V. Natural and Environmental Hazards

Introduction and Purpose

Maintaining a safe environment for community members and visitors is one of the City's most important responsibilities. Huntington Beach's continued ability to thrive will depend in part on its ability to prepare for future emergency situations, particularly in the context of changing environmental conditions. The community must be resilient to a wide range of safety hazards and able to recover quickly when emergencies occur. Planning decisions should consider the risks posed by natural and environmental hazards, so that the community can grow and evolve in a way that reduces potential hazards as much as possible. This element offers a background and tools to address the risk from various safety threats.

Scope and Content

The Natural and Environmental Hazards Element satisfies the Safety Element requirements of state planning law, which is a mandated component of the General Plan. Section 65302(g) of the California Government Code sets forth the following list of issues that the element must cover, if these items pertain to conditions in the planning area:

- Seismically induced conditions including ground shaking, surface rupture, ground failure, tsunami, seiche, and dam failure
- Slope instability leading to mudslides and landslides
- Subsidence, liquefaction, and other geologic hazards
- Flooding
- Wildland and urban fires
- Evacuation routes

State law allows communities to address additional safety issues. The following additional issues are addressed in this element:

- Coastal hazards
- Hazardous materials and waste
- Aircraft hazards
- Disaster and emergency preparedness

The Natural and Environmental Hazards Element consists of this *Introduction and Purpose* identifying the intent of the element and how it relates to other documents; a *Hazards Plan* discussing the natural and environmental risks present in Huntington Beach and how they may change; and *Issues, Goals, and Policies* providing tools to prepare for emergency situations, improve community resilience, and allow for rapid recovery.

Relationship to Other Elements

The Natural and Environmental Hazards Element identifies areas prone to natural hazards, which must be considered in the designation of land uses in the Land Use Element. For example, proposed land uses must comply with the land use compatibility standards contained in this element for various types of hazards. Traffic-calming goals and policies in the Circulation Element may have implications for emergency response, and recommendations for evacuation and emergency access routes in the Natural and Environmental Hazards Element affect the Circulation Element. The Environmental Resources and Conservation Element is also linked to the Natural and Environmental Hazards Element, because open space zones and allowable uses are often related to hazard-prone locations. For example, areas prone to landslide hazards are often set aside as open space because their steep slopes limit other uses.

Relationship to Local Hazard Mitigation Plan

Under the provisions of the federal Disaster Mitigation Act of 2000 and California Government Code Sections 8685.9 and 65302.6, local governments can adopt a local hazard mitigation plan into their safety element. If a community has not done so, the state will only reimburse the community up to 75 percent of eligible costs associated with emergency response and recovery from a specific situation. Communities with a hazard mitigation plan incorporated into their safety element may receive more than 75 percent of eligible costs from the state.

The City of Huntington Beach adopted a Local Hazard Mitigation Plan in 2012, which was approved by the Federal Emergency Management Agency (FEMA) and is in compliance with the federal Disaster Mitigation Act of 2000. The 2012 Huntington Beach Local Hazard Mitigation Plan and all subsequent amendments and updates are hereby incorporated into this Natural and Environmental Hazards Element by reference as though they were fully set forth herein. A copy of the Local Hazard Mitigation Plan is on file in the City's Emergency Operations Center.

Hazards Plan

The following natural and environmental hazards pose a safety risk in the planning area.

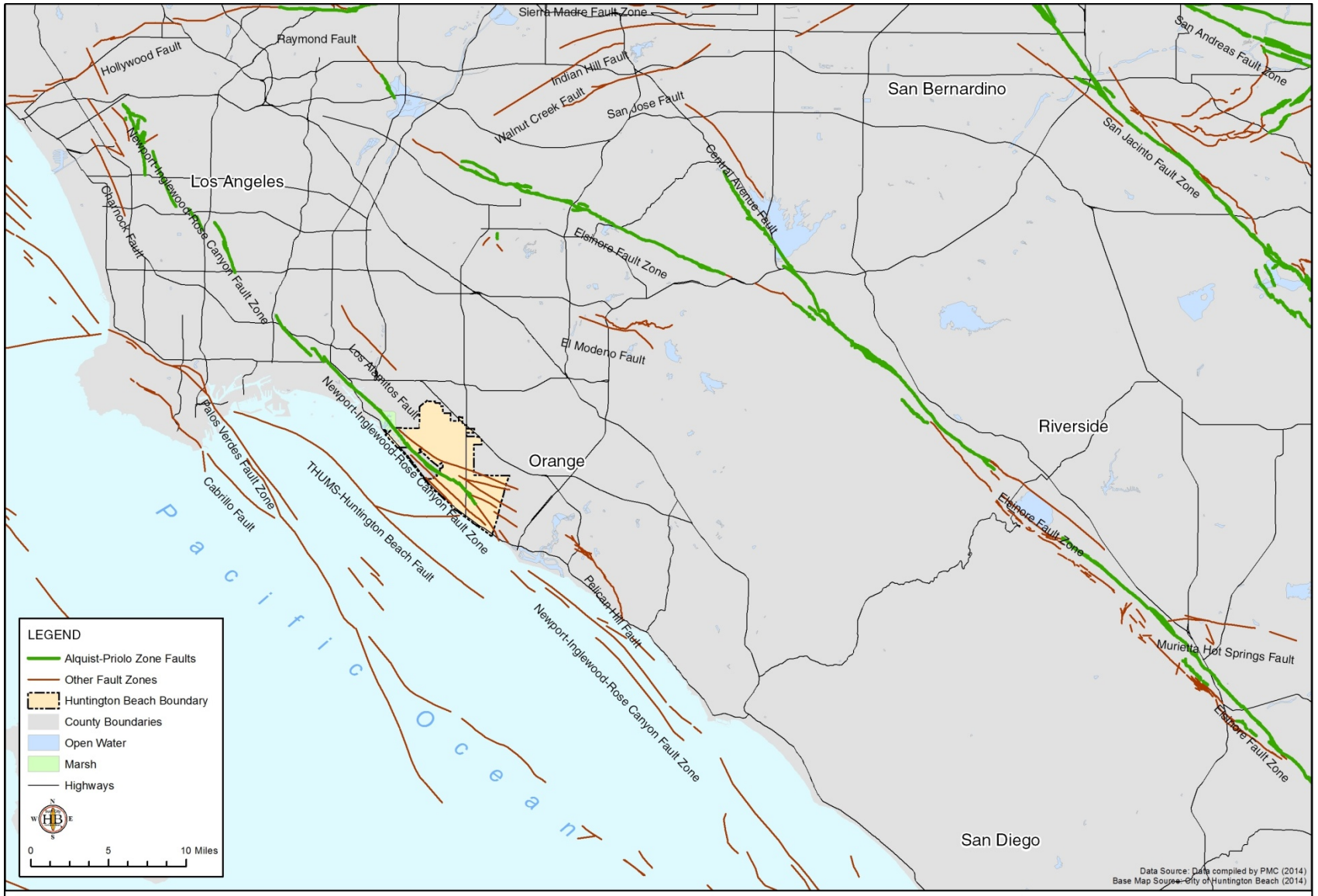
Geologic and Seismic Hazards

Geologic and seismic hazards are risks caused by the movement of different parts of the earth's crust, or surface. The most familiar type of geologic or seismic hazard is an earthquake, which occurs when parts of the earth's crust move rapidly past each other and cause the ground to shake. This movement can in turn trigger many other types of secondary hazards, including the following:

- Surface rupture, which occurs when the surface of the ground cracks or breaks above the area where an earthquake occurs.
- Liquefaction, which occurs when soil becomes waterlogged and loses much of its strength, damaging or destroying structures built on or in it.
- Landslides, which happen when the shaking of an earthquake causes loose material to slide down a slope.
- Subsidence, which occurs when the ground surface drops.
- Tsunamis, which are large, fast-moving waves or walls of water that can flood low-lying coastal areas.

Figures HAZ-1 through HAZ-4 identify locations of known geologic and seismic hazards in the planning area.

Like much of California, Huntington Beach is located in a seismically active area (**Figure HAZ-1**). The Newport-Inglewood Fault Zone runs through the community (**Figure HAZ-2**), and other faults, including the San Andreas Fault, the Elsinore Fault, and the San Jacinto Fault, are located within approximately 50 miles. These faults and many others are capable of causing major earthquakes which could impact the planning area. Parts of the planning area are at an elevated risk of liquefaction (**Figure HAZ-3**), particularly near the coast and in the Huntington Harbour neighborhood. Although largely flat, some areas of the community are at risk from earthquake-induced landslides (**Figure HAZ-3**). Historically, the area between Goldenwest Street and Seapoint Street is prone to subsidence (**Figure HAZ-4**), and tsunamis may threaten low-lying coastal areas of the community, including Huntington Harbour and parts of Downtown.



Regional Fault Map

Figure HAZ-1

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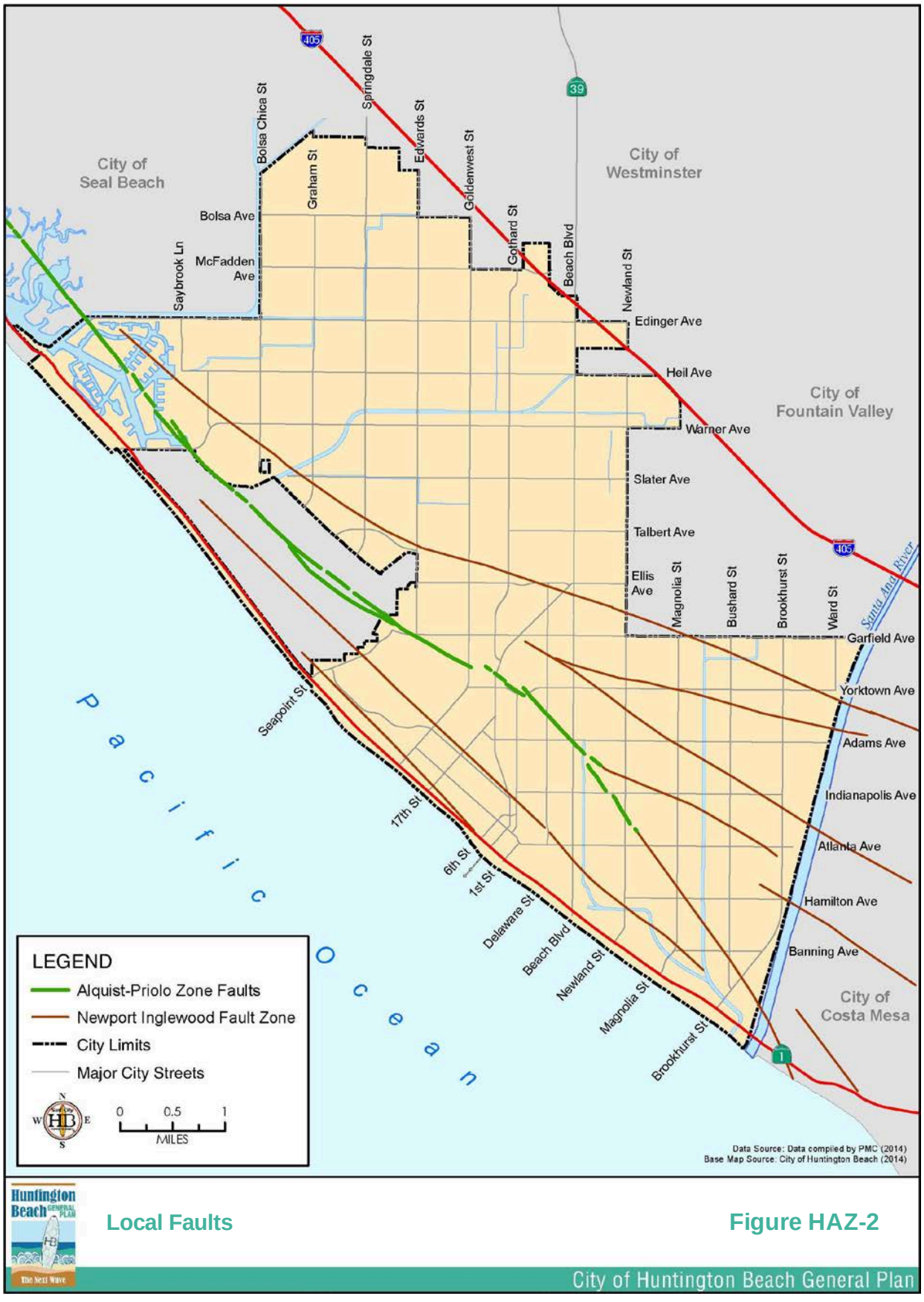
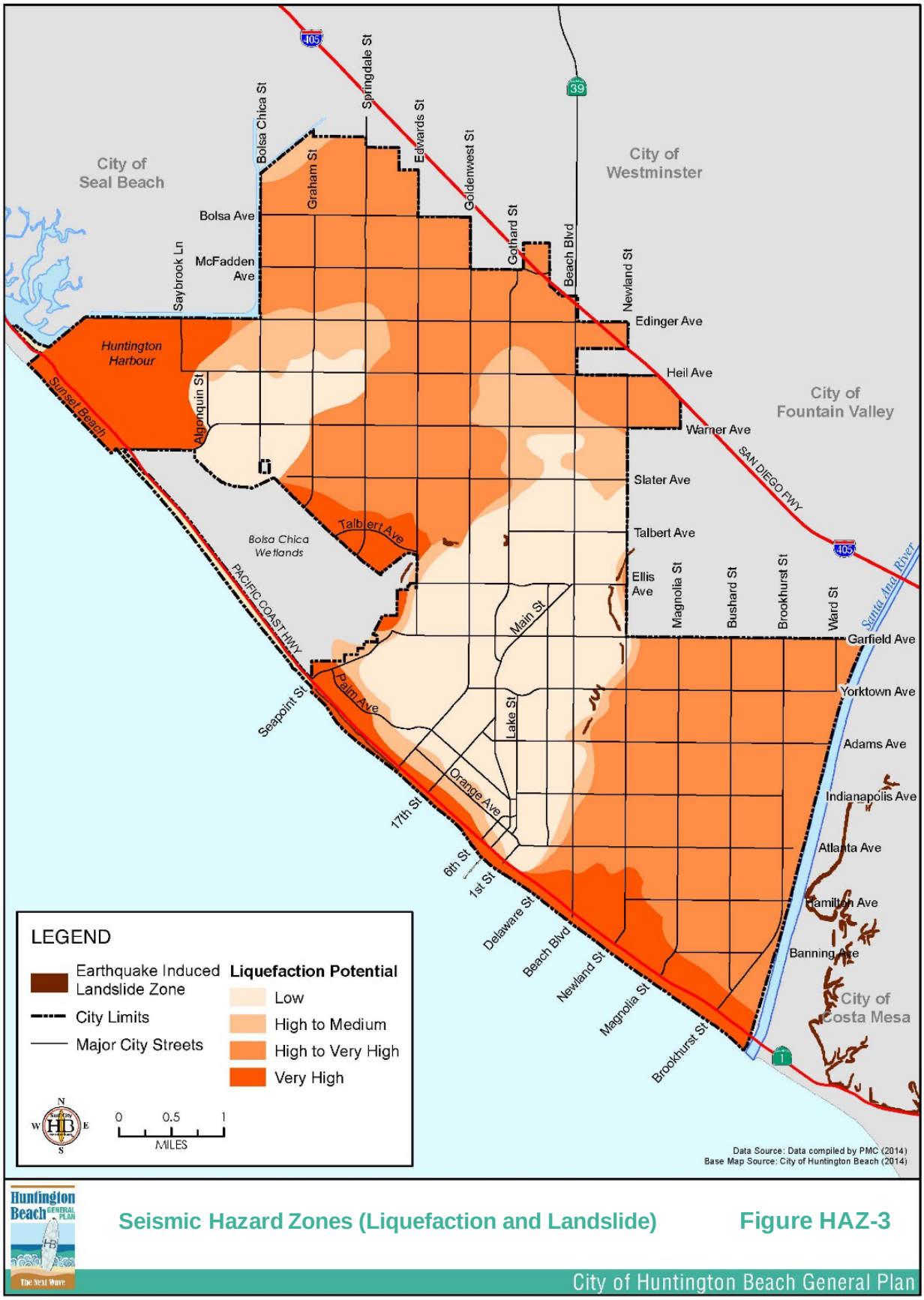
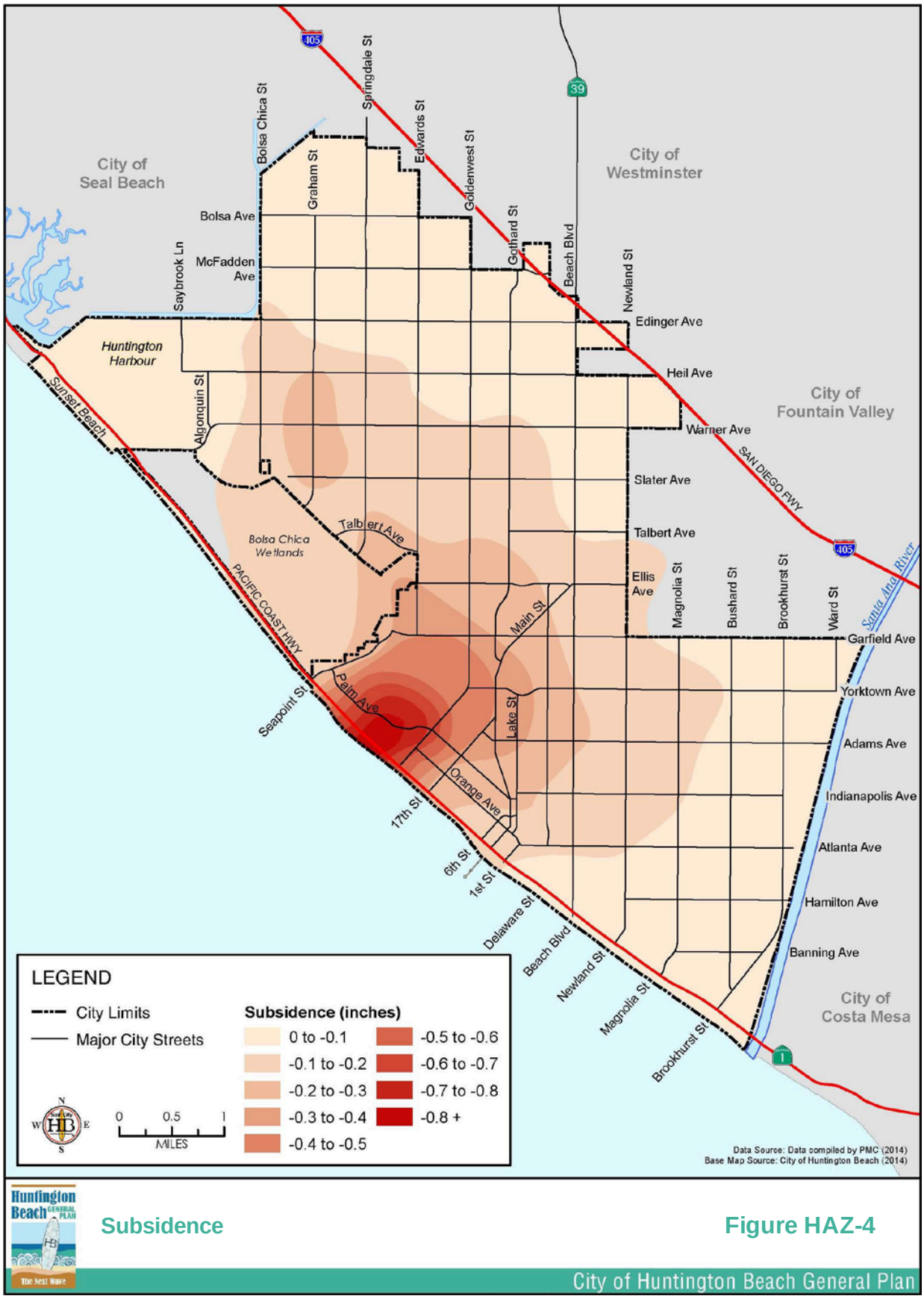


Local Faults **Figure HAZ-2**



Seismic Hazard Zones (Liquefaction and Landslide) **Figure HAZ-3**

City of Huntington Beach General Plan



Subsidence **Figure HAZ-4**

City of Huntington Beach General Plan

Tsunamis are an important hazard of concern for Huntington Beach, with the ability to impact the entire length of coastline in the planning area. Tsunamis are often caused by earthquakes occurring below or near the ocean floor, although underwater volcanic eruptions and landslides can also generate these waves.

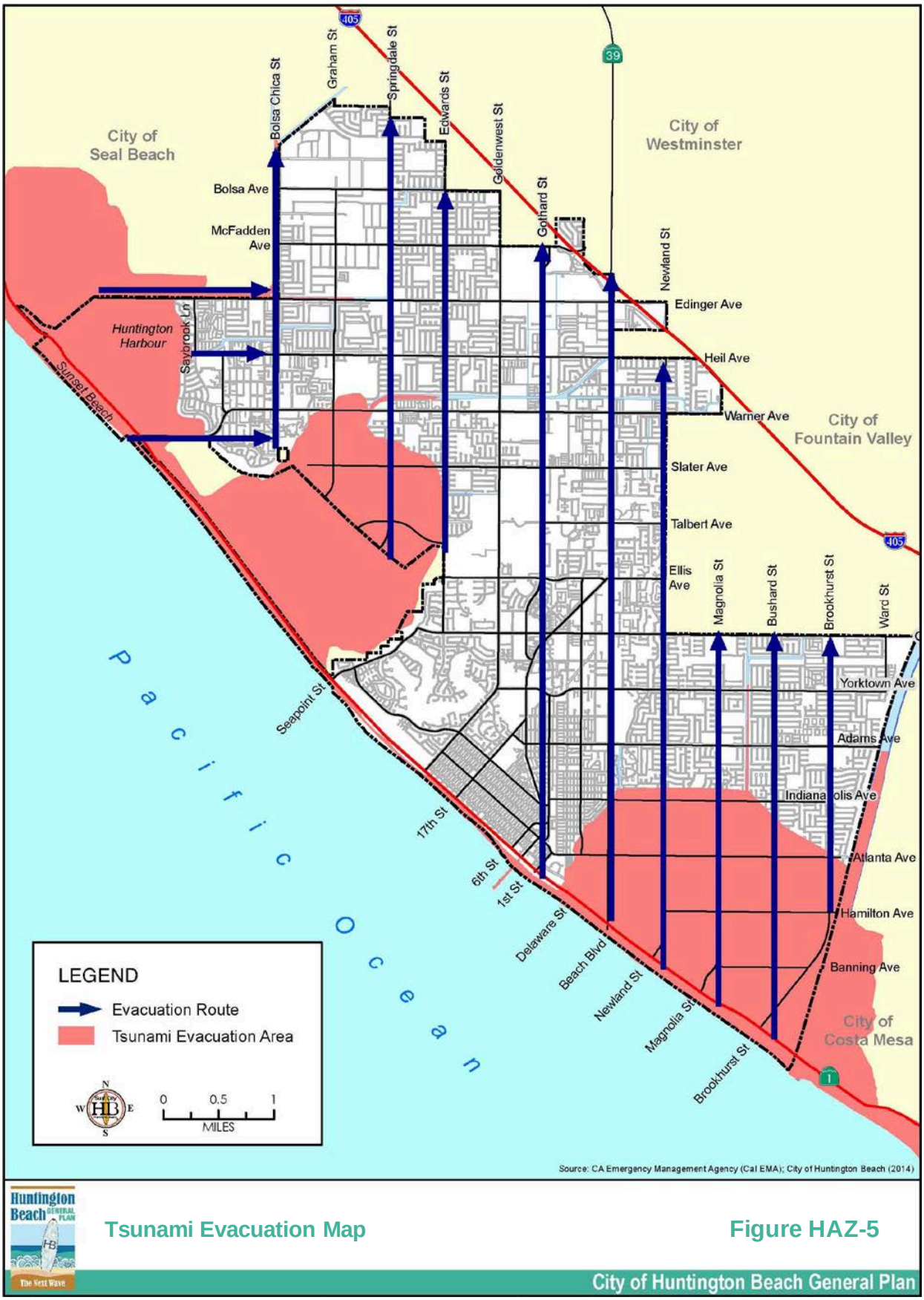
Tsunamis can travel vast distances, and are capable of causing damage far away from the site of event that generated them. Huntington Beach may be affected by a tsunami caused by a local event, or by an event thousands of miles away elsewhere in the Pacific Ocean. The California Office of Emergency Services (Cal OES) estimates that the Huntington Harbour neighborhood, the area northeast of the Bolsa Chica Wetlands, and the southeast corner of Huntington Beach are at an elevated risk of a tsunami, as shown in **Figure HAZ-5**.

Coastal Hazards

As a community with both bluffs and low-lying areas near the coast, Huntington Beach is at risk from two types of coastal hazards. High tides and high surf continually erode coastal bluffs located along the shoreline. This condition is often exacerbated by wind and inadequate drainage practices from development on top of bluffs. Beaches underneath the coastal bluffs can act as a protective buffer; however, these protective beaches themselves can be eroded away, particularly when structures such as seawalls, jetties, and breakwaters interrupt the natural processes that maintain the beaches.

The Huntington Beach coastline totals 9.5 miles of shoreline, including both state and City beach areas. Beaches and other low-lying portions of the planning area are threatened by sea level rise, a slow but gradual process that may cause average sea levels to increase by as much as 5.5 feet or more by the year 2100. Current science indicates that sea level rise is directly linked to climate change, and sea level is expected to increase over time. An increase in the frequency of intense storms that affect California is one possible effect of climate change, and any such increase would also likely increase erosion through high surf and storm surges. Higher sea levels may increase community vulnerability to hazards such as storm surges and tidal flooding, and may also exacerbate coastal erosion by decreasing the size of protective beaches.

To support the General Plan, and in accordance with adopted guidelines of the California Coastal Commission, the City prepared a vulnerability assessment estimating the consequences, probability, and resulting risk from various sea level rise scenarios. Depending on the scenario, additional land located near the coast could be subject to varying degrees of shoreline erosion and more extreme storm-related flooding. These hazards could threaten private buildings, public facilities, roads, and beaches.



Tsunami Evacuation Map **Figure HAZ-5**

City of Huntington Beach General Plan

This assessment looks forward to 2100 to determine the specific extent of the city's vulnerability to sea level rise, including an inventory of potentially affected assets and their estimated replacement value. Although most of this General Plan looks to the year 2040, the sea level rise assessment identifies vulnerabilities on a much longer horizon for multiple reasons. First, while the sea level rise assessment relies on the best available science and methods, there is an inherent degree of uncertainty in these projections, meaning sea levels could rise faster or slower than the estimated projections. Second, as current science indicates that sea level rise is a consequence of climate change, the amount of sea level rise could exceed estimates if the activities that cause climate change end up being greater than expected. Additionally, a building constructed within the horizon of this General Plan may still be used toward the end of the century; thus, it is important to understand potentially hazardous conditions within the planning area in 2100 to cover the life span of a building.

Both coastal and inland areas face threats from sea level rise. The threat to coastal areas is the result of erosion and flooding from wave run-up (particularly from large waves associated with coastal storms). Sea level rise threatens the inland areas by exacerbating flooding from very high tides, and by contributing to flooding from extreme rainfall events.

Areas subject to potential coastal or inland sea level rise by 2050 are identified as a Potential Sea Level Rise Hazard Area in **Figure HAZ-6**. The Sunset Beach and Huntington Harbour neighborhoods and areas located south of the Huntington Beach Pier face the highest risks. The planning horizon of this General Plan is 2040, although the hazard area reflects areas of potential impact by 2050. This extra time helps ensure that projects proposed near the end of the General Plan horizon will still benefit from increased resiliency to sea level rise for several more years. It also provides a safety margin in the event that future sea level rise is more severe or occurs more rapidly than anticipated in current modeling, as previously discussed.

Sea level rise risks within the hazard area are addressed by the Huntington Beach Coastal Resiliency Program (CRP). Strategies outlined in the CRP include monitoring and implementation of regulations to minimize impacts in low-lying coastal areas of the city, constructing new infrastructure in less vulnerable areas or using methods more resilient than current standards, considering sea level rise when planning shoreline protection structures, and encouraging new development in less vulnerable areas.

Potential Sea Level Rise Hazard Areas (2050) **Figure HAZ-6**

Flooding

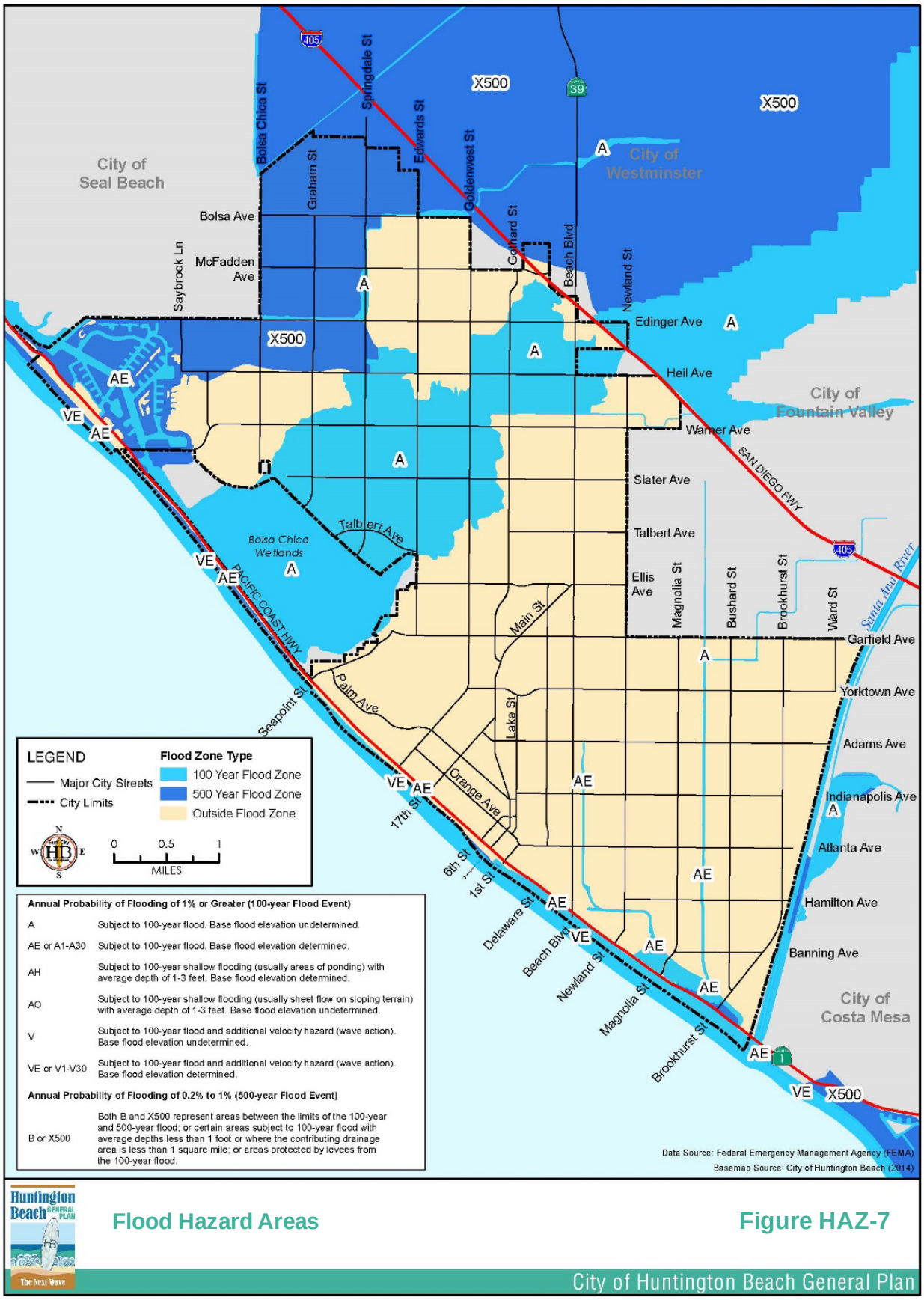
Flooding in the planning area can be caused by a number of natural events, including heavy rains and coastal storms. Less often, floods can be caused by high tides (tidal flooding), or tsunamis (discussed in the Geologic and Seismic Hazards section). Flood events can also happen as a result of infrastructure failure; for example, if a water tank breaks. Flooding is the most common hazard in the planning area.

Areas at an elevated risk of flooding are generally divided into 100-year flood zones and 500-year flood zones. A 100-year flood zone has a 1 percent chance each year of a major flood; a 500-year flood zone has a 0.2 percent chance of flooding each year. As identified in **Figure HAZ-7**, the planning area has areas within both flood zones. As land uses and climate conditions shift and as improvements are made to flood control channels, the size of these flood zones is likely to change.

Dam Failure

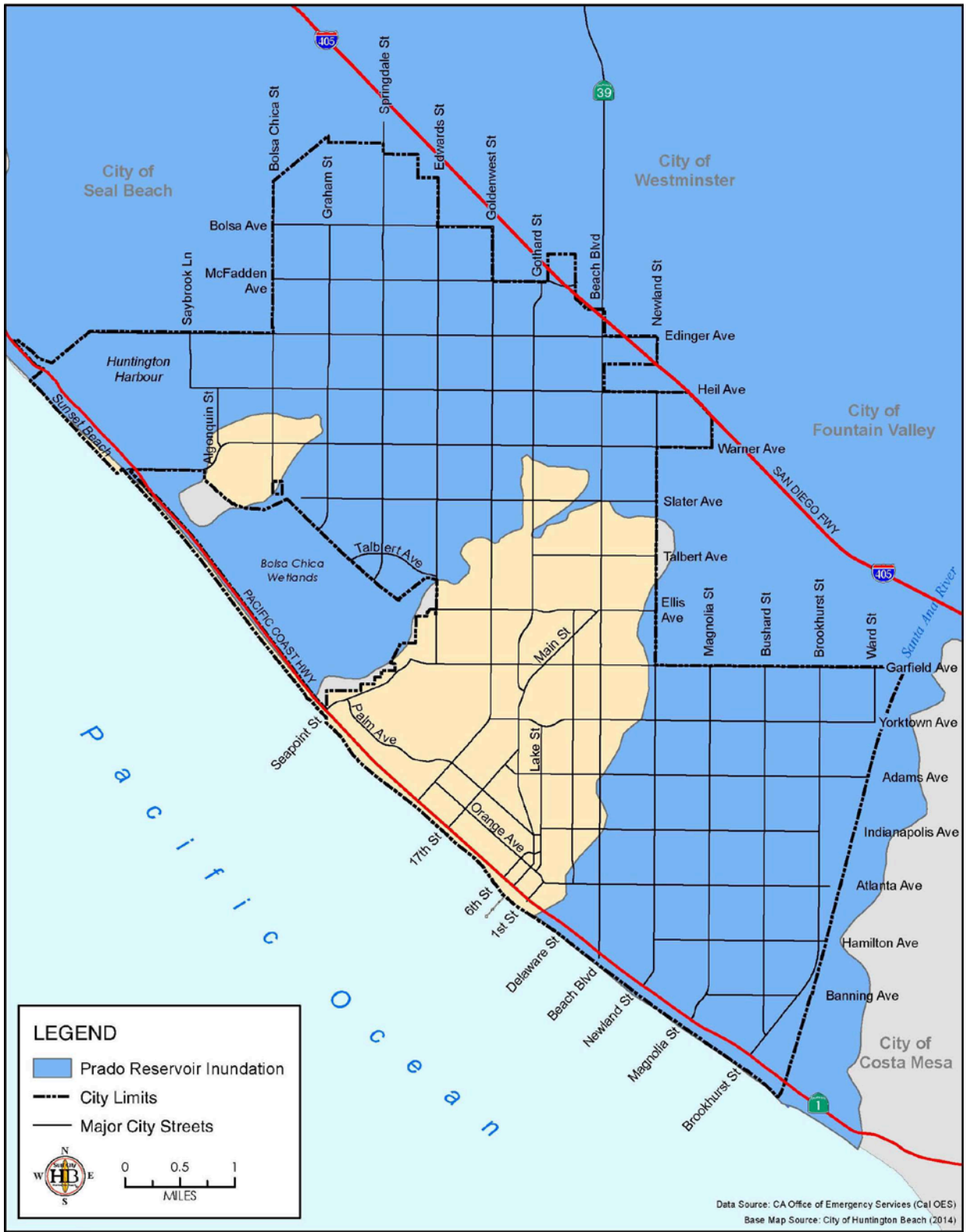
Dam failure is a specific type of flood event that occurs when a dam experiences a partial or complete collapse, releasing a large volume of water that can rapidly flood downstream areas. Dam failure can occur due to structural weaknesses of the dam itself, as a result of another hazard such as an earthquake, or as a combination of both. Dam failure events are very rare, as dams that are large enough to hold back large quantities of water are usually built to very high safety standards. If there is an elevated risk of dam failure, dam operators will often release water from the dam in a controlled manner, so that if the dam does fail the resulting flood will be minimal.

No dams are located in the planning area, although two dams upstream along the Santa Ana River, Seven Oaks Dam and Prado Dam, could flood large portions of the planning area if they experienced a catastrophic failure (see **Figure HAZ-8**). Both dams are flood control dams that usually store water during and after a flood event. However, Prado Dam stores water most of the year and releases it in a controlled manner down the Santa Ana River to recharge the groundwater aquifer underlying Orange County. Although upstream dam failure could occur, it is likely only a threat to Huntington Beach during a relatively small part of the year when the reservoir behind Prado Dam is at its fullest.



Flood Hazard Areas **Figure HAZ-7**

City of Huntington Beach General Plan



Dam Flooding Areas **Figure HAZ-8**

Urban Fires

As an urbanized area surrounded by other urbanized communities, Huntington Beach does not face the wildfire risks that are a threat to other areas of California. Urban fires are the primary fire hazard in the planning area, which can be caused by electrical faults, unattended cooking, or flammable or combustible materials exposed to a heat source, among other causes. Several areas and activities pose unique urban fire challenges due to the age of buildings, the size and density of structures, and the presence of flammable or combustible materials.

The California Government Code requires safety elements of a general plan to identify land designated as a State Responsibility Area for fire services and land designated within a very high fire severity zone. There is no land with either designation located in the planning area.

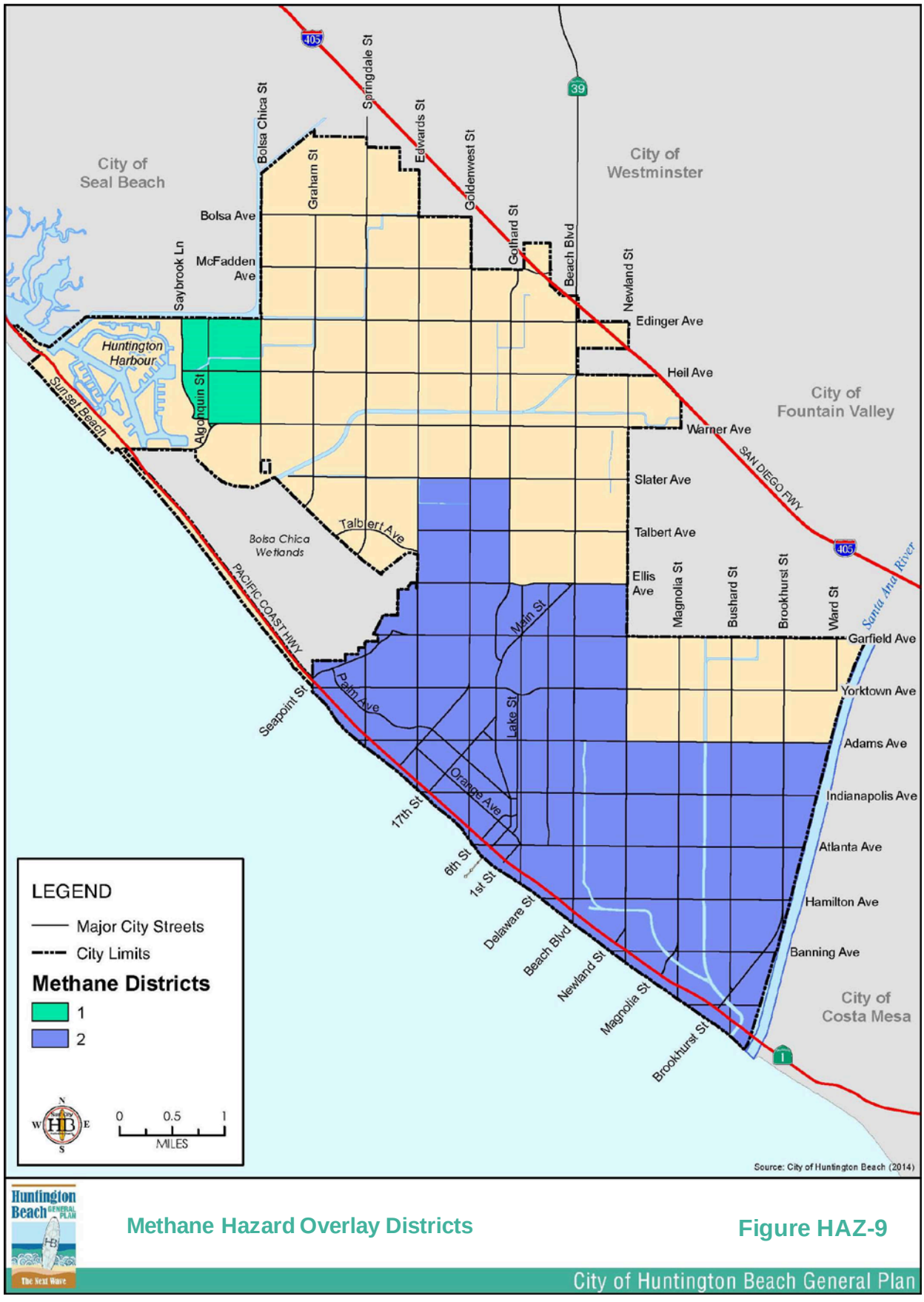
Hazardous Materials and Waste

Hazardous materials are materials that pose a significant risk to public safety or human or environmental health. These include toxic chemicals, flammable or corrosive materials, petroleum products, and unstable or dangerously reactive materials. They can be released through human error, malfunctioning or broken equipment, or as an indirect consequence of other emergencies (e.g., if a flood damages a hazardous material storage tank). Hazardous materials can also be released accidentally during transportation, as a consequence of vehicle accidents.

The majority of hazardous materials in the community are being transported on truck routes along major roadways. Some parts of the planning area, including in the northwest industrial area and along the Gothard Street corridor, have large concentrations of industrial facilities that may store, manufacture, use, and/or dispose of hazardous materials on site. In previous years, sewage and petroleum products were involved in the majority of hazardous material spills reported in the planning area.

Soils in Huntington Beach have a high likelihood to contain methane gas, which is often found in the same location as petroleum and in areas with peat in the soil. Methane is the primary component of natural gas and so is a valuable natural resource. In 2014, fossil fuel companies extracted approximately 754 billion cubic feet of natural gas from Huntington Beach and surrounding areas.

Despite its usefulness, methane is extremely flammable, potentially explosive, and may cause asphyxiation in high enough concentrations. As shown in **Figure HAZ-9**, the City has identified Methane Hazard Overlay Districts where soils are likely to contain increased areas of methane. Future development sites located in these districts must be tested for elevated levels of methane in the soil prior to construction, and future development or reuse projects may be required to include vent systems and/or barriers to reduce the level of methane to a safe concentration. There is no difference in requirements between the two districts.



Methane Hazard Overlay Districts — **Figure HAZ-9**

Aircraft/Airport Hazards

Aircraft crashes can be a major hazard, as they can significantly damage or destroy structures adjacent to airport facilities or within flight paths, and cause harm to both people in the aircraft and on the ground. These events typically cause fires, which may spread beyond the initial emergency site if not contained and can release hazardous materials into the environment.

While there are no airports in the planning area, there are multiple airports in the vicinity, including John Wayne Airport, Long Beach Airport, and Los Angeles International Airport, as well as the military Joint Forces Training Center in nearby Los Alamitos. Studies have found that aircraft departing from or arriving at these airports may pass lower than 2,000 feet above the planning area, which can generate noise in excess of 70 dBA. There are also multiple heliports within the planning area.

Disaster and Emergency Preparedness

The Huntington Beach Emergency Management and Homeland Security (EMHS) office is responsible for coordinating emergency preparedness activities in the planning area, often in cooperation with neighboring cities, the Orange County Sheriff's Department, the Water Emergency Response Organization of Orange County (WEROC), and state and federal agencies. As part of this responsibility, the EMHS office and other City organizations have set up multiple programs to make Huntington Beach more resilient to disasters and to improve the effectiveness of emergency response activities when a disaster occurs. These programs include the Community Emergency Response Team (CERT), which trains members of the public to effectively respond to a disaster; drills and exercises for emergency response staff; the Radio Amateur Civil Emergency Services (RACES) program; and the preparation of preparedness plans such as the Huntington Beach Emergency Operations Plan (EOP).

Issues, Goals, and Policies

The natural and environmental hazard issues addressed in this element include:

- Preparing for and mitigating geologic and seismic hazards
- Preparing for a changing coastline
- Minimizing flooding and tsunami hazards
- Reducing potential urban fire risks
- Remediating brownfield sites
- Managing hazardous materials and wastes
- Reducing potential aircraft hazards
- Preparing residents and businesses for future disasters
- Reducing potential threats to homeland security

Preparing for and Mitigating Geologic and Seismic Hazards

Earthquakes and other geologic and seismic hazards are among the most severe threats facing the planning area. Studies by the US Geological Survey indicate that Southern California will be affected by a major earthquake within the next few decades. In addition to the impacts associated with ground shaking, such an earthquake could cause other geologic/seismic hazards, urban fires, hazardous material spills or other incidents. To prepare for such events, the City will ensure that existing buildings are resilient to geologic and seismic hazards; community members are informed on how to stay safe during and after these events; and key City facilities can continue to provide vital services during response and recovery activities.

Goal HAZ-1. Structures are designed and retrofitted to be more resilient to earthquakes and other geologic and seismic hazards, protecting against injury while also preserving the structural integrity of the structure.

Policies

A. Ensure that new and significantly retrofitted structures are sited and designed to reduce the risk of damage from geologic and seismic hazards.

B. Support retrofits to existing structures to improve resiliency to geologic and seismic hazards.

C. Construct new key facilities to be resistant to damage from geologic and seismic hazards.

D. Maintain records of existing structures in Huntington Beach that may be vulnerable to geologic and seismic hazards, including unreinforced masonry structures, older concrete buildings, and wood structures with weak first floors.

Preparing for a Changing Coastline

Under the most conservative planning scenarios, both coastal and inland portions of Huntington Beach could be periodically flooded due to the cumulative impact of storm surge and higher high tides, as well as the possibility of sea level rise. In anticipation, the City will establish new standards and requirements to ensure that vulnerable areas are protected; new development is planned appropriately to accommodate changing conditions; and existing beach and wetland resources adapt and become more resilient.

Goal HAZ-2. Coastal environments accommodate coastal changes and reduce coastal development impacts.

Policies

A. Promote appropriate land uses and development patterns within potential sea level rise areas identified in the Sea Level Rise Hazard Area established in **Figure HAZ-6**.

B. Implement priority measures to reduce and mitigate sea level rise impacts to property and infrastructure outlined in the Coastal Resiliency Program.

C. Promote land use changes and development patterns that conserve coastal resources and minimize bluff and coastal erosion.

D. Continue to support beach sand replenishment projects located north of the planning area that will support sand deposition on beaches in the planning area.

E. Provide information to property owners about the risks associated with coastal erosion and flooding and encourage them to take adequate steps to prepare for these risks.

F. Provide sufficient warning and evacuation assistance to community members impacted by coastal flooding events.

G. Increase the City's understanding and funding for public improvements with respect to potential vulnerabilities and impacts to infrastructure associated with changes in sea level elevation.

H. Monitor potential ocean surf line hazards.

Minimizing Flooding and Tsunami Hazards

Portions of Huntington Beach are susceptible to flooding and many areas experience recurring local flooding during extreme high tide events, rainstorms, and storm surges. In addition, some open space and residentially developed areas (approximately 2 percent of the planning areas) are below sea level. These conditions could be exacerbated by sea level rise in the future. For example, low-lying areas that experience flooding may experience greater flooding for longer periods of time. In addition, areas that are prone to flooding could have unsustainable flood-insurance requirements in the future, potentially depressing property values and making homes less desirable. The failure of Prado Dam near the head of Santa Ana Canyon poses a remote flooding threat if the basin were nearly full during a failure. Due to the location on the coast, Huntington Beach is also subject to potential run-up and tsunami damage from both distant and locally generated tsunamis. Long-term ponding of water during heavy rains or lengthy periods of precipitation is likely in some areas.

Goal HAZ-3. Residents, businesses, visitors, and resources are adequately protected from risks associated with flood and tsunami hazards.

Policies

A. Establish and maintain local flood prevention standards and practices that adequately protect public and private development and resources within the planning area.

B. Maintain and increase local storm drain capacity to meet 100-year or greater flood protection requirements to protect residents and businesses from flood risks.

C. Provide sufficient warning and evacuation assistance to residents and others impacted by flooding and tsunami events.

D. Continue to identify tsunami-prone areas and establish development, emergency response, and recovery standards and procedures within these areas.

E. Continue to identify, manage, and repair or renovate areas that experience long-term ponding during heavy rain events.

Reducing Potential Urban Fire Risks

Building size and density, age of structures, and the presence of certain materials or activities all contribute to the risk of urban fires in Huntington Beach.

Goal HAZ-4. The risk of urban fires is reduced through effective building design and effective fire services.

Policies

A. Ensure that all new construction is designed for easy access by fire and other emergency response personnel.

B. Ensure that existing buildings are maintained to minimize fire risks.

Remediating Brownfield Sites

Due to historical aerospace, oil, and energy production uses and related contamination, several opportunity sites for future cleanup and remediation are located within the community. These sites offer new opportunities for brownfield development and reduce the potential for exposure to contaminants for future generations. For the purposes of this General Plan, brownfield sites are defined as properties that are contaminated and underutilized due to perceived remediation costs and liability concerns. The goals and policies provided below are intended to assist the City in the future development of sites that meet this criteria rather than regulate sites with current hazardous waste activities.

Goal HAZ-5. Environmental cleanup and management of brownfield sites improves environmental quality of life, desirability of surrounding neighborhoods, economic development, and housing options in the community.

Policies

A. Continue to identify, map, and remediate existing hazardous waste sites and require remediation when a property is redeveloped.

B. Encourage use of remediated brownfields for housing, commercial, industrial, public, and recreational uses and for open space opportunities while prioritizing open space uses, energy facilities, and other community-supporting facilities as preferred options for future use of remediated brownfield sites.

C. Prohibit the future placement of sensitive land uses in close proximity to hazardous material and waste sites.

Managing Hazardous Materials and Wastes

While brownfield sites pose a risk from hazardous materials that may have leaked into the environment in previous years, Huntington Beach community members and visitors also face risks from hazardous materials that are transported through the community or used as part of current activities, including vehicle and pipeline transport. The City can reduce risks from these materials by ensuring that proper safety practices are in place, and that emergency responders and community members have information necessary to protect themselves.

Goal HAZ-6: The risk of exposure to hazardous materials in Huntington Beach is substantially decreased.

Policies

A. Avoid locating facilities that use, store, transport, process, or dispose of hazardous materials near residential areas or other sensitive uses.

B. Promote the use of roadways with minimal exposure to residential areas or other sensitive uses as routes suitable for transporting hazardous materials.

C. Ensure that all community members have access to information about proper handling, storage, and disposal of hazardous materials, including electronic waste.

D. Continue to develop and enforce Methane District Regulations to reduce the hazards from methane-containing soils.

E. Continue to implement the Certified Unified Program Agency (CUPA) program to identify, inspect, and monitor businesses that use and store hazardous materials in the city.

Reducing Potential Aircraft Hazards

Several widely used airports are located close to the planning area. Although accidents involving aircraft are rare and there is little the City can do to decrease the risk of such an event happening, Huntington Beach can take proactive steps to ensure a safe and effective response.

Goal HAZ-7: The damage from potential aircraft hazards is reduced through increased preparation and coordination.

Policies

A. Maintain consistency with the Airport Environs Land Use Plans for all applicable airports and helipads.

B. Review and update City emergency preparedness and response plans and procedures for responding to aircraft emergency situations.

C. Coordinate any aircraft disaster response activities with the appropriate airport fire response organization.

Preparing Residents and Businesses for Future Disasters

No matter how low the risk, natural and environmental hazards can never be completely eliminated. However, education and training programs can reduce property damage and bodily harm resulting from emergency situations. Community members can also prepare themselves for hazard events to improve response and recovery after an emergency occurs.

Goal HAZ-8: Community members are well informed and equipped to make their homes and businesses more resilient to natural and environmental hazards, and to rapidly and successfully recover from them.

Policies

A. Educate community members about hazard risks present in Huntington Beach and ways to effectively reduce risk.

B. Ensure that all emergency plans are fully inclusive of the community members of Huntington Beach.

C. Support the Community Emergency Response and Training (CERT) program, as feasible, depending on the availability of funding and volunteers.

Reducing Potential Threats to Homeland Security

Huntington Beach is a desirable location to live and work as well as a destination for over 11 million visitors annually. Large-scale events such as the US Open of Surfing attract large crowds every year. In addition, the beach and Downtown area attract a wide variety of visitors on a regular basis. These conditions have increased the need for enhanced emergency response and preparedness activities throughout the community. As a result, a portion of the City's emergency response resources are used to address planning and policy issues associated with homeland security, as well as to regularly monitor activities within these areas. In recent years, some events have escalated, causing minor property damage and injuries and resulting in additional police response.

Goal HAZ-9. Residents and businesses are protected from human-caused and terrorism-related hazards.

Policies

A. Recommend emergency personnel become engaged in proactive community policing activities during special events.

B. Ensure City procedures and protocols are updated to reference departmental roles in the Emergency Operations Plan, which outlines response and recovery activities for terrorism and civil unrest in the city.

C. If deemed necessary during a large community event, activate the Emergency Operations Center to ensure effective coordination of emergency response activities.

D. Expand emergency management planning and preparedness activities to include anti-terrorism components.