 years	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 within the City facing the highest risk of structure fires.	CM, CD, FD	Ongoing	X	X				GF, GR	L	L	M	GF

Action Item	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					
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.	All	Ongoing	X					GF	M	M	L	GF
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

Action Item	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					
MH-22 Hazardous Materials - Public Awareness and Worker Education: The Emergency Planning and Community Right-to-Know Act (EPCRA), 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	Ongoing	X	X				GF, GR	M	L	M	GF
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; and, • a plan for conducting exercises that test the plan. The City desires to maintain compliance with this standard.	CM	1-3 years	X	X			X	GF, GR	M	L	H	GF, GP

Action Item	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					
MH-24, 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 the nation's highways, railways, and waterways. City police and Public Works vehicles and the City EOC are equipped with 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-25, 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

Action Item	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					
MH-26, 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
MH-27, HAZMAT 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.	PD, PW	1-5 years	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					GF, GR	M	H	M	GF

Action Item	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					
MH-29, Utility Failure – Electrical Lines: The City will continue the process of burying electric and telephone lines, where possible, to resist damage from severe winds, lightning, and other hazards. Additional funds are needed to complete the project.	CM, PW	Ongoing	X				X	CIP, GF, GR	M	H	L	GF
MH-30, Utility Failure – System Redundancies: The City desires system redundancies in its utility and communications systems, especially lifeline systems. The intention is that if one system fails, the other shadow system can take over. The current SCADA system needs maintenance and/or upgrade.	CM, IT, PW	Ongoing					X	CIP, GF, GR	M	M	M	GF
MH-31, 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	Ongoing	X				X	GF	M	L	M	GF

Action Item	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					
MH-32, Utility Failure – Maintenance: Continue regular maintenance and equipment checks, along with replacement or renovation of aging structures and equipment, which should be made as hazard-resistant as economically possible.	CM, PW	Ongoing	X				X	CIP, GF	M	M	M	GF
MH-33, 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
MH-34, 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-35, 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

Action Item	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					
MH-36, 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-37, 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 Police Department's Active Shooter Training.	PD	Ongoing	X	X				GF, GR	M	L	H	GF
MH-38, 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-39, 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	Ongoing	X	X				GF	M	L	M	GF

Action Item	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					
MH-40, 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	CP, GF	H	M	H	GF
MH-41, Public Health Emergencies – Vacant Structures: The City has enacted ordinances to assure demolition and clearance of vacant condemned structures in order to prevent safety and health violations.	CD	Ongoing	X					GF	M	L	L	BC
MH-42, Cybersecurity: Develop a cyber terrorism/security implementation plan that outlines procedural and technological measures to secure the City's information technology infrastructure.	CM, IT	3-5 years		X			X	GR	H	H	H	GF
MH-43, Upgrade Traffic Management Center at City Hall: Upgrade the traffic management center to current standards and promote safety.	PW	Ongoing	X				X	CIP, GR	L	M	L	GF

Action Item	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					
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 Replacement and Relocation: Replace the PRVs that are 50 years old. This will provide adequate water pressure for reliable water service. Relocate PRV station at Beach Blvd. for easier accessibility.	PW	Ongoing	X				X	CIP, GF	M	M	M	GF
MH-46, Infrastructure Replacement Program: Comprehensive replacement of water-related infrastructure at various locations within the City per Water Master Plan. 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	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 the street lifespan and keep City infrastructure in shape.	PW	Ongoing	X					CIP, GF	M	M	M	GF

Action Item	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					
MH-48, Pre-Disaster Recovery Plan: A Pre-Disaster Recovery Plan regulates repair activity, generally depending on property location. It prepares a community to respond to a disaster event in an orderly fashion by requiring residents or landlords to (a) obtain permits for repairs, (b) refrain from making repairs, or (c) make repairs using standard methods.	CD, ESC	1-5 years		X	X	X		GF, GR	M	L	L	GF
Earthquake Mitigation Action Items												
EQ-1, Seismic Hazard Mapping: Information gained from seismic hazard mapping can be used 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

Action Item	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					
EQ-2, ATC-20/45 Safety Assessment: In a post-disaster setting, the ARC-20/45 process is used to determine if buildings are safe to re-enter. 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
EQ-3, 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
EQ-4, 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

Action Item	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					
EQ-5, 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-6, 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-7, Retrofit Ehlers Event Center: The City will incorporate seismic retrofit measures into any renovations at the Ehlers Event Center.	CS, PW	Ongoing	X					CIP, GR	M	H	M	GF

Action Item	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					
EQ-8, Financial Incentives: The City desires to support financial incentives, such as low-interest loans or tax breaks, for property owners who seismically retrofit their structures. The Hazard Mitigation Planning Team will examine best practices and develop financial incentives. The incentives should focus on properties built following building standards now known to be inadequate.	HMPT, CD, CM, ED	4-10 years	X					GR	M	H	L	GF
Flood Mitigation Action Items												
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.	CD, PW	Ongoing	X					GF	M	L	L	GF, ZO

Action Item	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					
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.	CD, PW	Ongoing	X					CIP	M	L	M	GF, ZO
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.	CD, PW	Ongoing	X					GF	M	L	M	ZO
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.	CD, PW	Ongoing	X					GF	M	L	L	ZO
FLD-5, Water-Supply Hardening: Flood-proof City-owned water wells.	PW	1-5 years	X				X	GR	M	M	H	CIP

Action Item	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					
FLD-6, 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
FLD-7, Master Plan for Storm Drainage: The City completed its Master Plan for Storm Drainage in 2015. This Plan regulates development in areas prone to produce or be impacted by storm waters.	PW	Complete	X		X			GF	M	M	M	GF
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.	CD, PW	Ongoing	X			X			M	L	M	BC, GP, ZO
FLD-9, 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, GF, GR	M	H	M	GF

Action Item	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					
FLD-10, Floodproofing Roads: There are various construction and placement factors to consider when building roads to maintain dry access. Road construction, reconstruction, or repair can include attention not only to drainage, but also to stabilization or armoring of vulnerable shoulders or embankments. 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
FLD-11, Drain Grates: Add drain grates to existing City storm drains.	PW	Ongoing	X					GF, GR	L	L	M	GF
FLD-12, Storm Drain Improvement: The City will continue to upgrade its storm drain system to current standards, keep City drainage infrastructure in shape, and maintain high water-quality standards.	PW	Ongoing	X					CIP, GF	M	M	M	GF

Action Item	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					
FLD-13, 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, 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, and ensuring water sprinklers function correctly and do not water hardscape.	CD, CM, PW	Ongoing		X				GF	M	L	M	GF
DR-2, 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

Action Item	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-3, 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 emergency situations like firefighting.	PW	Ongoing	X				X	CIP, GF	M	L	M	GF
DR-4, 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, GF			M	GF
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 Meter Replacement Program: The City will replace all existing water meters with AMI meters to promote conservation and detect leaks.	F, IT, PW	Ongoing	X	X				B	M	H	M	GF
DR-7, 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, GF	M	M	H	GF

Section 9: Planning Process

Plan Methodology[75]

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.

Throughout the 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.

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.

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. An extensive 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 planning process. The Planning Team first met on March 2, 2015 to review the requirements associated with DMA 2000 and to develop a work plan for creating the 2016 Mitigation Plan. An additional meeting was held on April 27, 2015 to discuss mitigation action items and discuss a plan review strategy. The final meeting took place on March 14, 2017, to review the Plan and Mitigation Actions Matrix prior to moving forward with final public comment.

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 key 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 during the plan-writing phase of the planning process. Table 15 (page 144) shows the various Planning Team members' levels of participation.

[75] **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))

Table 15. Planning Team Level of Participation[76]

Name	Issue Request for Proposal and Process Contract	Contract with Emergency Planning Consultants	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
Doug Brodowski, Chair	X	X	X	X	X	X	X		X
Aaron France			X	X		X			
Jay Saltzberg			X	X		X			
Lisa McLaughlin			X	X		X			
Steve Holliday			X	X		X			
Simon Mikiewicz			X	X		X			
Lance Charnes			X	X	X	X		X	X
Melisa Dhauw			X	X		X			
William Mattern			X	X		X			
Randy Black			X	X		X			
Craig Covey			X	X		X			

[76] **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))

Planning Team Involvement

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

- Established plan development goals.
- Prepared 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.

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 Involvement[77]

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 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. Page 157 shows the invitation and list of invited external reviewers.

[77] **ELEMENT A: PLANNING PROCESS | A2**

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

State and Federal Guidelines and Requirements for Mitigation Plans

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.

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, which describes the goals and objectives, including proposed strategies, programs and actions to avoid long-term vulnerabilities.
- A plan maintenance process, which 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.

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. Through its consultant, Emergency Planning Consultants, the City had access to numerous existing mitigation plans from around the country, as well as current FEMA Mitigation Planning standards (386 series) and the State of California Mitigation Plan Guidance.

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

- County of Orange Hazard Mitigation Plan (2015)
- State of California Hazard Mitigation Plan (2013)

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.

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 are 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

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

The City joined the NFIP on October 15, 1974. The Program 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's continued involvement in NFIP supports this Plan.

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 (*Section 3: Risk Assessment*), 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 16 (page 148) identifies existing processes/programs through which the Plan could be implemented, and as appropriate, opportunities to expand or improve these processes and programs to enhance mitigation (shown in *italics*).

Section 10: Plan Maintenance 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 16. Existing Processes and Programs[78]

Process	Action	Implementation of Plan
Administrative	Departmental or organizational work plans, policies, and procedural changes	• City Manager's Office • Community 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*

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/public funding
		  ○ *Research grant opportunities through USHUD Community Development Block Grant; the FEMA HMGP; and other state and Federal programs*
		• Non-traditional funding sources
		  ○ *Seek assistance from foundation, nonprofit, and private sources*

[78] **ELEMENT C. MITIGATION STRATEGY | C1**

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

Table 16 (continued)

Process	Action	Implementation of Plan
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

Use of Existing Data[79]

The Planning Team gathered and reviewed numerous electronic and hardcopy documents to support the planning process:

- City of Buena Park General Plan (2010)
- County of Orange Hazard Mitigation Plan (2015)
- HAZUS reports
- Historic GIS maps and local inventory data
- Local Flood Insurance Rate Maps

The Team used these documents as resources throughout the Plan.

Federal Data

A variety of federal data was collected and used throughout the mitigation planning process, including:

- Census data
- FEMA "How To" Mitigation Series (386-1 to 386-9)
- National Oceanic and Atmospheric Administration statistics
- Army Corps of Engineers Consequence Assessment Reports

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

[79] **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))

Public Participation[80]

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 its first-ever Whole-Community Working Group (WCWG) to assist with both the preparation of the Hazard Mitigation Plan and the update to the Emergency Operations Plan. A letter signed by the Mayor was emailed to invitees to the first meeting.

- During the meeting on May 28, 2015 (page 162), Emergency Planning Consultants presented an overview on hazard mitigation planning and an introduction to the hazards in the region. The bulk of the meeting concerned the Emergency Operations Plan, which was also under revision.
- The October 12, 2015 meeting (page 167), conducted by City staff members, was dedicated to hazard mitigation and some of the tradeoffs involved in carrying out a mitigation program.
- The April 5, 2017 meeting (page 171) reviewed the draft Plan and explained the reasons behind what was included and excluded.

Pages 162-179 show the WCWG invitations, agendas, 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. Public comment resulted in one addition to the plan: item MH-7 in the Mitigation Actions Matrix (Table 14, page 119).

On March 15, 2017, the City posted the draft LHMP on the City website (http://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 Stakeholder Group (see page 176), informing them of the draft LHMP's availability. The Planning Team also posted flyers at City Hall and in the Buena Park Library announcing the public online review (see page 179). The City received no comments.

In addition to DMA 2000 requirements, adoption of the plan is necessary because:

It lends authority to the plan to serve as a guiding document for all local and state government officials;

It gives legal status to the plan in the event it is challenged in court;

It certifies to program and grant administrators that the plan's recommendations have been properly considered and approved by the governing authority and jurisdictions' citizens; and

It helps to ensure the continuity of mitigation programs and policies over time because elected officials, staff, and other community decision-makers can refer to the official document when making decisions about the community's future.

Source: FEMA. 2003. "How to Series" - *Bringing the Plan to Life* (FEMA 386-4)

[80] **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))

City Council Public Meeting

The Buena Park City Council conducted one public meeting on November 14, 2017 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 the Buena Park Library.

Plan Adoption Process

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

The Planning Team prepared for City Council the staff report on the Plan (Figure 30, page 153), 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.

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 its dedication and efforts to satisfy the DMA 2000 requirements. The City Council voted unanimously for the adoption of the Mitigation Plan.

The City Council must adopt the Mitigation Plan before FEMA can approve the Plan. The City Council's resolution of adoption appears in Figure 31 (page 155).

Plan Approval[81]

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 October 17, 2017, pending adoption by the City Council.

With the City Council approval in hand, FEMA lifted the conditional approval on November 22, 2017 (Figure 29, page 152).

[81] **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))

Figure 29. FEMA Approval Letter

U.S. Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, CA. 94607-4052

FEMA

November 22, 2017

Lance Charnes
Emergency Services Coordinator
City of Buena Park
6640 Beach Boulevard
Buena Park, CA 90621

Dear Mr. Charnes:

We have completed our final review of the *City of Buena Park Local Hazard Mitigation Plan*, officially adopted by the City of Buena Park on November 14, 2017, and found the plan to be in conformance with Title 44 Code of Federal Regulations (CFR) Part 201.6 *Local Mitigation Plans.*

The approval of this plan ensures the City of Buena Park's continued eligibility for project grants under FEMA's Hazard Mitigation Assistance programs, including the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program. All requests for funding, however, will be evaluated individually according to the specific eligibility, and other requirements of the particular program under which applications are submitted.

Also, approved hazard mitigation plans may be eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Additional information regarding the CRS can be found at https://www.fema.gov/national-flood-insurance-program-community-rating-system or through your local floodplain manager.

FEMA's approval of the *City of Buena Park Local Hazard Mitigation Plan* is for a period of five years, effective starting the date of this letter. Prior to November 22, 2022, City of Buena Park is required to review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval in order to continue to be eligible for mitigation project grant funding. The enclosed plan review tool provides additional recommendations to incorporate into the plan when the City of Buena Park undertakes its identified plan maintenance process.

If you have any questions regarding the planning or review processes, please contact Alison Kearns, Lead Community Planner, at (510) 627-7125 or by email at alison.kearns@fema.dhs.gov.

Sincerely,

Jeffrey D. Lusk
Division Director
Mitigation Division
FEMA Region IX

Enclosure

cc: Jose Lara, Chief of Hazard Mitigation Planning, California Governor's Office of Emergency Services
Jennifer Hogan, State Hazard Mitigation Officer, California Governor's Office of Emergency Services

www.fema.gov

Figure 30. City Council Agenda Report

City of BUENA PARK

AGENDA REPORT TO CITY COUNCIL

MEETING DATE: November 14, 2017

TO: The Mayor and City Council

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

RECOMMENDED ACTION: 1) Adopt a Resolution adopting the City's 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 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. At the November 12, 2014, City Council meeting, the City Council approved a Professional Services Agreement with Emergency Planning Consultants to develop a LHMP pursuant to the DRI grant award.

DISCUSSION: On November 20, 2013, the City received a grant from the California Department of Housing and Community Development (HCD) in the amount of $145,000 to create a new LHMP for the City. In April 2015, the City received authorization from HCD to proceed with the project.

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.

DMA 2000 is intended to help state and local governments work together by facilitating cooperation. Through collaboration, mitigation needs can be identified before disasters strike, resulting in faster allocation of resources and more effective risk-reduction projects. Under DMA 2000, each state and local government must have a federally-approved mitigation plan to be eligible for hazard mitigation grant funding. This is the City's first mitigation 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

Page 2 AGENDA REPORT TO CITY COUNCIL
Meeting Date: November 14, 2017
Subject: RESOLUTION APPROVING THE CITY OF BUENA PARK LOCAL HAZARD MITIGATION PLAN

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 creating the LHMP included several meetings with representatives from each City department, including the Police Department, the Emergency Services Coordinator, the Orange County Fire Authority (OCFA), and other organizations and interest groups in the City. 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 three community meetings in which staff presented the LHMP planning regime, facilitated discussions, and received input from these groups.

The California Governor's Office of Emergency Services reviewed the LHMP and approved it on August 31, 2017. The Federal Emergency Management Agency subsequently reviewed the Plan and approved it on October 17, 2017, pending City Council adoption of the proposed resolution.

BUDGET IMPACT: There is no budget impact associated with this action. The LHMP development was entirely paid for with grant funds and budgeted staff time.

Prepared by: Corey S. Sianez, Police Chief
Approved by: Jim Vanderpool, City Manager

Presented by: Lance Charnes, Emergency Services Coordinator

ATTACHMENTS:
1) Resolution
2) Local Hazard Mitigation Plan

Figure 31. City Council Adoption Resolution

RESOLUTION NO. 13702

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BUENA PARK, CALIFORNIA, ADOPTING THE 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, once approved by the City Council, Federal Emergency Management Agency will officially approve the City of Buena Park Local Hazard Mitigation Plan. The Plan will be reviewed periodically, and revised as necessary to meet changing conditions.

NOW, THEREFORE, BE IT RESOLVED that the City Council does hereby adopt the 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.

PASSED AND ADOPTED this 14th day of November 2017, by the following called vote:

AYES:	COUNCILMEMBERS:	Brown, Smith, Berry, Vaughn, Swift
NOES:	COUNCILMEMBERS:	None
ABSENT:	COUNCILMEMBERS:	None
ABSTAIN:	COUNCILMEMBERS:	None

RESOLUTION NO. 13702
Page 2

Elizabeth A. Swift
Mayor

ATTEST:

City Clerk

I, Adria M. Jimenez, 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 14th day of November 2017.

City Clerk

Exhibit: 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 Department of Education
Orange County Fire Authority
Orange County Public Works
Orange County Sheriff's Department, Emergency Management Division
St. Pius School
Savanna School District
Southeast Area Animal Control Authority
Speech & Language Development Center

Note: while the draft LHMP was sent to all these agencies, none responded with comments.

Exhibit: Invitation to External Agency Reviewers

Charnes, Lance

From: Charnes, Lance
Sent: Thursday, March 16, 2017 9:59 AM
To: Steffen, D/C Dave (OCFA); McCasland, Mary; Coburn, Mary-Joy (OCMVCD); DuVall, Jeff (Anaheim FD); 'Keyworth, Lisa'; Fleming, Ed; Erpelding, Loree (Cypress); 'Chris Guerrero'; Gonzalez, David; Swisher, Joshua (joshua.swisher@seaaca.org); Vialpando, Andrew; 'Erdner, Margaret E'; Hanson, Lori; Anderson, Mike; Blake, Tracy; Clark, Dr. Brian; Coombs, Jim (BPHS); Daley, Robert; Egans, Dr. Shanna; Friedman, Dr. Jerry; Gandara, Pamela; Hill, JoAnn; 'jcamarena@spectrumschools.com'; 'jim_evans@cesd.us'; 'konrad_a@auhsd.us'; Laehle, Christine; Lewis, Sandy; 'Murillo, Hipolito'; 'skaminske@ocsd.org'; Stevenson, Mark; Tsunezumi, Kelvin
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: http://www.buenapark.com/residents/city-documents.

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 14 April**. 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

Exhibit: Planning Team Sign-In Sheet – March 2, 2015

City of Buena Park
Hazard Mitigation Planning Team
March 2, 2015

Name	Department
CAROLYN HANSHAW	EMERGENCY PLANNING CONSULTANTS
Aaron France	City Managers Office
Doug Bradowski	PW
RYAN COTA (fill in for Simon Mikiewicz)	Information Technology
STEVE HOLLIDAY	PD
JAY SALTZBERG	Community Development
LISA McLAUGHLIN	FINANCE
Melissa Dhanu	Economic Development
LANCE CHANLES	ESC
Craig Covey	Orange County Fire

Emergency Planning Consultants

Exhibit: Planning Team Sign-In Sheet – April 27, 2015

City of Buena Park
Hazard Mitigation Planning Team
April 27, 2015

Name	Department
LANCE CHANDLER	EMERGENCY SVCS. COORD.
JAY SALTZBERG	Community Development
STEVE HOLLIDAY	PD
RYAN COSTA	PD
DOUG BYRDOWSKI	PW
LISA McCAMMOND	FINANCE

Emergency Planning Consultants

Exhibit: Planning Team Sign-In Sheet – March 14, 2017

CITY OF BUENA PARK
REGISTRATION SIGN-IN/OUT SHEET

DATE: 14 Mar 2017 EVENT: Hazard Mitigation Planning Team OP PERIOD: _____ [X] THIS IS A DRILL

Dept/ Agency	Name (print)	Signature	Telephone # (if not city emp.)	24-Hour Clock In	24-Hour Clock Out
PW	Doug Brodowski				
	LANCE CHANDLER				
	Susan Shivers				
HR/Risk	Alica Burnett				
CD	Jay Schlossberg				
CS	Meg Riley				
FINANCE	Harry Wang				

EOG FORM 211, 13 MAY 2016

Exhibit: Whole Community Working Group Agenda – May 28, 2015

City of Buena Park
EOP Update Project
Agenda: Whole Community Planning Meeting

CITY OF BUENA PARK
WHOLE COMMUNITY PLANNING MEETING
MEETING AGENDA

Thursday, May 28, 2015
6:30PM – 8:30PM
City Council Chamber
6650 Beach Boulevard, Buena Park, CA 90622

1. **Welcome & Introductions**
   a. Introductions
   b. Logistics and Administration
      i. Emergency Exits
      ii. Drop, Cover & Hold On
      iii. Restrooms

2. **Purpose of Meeting**
   To ensure that the voices of our collective Buena Park community are heard and are incorporated into the Emergency Operations Plan so that the City, as a whole, may best mitigate, prepare for, respond to, and recover from a disaster or emergency.

3. **'Whole Community' Concept and Application to the City of Buena Park's Emergency Operations Plan (EOP)**
   'Whole Community' is a means by which residents, emergency management practitioners, organizational and community leaders, and government officials can collectively understand and assess the needs of our community and determine the best ways to organize and strengthen our assets, capacities, and interests.

4. **City of Buena Park EOP Update**
   a. Plan Overview
   b. The Hazards We Face
   c. Current Status/Timeline for Revision
   d. How Feedback will be Incorporated

5. **Facilitated Community Discussion**

6. **Ways to Provide Input**

7. **Adjourn**

Exhibit: Whole Community Planning Group Minutes – May 28, 2015

City of Buena Park
EOP Update Project
Meeting Minutes: Whole Community Planning Meeting

CITY OF BUENA PARK
EMERGENCY OPERATIONS PLAN UPDATE
WHOLE COMMUNITY PLANNING MEETING: MEETING MINUTES

Meeting Date: Thursday, May 28, 2015
Date Meeting Minutes Published: Thursday, June 25, 2015
Meeting Minutes Submitted by: Carolyn Harshman, Emergency Planning Consultants

Meeting Attendees

Name	Department/Agency
Alfonso Perez	Buena Park School District
Brent Brodowski	LDS Church
Bri Sarno	Farrell's Ice Cream
Brian Reider	Boys & Girls Club
Bruce Morgan	Dayle McIntosh Center
Doug Brodowski	Public Works
John Passage	Buena Park Mall
Jon Hultman	Buena Park Council of PTAs
Karen Cant	Cypress College
Kelvin Tsunezumi	Buena Park School District
Lance Charnes	Police (Emergency Services)
Louie Lemonnier	Hope School/Anaheim Union High School District
Marc Brown	LDS Church
Marcia Miyoshi	Buena Park Library
Mary McCasland	Buena Park Library
Mike Reazuddin	Best Host Inn
Nicholas Cassella	Buena Park Mall
Norma Martinez	Centralia School District
Tina Rollins	Buena Park Citizen
Todd Trout	Boys & Girls Club
Greg Maldonado	Knott's Berry Farm
Consultants	
Kim Guevara-Harris	Mozaik Solutions *Subcontractor to Emergency Planning Consultants*
Carolyn Harshman	Emergency Planning Consultants

Meeting Purpose

The purpose of the meeting was to begin to provide an opportunity for the collective Buena Park community to provide input into the Emergency Operations Plan so that the City, as a whole, may best mitigate, prepare for, respond to, and recover from a disaster or emergency.

1 | Page

City of Buena Park
EOP Update Project
Meeting Minutes: Whole Community Planning Meeting

Whole Community Overview

An overview of the "whole community" concept was provided to meeting attendees. Whole Community was summarized utilizing language from FEMA's *"A Whole Community Approach to Emergency Management: Principles, Themes, and Pathways for Action"* guide, specifically *"'Whole Community' is a means by which residents, emergency management practitioners, organizational and community leaders, and government officials can collectively understand and assess the needs of our community and determine the best ways to organize and strengthen our assets, capacities, and interests."*

The Whole Community Approach reinforces the fact that government (local, State, Federal) is only one part of the nation's emergency management team; the WHOLE city and community that is Buena Park must be included. All groups provide vital resources and information that can better help the City assess and meet the needs of its population. The importance of participating in this process was underscored to meeting attendees so that all attendees from government, private, non-profit sectors, as well as individuals could understand that in order to prevent/deter, respond to and recover from any event or hazard the entire community would have to participate. No single entity can achieve resilience on their own.

Included, but not limited to, as part of the "whole community" concept are:

- Persons with Disabilities and/or Access and Functional Needs (PWD/AFN)
- Children
- Pets and Animals
- Faith-based and community/non-profit groups
- Private Sector/Industry
- Individuals, families and communities

EOP Overview

An overview of the City of Buena Park's Emergency Operations Plan (EOP) was provided to attendees, to include the primary hazards faced by the City, the timeline for revision of the Plan and how feedback will be incorporated into the planning/revision process.

Community Discussion

A robust facilitated discussion was conducted for the remainder of the meeting. Key recommendations, action items, strengths and areas for improvement are summarized below:

Strengths

1. This first meeting was well attended,
2. Participants were eager to offer facilities, resources, equipment and knowledge that can assist the City in preparing for, responding to, and recovering from an emergency/disaster.

Recommendations

1. Conduct additional Whole Community Planning meetings to assist in this Planning Revision iteration. Due to time constraints, a number of questions primed for the meeting were unable to be addressed.
2. Form an established "Whole Community" working/community group to provide input and information on a regular, ongoing (e.g., quarterly) basis.

3. Develop a "Resource List" of available resources from the Community; inclusive of a tracking system if possible, and capability for needs matching.
4. Assist participants in getting their facilities on the Red Cross and City shelter lists and in training shelter teams to enhance capacity and capability in Buena Park (ex. Boys & Girls Club, Cypress College)
5. Better understand City obligations related to PWD/AFN, to include children, service animals, etc. (comment from audience: It will not be the Red Cross that is sued for failure to provide facilities, transport, etc. – it will be the City)
6. The City should provide Buena Park-specific preparedness information on its website in an easily referenced and prominent area, to include information regarding the specific hazards the City faces (e.g., take from the EOP, the Local Hazard Mitigation Plan, as well as the City General Plan)
    a. Conduct an Emergency Preparedness Campaign (City led)
        i. Consider engaging in a strategic, targeted "Preparedness Month" to engage all residents and businesses. Key areas of emphasis should include how to shelter in place for five (5) days and how to evacuate/evacuation procedures.
    b. Use the "Buena Park Today" newsletter to provide preparedness tips and information in each publication
    c. Use already scheduled/planned City/City-wide outreach events to provide preparedness information and reinforce key preparedness concepts, as well as to gather information from the community on potentially available resources.
7. The City should consider priority agreements with bottled water companies and large volume filtering services given the City's independent water system.
8. Consider City ordinance that requires businesses to have an emergency plan.
9. For the next meeting, to the extent possible, provide a list of questions/discussion areas in advance to attendees so that they can best prepare for the discussion.
10. Establish redundant plans to communicate with businesses and residents in an emergency.

Additional Information Provided/Gaps Identified (as responses to structured questions)

1. *Emergency Public Information/Communications.* Emergency alerts and notifications are best provided to participants via: Alert OC, email, ham radio, texts, 2-way radios, Amber Alerts, the "Group Me" app and other apps, video phone, cell, landline phone, social media (Facebook, Twitter, etc.), 211, City and County websites (other websites, such as Red Cross, etc.), Video Phone Services (for deaf/hard of hearing)
2. *Evacuations.* This area requires additional discussion and work.
    a. Primary discussion focused on schools, children, and resource sharing.
    b. Hotel shuttles, rental car companies, amusement parks may be available to the City, to include wheelchair accessible transportation equipment. *See Recommendation related to development of a current "Resource List" above.*
    c. School buses may or may not be available to help with transport. *See Recommendation related to development of a current "Resource List" above.*
    d. OCTA should not be relied upon unless the disaster/event is localized to Buena Park (e.g., participant comment "everyone has a contract with them")
    e. If using alternative transportation means, how are drivers paid? How is fuel for these vehicles prioritized if fuel is scarce and/or how is it paid for/reimbursed?
    f. A tracking mechanism is needed to ensure that people that are moved are also moved with their assistive devices (or a tagging/tracking system (e.g., some sort

of baggage tracking system) is needed to ensure owner/device are re-connected at the target destination)

g. Pets vs. service animals vs. companion animals will be an issue that must be addressed in evacuations
h. Unaccompanied minors, child reunification, etc. are still major gap areas
    i. Parental notification (where was child/children taken?)

3. *Sheltering*. This area requires additional discussion and work.
    a. "Relying upon the Red Cross is not enough." The City needs to assist Buena Park businesses and organizations with getting plugged into the Red Cross shelter assessment and shelter training programs, to include considering a City-led shelter program (under the direction of the Red Cross through its partner program).
4. *Water*. The City's water supply is not connected to the County's water system and relies on power-dependent wells. Participants had questions regarding whether the system is backed up by generators, and if so the fuel re-supply process; as well as alternative sources for potable and non-potable water. *See Recommendation above related to agreements with bottled water and large volume filtering companies.*

Exhibit: Whole Community Working Group Minutes – October 12, 2015

BUENA PARK WHOLE COMMUNITY PLANNING GROUP
12 October 2015, 6:30-8:30 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

Moderators: Doug Brodowski, Senior Management Analyst, Buena Park Public Works
714-562-3652; dbrodowski@buenapark.com
Lance Charnes, Emergency Services Coordinator, City of Buena Park
714-562-3960; lcharnes@bppd.com

Attendance

Name	Organization
Jim Coombs	Buena Park High School
Madeline Grande	Buena Park High School
Mary McCasland	Buena Park Public Library
Marsha Miyoshi	Buena Park Public Library
Mary Fuhrman	Buena Park Public Library (trustee)
Dave Cooper	Constant & Associates
Shannon Marquez	Constant & Associates
Bruce Morgan	Dayle McIntosh Center
Karen Troutman	Hope School
Jesse Lujan	Knott's Berry Farm

The meeting convened at 6:30 p.m.

1. Introduction to mitigation

Doug Brodowski began the session by prompting attendees to introduce themselves. He explained that this meeting was a follow-up to the meeting in May that was mostly concerned with the City's Emergency Operations Plan update. This meeting would focus on the Local Hazard Mitigation Plan.

Page 1 of 4

Whole Community Planning Group Meeting Minutes – 12 October 2015

The representatives from Constant & Associates, the firm carrying out the City's Local HAZMAT Assessment, discussed hazardous materials in the community and the firm's risk assessment approach. They presented slides showing the locations of CalARP facilities in the City and the possible impact areas should a major release occur.

Bruce Morgan from the Dayle McIntosh Center introduced a Special Needs Evacuation Tag. The tag allows for recording the types of access/functional needs (AFN) for each evacuee, and for identifying any support equipment the evacuee needs.

Mr. Brodowski turned the meeting over to Lance Charnes, who began the mitigation slide presentation that would guide the rest of the discussion. He introduced the definition of mitigation, the general types of disasters and disaster effects, and the general types of mitigation.

2. Local hazards overview

Mr. Charnes presented a list of hazards likely to visit Buena Park and their probable effects, including:

- Earthquakes
- Floods
- Heat emergencies
- HAZMAT accidents
- Prolonged blackouts/rolling brownouts
- Severe weather
- Terrorism

3. Personal/private-sector mitigation

Mr. Charnes listed the types of mitigation projects that individuals and businesses need to consider, such as structural and non-structural seismic hazard abatement and backup power, and identified some online resources explaining how to implement these measures.

4. Local hazard mitigation planning

Mr. Charnes explained the rationale behind creating a Local Hazard Mitigation Plan as part of the hazard mitigation cycle.

5. Questions/discussion

Mr. Brodowski moderated an open discussion of issues raised during the presentation, based on several questions posed to the audience:

- Which aspects of mitigation do you understand best? Which do you understand least?
    - What would help you understand better?

Page 2 of 4

Whole Community Planning Group Meeting Minutes – 12 October 2015

- 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?

The discussion:

- "Shelter in place" isn't well understood in the context of hazardous materials releases. Does it require a shelter location?
  - Mr. Charnes said that "shelter in place" means "in place," meaning not going to another location. There is information on the City website describing how to shelter in place.
- The City of Norwalk produced a "shelter in place" brochure. Does Buena Park need one?
  - Mr. Charnes said that Norwalk's brochure is for a larger issue – residents staying in their single-family houses following an earthquake. Buena Park may embark on such a program in the future, but there are more pressing issues to deal with first.
- People understand how to mitigate against earthquakes and floods, but not hazardous materials or blackouts. How is it different?
  - Mr. Brodowski said that most HAZMAT mitigation comes in the form of zoning and separating the major generators from residents. In Buena Park's context, this means grouping manufacturing firms in the northwest (Caballero Blvd.) area.
- Can the City require emergency controls or measures on businesses with large amounts of hazardous materials?
  - Mr. Brodowski said that HAZMAT regulation is in the hands of OCFA, the County Health Care Agency, and the state.
- How do we encourage/require the public to prepare as neighborhoods and help each other during emergencies?
  - Mr. Brodowski listed some of the methods already underway: demos during BPPD open houses, information on the City website, water bill inserts, articles in *Buena Park Today*.
  - Mr. Charnes mentioned that for fifteen years, the federal and state governments have been encouraging people to organize as communities and prepare to help each other, yet very few have done it. He pointed out that there's no shortage of information about *how* to do it, but people have to *want* to do it. The City can't make them do it.
- Will anyone in the audience take any of the personal mitigation steps mentioned in the presentation?
  - A few people said they might secure their cabinets.
  - The Library representatives said their employees had been trained to shut off the gas. The Library has also secured its shelving.

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  - Mr. Morgan said the McIntosh Center had strapped down its computer printers, and that its employees had CPR training.
  - Jesse Lujan said that Knott's Berry Farm is planning to retrofit older buildings over the next five years.
- What will be necessary to get people to do more to mitigate hazards in their own homes or businesses?
  - Rebates on gas or water bills.
  - Lists of qualified contractors.
- Would the audience would support mandatory retrofits on homes or businesses to mitigate seismic or flood hazards?
  - No support for mandatory retrofits.
  - Require notifications to tenants and release of liability.
- Would the audience support a bond issue or sales-tax increase to fund public mitigation measures?
  - The audience did not commit one way or the other.
  - There was general agreement that any such bond or tax increment would need to be handled like Measure M, with specific projects spelled out and budgeted.

Mr. Brodowski concluded the meeting by saying that this information may be included in the draft Local Hazard Mitigation Plan. When that draft is completed, there will be another public meeting to go over it.

The meeting adjourned at 8:30.

Exhibit: Whole Community Working Group Minutes – April 5, 2017

BUENA PARK WHOLE COMMUNITY PLANNING GROUP
5 April 2017, 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

Moderators: Doug Brodowski, Senior Management Analyst, Buena Park Public Works
714-562-3652; dbrodowski@buenapark.com
Lance Charnes, Emergency Services Coordinator, City of Buena Park
714-562-3960; lcharnes@bppd.com

Attendance

Name	Organization
Mike Anderson	Buena Park School District
Mark Stevenson	Buena Park School District
Bruce Morgan	Dayle McIntosh Center
Louie LeMonnier	Hope School (AUHSD)
Robert Grajeda	Knott's Berry Farm
Jesse Lujan	Knott's Berry Farm
Kelly Zimmerman	Orange County Fire Authority

The meeting convened at 1:15 p.m.

1. Introduction to mitigation

Lance Charnes began the session by explaining that this meeting was a follow-up to the meeting in October 2015 concerning the City's Local Hazard Mitigation Plan. This meeting is meant to review the draft LHMP with members of the community and to receive and discuss their comments, questions, and ideas.

Mr. Charnes began a mitigation slide presentation that would guide the rest of the discussion. He introduced the definition of mitigation, the general types of mitigation, and the purpose of an LHMP.

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2. Local hazards overview

Mr. Charnes presented a list of hazards likely to visit Buena Park and their probable effects, including:

- Earthquakes
- Floods
- Heat emergencies
- HAZMAT accidents
- Prolonged blackouts/rolling brownouts
- Severe weather
- Terrorism

He then highlighted the three hazards considered the most pressing by the LHMP Planning Group (earthquakes, floods/dam failures, and drought) and detailed their possible effects on Buena Park, using research materials and figures drawn from the LHMP.

3. Proposed mitigation actions

Mr. Charnes presented a list of the 47 multi-hazard mitigations actions, eight earthquake-specific mitigation actions, thirteen flood-specific mitigation actions, and seven drought-specific mitigation actions contained in the LHMP's Mitigation Actions Matrix. Each was color-coded to show which are existing, ongoing initiatives and which are new projects. Because most of the attendees said they had read the draft Plan, Mr. Charnes asked if they wanted to review or discuss specific mitigation actions, which led to the bulk of the discussion.

4. Questions/discussion

The discussion:

- Bruce Morgan of the Dayle McIntosh Center introduced the issue of emergency transportation services for those with special needs. He suggested this need should be specifically noted and addressed in the LHMP.
    - Mr. Charnes said this kind of transportation planning would be easy to add as a multi-hazard mitigation action.

- Louie LeMonnier of the Hope School asked for more details about early warning systems (MH-11 in the 15 March LHMP draft).
    - Mr. Charnes said that AlertOC is the City's primary mass-notification system. There are other methods available to the City: route alerting, which can cover a small area, and EAS and WAP (controlled by the County) that are very wide-reaching.
    - Mr. Morgan asked if the City has alarms or horns to alert the public to a disaster.
    - Mr. Brodowski said that what little there was of the old Civil Defense audible alarm system has been decommissioned.

- Mr. Morgan asked about the housing and industry breakdowns in Section 2 of the LHMP, specifically, why aren't skilled care homes and senior housing included in the numbers?

- Mr. Charnes said the breakdown of housing stock was meant to illustrate structural types of residential development, not its uses. The City has data on all CDSS- and CDPH-licensed facilities in the City, including any organic transport and backup power. The information is in the City's GIS and can be accessed in the EOC.
- Mr. Morgan asked if the data extends to over-55 apartments. He said that these types of multi-unit housing are a special challenge for responders because of the concentration of so many people who may have access or functional needs.
- Mr. Charnes said that this type of information would be useful for responders, but not necessarily in the LHMP, which is unlikely to be used during an emergency response. Compiling the information and keeping it current is much harder than for the CDSS/CDPH properties because there's no licensing requirement. It will take a fair amount of time to get even a partial list.
- Mr. Morgan suggested that the City's Senior Center may have information about 55+ housing that can serve as a start. He also volunteered to see if there is additional information available to DMC that he can forward.
- Mr. Charnes said he would contact the Senior Center in coming days and would welcome any additional information Mr. Morgan can provide. The structure for keeping and accessing this kind of data is already in place; the hard part will be getting the data.

Mr. Charnes concluded the meeting by outlining the next steps the draft LHMP will go through on its road to approval. He said that any subsequent drafts of the Plan will be available in the same place on the City's website.

The meeting adjourned at 2:30.

Exhibit: Invitation to the October 12, 2015 WCWG meeting

From: Brodowski, Douglas
Sent: Monday, September 21, 2015 11:37 AM
To: marta.armstrong@knotts.com; bangh@autonation.com; camilo.bruce@marriott.com; dbryson@gchope.org; zchiranian@premierautomotive.com; chefseancoats@gmail.com; jcoombs@fjuhsd.net; ccordray@bpsd.k12.ca.us; victor.coronado@pepsico.com; juliod@piratesdinneradventure.com; rdutter@vestar.com; anthonyespinosa@ocfa.org; m.fleming@farrellsusa.com; daniel.galbraith@amway.com; peteganahl@ganahl.com; greghalibozek@ufcw324.org; m61053bo@motel6.com; mhatherill@stpius5school.net; E.Heileman@farrellsusa.com; randy_helms@cesd.us; scott@superiorsignsandgraphics.com; hung_j@auhsd.us; Rod@radissonsuitesbp.com; jajones.s05032.us@wal-mart.com; raffi.kaprelyan@knotts.com; michaelsk13@gmail.com; kurt@kengrodyford.com; lemonnier_l@auhsd.us; lew_c@auhsd.us; slewis@stpius5school.net; Magnuson, Greg; Greg.Maldonado@knotts.com; david.manuel@medievaltimes.com; martins_r@auhsd.us; Novack, Elizabeth; artie@americasprinter.com; jparlet@johnspizza.com; josh.proctor@target.com; eramirez@edcodisposal.com; mikereazuddin@gmail.com; sam.rehnborg@amway.com; Salazar.Silvia@dol.gov; marcelos@shellybmw.com; Tom.Sarnecki@ororagroup.com; madeline.sherman@searshc.com; Dsimpson@SimpsonAutomotive.com; javier.solis@hibuenapark.com; solorzano_t@auhsd.us; Steffen, David; Russ.Sutter@nutrilite.com; viviana.talavera@ororagroup.com; tdtrout@theplaceforkids.org; tony.ugliano@blackbeardiner.com; alexuniack@ganahl.com; vvaughn1973@yahoo.com; john.webb.qukv@statefarm.com; evelyn.whalen@marriott.com; jesse.lujan@knotts.com; harredondo@fjuhsd.k12.ca.us; joshua.swisher@seaaca.org; pdonnelly@earthlink.net; lrodehaver@hotmail.com; bprotaryclub@aol.com; sibuenapark@soroptimist.net; smiwamoto@suburbanoptimistclub.org; johnmuller@firstteam.com; office2046 @sbcglobal.net; admin@loom1945.org; info@kofc-bp.org; info@historicalsociety.org; wendy@thebpcc.org; INFO@THEPLACEFORKIDS.ORG; pastor@anaheimcrc.org; pastordonharbert@me.com; admin@anaheimcrc.org; matsuda_m@auhsd.us; solorzano_t@auhsd.us; cchaney@schoolsfirstfcu.org; jbhultman@yahoo.com; jcoombs@fjuhsd.net; harredondo@fjuhsd.net; marymac@buenapark.lib.ca.us; Magnuson, Greg; diane_scheerhorn@cesd.us; lorraine_test@cesd.us; sherry_martinez@cesd.us; folaoshebikan@ochca.com; mibanez@ochca.com; rsimpson@cypresscollege.edu; randy_helms@cesd.us; jwilliams@fjuhsd.k12.ca.us; kstichter@fjuhsd.k12.ca.us; lew_c@auhsd.us; pastordonharbert@me.com; superintendent@savsd.org; jerry.friedman@savsd.org; ona.sandi@savsd.org; mhatherill@stpius5school.net; Lisa.Babilonia@ocparks.com; bishopbrodowski@gmail.com; bmorgan@daylemc.org; sconlin@bpsd.k12.ca.us; amanda.knitter@lung.org
Cc: Charnes, Lance; Carolyn Harshman; Kim Guevara-Harris; Dave Cooper; Crystal Chambers
Subject: October 12, 2015 meeting of Emergency Plan Community Group

Hello everyone. The next meeting of our Community Group is Monday, October 12, at 6:30 pm. The location is the city council chamber at 6650 Beach Boulevard. This is the third of four planned meetings as we develop the City's Emergency Operations Plan and Local Hazard Mitigation Plan. As this work progresses it is important to share it with you, the public and key leaders, and to obtain your input and insight so that these plans will meet the needs of our diverse community.

1

An additional benefit of meeting with you is that we can identify other needs of our community. For example, based on our discussions with many of you we identified an interest in creating an emergency plan working group which will continue meeting into the future. The goal of this group is to roll up our sleeves together and focus on the development of emergency response plans for the various agencies and companies in our community that want or need assistance in these tasks. Most of us do not do emergency planning on a regular basis and it is not the key focus of our job responsibilities. So it is very helpful to be able to reach out and meet other professionals that may have more experience than we do. This is a great opportunity for you if you are the designated person to development and maintain these plans. You can expect to hear more from us in this regard.

I look forward to seeing you October 12.

Doug Brodowski
Senior Management Analyst
Public Works Department
City of Buena Park
(714) 562-3652

2

Exhibit: Invitation to the April 5, 2017 WCWG meeting and notice of the Draft LHMP public posting

From: Brodowski, Douglas
Sent: Tuesday, March 21, 2017 2:59 PM
To: Brodowski, Douglas
Subject: City Meeting to Review and Take Comments on Buena Park Local Hazard Mitigation Plan

Hi. Each of you previously received emails regarding the development of the City's Local Hazard Mitigation Plan – and some of you attended a meeting at City Hall last year. Since that time we have developed the final draft plan and want to share it with you. This is a plan to reduce our 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. Please plan to meet with us Wednesday, April 5, at 1:00 pm at the council chambers at 6650 Beach Boulevard. The meeting will last about one hour – or until you run out of questions and we run out of answers! You can preview the plan at http://www.buenapark.com/residents/city-documents and you can provide comments, or ask questions, by sending an email to city@buenapark.com. We look forward to seeing or hearing from you!

Doug Brodowski
Senior Management Analyst
Public Works Department
City of Buena Park
(714) 562-3652

This email was sent to members of the Police Chief's Stakeholder Group, as follows:

Contact	Title/Role	Organization
Anderson, Mike		Buena Park School District
Armstrong, Marta	Administrative Assistant to GM	Knott's Berry Farm
Arredando, Hilda	Asst. Principal Student Affairs	Buena Park High School
Babilonia, Lisa	Clark Paleontology Museum	Clark Regional Park
Bang, Hosung	Mercedes Benz Representative	House of Imports - Mercedes Benz
Brodowski, Brent	Buena Park Ward Bishop	LDS Church
Bruce, Camilo	General Manager	Courtyard by Marriott
Bryson, Drew	Development Director	Giving Children Hope
Cheney, Carol	President	Buena Park School District Education Foundation
Chiranian, Zareh	General Manager	Premier Chevrolet
Coats, Sean		
Conlin, Sarah		Buena Park Collaborative
Coombs, Jim	Principal	Buena Park High School
Cordray, Carma	Exec. Assistant, Superintendent	Buena Park School District
Coronado, Victor	Plant Director	Pepsi Bottling Group
Duran, Julio	General Manager	Pirates Dinner Adventure
Dutter, Robert	Operations Manager	Vestar (manages Buena Park Downtown)

Contact	Title/Role	Organization
Erickson, Carol		Fullerton Joint Union HSD
Espinosa, Anthony	Battalion Chief	OCFA
Fleming, Michael	CEO, Parlour Enterprises	Farrell's
Friedman, Jerry	Principal of Holder School	Savanna School District
Galbraith, Daniel		Amway (Nutrilite)
Ganahl, Pete	President	Ganahl Lumber
Halibozek, Greg	Vice President	United Food & Commercial Workers Local 324
Harbert, Don	Representative	Ministerial Association
Harris, Noemi	General Manager	Motel 6
Hatherill, Marianne	Assistant Principal	St. Pius V Catholic School
Heileman, Erich	General Manager	Farrell's
Helms, Randy L.	Deputy Superintendant	Centralia Elementary School District
Hoffman, Scott	Owner	Superior Signs & Graphics
Hultman, Jon	President	Buena Park Council of PTAs
Hung, Jennifer	Teacher, Computer/Business	Hope School (Anaheim Union HSD)
Hurt, Rod	General Manager	Radisson Suites BP
Ibanez, Marinet	Program Manager	County of Orange WIC Program
Johnson, Sue	Superintendent	Savanna School District
Jones, Jeanna	Store Manager	Walmart
Kaprelyan, Raffi	General Manager	Knott's Berry Farm
Kim, Michael	Owner	Brookhurst Tow
Knitter, Amanda		Buena Park Collaborative
LeMonnier, Louie	Assistant Principal	Hope School (Anaheim Union HSD)
Lew, Cherylin	Principal	Hope School (Anaheim Union HSD)
Lewis, Sandy	Principal	St. Pius School
Lujan, Jesse		Knott's Berry Farm
Magnuson, Greg	Superintendant	Buena Park School District
Maldonado, Greg	Director, General Services	Knott's Berry Farm
Maletych, Kurt	Vice President/Co-Owner	Ken Grody Ford
Manuel, David	Marketing Manager	Medieval Times
Martinez, Sherry	Office Manager	Centralia School District
Martins, Rick	Director, Student Support Services	Anaheim Union HSD
Matsuda, Michael	Superintendent	Anaheim Union High School District
McCasland, Mary	Library Director	Buena Park Library District
Morgan, Bruce	Transition, Employment & Safety	Dayle McIntosh Center
No rep appointed		Coordinating Council
No rep appointed		Elks
No rep appointed		Historical Society
No rep appointed		Knights of Columbus
No rep appointed		Moose
No rep appointed		Noon Lions
No rep appointed		Optimists
No rep appointed		Rotary
No rep appointed		Soroptimists

Contact	Title/Role	Organization
No rep appointed		VFW
No rep appointed		WOCRCC
Novack, Elizabeth	Superintendent	Anaheim Union HSD
Olaoshebikan, Felishia	Nutrition Clinic Supervisor	County of Orange WIC Program
Parent, Artie	President	America's Printer
Parlet, John	Owner/Founder	John's Incredible Pizza Company
Proctor, Josh	Asset Protection	Target
Ramirez, Efrain	VP & General Manager	EDCO Disposal
Reazuddin, Michael	Director of Operations	Best Host Inn
Rehnborg, Sam		Amway (Nutrilite)
Salazar, Silvia	Community Outreach Specialist	U.S. Dept. of Labor
Sandi, Ona	Asst. Superintendent	Savanna School District
Sandoval, Marcelo	General Sales Manager	Shelly BMW
Sarnecki, Tom	VP Human Resources	Orora Group
Scheerhorn, Diane	Superintendent	Centralia School District
Sherman, Madeline	General Manager	Sears
Simpson, Bob	President	Cypress College
Simpson, Dave	President	Simpson Buick-GMC
Solis, Javier	General Manager	Holiday Inn
Solorzano, Trudy	Sr. Exec. Assistant, Superintendent	Anaheim Union HSD
Steffen, David	Division 7 Chief	OCFA
Stichter, Ken	Interim Superintendent	Fullerton Joint Union High School District
Sutter, Russ	Supervisor, Protection Services	Nutrilite
Swisher, Johnathan		SEAACA
Talavera, Viviana	HR, Amcor Packaging, Upland	Orora Group
Test, Lorraine	Exec. Dir. Curriculum & Instruction	Centralia School District
Trout, Todd	Chief Professional Officer	Boys & Girls Club
Ugliano, Tony	General Manager	Black Bear Diner
Uniack, Alex	General Manager, Laguna Beach	Ganahl Lumber
Vaughn, Virginia	Councilwoman	City of Buena Park
Webb, John	Owner	State Farm
Whalen, Evelyn	General Manager	Fairfield Inn & Suites
Williams, Jennifer	Dir. of Admin. Services	Fullerton Joint Union High School District

Some addressees attended the WCWG meeting on April 5. The City received no comments from the online Plan posting.

Exhibit: Flyer posted to announce the Draft LHMP online posting and call for comment

Buena Park Local Hazard Mitigation Plan (LHMP)

A Local Hazard Mitigation Plan (LHMP) 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 the draft plan and comment on what's in it.

Read the plan online at
http://www.buenapark.com/residents/city-documents.

Send your comments to city@buenapark.com.

Or, attend the
PUBLIC MEETING
Wednesday, April 5, 2017 at 1:00 p.m.
Buena Park City Hall, City Council Chamber

This flyer was posted inside and outside the City Hall and in the Buena Park Library on March 15, 2017. The City received no responses.

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Section 10: Plan Maintenance

The Plan Maintenance section of this document 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.

Method and Scheduling of Plan Implementation[82]

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 Credits (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					X
Evaluating					
Internal Planning Team evaluation	X	X	X	X	X
Cal OES and FEMA evaluation					X

Monitoring and Implementing the Plan

Plan Adoption

Adoption of the Mitigation Plan by the City's governing body is one of the prime requirements for approval of the Mitigation Plan. Once the plan is completed, the City Council will be 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 future growth and development of the City.

Once the City Council adopts the Plan, the City Manager will submit it to the State Hazard Mitigation Officer at California Emergency Management Agency (Cal OES). Cal OES will then submit the plan to the Federal Emergency Management Agency (FEMA) for review and approval. This review will address the requirements set forth in 44 CFR Section 201.6 (Local Mitigation Plans). Upon acceptance by FEMA, the City will gain eligibility for Hazard Mitigation Grant Program funds.

Planning Team

The Planning Team will take responsibility for Plan maintenance and implementation once it's adopted. The Emergency Services Coordinator will serve as chairperson to facilitate the

[82] **ELEMENT A: PLANNING PROCESS | A6**
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

Planning 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 Planning Team members. The Emergency Services Coordinator will have authority to prepare and approve future amendments to the Mitigation Plan, with 5-year updates to FEMA resubmitted to the City Council for adoption.

The Planning Team will be responsible for coordinating implementation of Plan action items and undertaking the formal review process. The Chairperson will assign representatives from City departments, divisions, and agencies, including, but not limited to, the current Planning Team.

In order to make the Planning Team as broad and useful as possible, the Emergency Services Coordinator may choose to involve other relevant organizations and agencies in hazard mitigation. These additional appointments could include:

- A representative from the American Red Cross
- A representative from a county government emergency response agency
- A representative from the local business community

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

Implementation through Existing Programs[83]

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

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

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83 **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))

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. The meetings of the Planning Team will provide an opportunity for Planning Team members to report on the progress made on the integration of mitigation planning elements into City planning documents and procedures.

Economic Analysis of Mitigation Projects

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

Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later.

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

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

FEMA Benefit-Cost Analysis Guidelines

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

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

The BCA program consists of guidelines, methodologies and software modules for a range of major natural hazards. The ones most applicable to the City include:

- Flood (Riverine, Coastal Zone A, Coastal Zone V)
- Damage-Frequency Assessment

- Earthquake
- Wildfire

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

Evaluating and Updating the Plan[84]

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 evaluation process includes a firm schedule and timeline, and identifies the agencies and organizations participating in plan evaluation. The 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.

The Planning Team will review the goals and action items to determine their relevance to changing situations in the City, as well as changes in state or federal policy, and to ensure they are addressing current and expected conditions. The Planning Team will also review the Plan's *Section 3: Risk Assessment* to determine if this information should be updated or modified, given any new available data. The coordinating organizations responsible for the various action items will report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised.

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 Involvement[85]

The City is dedicated to involving the public directly in the continual review and updates to the Mitigation Plan. Copies of the plan will be catalogued, posted on the City website, and made available at City Hall and at the Buena Park Public Library. The existence and location of these copies will be publicized in City newsletters and on the City website. This site will also contain

[84] **ELEMENT A: PLANNING PROCESS | A6**
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

[85] **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))

an email address where people can direct their comments and concerns. A public meeting will also be held after each evaluation or when deemed necessary by the Planning Team. The meetings will provide the public a forum in which they can express their concerns, opinions, or ideas about the Plan.

The City Manager's Office will publicize the annual public meetings and maintain public involvement through the public access channel, City website, and newspapers.