

CITY OF ANAHEIM

GENERAL PLAN SAFETY ELEMENT

PUBLIC REVIEW DRAFT

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CITY OF ANAHEIM

SAFETY ELEMENT

REVISED 2022

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INTRODUCTION

Anaheim is characterized by a mixture of flat areas in the western portion of the City and steep hillside areas with gullies, arroyos, and rugged canyon bottoms in the eastern portion. These changes in topography help create a variety of hazardous conditions that can impact the community. The risks faced by Anaheim include wild and urban fire events, earthquakes, unstable geology, flooding, and the potential for dam inundation. The city has experienced a variety of these events on different occasions throughout the years. To compound matters, the impact of a changing climate is likely to intensify future events increasing risks to the community. Drier and hotter conditions will likely increase fire risk and potentially impact future water supplies, while wetter and more intense winter storms could inundate new areas within the community. These climatic changes may also exacerbate slope instability causing landslides within the city's hillsides.



Historic Photo of Anaheim, CA

ACHIEVING THE VISION

The Safety Element is one of seven mandatory elements of the General Plan. Its primary purpose is to identify potential risks within the City that could endanger the community's public health, safety, and welfare. Periodic updates of the Safety Element ensure that goals and policies are relevant and responsive to community needs. Each Safety Element must also geographically identify the location and potential extent of the risks exposed to the community, which primarily includes hazards surrounding seismicity, flooding, and fires, using maps.

The City of Anaheim reaffirms the importance of protecting the community from potential natural hazard risks. The city's location and history with hazards make it likely that Anaheim will experience risks from seismic, flooding, and wildfire events in the future. Anaheim can also expect that some of these risks will worsen as climate change accelerates. With this in mind, the Safety Element, in conjunction with the LHMP, is the best avenue to understand and address natural hazard risks within the community.

RELATIONSHIP TO OTHER DOCUMENTS AND REGULATIONS

Related General Plan Elements

The Anaheim Safety Element is an essential component of the General Plan and works in tandem with the following other elements to guide these efforts.



Housing Element

- Identifies policies used to guide the development of new housing and the future population increases expected within the City. The Safety Element can help ensure new residents are located in low-risk areas and make sure the latest codes and standards are followed.

Land Use Element

- Ensures the City understands and addresses the natural and human-caused hazards affecting the community by designating the appropriate land uses in hazardous locations.

Circulation Element

- Can influence public health and safety by addressing traffic congestion on roads designated as evacuation routes during emergencies and by redefining truck routes to avoid residential and other heavily populated areas.

Community Design Element

- Focuses on policies and programs to address city and district level design elements and features and create a strong community identity.

Green

- Focuses on advancing sustainable goals and policies focused on stormwater management, energy conservation, building performance, and landscaping to ensure a more resilient future for Anaheim.

Growth Management Element

- Focuses on the effective management of population growth and development within the City.

Public Services and Facilities Element

- Focuses on the provision of key services like utility (water/sewer/electric), police, and fire, and ensuring these services expand to meet future demands.

Consistency with Local Hazard Mitigation Plan

The [Local Hazard Mitigation Plan \(LHMP\)](https://www.anaheim.net), approved and adopted on May 19, 2022, serves three primary purposes: 1) it provides a comprehensive analysis of the natural and human-caused hazards that threaten the city, with a focus on mitigation; 2) it keeps the City of Anaheim eligible to receive additional federal and state funding to assist with emergency response and recovery, as permitted by the federal Disaster Mitigation Act of 2000 and California Government Code Sections 8685.9 and 65302.6; and 3) it complements the efforts undertaken by the Safety Element. The LHMP complies with all requirements set forth under the federal Disaster Mitigation Act of 2000 and received approval from the Federal Emergency Management Agency (FEMA) in 2018. Sections of the Safety Element are supplemented by the LHMP, incorporated by reference in this element, as allowed by California Government Code Section 65302(g). The hyperlink above provides access to this document, or you can visit the City's website (<https://www.anaheim.net>).



Regulatory Environment

California Government Code 65302(g)(1)

California Government Code Section 65302(g)(1) establishes the legislative framework for California's Safety Elements. This framework consolidates the requirements from relevant federal and state agencies, ensuring that all cities are compliant with the numerous statutory mandates. These mandates include:

- Protecting against significant risks related to earthquakes, tsunamis, seiches, dam failure, landslides, subsidence, flooding, and fires as applicable.
- Including maps of known seismic and other geologic hazards.
- Addressing evacuation routes, military installations, peak-load water supply requirements, and minimum road widths and clearances around structures as related to fire and geologic hazards, where applicable.
- Identifying areas subject to flooding and wildfires.
- Avoiding locating critical facilities within areas of high risk.
- Assessing the community's vulnerability to climate change.
- Including adaptation and resilience goals, policies, objectives, and implementation measures.

California Government Code Sections 8685.9 and 65302.6

California Government Code Section 8685.9 (also known as Assembly Bill 2140 or AB 2140) limits California's share of disaster relief funds paid out to local governments to 75 percent of the funds not paid for by federal disaster relief efforts. However, if the jurisdiction has adopted a valid hazard mitigation plan consistent with DMA 2000 and has incorporated the hazard mitigation plan into the jurisdiction's General Plan, the State may cover more than 75 percent of the remaining disaster relief costs. All cities and counties in California must prepare a General Plan, including a Safety Element that addresses various hazard conditions and other public safety issues. The Safety Element may be a standalone chapter or incorporated into another section as the community wishes. California Government Code Section 65302.6 indicates that a community may adopt an LHMP into its Safety Element if the LHMP meets applicable state requirements. This allows communities to use the LHMP to satisfy state requirements for Safety Elements. As the General Plan is an overarching long-term plan for community growth and development, incorporating the LHMP into it creates a stronger mechanism for implementing the LHMP.

**California Government Code 65302 (g) 3 adopted through SB 1241 (Effective 2014/ Adopted 2012)**

California Government Code Section 65302 (g) 3 requires the Safety Element to identify and update mapping, information, and goals and policies to address wildfire hazards. As part of this requirement, any jurisdiction that includes State Responsibility Areas or Very High Fire Hazard Severity Zones (VHFHSZ) in the Local Responsibility Areas (LRA), as defined by the California Board of Forestry and Fire Protection (Board), is required to transmit the updated element to the Board for review and approval. The City has VHFHSZs located within the LRA and therefore complies with this requirement.

California Government Code 65302 (g) 4 adopted through SB 379 (Effective 2017/ Adopted 2015)

California Government Code Section 65302 (g) 4 requires the Safety Element to address potential impacts of climate change and develop potential strategies to adapt/mitigate these hazards. Analysis of these potential effects should rely on a jurisdiction's Local Hazard Mitigation Plan or an analysis that includes data and analysis from the State of California's Cal-Adapt website. The City completed a Climate Adaptation Vulnerability Assessment that is incorporated into the Safety Element and LHMP to ensure compliance with this requirement.

California Government Code 65302 (g) 5 adopted through SB 99 (Effective 2020/ Adopted 2019)

California Government Code Section 65302 (g) 5 requires the Safety Element to identify evacuation constraints associated with residential developments, specifically focused on areas served by a single roadway. This analysis has been incorporated into this element to ensure compliance with this requirement.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) was created in 1968 to help communities adopt more effective floodplain management programs and regulations. The Federal Emergency Management Agency is responsible for implementing the NFIP and approves the floodplain management plans for participating cities and counties. Anaheim participates in the NFIP and uses Chapter 17.28 Flood Hazard Reduction of the Anaheim Municipal Code to administer flood management regulations throughout the city.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (California Public Resources Code [PRC], Chapter 7.5, Section 2621-2699.6) was intended to reduce the risks associated with surface faults and requires that the designated State Geologist identify, and map "Earthquake Fault Zones" around known active faults. Per PRC Section 2623 a, cities and counties shall require a geologic



report defining and delineating any hazard of surface fault rupture before the approval of a project. If the jurisdiction finds no undue hazard of that kind exists, the geologic report on the hazard may be waived, with the State Geologist's approval. For a list of project types, please refer to PRC Section 2621.6. There are no Alquist-Priolo Earthquake Fault Zones that run through Anaheim; therefore, it is not a topic of concern addressed in this element.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (California Public Resources Code, Chapter 7.8, Section 2690-2699.6) created a statewide seismic hazard mapping and technical advisory program in 1990 to help cities and counties more effectively address the effects of geologic and seismic hazards caused by earthquakes. Under PRC 2697, cities and counties shall require a geotechnical report defining and delineating any seismic hazard before approving a project located in a seismic hazard zone. If the jurisdiction finds that no undue hazard of this kind exists based on information resulting from studies conducted on sites near the project and of similar soil composition to the project site, the geotechnical report may be waived. After a report has been approved or a waiver granted, subsequent geotechnical reports shall not be required, provided that new geologic datum, or data, warranting further investigation is not recorded. Each jurisdiction shall submit one copy of each approved geotechnical report, including the mitigation measures to be taken, if any, to the State Geologist within 30 days of its approval of the report. For a list of project types, please refer to PRC Section 2693. Landslide and liquefaction hazards are prevalent within the City and are addressed within this element.

Cortese List

Government Code Section 65962.5 (typically referred to as the "Cortese List") identifies sites that require additional oversight during the local permitting process as well as compliance with the California Environmental Quality Act (CEQA). The list is generally a compilation of properties and businesses that generate, store, and/or have been impacted by the presence of hazardous materials/wastes. Many properties identified on these lists may be undergoing corrective action, cleanup, or abandoned and in need of these activities. The City maintains updated lists for these types of properties and should be referenced during the development review process.



GOALS AND POLICIES

The following goals and policies have been updated and revised to address the current and future needs of Anaheim. New goals are identified using the following text (*NEW GOAL*), while new policies are identified using the following (*New Policy*). If existing policies were revised, they have been identified using the following text (*Revised Policy*). In some cases, the original policy may have been identified in the annotated text. If no annotation is provided, then the policy is the same as the previous Safety Element.

SEISMIC AND GEOLOGIC HAZARDS

Seismic and geologic hazards are traditionally addressed together because they both involve the movement of the Earth's surface. Although some geologic events (landslide, subsidence, erosion, etc.) can and do happen independently, the primary catalyst for their occurrence is often a seismic event, commonly referred to as an earthquake. This section identifies four common seismic and geologic hazards that threaten Anaheim and establishes policies meant to protect the community when an event occurs. A key consideration for seismic and geologic hazards is the potential for cascading effects resulting from an event. When an earthquake occurs, the seismic shaking can cause natural gas and water/sewer pipelines to rupture, which can cause other impacts like flooding, erosion, or fires. The goals and policies throughout this element are designed to work together to reduce both the individual and collective risk of these hazards.

Seismic Hazards

Southern California is no stranger to earthquakes, and their frequent occurrence is widely accepted as a fact of life. Anaheim is prone to seismic hazards due to its location in a seismically active region. These hazards can be divided into three categories, each with unique characteristics and implications for planning.

Surface Rupture

The Earth is covered in tectonic plates, which are large sections of the Earth's crust that are constantly shifting and moving closer together, further apart, or past one another. The movement of two plates past one another frequently causes friction resulting in plates that "stick." When this occurs, the same forces that push the plates past each other are now concentrated in certain areas. In time, friction can no longer hold the plates together, and the plates suddenly shift, releasing the massive build-up of energy (i.e., earthquake). This rapid movement and release of energy can cause the Earth to fracture and displace the land around it, resulting in an earthquake fault. Some faults are buried beneath the surface, and others are located at the surface of the Earth. Surface rupture of a fault is especially dangerous if structures are built on top of the fault or infrastructure crosses the fault, because these facilities could be damaged by fault movement. If a surface rupture occurs, the movement could break pipelines, damage roads and bridges, rendering them useless after the event. Areas of known surface rupture hazard in California are



identified in Alquist-Priolo Special Study Zones. Anaheim does not currently have any Alquist-Priolo Special Study Zones at this time. Fortunately, many seismic events do not cause surface ruptures and instead disperse the energy exclusively in the form of seismic shaking.

Seismic Shaking

Seismic shaking is the recognizable movement caused by the energy released from an earthquake. The same mechanism that creates a surface rupture is also responsible for seismic shaking and can produce an equally devastating effect. Buildings and other structures may be destroyed because of violent shaking. Infrastructure such as roads, pipelines, and power lines are also susceptible to damage and pose additional safety concerns. Unlike surface rupture, seismic shaking consequences are not restricted to the area immediately surrounding the fault. Energy resonating through the ground can travel hundreds of miles and cause damage in many locations simultaneously. The closer to the earthquake's source (epicenter), the stronger the shaking will be.

Seismic shaking is of particular concern for the City of Anaheim due to the proximity to active faults that can generate significant earthquakes. The Anaheim LHMP identifies that there is up to a 20% probability of a magnitude 6.7 or greater earthquake to occur along numerous faults within southern California in the next 20 years. The highest probability (20%) is projected for the San Andreas fault, located approximately 39 miles east of the city. While the closest fault (Peralta Hills) is approximately 1.5 miles from the city and is estimated to have a less than 1% probability of generating a 6.7M earthquake or greater. **Figure S-1** depicts the Seismic Shaking Potential associated with a strong earthquake. Based on this modeling Anaheim could experience strong shaking throughout most of the community.

Liquefaction

Liquefaction is a phenomenon that occurs when intense vibrations from an earthquake cause saturated soil to lose stability and act more like a liquid than a solid. This poses significant problems for buildings and other structures in areas where liquefaction can occur, as the ground may give way under the weight of the structure and its foundation. In addition, underground structures are vulnerable to liquefaction.

Multiple areas in Anaheim are at risk of liquefaction, primarily along the Santa Ana River corridor in the eastern portion of the City and the western portions of the City where shallow groundwater conditions exist. The areas most prone to liquefaction are characterized by loose sandy/silty soils that are saturated with water. In Anaheim, these areas are predominantly located along stream/river corridors or in areas of shallow groundwater. **Figure S-2** depicts the areas of potential liquefaction susceptibility based on data provided by the California Geological Survey.



Geologic Hazards

Although seismic events, such as earthquakes, often trigger geologic hazards, there are instances where events involving landslides, mudflows, and episodes of instability occur. Therefore, understanding and preparing for these hazards as standalone events is equally important.

Landslides and Mudflows

A landslide is the movement of earth materials down slopes and areas of steep topography. Although earthquakes often cause them, landslides can occur when any sloped surface can no longer support the material contained within or sitting above it. This instability can be caused by the sheer weight of the loose material or can be aided by other events such as heavy rain.



Structural Damage from 2005 Anaheim Hills Landslide
Source: OC Register, 2006

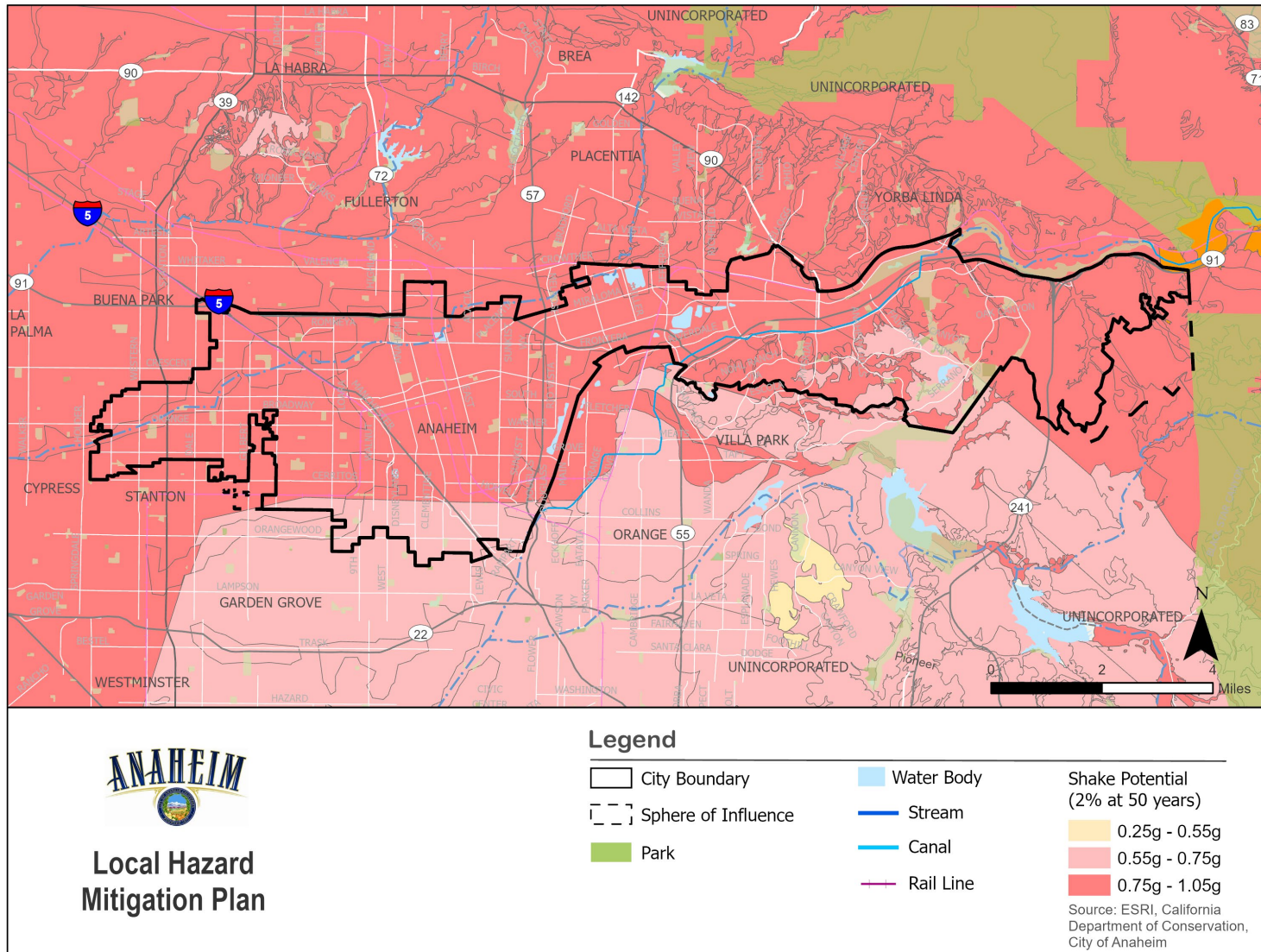
When rain causes a slope to fail, the movement of earth materials is typically referred to as a mudslide. Both landslides and mudslides move with great force and pose a significant danger to buildings and other structures. In some circumstances, these events may cause bodily harm if bystanders cannot move out of its path in time. The City was impacted by landslide events in 1993 and, most recently, in 2005.

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Anticipating the risk of landslides in the susceptible areas identified by **Figure S-3** will be essential for protecting the community members who reside there. According to the California Geological Survey, the parts of Anaheim at risk of deep-seated landslides are areas within Anaheim Hills, various parts along the SR-91 corridor, and the easternmost portion of the city.



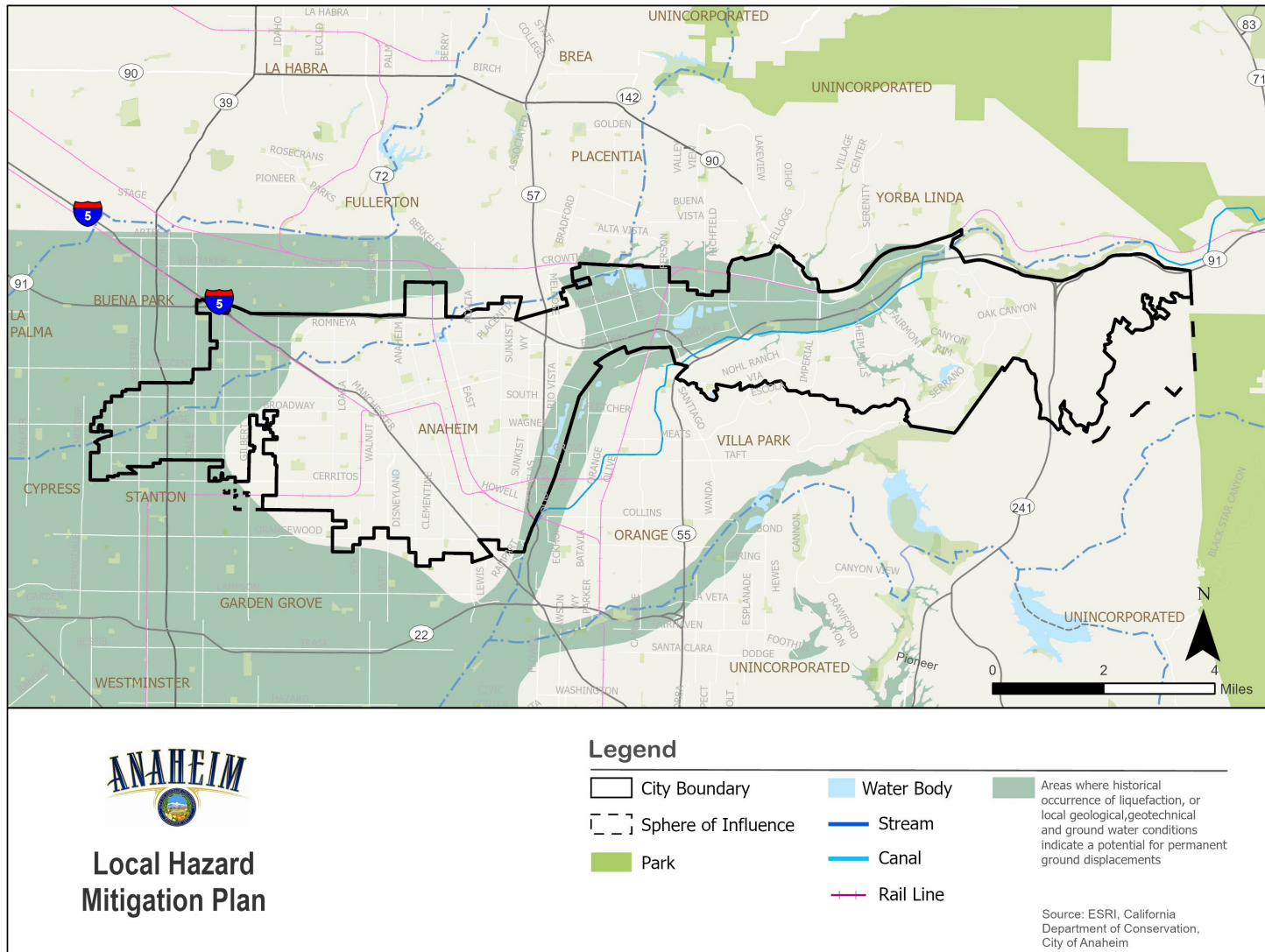
FIGURE S-1 – SEISMIC SHAKING POTENTIAL



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Local Hazard Mitigation Plan



FIGURE S-2 – LIQUEFACTION PRONE AREAS





GOAL 1.1: A COMMUNITY PREPARED AND RESPONSIVE TO SEISMIC AND GEOLOGIC HAZARDS. *(NEW GOAL)*

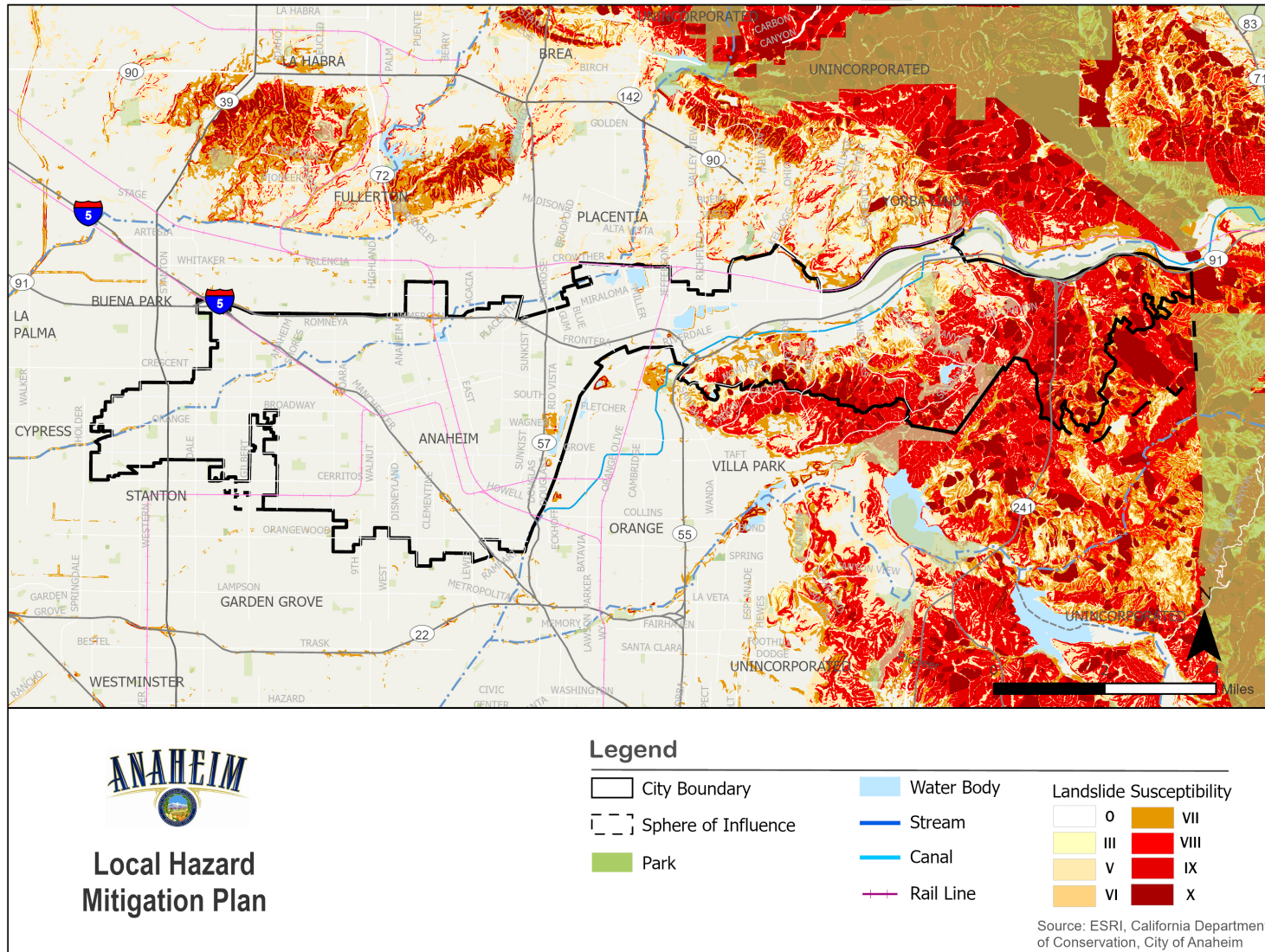
Policies

1)	Minimize the risk to public health and safety and disruptions to vital services, economic vitality, and social order resulting from seismic and geologic activities. <i>(Revised Policy)</i>
2)	Minimize the risk to life and property through the identification of potentially hazardous geologic areas. <i>(Revised Policy)</i>
3)	Require geologic and geotechnical investigations in areas of potential seismic or geologic hazards as part of the environmental and/or development review process for all structures. <i>(Revised Policy)</i>
4)	Enforce structural setbacks from faults and other geologic hazards identified during the development review process. <i>(New Policy)</i>
5)	Enforce the requirements of the California Seismic Hazards Mapping and Alquist-Priolo Earthquake Fault Zoning Acts when siting, evaluating, and constructing projects within the City. <i>(Revised Policy)</i>
6)	Require that engineered slopes be designed to resist earthquake-induced failure.
7)	Require removal or rehabilitation of hazardous or substandard structures that may collapse in the event of an earthquake.
8)	Require that lifelines¹ crossing a fault or located within a geologic hazard be designed to resist damage resulting from a hazard event. <i>(Revised Policy)</i>
9)	Require new construction, redevelopment, and major remodels located within potential landslide areas be evaluated for site stability, including the potential impact to other properties, during project design and review. <i>(Revised Policy)</i>

¹ Lifelines are considered water, sewer, electrical, gas facilities, and communication and transportation facilities that are needed in the event of a hazard event or natural disaster.



FIGURE S-3 – LANDSLIDE SUSCEPTIBILITY





FIRE HAZARDS

Wildfires

The most common type of natural hazards in California are wildfires, which can burn large areas of undeveloped or natural land in a short amount of time. They often begin as smaller fires caused by lightning strikes, downed power lines, or unattended campfires but may rapidly expand in size if conditions are dry and/or windy. The recent trend toward more prolonged periods of drought increases the likelihood of a wildfire occurring. Typically, wildfires pose minimal threat to people and buildings in urban areas but increasing human encroachment into natural areas increases the likelihood that bodily harm or structural damage will occur. This encroachment occurs in areas called the wildland-urban interface (WUI), which is considered an area within the high and very high fire hazard severity zone, as defined by the California Department of Forestry and Fire Protection (Cal FIRE).



*Burning structure during the 2017 Canyon Fire 2 Event
Source: OC Register, 2017*

Significant wildfires have occurred in Anaheim in the past and pose a significant threat to people and property. Natural, undeveloped hillsides border the developed areas within the community. Due to the Santa Ana Mountains' foothill topography, eastern Anaheim is susceptible to wildfires and in the Very High Fire Hazard Severity Zone (VHFHSZ). The Anaheim Hills along the eastern portions of the City is located within fire prone areas along the WUI interface. Past fire events have occurred in this area impacting thousands of acres of brushland and destroying or damaging numerous homes. **Figure S-4** depicts the VHFHSZs mapped throughout Anaheim along with the Critical Facilities and Facilities of Concern identified in the LHMP. According to the LHMP, critical facilities play important roles in government operations and services to the community. Examples include local government offices and yards, community centers, public safety buildings (police/fire stations), schools, and other properties deemed essential by the City. Facilities of concern are structures that play an important role in the City but are not critical to its function. Examples include city-owned or privately owned facilities such as senior assisted living homes, parks, and storage facilities.

The LHMP identifies VHFHSZs in relation to developed areas of the City and the location of critical facilities and infrastructure. In addition, the Fire Department conducts strategic planning on a regular basis to ensure fire response capabilities and personnel can adequately address current service needs throughout the City and identifies potential issues to be addressed by the Department. This Strategic Plan is completed every five years with the latest update located here: [Anaheim Fire and Rescue Strategic Plan](#).



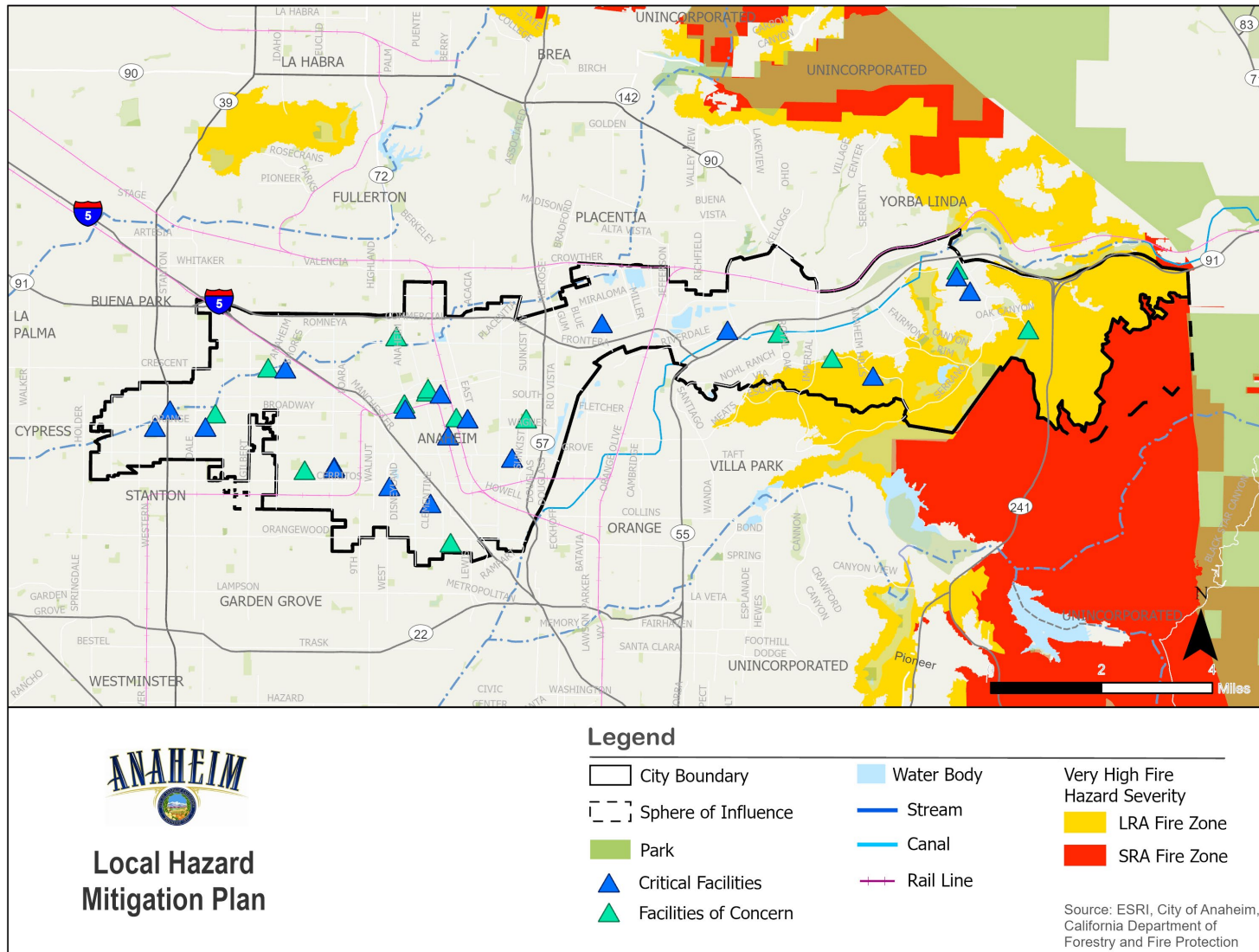
Urban Fires

The possibility of an urban fire confronts every city. Many urban fires begin as isolated incidents caused by a faulty electrical appliance, absentminded cooking mishap, or industrial malfunction but can spread to other buildings if conditions permit. Many factors contribute to an urban fire's severity and extent, but modern building codes and practices have helped reduce their effects. Despite these improvements, it is important to acknowledge the risks associated with fires in urban areas. No matter its size, any fire can cause people severe harm and can damage buildings and other structures.

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FIGURE S-4 – VERY HIGH FIRE HAZARD SEVERITY ZONES



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Local Hazard Mitigation Plan



GOAL 2.1: A COMMUNITY PROTECTED AND PREPARED FOR URBAN AND WILDLAND FIRES. *(NEW GOAL)*

Policies

1)	Protect the lives and properties of residents, businesses owners, and visitors from urban and wildland fire hazards. <i>(Revised Policy)</i>
2)	Effectively enforce City and State regulations within the VHFHSZ and incorporate new techniques and best practices as they become available to reduce future risks to existing and new developments. <i>(New Policy)</i>
3)	Develop a post-wildfire recovery framework that assists City staff, residents, and business owners in planning and recovery efforts. <i>(New Policy)</i>
4)	Minimize urban and wildland fire exposure for residents, business owners, and visitors by incorporating Fire Safe Design into existing and new developments. <i>(Revised Policy)</i>
5)	Continually assess the need for additional greenbelts, fuel breaks, fuel reduction and buffer zones around existing communities and roadways. This assessment should include long term maintenance of existing efforts and funding sources to sustain these projects. <i>(Revised Policy)</i>
6)	Maintain a weed abatement program to ensure clearing of dry brush areas.
7)	Expand vegetation management activities in areas adjacent to wildland fire prone areas. <i>(New Policy)</i>
8)	<p>Refine procedures and processes to minimize the risk of fire hazards in the Special Protection Area including requiring new development to:</p> <ul style="list-style-type: none"> • Utilize fire-resistant building materials; • Incorporate fire sprinklers as appropriate; • Incorporate defensible space requirements; • Comply with Anaheim Fire Department Fuel Modification Guidelines; • Provide Fire Protection Plans; and, • Implement a Vegetation Management Plan, which results in proper vegetation modification on an ongoing basis within the Special Protection Area. • Develop fuel modification in naturalized canyons and hills to protect life and property from wildland fires, yet leave as much of the surrounding natural vegetation as appropriate. • Require development to use plant materials that are compatible in color and character with surrounding natural vegetation. • Provide wet or irrigated zones when required. <i>(Revised Policy)</i>
9)	Use selective trimming and obtain permits when necessary in designated areas to preserve environmentally sensitive native plants. <i>(New Policy)</i>
10)	Site new essential public facilities outside of the VHFHSZ, where feasible. <i>(New Policy)</i>
11)	Evaluate feasibility of relocating essential public facilities located within the VHFHSZ to areas outside of this hazard zone. If relocation isn't possible, prioritize retrofitting and hardening of structures. <i>(New Policy)</i>



12)

Continue to classify areas of varying fire hazard severity based upon the proximity to open wildland slope, grades, accessibility, water supply and building construction features.

13)

All development projects within the VHFHSZ must prepare a Fire Protection Plan (FPP) to reduce or eliminate fire threats. FPPs shall be consistent with the following guidance: (New Policy)

A Fire Protection Plan (FPP) may be required by the fire code official for new development within the Very High Fire Hazard Severity Zones (VHFHSZ). FPPs are required to include mitigation strategies that consider location, topography, geology, flammable vegetation, sensitive habitats/species, and climate of the proposed site. FPPs must address water supply, access, building ignition, and fire resistance, fire protection systems and equipment, proper street signage, visible home addressing, defensible space, vegetation management, and long-term maintenance. All required FPPs must be consistent with the requirements of the California Building and Residential Codes, the California Fire Code as adopted by the City of Anaheim, and the City of Anaheim Municipal Code.

FLOOD AND DAM INUNDATION HAZARDS

Flood

Flooding is caused by the accumulation of water on the ground surface. This typically occurs after heavy rainfall but can also result from water delivery infrastructure failures such as pipes and storage containers. Worsening drought conditions caused by climate change may exacerbate the effects of flooding, as surfaces that typically absorb water can quickly dry out and become less permeable.



Historic Anaheim Flooding (1938)

Flooding presents multiple dangers to people

and structures alike. Standing water may be deep enough to cause drowning, and even shallow water can easily damage buildings and property. Fast-moving water is more hazardous, as it may sweep people downstream or cause extensive damage to structures.

FEMA has designated the vast majority of Anaheim as lying within the 500-year flood zone, which means there is a 0.2% chance of flooding in any given year, occurring in most parts of the City. This designation is identified as Zone X on FEMA Flood Insurance Rate Maps (FIRM). The topography of a majority of the city is relatively flat, aside from the eastern portions south of SR-91, which are comprised of hills and canyons. Given Anaheim's unique geography in this area, flood risks in this part of the City are higher. The Santa Ana River channel and levee systems (which run along the eastern portions of the city as the river flows to the coast have effectively mitigated the risk of a 100-year flood. However, it is still possible that the channel and levee system could overflow its embankments in an exceptionally powerful rainstorm.



While a majority of the City is located within the 500-year flood zone, areas along both the Santa Ana River and Carbon Creek include other FEMA designations. Portions of the Santa Ana River channel and Carbon Creek are located within the Floodway (Zones AE, AO, and AH) and the 100-Year Flood Zone (Zone A). While the areas surrounding the Santa Ana River are designated as Areas of Reduced Flood Risk Due to Levee (Zone X). **Figure S-5** illustrates these FEMA flood designations within the community.

In addition to potential flooding associated with the Santa Ana River, the city is at risk of surface drainage flooding in and around streets and storm drains. The drainage pattern in the city varies, with most runoff conveyed on street surfaces and local storm drain facilities to the regional facilities owned and maintained by the Orange County Flood Control District.



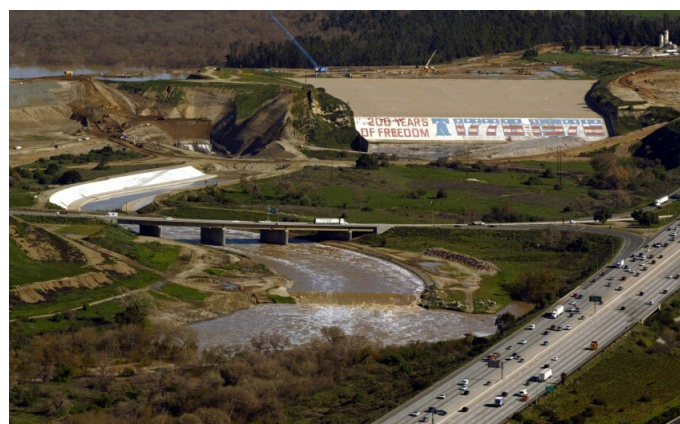
Flooding in Anaheim (2018)

While flooding by itself is a significant hazard, often flooding can coincide with other hazards like landslides and mudslides, which can occur during intense precipitation events. Areas with steep topography (hillsides) are most prone to these conditions, which are especially hazardous after a wildfire event that has removed vegetation from these areas.

Dam Inundation

Dam, reservoir, and levee failure can result from several causes such as earthquakes, rapidly rising floodwaters, and structural design flaws. These hazards can occur instantaneously or very gradually, depending on the source of the failure. Inundation associated with these events can cause loss of life, damage property, and result in other impacts, such as displacement of persons residing in the inundation path and loss of critical infrastructure.

Dam inundation poses a flooding risk to Anaheim due to the city's proximity to several dams. The biggest inundation threat comes from Prado Dam. Prado Dam is located approximately 2.5 miles east of the city limits, along the Santa Ana River in Riverside County. This dam facility poses the greatest risk to the city (and a majority of northern Orange County), due to its size and the amount of water impounded at full capacity. In the event of dam failure, the flood wave would take 6.5 hours to reach Anaheim and be around four feet deep.



Prado Dam along Santa Ana River upstream from Anaheim
Source: LA Times, 2015

Inundation from this facility would affect the entire city. **Figure S-6** identifies the potential



inundation areas that could impact the City of Anaheim. These areas show downstream locations that could be inundated if dams upstream were to fail. The areas that could flood in the case of a dam failure may be located outside of the typical areas that flood within due to the amount of water released.

Water Supply

Water service in Anaheim is provided by Anaheim Public Utilities. According to the City's 2020 Urban Water Management Plan, adequate water supplies are available to meet customer demands within the City. This is especially important for ensuring adequate supplies are available for existing and future fire suppression needs. While adequate water supplies are available, the City is continually investing in upgrades to the system to meet future demands and address deficiencies in service. In addition, conservation efforts are promoted throughout the community to reduce demands and ensure adequate water quality and quantity is available for residents and businesses. As a standard practice, new developments and major remodels are required to conduct water pressure/flow testing and design the project to ensure standards are met.



FIGURE S-5 – FEMA DESIGNATED FLOOD ZONES

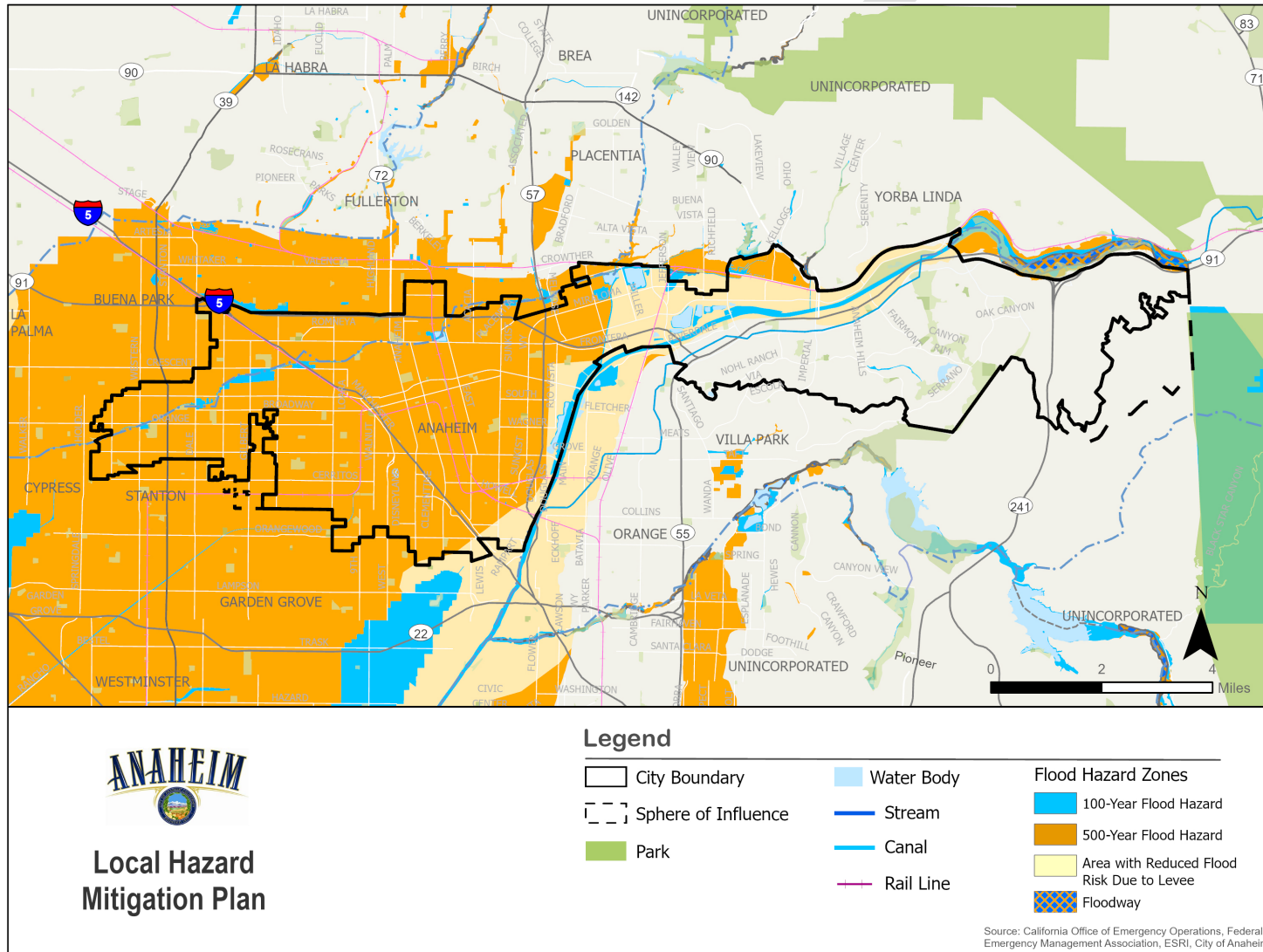
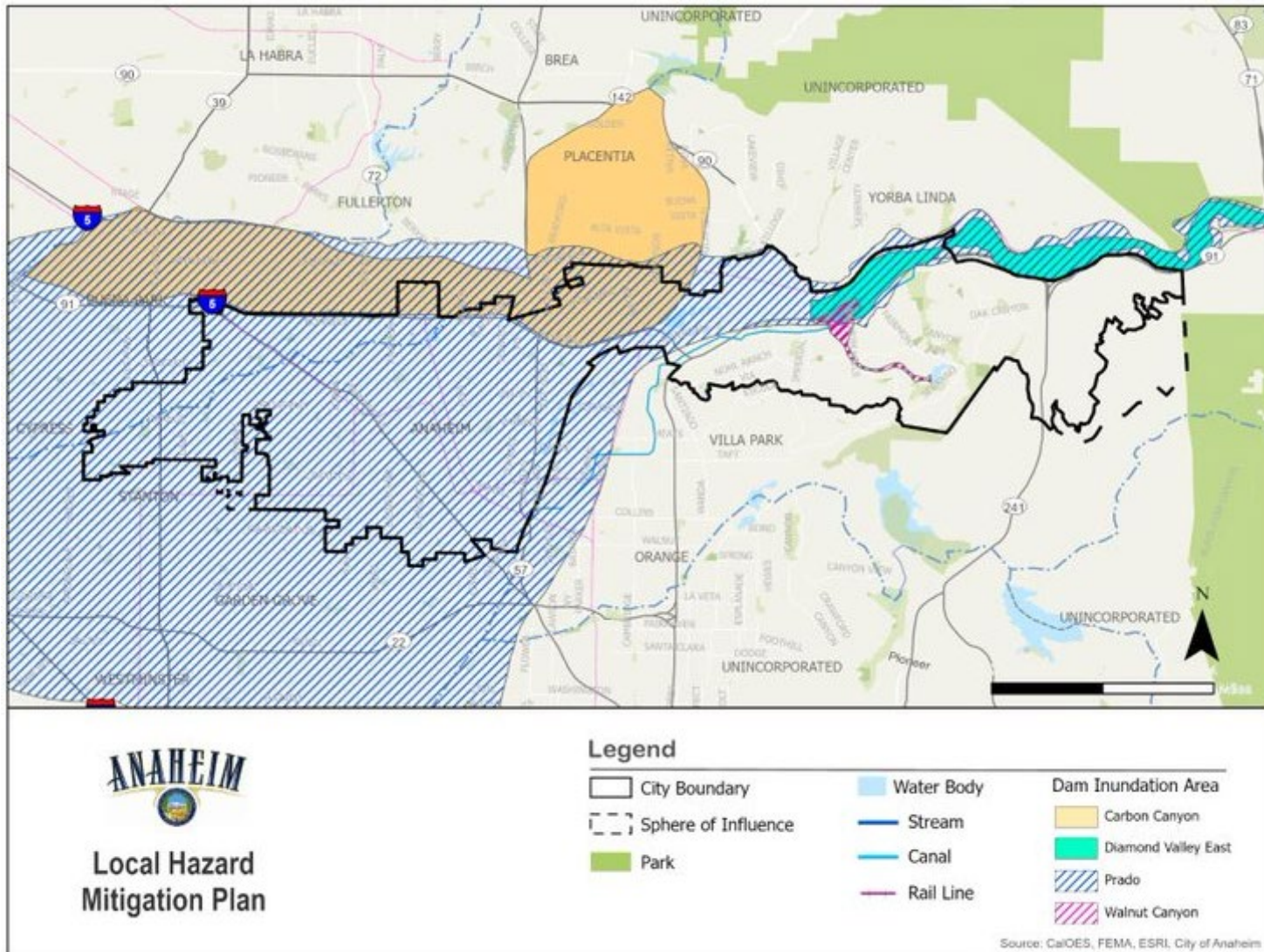




FIGURE S-6 – DAM INUNDATION





GOAL 3.1: A COMMUNITY RESILIENT TO THE EFFECTS OF FLOODING AND DAM INUNDATION HAZARDS. (NEW GOAL)

Policies

1)	Evaluate all development proposals located in areas that are subject to flooding to minimize the exposure of life and property to potential flood risks. (New Policy)
2)	Continue to participate in the National Flood Insurance Program. (Revised Policy)
3)	Continue compliance with the Cobey-Alquist Floodplain Management Act requirements and State of California Model Ordinance. (Revised Policy)
4)	Encourage properties prone to flooding or creating new flooding conditions to incorporate flood safe design elements and appropriate setbacks to reduce flood damage potential. (New Policy)
5)	Encourage new development to maintain and enhance existing natural streams, as feasible.
6)	Support policies and programs to promote water conservation measures, low-impact development, and green infrastructure that can help convey stormwater and reduce impacts from both drought and flooding. (New Policy)
7)	Coordinate with local, state, and federal agencies on flood control and stormwater management improvements in and around the city. (New Policy)
8)	Coordinate with OC Flood Control and USACOE on operations, maintenance, and improvements to Prado Dam and the Santa Ana River. (Revised Policy)
9)	Utilize flood control methods that are consistent with Regional Water Quality Control Board Policies and Best Management Practices (BMPs). (Revised Policy)



HAZARDOUS MATERIALS AND WASTES

Natural hazards are not the only threat to a community's safety. Human-caused dangers, such as various hazardous materials and wastes, are often found throughout a community and can pose significant risks. Generally speaking, hazardous materials are identified as being toxic, flammable, explosive, corrosive, infectious, radioactive, or a combination of these characteristics. Hazardous wastes are categorized similarly but are identified separately from materials because they no longer serve a meaningful use. The City's Hazardous Materials Section administers and implements a Hazardous Materials Management Program that oversees permitting, inspections, and response activities. This section administers various plans and procedures including the Anaheim Hazardous Materials Area Plan, which is designed to assist in the prevention and mitigation of impacts associated with hazardous materials release.

In the Community

Although common household chemicals pose little threat to the community at large, hazardous materials and wastes used by business and industry present a greater risk. Automotive dealerships, repair shops, gasoline, diesel fuel stations, and dry cleaners are examples of businesses that regularly use and store chemicals or other hazardous materials. Pipelines and tanks within the City also transport and store chemicals that could pose a risk if failure occurs. These releases are anticipated to be isolated to properties where storage occurs. Releases also tend to involve the transportation of raw materials and their byproducts either by pipeline or truck. Regulation of the use, storage, and transportation of hazardous materials and wastes rests on state and federal agencies; however, cities play a large role in minimizing the risks and impacts of exposure through careful planning and preparation. Major transportation routes through the City include Interstate 5 and State Routes 57 and 91. In addition, major roadways designated as truck routes are the primary thoroughfares used to transport hazardous materials and wastes through the City. For the location of these roadways, refer to the City of Anaheim General Plan Circulation Element.

In the Home

Exposure to hazardous materials is not uncommon, as many household cleaning products contain chemicals that can harm both humans and the environment. Through proper use, however, the health risks associated with these hazardous materials can largely be avoided. The proper storage of household cleaning products and other common hazardous materials, such as those used in automotive and home repair, is also an important component of responsible management. Following the manufacturer's instructions on the packaging and keeping products out of the reach of children are two simple steps that can help reduce the risk of exposure. In addition, the City operates a facility (Anaheim Stop & Swap) that offers free drop off services for household, yard, and car care products no longer needed by residents.



GOAL 4.1: A COMMUNITY BETTER PROTECTED FROM THE RELEASE AND EXPOSURE TO HAZARD MATERIALS AND WASTES. (NEW GOAL)

Policies

1)	Follow Anaheim Hazardous Materials Area Plan procedures in the event of a hazardous materials emergency. (Revised Policy)
2)	Promote the proper handling, treatment and disposal of hazardous materials and hazardous waste.
3)	Encourage businesses to utilize practices and technologies that will reduce the generation of hazardous wastes at the source.
4)	Implement Federal, State, and local regulations for the disposal, handling, and storage of hazardous materials.
5)	Promote the recovery and recycling of hazardous materials.
6)	Employ effective emergency preparedness and emergency response strategies to minimize impacts from hazardous materials exposures and releases. (Revised Policy)
7)	Partner with Orange County to provide needed hazardous waste programs to provide disposal of household hazardous waste at no cost to residents and participating agencies. (Revised Policy)



CLIMATE ADAPTATION

Although climate change is not identified as a discrete hazard, variations in climatic conditions can impact some of the natural hazards affecting Anaheim. Projections of future conditions in the City include increased temperatures, increased extreme heat days, changes in precipitation, more prolonged droughts, and changes in the size and frequency of wildfire incidents. **Table S-1** identifies the current/historical conditions and projected future conditions within Anaheim associated with climate change.

Table S-1 – Potential Climate Change Effects for Anaheim	
Temperature Changes (annual mean)	
Historic (1961-1990)	Future (2070-2099)
75.2° F	78.3 to 86.7° F
Extreme Heat Days (average per year)	
Current (@ 97.2° F)	Future (2070-2099)
3 days	30 days
Warm Nights (average per year)	
Current (@ 66.7° F)	Future (2070-2099)
5 days	89 days
Precipitation Changes (annual mean)	
Historic (1961-1990)	Future (2070-2099)
13.3 inches	13.0 to 13.4 inches
Wildfire Potential (annual average area burned)	
Current	Future (2070-2099)
299.7-302.3 acres	368.0 to 384.1 acres
Source: https://cal-adapt.org/, 2022	

Increasing temperatures associated with climate change can act as a hazard multiplier. By the end of the century, annual mean temperatures are projected to increase between 3 and 11 degrees, impacting city residents and businesses. These increases are also anticipated to increase the number of extreme heat days, increasing from a change from 3 days per year on average to 30 days per year on average. These potential temperature increases may impact residents living in poorly insulated structures or those that do not meet current code requirements. For extreme heat incidents the City relies on the Orange County Operational Area Excessive Temperature Annex to the Emergency Operations Plan. This regional coordination ensures resources area available to residents and employees during extreme heat events.



While temperatures are anticipated to increase in the coming decades, climate change projections also suggest that annual mean precipitation may slightly increase by the end of the century. While annual average is not expected to change much by the end of the century, it is anticipated that future rain events may be more intense than what is currently experienced. The 30-year range for precipitation by the end of the century could vary from 8.4 -19.4 inches, which could result in reduced water supplies in the drier years and flooding in the wetter years. With changes in future precipitation, it is expected that changes to local vegetation may occur as well, which could impact drainages and increase the need for wildfire management activities.

Increased rainfall could also increase the amount of flooding within the community, introduce flooding into new areas, or cause areas with steep topography to become less stable, resulting in more landslides/mudslides and/or erosion. These types of events could impact streams, or cause damage to neighboring properties/structures in these areas.

With future temperature increases, wildfire impact is projected to increase by the end of the century. This projection is based on the overall increase in temperatures coupled with precipitation that on average remains the same as current conditions. Increased temperatures are anticipated to increase fire risk if vegetation becomes drier overall. The city currently experiences an annual average of approximately 300 acres burned, which is anticipated to grow to as much as 384 acres by the end of the century.

While climate change is projected to exacerbate many of the hazards already affecting the city, many of these hazards may interact with each other. Increased temperatures can affect both water supplies and vegetation growth. With drier conditions, vegetation growth may be reduced, which can reduce wildfire vulnerability, however if dry conditions persist for long periods, the reduced vegetation may be drier than normal. These two conditions may result in the same or greater risk for wildfires.

GOAL 5.1: ENSURE THAT ANAHEIM IS READY TO ADDRESS THE IMPACTS ASSOCIATED WITH CLIMATE CHANGE. (NEW GOAL)

Policies

1)	Support policies and programs to help residents and businesses be prepared for extreme heat conditions. (New Policy)
2)	Maintain guidelines for the monitoring and dissemination of public information related to extreme heat; maintain cooling centers and update their locations annually. (New Policy)
3)	Require new development within a designated floodplain or fire hazard severity zone to submit fire and/or flood safety plan for approval by the Fire Department and Floodplain Administrator. (New Policy)
4)	Continue to ensure emergency alert/ notification capabilities meet the City's future needs by providing alerts about potential, developing, and ongoing emergency situations. (New Policy)



EMERGENCY PREPAREDNESS

The ability to anticipate, evaluate, and mitigate potential risks posed by natural and human-caused hazards is paramount to a city's longevity. Although this element specifically addresses natural and human-caused hazards, emergency preparedness involves many more considerations beyond identifying the hazards themselves. The Emergency Preparedness section consolidates and briefly describes the City of Anaheim's hazard prevention and response strategies.

Emergency Operations Plan

The [Emergency Operations Plan \(EOP\)](#) is primarily responsible for informing the City of Anaheim's emergency management strategies. These strategies are typically organized under four categories: mitigation, preparedness, response, and recovery.

Mitigation

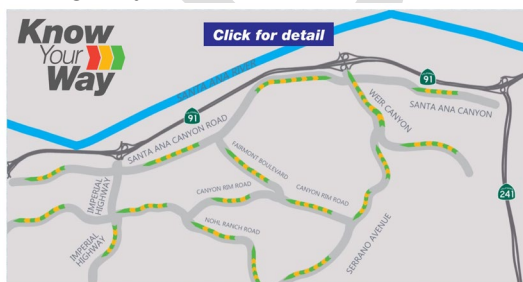
The EOP, in conjunction with the LHMP, identifies and assesses the natural and human-caused hazards that threaten the City and recommends proactive policy and procedural actions that reduce the risks associated with these hazards. This preemptive planning is intended to decrease the probability of emergency situations and minimize the effects should one occur. Examples of hazard mitigation and prevention can be found in many city policies, but they are most prominently displayed in the many codes regulating construction and development. The City has taken numerous actions to reduce its vulnerability to hazards including the undergrounding of overhead powerlines. This investment not only ensures more reliant electrical service, but also helps beautify the community.



Example of Relocated Powerlines

Preparedness

Emergency preparedness focuses on activities that prepare a community for a disaster. These activities typically involve the preparation of plans addressing life safety, emergency response, and evacuation; purchase and storage of emergency supplies; and training and exercises to practice response activities. As part of the City's preparedness initiatives, the City has begun a "Know Your Way" campaign which provides residents with additional information regarding how best to evacuate. Through this program, residents can learn



Anaheim "Know Your Way" Map



the roadways that will most likely be accessible and the directions most likely available during an evacuation.

Response

Emergency response activities typically focus on actions necessary to save lives and prevent further property damage during an emergency/disaster. Many of these activities are conducted in tandem with the Anaheim Police Department and Anaheim Fire and Rescue standard emergency response procedures. To guide response activities, the City will rely on implementing the Emergency Operations Plan, activating the Emergency Operations Center (EOC), and work closely with volunteer organizations such as the Community Emergency Response Team (CERT), which helps orchestrate internal and external communications, logistics, and assistance during large-scale emergencies. If City resources become overwhelmed, the City will request support through the Orange County Operational Area² using automatic aid and mutual aid agreements currently in place. However, the City recognizes that mutual aid resources are dependent on availability and may be limited during a large regional incident. Therefore, consideration for strengthening self-sufficiency should be a priority.

Recovery

Recovery activities typically occur after an emergency/disaster event. These activities focus on reestablishing services to impacted areas, repair and/or reconstruct damaged buildings and infrastructure, and assistance to residents and businesses with permitting and approvals of building plans. Depending on the scale and type of incident, recovery could occur in specific community locations and/or require specialized expertise to address the issues created. Cleanup of hazardous wastes shall be considered part of the recovery from a major disaster event (fire or flood).

Evacuation/Emergency Routes

Evacuation refers to the movement of people that are at risk of being impacted by a disaster to a safer location, using routes that do not pose a significant danger to the evacuees. Thus, both the destination and the route need to be scrutinized, preferably before the evacuation orders are issued. This involves deciding which of the potential temporary shelters in the City be opened, based on the shelters' locations relative to the impending disaster and their ease of accessibility from the safest identified routes. Evacuations in the city are conducted in cooperation between the Anaheim Police Department and Anaheim Fire and Rescue. In the event of a fire, Anaheim Police department would take the lead on evacuation while Fire and Rescue would focus on fire suppression. To comply with SB 99, the City identified areas of the City that have single

² Includes all political subdivisions (County, Cities, School Districts, Special Districts) within the County's geographic boundaries.



ingress/egress conditions. To achieve this an analysis of constrained roadways and constrained parcels was conducted. Definitions for these two conditions include:

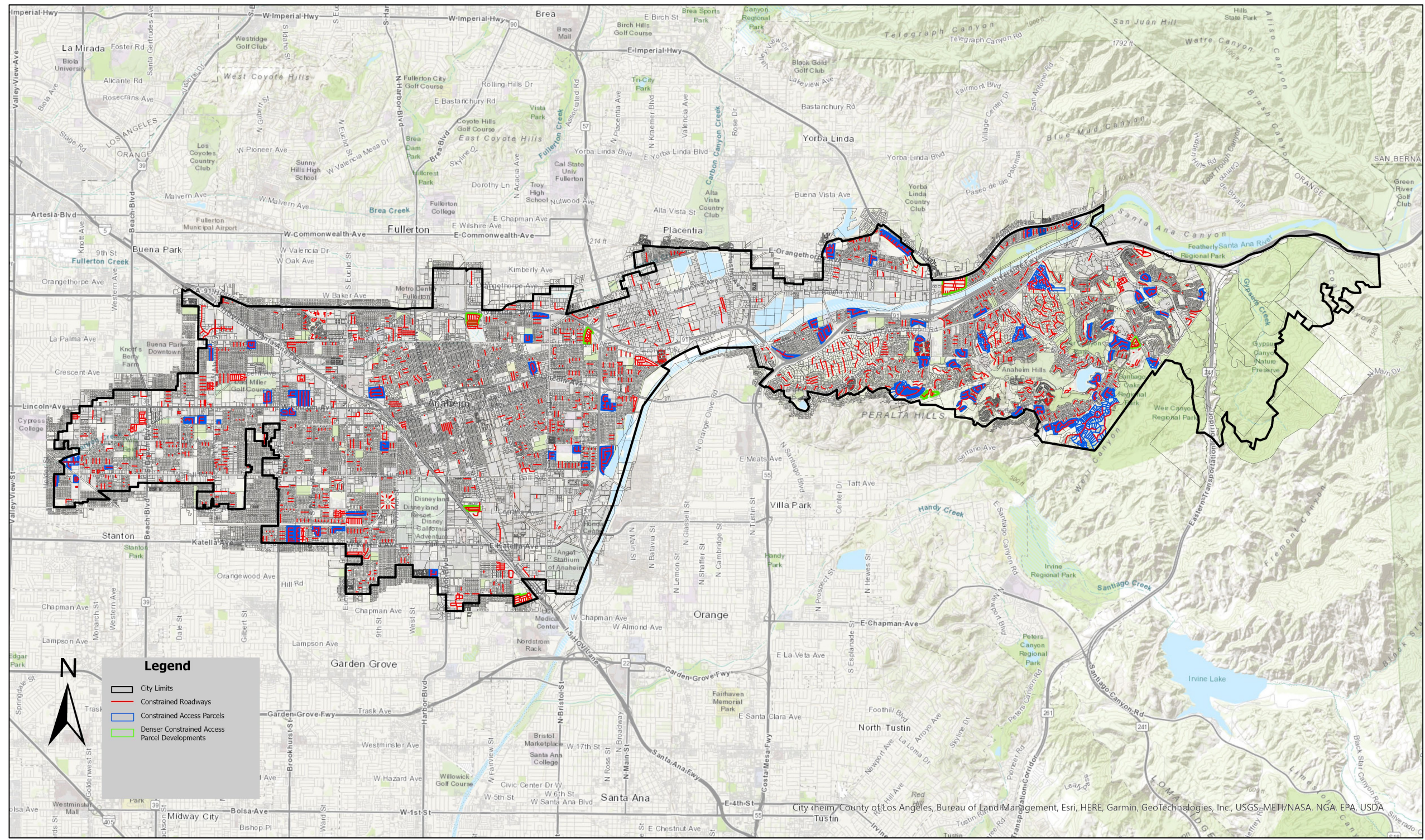
- **Constrained Roadways** are segments of the roadway network that have a single point of connection with the rest of the roadway network. These could be cul-de-sacs or roadways with secondary connections that are not publicly accessible due to a gate or other constraint. **Figure S-7** identifies these roadways within the City.
- **Constrained Parcels** are areas of the City where at least 30 parcels are located along a constrained roadway. These parcel locations are accessible by one means of ingress/egress, which is consistent with Cal FIRE guidance regarding Public Resources Code Section 4290.5. Under this guidance, Cal Fire is concerned with subdivisions within the state that have 30 or more dwellings accessing a single roadway. **Figure S-7** identifies these areas within the City.

This analysis identified 82 locations where at least 30 parcels/dwellings meet the constrained parcel threshold. 74 locations are single family neighborhoods, while 8 locations are large mobile home parks and gated townhome communities within the City. 48 of the 82 locations are located in eastern Anaheim with the vast majority of these located in Anaheim Hills. The concern regarding areas with constrained parcels is the ability to safely and effectively evacuate residents in the event of an emergency. Twenty eight (28) of these constrained parcel areas are located within or adjacent to Cal Fire VHFHSZs. Although these locations have been identified based on the 30-parcel threshold many other areas within the City are just below this threshold and could exceed it if additional development occurs. Future implementation actions should identify and better understand these areas and the ramifications associated with evacuation.

Identified Evacuation Routes for eastern Anaheim (Anaheim Hills) are mapped and made available to residents as a part of the Know Your Way campaign. The primary route of evacuation is the westbound SR-91 freeway, which leads away from the foothills and canyons (the most probable location for a hazard event). The major roads accessing SR-91 include Weir Canyon Rd, Serrano Ave, Nohl Ranch Road, and Santa Ana Canyon Rd, which can also be accessed from secondary roads Fairmount Boulevard and Canyon Rim Road. These routes may be changed during an evacuation, depending on the specific nature of the emergency. If changes are proposed, residents and travelers would be advised and directed by either police or fire personnel during the incident.

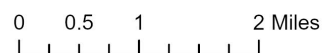


FIGURE S-7 – CONSTRAINED ROADWAYS AND PARCELS (SB 99)



Legend

- City Limits
- Constrained Roadways
- Constrained Access Parcels
- Denser Constrained Access Parcel Developments





GOAL 6.1: A CITY THAT PRIORITIZES EMERGENCY PREPAREDNESS AND PUBLIC AWARENESS OF COMMUNITY RISKS. (NEW GOAL)

Policies

1)	Ensure the availability of both the Safety Element and Emergency Operations Plan to employers and residents of Anaheim. <i>(Revised Policy)</i>
2)	Coordinate disaster preparedness and recovery with neighboring jurisdictions and other governmental agencies, such as Orange County, Water Districts, and Utility Providers. <i>(Revised Policy)</i>
3)	Assess emergency and evacuation capabilities for potential disruptions from existing and future hazards affecting the community. <i>(New Policy)</i>
4)	Ensure mapping of the City's emergency facilities, evacuation routes and hazardous areas are periodically updated to reflect additions or modifications. <i>(Revised Policy – current policy under Hazardous Materials)</i>
5)	Ensure access routes to and from hazard areas relative to the degree of development or use (e.g., road width, road type, length of dead-end roads, etc.) are adequately designed and sized to accommodate anticipated needs. <i>(New Policy)</i>
6)	Ensure disruption of evacuation routes from landslide movement, fault ruptures, and failures caused by earthquakes are minimized to the greatest extent feasible. <i>(New Policy)</i>
7)	Appropriately locate and coordinate emergency services including fire, police, and ambulance services to provide responsive services across the entire community.
8)	<p>Conduct hazards-oriented public outreach to prepare the community for the following hazards: <i>(New Policy)</i></p> <ul style="list-style-type: none"> • Seismic and Geologic Hazards • Wildfire Hazards • Flooding and Dam Inundation • Hazardous Materials Release • Climate Change • Evacuation
9)	Conduct training and exercises with City staff to better prepare them for future hazards and incidents. <i>(New Policy)</i>
10)	Train multi-lingual personnel to assist in emergency preparedness and response activities to meet the community's need. <i>(New Policy)</i>
11)	Incorporate the latest information and best practices from the Department of Homeland Security to prepare the City to respond to terrorist attacks. <i>(Revised Policy)</i>
12)	Periodically update the Emergency Operations Plan to ensure consistency with the Safety Element and Local Hazard Mitigation Plan. <i>(New Policy)</i>
13)	Periodically conduct and evaluate Emergency Operations Center (EOC) exercises. <i>(Revised Policy)</i>



GOAL 7.1: A CITY THAT CAN EFFECTIVELY RESPOND AND EVACUATE DURING HAZARD EVENTS. *(NEW GOAL)*

Policies

1)	Coordinate with neighboring jurisdictions and Caltrans regarding transportation network constraints and improvements. <i>(New Policy)</i>
2)	Coordinate with neighboring jurisdictions and County agencies to prioritize roadway and storm drain infrastructure retrofitting and enhancement projects along primary evacuation routes. <i>(New Policy)</i>
3)	Ensure all new development and redevelopment projects provide adequate ingress/egress for emergency access and evacuation. <i>(New Policy)</i>
4)	Identify and construct additional evacuation routes in areas of high hazard concern or limited circulation, where feasible. <i>(New Policy)</i>
5)	Ensure the City's transportation network allows for effective emergency response and evacuation activities. <i>(New Policy)</i>
6)	Develop evacuation standards and metrics for constrained neighborhoods and alternative evacuation plans, where necessary. <i>(New Policy)</i>
7)	Monitor changes to hazard conditions and vulnerabilities to ensure the accessibility or viability of evacuation routes in the future. <i>(New Policy)</i>
8)	Expand the "Know Your Way" program to identify and enhance evacuation resources that includes areas of the City with limited ingress/egress, limited circulation capacity, and/or critical infrastructure that could impact evacuation efforts.
9)	Enhance the City's existing education and outreach program, "Know Your Way," with potential evacuation scenarios and the activities that residents and businesses can do to protect their properties and prepare for potential events. <i>(New Policy)</i>