APPENDIX SF: SAFETY ELEMENT BACKGROUND REPORT

Prepared for

City of Hesperia

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1 Overview

1.1 PURPOSE AND CONTENT

The Safety Element of the Hesperia General Plan is a State-mandated General Plan element that must identify potential natural and human-caused hazards that could affect the City of Hesperia's (City's) residents, businesses, and services. The Safety Element establishes a framework that anticipates these hazards and prepares the community to minimize exposure to these risks.

The Safety Element conveys the City's goals, policies, and implementation strategies to minimize the hazards to safety in and around Hesperia. It identifies the natural and human-caused hazards that affect existing and future development, describes present and expected future conditions, and sets goals and policies for improved public safety. This document includes efforts to minimize physical harm to the buildings and infrastructure in and around Hesperia to reduce damage to local economic systems, community services, and ecosystems.

The Safety Element serves the following functions:

- Develops a framework by which safety considerations are introduced into the land use planning process.
- Facilitates identifying and mitigating hazards for new development, thus strengthening existing codes, project review, and permitting processes.
- Presents policies directed at identifying and reducing hazards in existing development.
- Strengthens earthquake, flood, dam inundation, and wildfire preparedness planning and post-disaster reconstruction policies.
- Identifies how natural and climate-related hazards are likely to increase in frequency and intensity in the future and provides policies to increase community resilience through preparedness and adaptation.

Section 65302(g) of the California Government Code requires that the Safety Element contain background information and policies to address multiple natural hazards, analyze the vulnerabilities from climate change, contain policies to improve climate change resilience, and assess residential areas with evacuation constraints. As an appendix to the General Plan, this

Background Report provides the required background information to comply with the California Government Code. The public safety issues in Hesperia include the following:

- Seismic and geologic hazards
- Flood and inundation hazards
- Fire hazards
- Hazardous waste and materials
- Emergency preparedness and response
- Air Quality
- Drought
- Extreme heat
- Severe weather
- Human health hazards

1.2 RELATIONSHIP TO OTHER LOCAL PLANS

Hesperia's General Plan Safety Element is one of several plans that address community safety and related topics. Other plans include the Hesperia Local Hazard Mitigation Plan, Hesperia Emergency Operations Plan, Hesperia Climate Action Plan, and various local regulations. The General Plan Safety Element should be consistent with these other plans to minimize conflicts between documents and ensure that the City has a unified strategy to address public safety and resilience issues. The Safety Element incorporates information, technical analyses, and policies from these other documents where appropriate to help support this consistency.

General Plan Elements

The Hesperia General Plan is made up of eight State-required elements:

- Land use
- Circulation
- Safety
- Open space
- Housing
- Conservation
- Noise
- Environmental justice (new element)

The Safety Element provides policy direction that complements the policies of other General Plan elements. Crucial relationships exist between the

Safety Element and the other General Plan elements. How land uses are determined in areas prone to hazards, what regulations limit development in these areas, and how hazards are mitigated for development, are issues that tie the elements together. For instance, the Open Space Element considers how hazards affect City parks and facilities, but also recognizes that parks can provide strategies to reduce flood risks. The Housing Element is also closely tied to the Safety and Circulation Elements because future development must be protected from hazards, be able to adapt to climate change hazards, and have access to evacuation routes. Interstate (I-) 15, State Route (SR-) 138, SR-173, and US-395 are Hesperia's primary evacuation routes, supported by routes designated as arterials in the City's Circulation Element. This Safety Element is consistent with the other elements of the Hesperia General Plan.

Hesperia Local Hazard Mitigation Plan

The City of Hesperia prepared the Hesperia Local Hazard Mitigation Plan (LHMP) in accordance with the federal Disaster Mitigation Act of 2000 and the Federal Emergency Management Agency's (FEMA) hazard mitigation assistance guidance. Hesperia's LHMP is a plan that assesses hazard vulnerabilities from natural and human-caused hazards, including risk to people and facilities, and identifies short-term (five-year) mitigation actions to reduce or eliminate hazard risks in Hesperia. The LHMP discusses Hesperia's characteristics and history, development trends, hazard mitigation capabilities, integration with other hazard mitigation planning efforts, and vulnerabilities of specific facilities and infrastructure. The mitigation actions in the LHMP include both short-term and long-term strategies and involve planning, policy changes, programs, projects, and other activities. These mitigation actions are identified based on assessments of hazards, vulnerabilities, and risks and the participation of a wide range of stakeholders and the public in the planning process. Local governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance.

The LHMP and Safety Element address similar issues, but the Safety Element provides a higher-level, long-term framework and set of policies that pertain to the safety of the city, while the LHMP focuses on more-specific mitigation, often short-term actions, to enable jurisdictions to better protect lives, property, and natural systems. The LHMP, as its name implies, focuses on mitigation-related actions, and the Safety Element also includes policies related to emergency response, recovery, and preparation activities. The City is in the process of updating the LHMP, which will be

adopted by City Council upon receiving the necessary approvals by the California Governor's Office of Emergency Services (Cal OES) for state approval, and then to FEMA Region IX for federal approval. The current LHMP, as certified by FEMA, is incorporated into this Safety Element by reference, as permitted by California Government Code Section 65302.6. It is available online at: Hazard Mitigation | City of Hesperia - Official Website

Resilient IE

The Resilient IE project is a joint effort between the Western Riverside Council of Governments (WRCOG) and San Bernardino County Transportation Authority (SBCTA) to prepare the western Riverside County-San Bernardino County (WRCOG-SBCTA) region for the increasing climate-related hazards. Resilient IE supports regional and local efforts to prepare for and mitigate risks associated with climate adaptation on the region's transportation infrastructure with five primary project components:

1. The Inland Southern California Climate Collaborative (ISC3).
2. Subregional vulnerability assessments and adaptation strategies.
3. City-level, climate-related transportation hazards and evacuation maps.
4. A regionally tailored climate resilient transportation infrastructure guidebook.
5. A template for a regional climate adaptation and resiliency element.

The Resilient IE Toolkit is a collection of resources that provides data on the risk from climate-related hazards and tools and resources for developing and implementing climate adaptation and resilience strategies to reduce these risks. The Toolkit specifically addresses the anticipated increasing risks and impacts of climate-related hazards on the inland areas of southern California.

The Toolkit provides a summary of the anticipated climate-related impacts each jurisdiction is likely to confront, template language and model adaptation strategies that city and county governments can adapt for their own specific needs, and guidance for how communities can seamlessly incorporate adaptation into their individual existing efforts and comply with State-mandated resilience planning laws. The primary function of this Toolkit is to facilitate greater resilience and adaptive capacity in the face of climate-related impacts in the WRCOG-SBCTA region.

Jurisdictions in the WRCOG-SBCTA region can use this Toolkit to assess how climate-related impacts may affect them and to implement

adaptation and resilience measures that will improve climate adaptation in the community. It is available online at: https://wrcog.us/DocumentCenter/View/8019/Resilient-IE-Toolkit

Hesperia Emergency Operation Plan

The Emergency Operations Plan (EOP) is an all-hazard plan that describes how the City of Hesperia will respond to large-scale emergencies and disasters in the city. In response to an emergency, the City uses the EOP to implement operational procedures and protocols that concentrate on public welfare. The contents of the EOP establish a framework for emergency management activities and assign key responsibilities among City departments.

The plan is primarily applicable to extraordinary situations and is not intended for use in response to typical, day-to-day emergency situations. Some hazards addressed in the EOP are:

- Earthquake
- Dam Failure
- Flooding
- Severe Thunderstorm
- Wildfires
- Technology Hazards, including hazardous material incidents
- Human Hazards, including terrorism

The City's EOP complements the San Bernardino County Operational Area Emergency Operations Plan (County EOP), the Cal OES State Emergency Plan, and FEMA's National Response Framework and identifies critical tasks needed to support a wide range of response activities. The EOP is reviewed and updated every four years with the most current information and procedures. The most recent EOP was released in 2022. Developing the EOP is a collaborative effort among City Departments, with input from the San Bernardino County Sheriff's Department, San Bernardino County Fire Department, Hesperia Unified School District, healthcare entities, business owners, and local stakeholders.

Hesperia Climate Action Plan

The Climate Action Plan describes a series of community-wide and municipal measures and actions that will aid the City in reducing GHG emissions to meet community goals. The Climate Action Plan outlines a course of action for the City government and the community of Hesperia

to reduce per capita greenhouse gas emissions and adapt to effects of climate change. It provides clear guidance to City staff regarding when and how to implement key provisions and sets an implementation and monitoring framework for its strategies. Furthermore, it demonstrates that the General Plan Update policies and Climate Action Plan strategies would reduce emissions to the reduction target. The Climate Action Plan is available online at:

https://www.cityofhesperia.us/409/Hesperia-General-Plan

1.3 COMMUNITY PROFILE

Hesperia is north of the Cajon Pass, 35 miles north of San Bernardino, 80 miles northeast of Los Angeles, and 195 miles south of Las Vegas, Nevada at the intersection of US-395 and I-15. Hesperia is one of four incorporated cities in the Victor Valley region of San Bernardino County. Hesperia's incorporated area and sphere of influence encompass approximately 110 square miles.

The communities of Adelanto, Apple Valley, Victorville, and the County of San Bernardino unincorporated areas of Oak Hills and Summit Valley border Hesperia's city limits. The western banks of the dry bed of the Mojave River delineate most of the eastern boundary of the city. The northwestern portion of Hesperia borders the northbound lanes of I-15, with a portion of the city limits just west of US-395 marking a smaller western boundary.

The City of Hesperia is in a transitional area between the foothills of the San Bernardino Mountains to the south and the Mojave Desert to the north. As a result, the planning area contains a variety of slope conditions, soil types, plant communities, and other physical characteristics that vary from south to north. Hesperia generally slopes from southwest to northeast, with surface and subsurface flows trending away from the foothills and towards the Mojave River, which flows north towards the City of Barstow. While the foothill areas within Summit Valley contain significant slopes, much of the city is fairly level.

Hesperia is home to 99,818 residents and 27,790 households and supports about 39,468 jobs.[1] Approximately 23 percent of Hesperia residents are employed in the management and professional field.[2] Relative to the County, the city has a larger proportion of residents employed in the transportation, construction, and maintenance fields. Major employers in

Hesperia include the Hesperia Unified School District, County of San Bernardino, Walmart, Target, and Stater Bros. Markets.[3]

In 2019, the median age of all people in Hesperia was approximately 31.2.[4] The largest ethnic groups in Hesperia are Hispanic/Latino (58.1 percent); non-Hispanic White (33.1 percent); African American (3.9 percent); Asian/Pacific Islander (2.2 percent); Two or More Races (1.5 percent); and Other Race* (1.2 percent).[5]

The High Desert's climate vastly differs from other areas in Southern California, as there is a broad range of temperature fluctuations between the summer and winter months as well as day and night times that characterize the high desert's climate. The average annual rainfall is just 5.5 to 6 inches. A significant portion of the precipitation occurs from November through February, with the occasional summer thunderstorm.

Fire prevention and suppression services in Hesperia are provided by the San Bernardino County Fire Department. During emergencies, the Apple Valley Fire Protection District may also respond to calls in the city. Hesperia and the Town of Apple Valley are part of the San Bernardino County Operational Area, which has mutual aid agreements that enable the deployment of additional emergency resources when necessary. The City contracts with the San Bernardino County Sheriff's Department for law enforcement services.

Hesperia's water supply is managed by the Hesperia Water District, an independent County District that sources its water entirely from groundwater. The city has historically depended on the Mojave Basin for its water needs, primarily using pumped groundwater from the Alto subarea of this basin. Sewer collection in Hesperia is managed by the Hesperia Public Works Department, which discharges wastewater to the Victor Valley Wastewater Reclamation Authority's regional treatment facility.

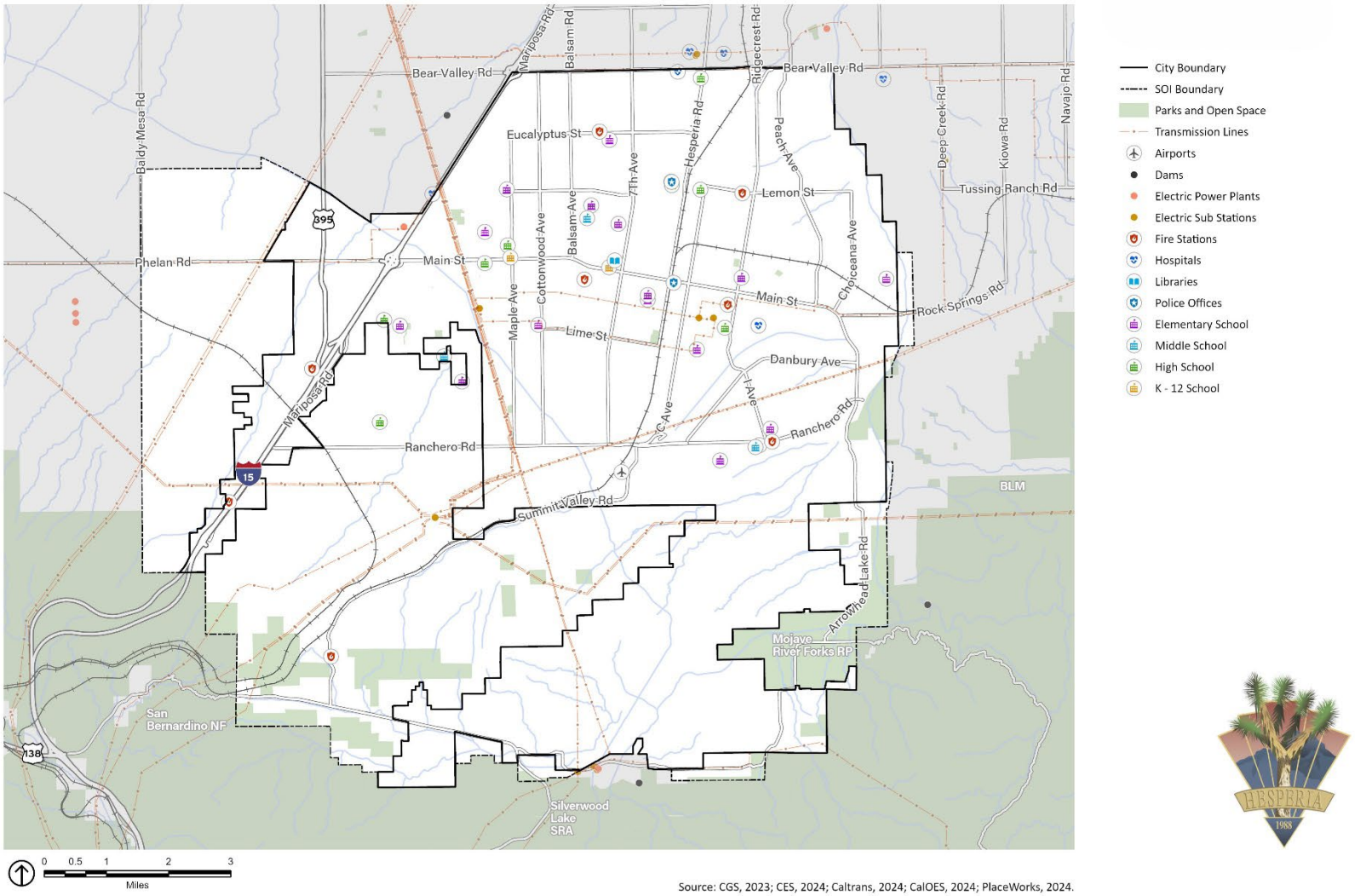
Southern California Edison (SCE) provides Hesperia's electricity, and natural gas is supplied by Southwest Gas Corporation.

As shown in **Figure 1**, the city is served by I-15, which runs through the western portion of the city in a north-south direction. Other major transportation routes include SR-138, SR-173, and US-395. Hesperia is

* The Census "Other Race" includes American Indian, Alaskan Native and individuals indicating an 'other' race.

served by Victor Valley Transit Authority, which provides local bus transit options.

Figure 1 Critical Facilities



Source: CGS, 2023; CES, 2024; Caltrans, 2024; CalOES, 2024; PlaceWorks, 2024.

1.4 CLIMATE CHANGE VULNERABILITY ASSESSMENT

As part of the update to the Safety Element, the City prepared a Climate Change Vulnerability Assessment. The Vulnerability Assessment follows the recommended process in the *California Adaptation Planning Guide* (2020) by the California Governor's Office of Emergency Services. This includes a four-step process: (1) characterizing the city's exposure to current and projected climate hazards; (2) identifying potential sensitivities and potential impacts to city populations and assets; (3) evaluating the current ability of the populations and assets to cope with climate impacts, also referred to as its adaptive capacity; and (4) identifying priority vulnerabilities based on systematic scoring. A more detailed description of the method, hazards, and results is in **Appendix A**, and each of the hazard sections of this report provides a summary of vulnerabilities created by each climate-change-related hazard.

Step 1. Identify Exposure. The goal of this step is to characterize the community's exposure to current and projected climate change hazards. The climate change hazards in the Vulnerability Assessment are air quality and smoke, drought, extreme temperatures, human health hazards, flooding, landslides, severe weather, severe storms, and wildfire.

Step 2. Identify Sensitivities and Potential Impacts. This step involved evaluating potential future climate change impacts to community populations and assets.[*] City staff first identified a comprehensive list of populations and assets to understand how susceptible the people, places, ecosystem services, and services within the community are to climate change hazards. After this applicability review, City staff evaluated which hazards are likely to affect which populations and assets, then the potential impacts to the applicable populations and community assets. Based on the results of the impact assessment, each population and asset was identified as experiencing low, medium, or high impacts for each relevant hazard. The populations and assets in the Vulnerability Assessment are shown in **Table 1**.

[*] Community populations are groups of people that may be uniquely vulnerable to climate change hazards due to existing stressors such as financial instability, health conditions, mobility challenges, and housing conditions.

Table 1 Populations and Assets

POPULATIONS			
Children and youth (under 18)	College students	Cost-burdened/low-income/overcrowded households	Households in poverty
Immigrant communities/linguistically isolated persons	Low-resourced people of color	Outdoor workers	Persons experiencing homelessness
Persons living in mobile homes	Persons living on single access roads (roads with only a single entry or exit point)	Persons with chronic illnesses and/or disabilities	Persons without a high school degree
Persons without access to lifelines	Renters	Seniors (65+)	Unemployed persons
INFRASTRUCTURE			
Airport	Dam	Energy and communication infrastructure	Flood control and stormwater infrastructure
Hazardous materials sites	Parks, Open Space, and Trails	Transportation infrastructure	Vehicle fuel stations
Water and wastewater infrastructure			
BUILDINGS			
Commercial centers	Government and community facilities	Historical places	Homes and residential structures
Medical and care facilities	Public safety buildings	Schools	
ECONOMIC DRIVERS			
Agriculture	Commercial and retail centers	Education services	Major employers
Manufacturing and industrial	Outdoor recreation		
ECOSYSTEMS AND NATURAL RESOURCES			
Chaparral	Scrub	Riparian	Woodland
KEY SERVICES			
Education services	Emergency services	Energy delivery and communication services	Government administration and community services
Public transit access	Solid waste removal	Water and wastewater	

Step 3. Assess Adaptive Capacity. Adaptive capacity is the ability of populations and community assets to prepare for, respond to, and recover from the impacts of climate change using existing resources and programs. Based on the results of the adaptive capacity assessment, the City ranked the adaptive capacity of each population or asset as low, medium, or high for each relevant hazard.

Step 4. Conduct Vulnerability Scoring. The City used the impact and adaptive capacity scores for each population and asset for each relevant hazard to determine the vulnerability score. The vulnerability score reflects how susceptible a population or asset is to harm from a particular hazard. Vulnerability is assessed on a scale from low to high. The vulnerability scores reflect both the severity of climate-related impacts and the ability of populations and assets to resist and recover from these effects. The matrix in **Figure 2** shows how impact and adaptive capacity scores combine and translate into a vulnerability score.

Figure 2 Vulnerability Scoring

	Low Impact	**Medium Impact**	**High Impact**
Low Adaptive Capacity	Medium	High	High
Medium Adaptive Capacity	Low	Medium	High
High Adaptive Capacity	Low	Low	Medium

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2 Public Safety Issues

This section outlines the existing and likely future hazardous conditions and other public safety issues in Hesperia and policy responses to these issues. The public safety issues in Hesperia that are covered in the following sections include:

- Section 2.1: Emergency Preparation and Response
- Section 2.2: Flood and Inundation Hazards
- Section 2.3: Seismic and Geologic Hazards
- Section 2.4: Fire Hazards
- Section 2.5: Hazardous Waste and Materials
- Section 2.6: Drought
- Section 2.7: Extreme Heat
- Section 2.8: Severe Weather
- Section 2.9: Human Health Hazards

This section provides details pertaining to probable locations each hazard or issue is likely to occur (per availability of data), past notable events in and around Hesperia, agencies responsible for providing protection from these public safety issues, and other background information required by California Government Code Section 65302(g)(4). The results of the Vulnerability Assessment are integrated into the discussion of hazards and public safety issues.

Of particular concern to Hesperia, as in many other communities, is the possibility of cascading and compounding hazard events. These are instances where one hazard event triggers one or more others, which may occur over a very short time frame (minutes or hours) or weeks or months apart. These linked events are often the most damaging because of the wider range of impacts. When cascading and compounding events occur closely together, emergency response operations must be flexible enough to respond to rapidly changing conditions and have access to sufficient resources to meet community needs. Examples of cascading and compounding events include a heavy rainstorm that causes flooding and mudslides, or extreme and high winds that lead to wildfires.

2.1 EMERGENCY PREPARATION AND RESPONSE

Local Emergency Response

The San Bernardino County Sheriff's Department and San Bernardino County Fire Protection District conduct emergency preparedness activities in Hesperia.

San Bernardino County Sheriff's Department

Local police services are provided by contract with the San Bernardino County Sheriff's Department. The department is augmented by several divisions to include aviation, training, patrol, dispatch, court services, detention, and the coroner's division. The Sheriff's Department leads evacuation efforts in the community and works closely with the San Bernardino County Fire Protection District in managing the evacuation area.

San Bernardino County Fire Protection District

Fire prevention and suppression services in Hesperia are provided on a contract basis by the San Bernardino County Fire Protection District (County Fire), a community-based, all hazard emergency services provider. County Fire's fire-fighting resources in Hesperia include three fire stations:

- Fire Station 302, 17288 Olive Street
- Fire Station 304, 15660 Eucalyptus Street
- Fire Station 305, 8331 Caliente Road

If needed, Apple Valley Fire Protection District may respond to emergency calls in Hesperia. The Town of Apple Valley and Hesperia are part of the San Bernardino County Operational Area. The jurisdictions that form an Operational Area have mutual aid agreements that allow the response of additional emergency resources, as needed, from non-affected members in the group. Numerous other local, state, and federal agencies are available to assist the County Fire as needed, depending on the type of incident.

County Fire, in cooperation with the City, also conducts regular training exercises with residents, which include the CERT program. The CERT Program educates people about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations.

Standardized Emergency Management System

The County of San Bernardino is required to use a Standardized Emergency Management System (SEMS) to be eligible for funding of their response-related personnel costs under State disaster assistance programs.[6] State law establishes SEMS to standardize the response to emergencies involving multiple jurisdictions. SEMS is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management, including the Incident Command System, multiagency or interagency coordination, the operational area concept, and established mutual-aid systems.

Emergency Plans

The State of California requires all State, regional, and local agencies, including SCE, to maintain their own emergency plan relating to the infrastructure that they install and maintain. In the event of an emergency, the City relies on SCE to implement their emergency plan, with the City supporting as needed. When an incident occurs anywhere in Hesperia, the San Bernardino County Sheriff's Office and/or the San Bernardino County Fire Protection District is typically the first to arrive at the scene, where they secure the area and then determine which other agencies need to be involved.

Alert, Warning, and Notification

The City of Hesperia Alert Center allows residents to view all alerts and emergencies in the area. Hesperia residents may also use the Ready San Bernardino County app to help individuals prepare and plan for how to respond to a disaster in the area. Using the Ready San Bernardino County app, residents are able to:

- Share their status with selected contacts.
- Receive critical emergency alerts via push notification.
- Locate San Bernardino County's emergency shelters.
- View up-to-date evacuation route maps.
- Get the latest news and weather for the San Bernardino County area.
- Create a personalized Emergency Preparedness Plan by answering five basic questions.

Hesperia has access to other State and national systems, including the Wireless Emergency Alert, Emergency Alert Systems (EAS), and the

Emergency Digital Information System (EDIS). EAS is a national public warning system commonly used by State and local authorities to deliver important emergency information, such as weather and AMBER alerts, to affected communities. EAS participants include radio and television broadcasters, cable systems, satellite radio and television providers, and wireline video providers. FEMA, the Federal Communications System, and the NOAA's National Weather Service work collaboratively to maintain the EAS and Wireless Emergency Alerts, which are the two main components of the national public warning system and enable authorities at all levels of government to send urgent emergency information to the public. EDIS is a wireless emergency and disaster information service operated by Cal OES and is an enhancement to the EAS. These systems are available in multiple languages.

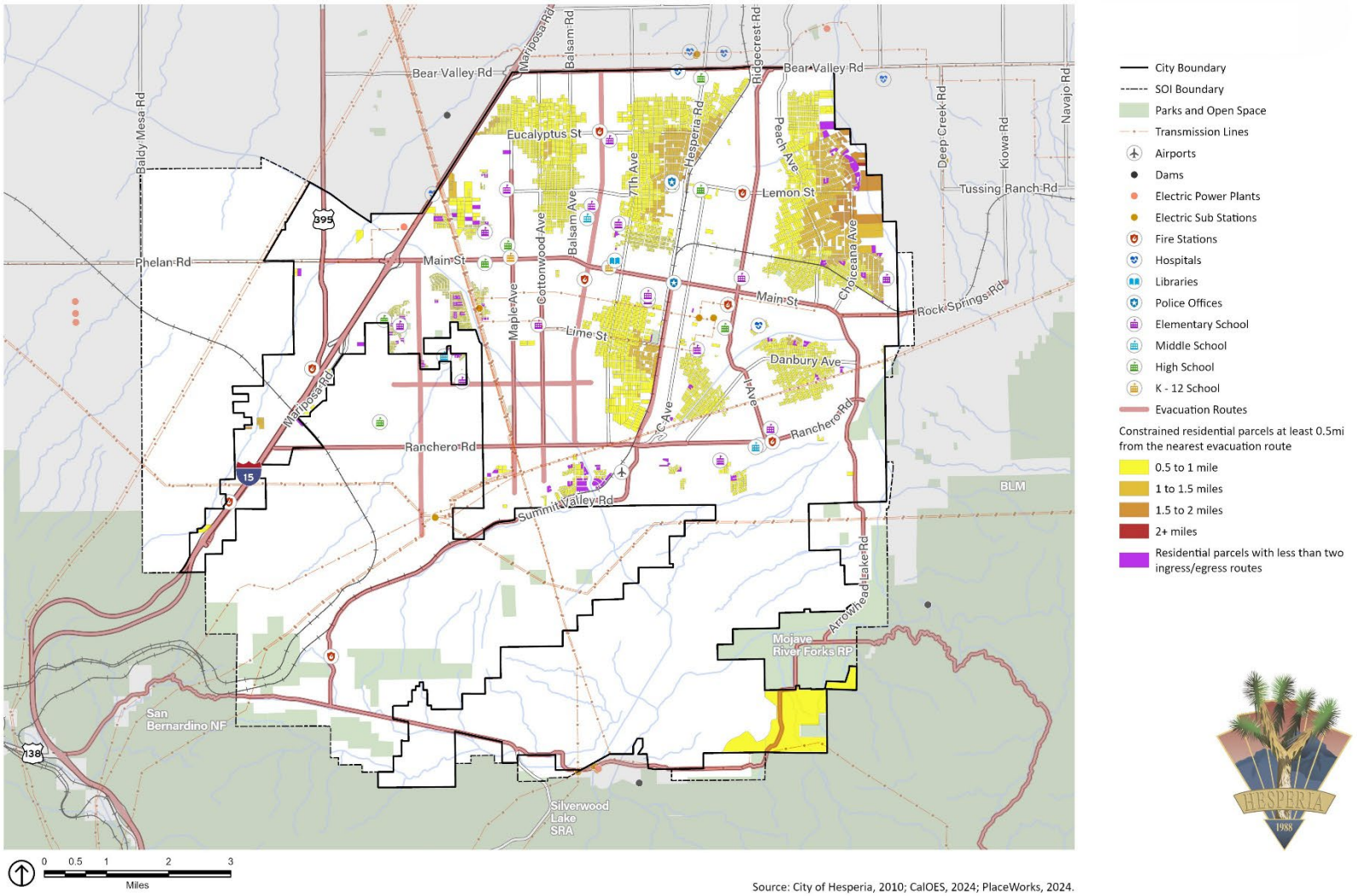
Emergency Evacuation

With advanced warning, evacuation can effectively reduce injury and loss of life during a catastrophic event. Primary emergency access and evacuation routes include I-15, which intersects the city from west to north along the western portion of the city; US-395, which intersects the city from north to south through the western portion of the city, and other local roadways that connect to these primary evacuation routes. All evacuation routes in Hesperia face a potential disruption from flooding or earthquake, which may block roadways, damage the roadway surface, or collapse bridges and overpasses. In the event of widespread disruption to local evacuation routes, remaining evacuation routes may become congested, slowing down evacuation of the community or specific neighborhoods. This issue may be compounded since evacuation routes for Hesperia will also likely serve as evacuation routes for surrounding communities, and so potential disruptions may have regional effects.

Figure 3 shows the potential evacuation routes throughout the city, although the recommended evacuation routes in any given situation will depend on the specifics of the emergency.

Figure 3 also shows residential parcels with evacuation constraints. All of these parcels are at least a half mile from a major roadway and have access to only one emergency evacuation route. The lack of multiple emergency access points limits roadway access for these properties, which may create difficulties if there is a need to evacuate.

Figure 3 Evacuation-Constrained Residential Parcels



Source: City of Hesperia, 2010; CalOES, 2024; PlaceWorks, 2024.

Implications for the Safety Element

The Safety Element Update can help Hesperia address emergency preparation and response by introducing policies to:

- Continue to implement the City's LHMP and formally incorporate the LHMP into the Safety Element.
- Coordinate with San Bernardino County, neighboring cities, and community partners to prepare for and respond to emergencies.
- Continue to expand participation in local community emergency alert systems and ensure that local emergency alerts are delivered in languages appropriate for the community and are accessible to those with disabilities.
- Coordinate with transit agencies and community service organizations to assist with evacuation efforts and ensure that evacuation services are made available to people with limited English proficiency and access to transportation, communication, and other lifeline resources and services.
- Ensure that evacuation routes remain operational in the event of an emergency.
- Operate evacuation assistance programs in conjunction with local transit providers to help those with limited mobility or who lack access to a vehicle to safely evacuate.
- Conduct community outreach focused on emergency preparedness and response.
- Require new development to have two ingress and egress routes for existing and proposed traffic evacuation volumes at buildout.

2.2 FLOODING AND INUNDATION HAZARDS

Flooding is the rising and overflowing of water onto normally dry land. Floods are one of the most frequent natural hazards impacting San Bernardino County and among the costliest natural disasters in terms of human hardship and economic loss nationwide, causing substantial damage to structures, landscapes, and utilities, as well as life-safety issues. Floods are usually caused by large amounts of stormwater, either from a period of very intense rainfall or a long period of steady rain. Flooding is more severe when prior rainfall has saturated the ground.

Flooding can be extremely dangerous; even six inches of moving water can knock a person over. Floodwaters can transport large objects downstream, damaging or removing stationary structures, such as dam spillways. Ground saturation can result in instability, collapse, or other damage that breaks utility lines and interrupts services. Objects can also be buried or destroyed through sediment deposition from heavy flooding. Standing water can cause damage to roads, foundations, and electrical circuits, as well as spread vector-borne illnesses. Other problems connected with flooding and stormwater runoff include erosion, degradation of water quality, and losses of environmental resources.

The term "flash flood" describes localized floods of great volume and short duration, generally less than four hours. This type of flood results from prolonged, heavy rainfall and typically occurs due to high peak flows of moderate duration and a large volume of runoff. Occasionally, flash flooding from short-duration, high-intensity precipitation events may occur. Flash floods can occur even during a drought. Such events can tear out trees, undermine buildings and bridges, and scour creek channels. In urban areas, flash flooding is an increasingly serious problem due to removing vegetation and replacing groundcover with impermeable surfaces such as roads, driveways, and parking lots. The greatest risk from flash floods is occurrence with little to no warning.

Atmospheric rivers are a relatively common weather pattern that brings southwest winds and heavy rain to California. Atmospheric rivers are long, narrow regions in the atmosphere that transport water vapor carried away from the tropics. These columns of vapor move with the weather, carrying large amounts of water vapor and strong winds. When the atmospheric rivers make landfall, they often release this water vapor in the form of rain or snow, often causing heavy rains that can lead to flooding and mudslide events.

Like most of southern California, Hesperia is subject to unpredictable seasonal rainfall. Every few years, the region is subjected to periods of intense and sustained precipitation. Most of the flooding occurs in the numerous washes, natural drainage courses, drainage easements, and floodways. Construction of the Mojave Forks Dam in 1971 greatly reduced the impact of flooding along the Mojave River, although a few parcels adjacent to the river are still at risk.

Most of Hesperia is located on alluvial fans, relatively flat to sloping areas covered with sediment deposited by shallow, intermittent streams that

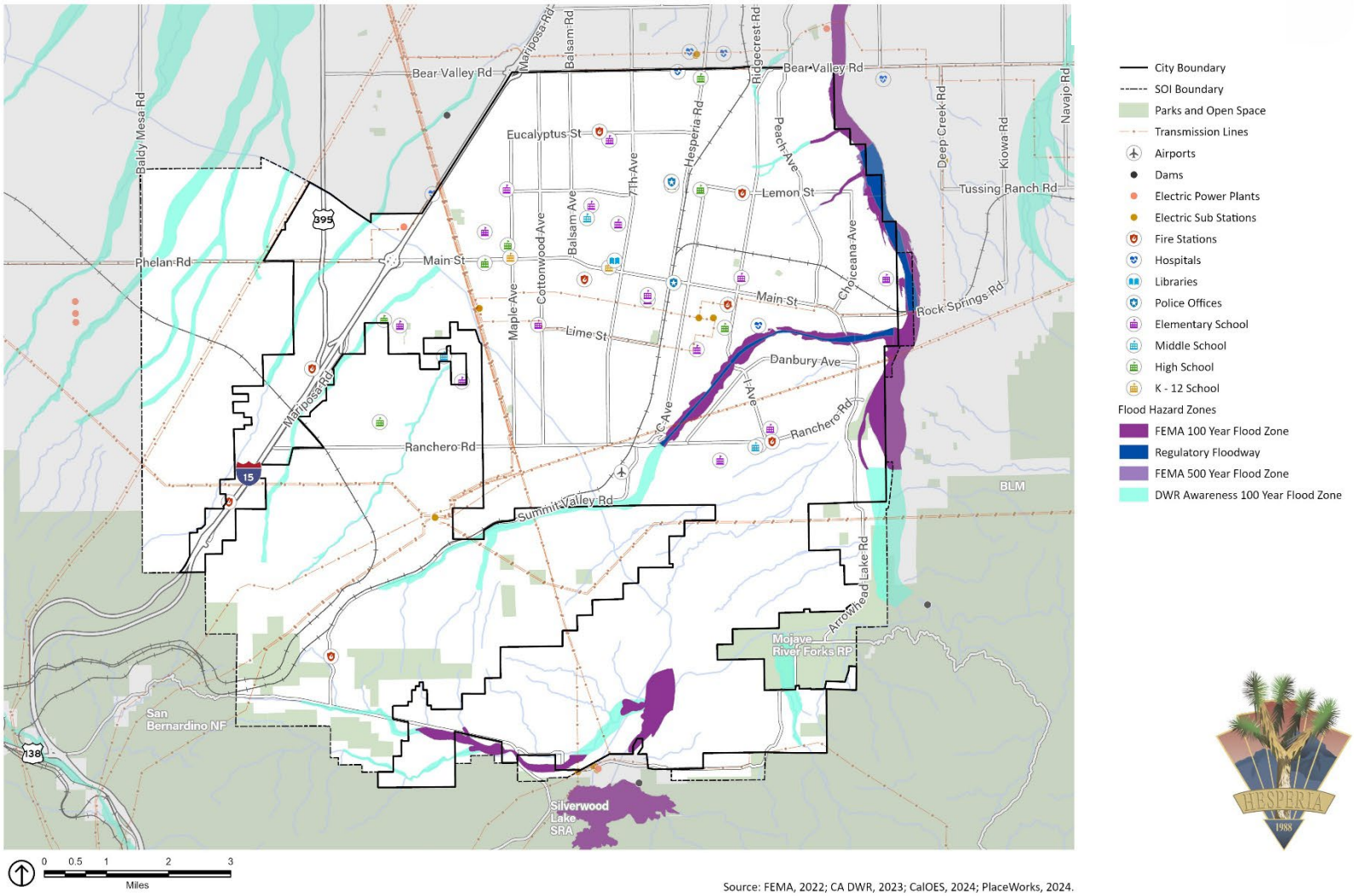
spread out from their source in the mountains to the south. The historical and geological record show that alluvial fan flooding is unpredictable, and floodwaters can travel at dangerously high speeds, be highly erosive, and can carry large amounts of sediment and other debris. These characteristics make it difficult to assess the flood risk and develop reliable mitigations for alluvial fans.

Areas at an elevated risk of flooding are divided into 100- and 500-year flood zones. A 100-year flood zone has a 1 percent chance of experiencing a major flood in any given year, and a 500-year flood zone has a 0.2 percent chance of flooding in any given year. The 100-year floodplain in Hesperia is primarily along the Mojave River, Antelope Valley Wash, and Summit Valley, as shown on **Figure 4**.

Several structures in the Antelope Valley Wash area are in the 100-year flood zone. In the Summit Valley area, most homes are above the floodplain; however, access to these homes can be cut off during severe flooding of the West Fork of the Mojave River. SR-138, SR-173, and several major roadways, including I Avenue, Rock Springs Road, and Ranchero Road, are within a 100-year flood zone. Owners of all structures in the 100-year flood zone are required to purchase and maintain flood insurance as a condition of receiving a federally backed mortgage or home equity loan on that structure.

Floodplains can change over time; the floodplain and watercourse of a stream can also be affected by human activities, such as land development and replacing permeable surfaces with hardscapes, the construction of bridges or culverts, or the creation of levees or other impoundment structures that control the flow in the watercourse.

Figure 4 Flood Hazard Zones



Source: FEMA, 2022; CA DWR, 2023; CalOES, 2024; PlaceWorks, 2024.

Agencies responsible for flood control in Hesperia include the Unites States Army Corps of Engineers, FEMA, Federal Insurance Administration, and the California Department of Water Resources (DWR).

» FEMA manages the National Flood Insurance Program), providing insurance to the public in communities that participate in the program. FEMA is the primary federal government agency contact during natural disasters and publishes the Flood Insurance Rate Maps, which identify the extent of flood potential in flood-prone communities based on a 100-year flood (or base flood) event.

» The City of Hesperia is a member of FEMA's National Flood Insurance Program. The City of Hesperia's Public Works Department is responsible for administering the program and providing flood protection and insurance information to Hesperia residents and businesses.

» Federal Insurance Administration is the primary agency that delineates potential flood hazard areas and floodways through the Flood Insurance Rate Maps and the Flood Boundary and Floodway Map. Flood insurance is required by all homeowners who have federally subsidized loans.

» DWR is responsible for managing and protecting California's water. DWR works with other agencies to benefit the state's people, and to protect, restore, and enhance the natural and human environments. DWR also works to prevent and respond to floods, droughts, and catastrophic events that would threaten public safety, water resources and management systems, the environment, and property. DWR is responsible for inspecting the Mojave Forks Dam, Cedar Springs Dam, and Lake Arrowhead Dam on an annual basis to ensure they are safely operating.

Dam and Pipeline Failure

A dam failure is an uncontrolled release of water from a reservoir through a dam because of structural failures or deficiencies in the dam, usually associated with intense rainfall or prolonged flooding. Water pipeline or aqueduct failures can create a similar sudden flood. Dam and pipeline failures can range from minor to catastrophic, potentially harming human life and property downstream from the failure. In addition, ecosystems and habitats can be destroyed by fast-moving floodwaters, debris, and sedimentation from inundation. Although dam and pipeline failures are very rare, these events are not unprecedented. There are four major causes of failures.

- **Overtopping:** These failures occur when a reservoir fills too high with water, especially in times of heavy rainfall, leaving water to rush over the top of the dam. Other causes of this type of failure include settling of the crest of the dam or spillway blockage.
- **Foundation defects:** These failures occur as a result of settling in the foundation of the dam, instability of slopes surrounding the dam, uplift pressures, and seepage around the foundation. All these failures result in structural instability and potential dam failure.
- **Piping and seepage failures:** These failures occur as a result of internal erosion caused by seepage and erosion along hydraulic structures, such as the spillways of a dam, or failures in the walls of a water pipeline. Animal burrows and cracks in the dam structure may also cause erosion.
- **Conduit and valve failure:** These failures occur as a result of problems with valves and conduits in a dam or pipeline's systems.

Many dam and pipeline failures are also the secondary result of other natural disasters, such as earthquakes, landslides, and extreme storms. Other causes include equipment malfunction, structural damage, and sabotage. Dams are constructed with safety features known as "spillways" that allow water to overtop the dam if the reservoir fills too quickly. Spillway overflow events, often referred to as "design failures," result in increased discharges downstream and increased flooding potential. In a dam failure scenario, the greatest threat to life and property typically occurs in areas immediately below the dam because flood depths and discharges generally decrease as the flood wave moves downstream. The primary danger associated with dam failure is the high-velocity flooding downstream of the dam and limited warning times for evacuation.

As mandated by the National Dam Inspection Act, the United States Army Corps of Engineers has the authority and responsibility for conducting inspections of all dams. The purpose of these inspections is to check the structural integrity of the dam and associated appurtenant structures, ensuring the protection of human life and property.

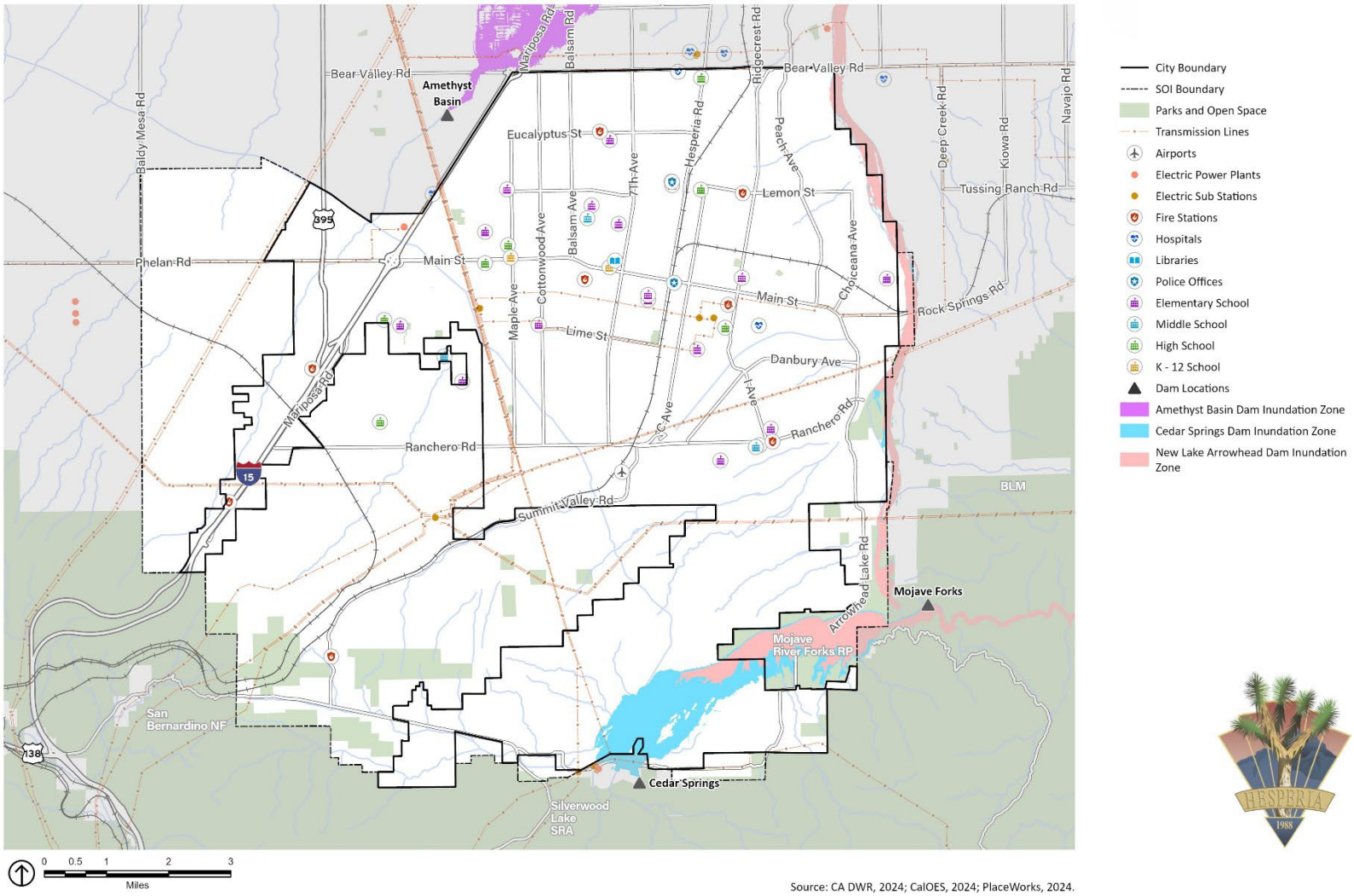
The National Dam Inspection Act requires all states to establish dam safety programs and sets minimum standards for dam design, construction, maintenance, and inspection. The California Division of Safety of Dams Program in the California Department of Water Resources is responsible for implementing the National Dam Inspection Act in California and ensuring that all non-federal dams in the state comply with federal safety standards. The program also works to promote dam safety awareness, provides

technical assistance to dam owners and operators, and conducts regular inspections and evaluations of California's dams.

The Division of Safety of Dams regulates approximately 1,250 dams throughout California and inspects dams on an annual basis to ensure they are safe and performing as intended. The Division also conducts independent reviews of applications for dam construction, removal, alteration, or repair; has inspection oversight over dam construction projects; and periodically reviews the stability of dams and their critical related structures, considering improved design approaches and requirements. The Division works closely with dam owners to identify and correct issues on an ongoing basis.

The Federal Energy Regulatory Commission, as required by federal law, reviews and approves comprehensive emergency action plans (EAP) for each of these dams. The EAP minimizes the threat to public safety and the response time to an impending or actual sudden release of water from project dams. The EAP is also designed to provide emergency notification when floodwater releases may present the potential for major flooding. The EAP is used primarily to notify partner agencies; however, it may also be used to notify the public in unique situations. The Mojave Forks Dam, Cedar Springs Dam, and Lake Arrowhead Dam, owned by the Department of Water Resources, are outside of city limits, as shown on **Figure 5**. In the event of a dam failure at the Mojave Forks Dam, Cedar Springs Dam, and Lake Arrowhead Dam, land along the banks of the Mojave River would flood. The Amethyst Basin Dam is to the north of the city limits, and the inundation area would not flood areas within Hesperia.

Figure 5 Dam Inundation Areas



Source: CA DWR, 2024; CalOES, 2024; PlaceWorks, 2024.

Past Occurrences

Floods are a regular feature in Hesperia and cause the second-greatest number of disaster declarations in the state. San Bernardino County has had several flooding events, including:

- A major flood in early March 1938 affected large swaths of Southern California, including San Bernardino, Riverside, Orange, and Los Angeles counties. Floodwaters resulted in widespread damage to buildings, roads, railroad tracks, bridges, and farmlands along the Mojave River. Estimates of the total death toll of the incident range from 87 to 249, and thousands were left homeless.[7, 8]
- Several days of heavy rain in January and February 1969 caused widespread flooding in Riverside and San Bernardino counties, causing both counties to be declared federal disaster areas. The Rancho Cucamonga area was the region most severely affected; however, evacuations, deaths, landslides, and damage to buildings and roadways occurred throughout the region.[9, 10]
- A series of severe rainstorms in Southern California between December 27, 2004, and January 11, 2005, resulted in Governor Schwarzenegger proclaiming a state of emergency for San Bernardino County on January 15, 2005, and President Bush declared a major disaster on February 4, 2005.
- A series of severe rainstorms occurred in Southern California between January 17, 2010, and February 6, 2010. Governor Schwarzenegger issued a state of emergency for San Bernardino County.
- In February 2019, firefighters in San Bernardino County rescued several people trapped on islands surrounded by floodwaters. This flood event resulted in several injuries and hospitalizations.[11]
- On August 20, 2023, tropical Storm Hilary made landfall, causing significant damage in San Bernardino County, with initial estimates indicating repair costs could reach approximately $26 million. The storm resulted in floods across various communities, including Hesperia. Communities most impacted included Oak Glen, Forest Falls, Phelan, Seven Oaks, and Wrightwood. The storm caused extensive damage to public infrastructure, including bridges, roads, and water basins.[12]

Potential Changes to Flood Risk in Future Years

Likelihood of Future Occurrence

Historically, extended heavy rains have resulted in floodwaters that exceed normal high-water boundaries and cause damage in Hesperia. Flooding has occurred within the 100- and 500-year floodplains and localized in other areas throughout the city, such as the A04 flood zone area along Main Street. As land uses and climate conditions shift, and improvements are made to flood-control channels, the size of these flood zones is likely to change. However, flooding is likely to continue in the future. The potential for a dam failure event in Hesperia is likely to remain a risk in future years, although the odds of such events are expected to remain very low.

Climate Change and Flooding

Floods are among the most damaging natural hazards in Hesperia, and climate change is expected to make flood events worse. Although climate change may not change average precipitation levels significantly, scientists expect that it will cause more years of extreme precipitation events. This means that more years are likely to see particularly intense storm systems that drop enough rainfall over a short period to cause flooding. Because of this, floods are expected to occur more often in Hesperia, and climate change may expand the parts of the city that are considered prone to flooding. Climate change is also likely to increase the frequency and severity of droughts that cause soil to dry out and become hard. When precipitation does return, more water runs off the surface than is absorbed into the ground, which can increase flooding downstream.

While the risk and associated short- and long-term impacts of climate change are uncertain, experts in this field tend to agree that the most significant impacts include those resulting from increased heat and rainfall events that cause increased frequency and magnitude of flooding. Increases in damaging flood events will cause greater property damage, public health and safety concerns, displacement, and loss of life. Displacement of residents can include both temporary and long-term displacement, an increase in insurance rates, or restriction of insurance coverage in vulnerable areas.

Implications for the Safety Element

The Safety Element Update can continue to reduce Hesperia's vulnerability to flood risk by incorporating policies to:

- Maintain the structural and operational integrity of essential facilities during and after flooding events.
- Locate new essential public facilities outside of flood hazard zones, including healthcare facilities, emergency shelters, fire stations, emergency command centers, and emergency communications facilities, or identify construction methods or other methods to minimize damage if these facilities are in flood hazard zones. If new critical facilities must be constructed in these areas, require that they be able to withstand flood impacts.
- Ensure that flood warnings and flood evacuation services are accessible to those with access and function needs and provided in multiple languages.
- Explore opportunities for installing green infrastructure and permeable paving materials to reduce flood risk; provide support services and incentives for property owners installing such measures.
- Support efforts for new development and existing building owners to install permeable pavements and green infrastructure to slow or absorb floodwaters.
- Regularly evaluate the capacity and integrity of stormwater conveyance and flood control infrastructure, repairing and expanding facilities, as necessary.

2.3 SEISMIC AND GEOLOGIC HAZARDS

Seismic and geologic hazards are risks caused by the movement of different parts of the earth's crust or surface. Seismic hazards include earthquakes and hazardous events caused by them. Geologic hazards are other hazards involving land movements that are not linked to seismic activity and can inflict harm to people or property.

Seismic Hazards

Seismic activity occurs along boundaries in the earth's crust, called faults. Pressure along the faults builds over time and is ultimately released, resulting in ground shaking, commonly referred to as an earthquake. Earthquakes can also trigger other hazards, including surface rupture (cracks in the ground surface), liquefaction (causing loose soil to lose its strength), landslides, and subsidence (sinking of the ground surface). Earthquakes and other seismic hazards often damage or destroy property

and public infrastructure, including utility lines, and falling objects or structures pose a risk of injury or death.

Earthquakes

The hazard event with the greatest potential for loss of life or property and economic damage in Hesperia is an earthquake. Damaging earthquakes affect widespread areas and trigger many secondary effects that can overwhelm the ability of local jurisdictions to respond. Historical and geological records show that Southern California has a long history of seismic events.

Nearby faults include the San Andreas, North Frontal, Cleghorn, Cucamonga, Helendale, and San Jacinto faults. All these faults have the potential to generate moderate to large earthquakes. The closest zoned faults include the North Frontal Fault approximately two miles to the east, and the San Andreas Fault, approximately four miles southwest of Hesperia.

The North Frontal Fault is thought to have moved in the past 10,000 years, making it an active fault. However, the fault has not been studied in detail and its recurrence interval, slip rate, and other fault parameters are not well understood. The North Frontal fault, given its location relative to Hesperia, has the potential to cause the most severe shaking in the city; loss estimation modeling indicates that a maximum magnitude 7.2 earthquake on this fault would be a worst-case scenario for the city.[13]

California is best known for the San Andreas Fault, a 400-mile-long fault running from the Mexican border to a point offshore, west of San Francisco. The San Andreas Fault is the principal boundary between the Pacific and North American Plates. This fault is considered the "Master Fault" in Southern California because it has frequent large earthquakes and controls the seismic hazards of the area. Over the past 1,400 to 1,500 years, large earthquakes have occurred at about 150-year intervals on the southern San Andreas Fault.[14]

Alquist-Priolo Earthquake Fault Zones are California Geological Survey–designated zones in California that are subject to special regulations for development and construction in the presence of certain active faults. These faults have surface traces, or a line on the earth's surface, defining a fault. During an earthquake, the ground's surface can move along these traces, damaging buildings or other structures built on top of them. However, no Alquist-Priolo Earthquake Fault Zones are in the city.

Figure 6 shows the location of regional faults and Alquist-Priolo Earthquake Fault Zones.

Liquefaction

In addition to the direct physical damage that can result from the motion of an earthquake, damage can result from liquefaction. Liquefaction occurs primarily in saturated, loose, fine- to medium-grained soils in areas where the groundwater table is within approximately 50 feet of the surface. Shaking causes the soils to lose strength and behave as a liquid. Excess water pressure is vented upward through fissures and soil cracks and can result in a water-soil slurry flowing onto the ground surface. This subsurface process can lead to near-surface or surface ground failure that can result in property damage and structural failure. Groundwater that is less than 10 feet below the surface can cause the highest liquefaction susceptibility, and lower groundwater levels cause lower liquefaction risks.

Soils susceptible to liquefaction are typically found in low-lying, current, or former floodplains. Geologically young, loose, unconsolidated sediments occur throughout the Hesperia area; however, shallow groundwater occurs only within the Mojave River floodplain where water at depths of less than 30 feet are recorded. Ground shaking of 0.2g and relatively long duration can be expected in the Hesperia area as a result of an earthquake on any of several faults in the region. As such, areas along the floodplains of Mojave River are likely to face liquefaction during an earthquake. Liquefaction-related lateral spreads can occur adjacent to stream channels and deep washes that provide a free face along which the liquefied mass of soil fails. Lateral spreads can cause extensive damage to pipelines, utilities, bridges, roads, and other structures.

Site-specific geotechnical studies are the only practical and reliable way of determining the specific liquefaction potential of a site. However, a determination of general risk potential can be provided based on soil type and depth of groundwater. In most cases, proper design and construction of subgrade soils and building foundations provides a mechanism to mitigate the risk of seismic hazards to an acceptable level in conformance with the California Building Code. Identifying areas having a liquefaction potential is only intended as notification to seek further site-specific information and analysis of this potential hazard as part of future site development. It should not be solely relied on for design or decision-making purposes without site-specific information and analysis.

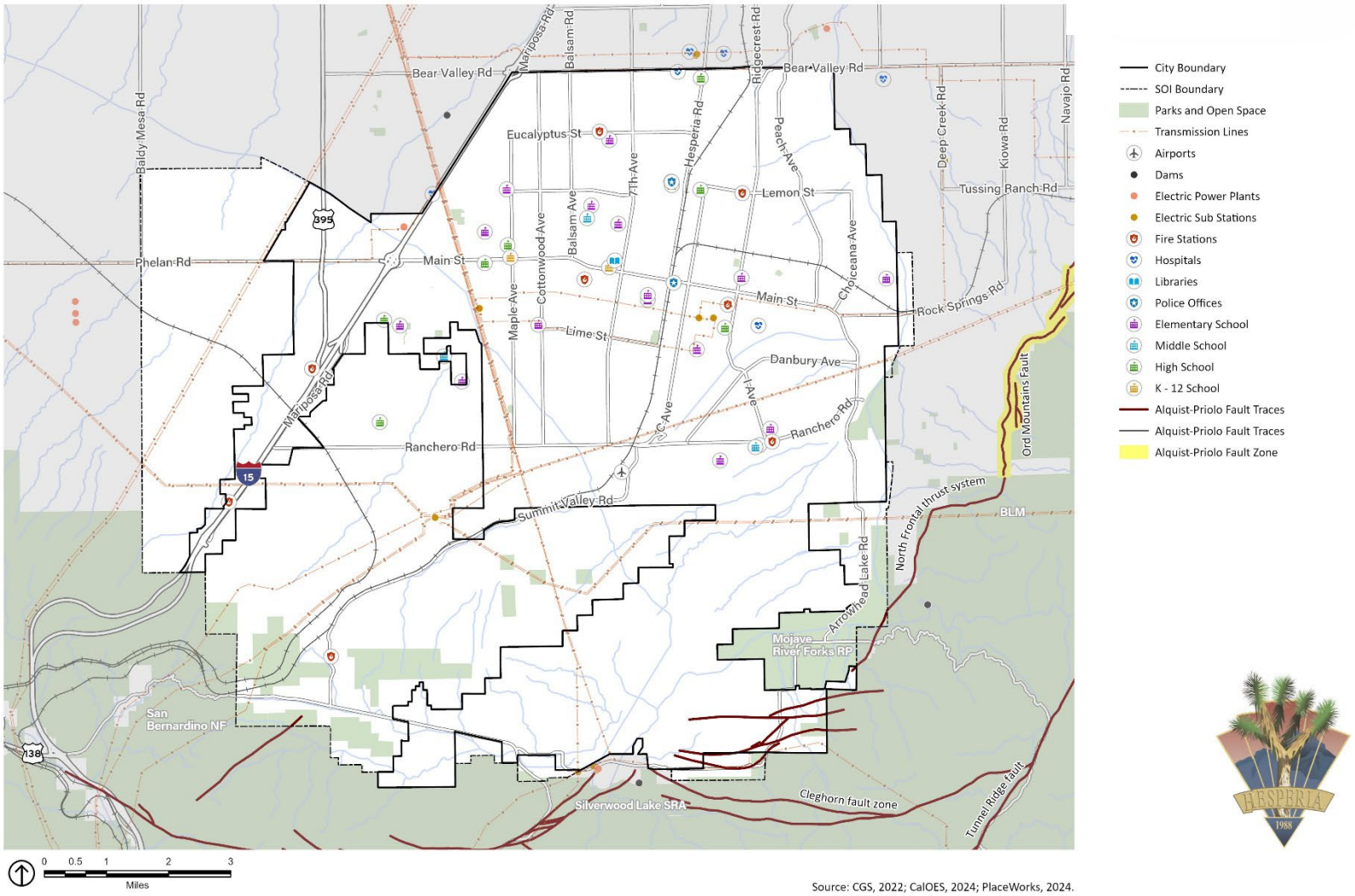
Landslides

Earthquake-induced landslides pose a significant risk due to the presence of landslide-prone areas in western Hesperia and proximity of earthquake faults. Ground shaking from seismic activity can cause rocks, debris, and hillside soils to loosen and fall downslope, harming facilities and infrastructure in its path. Landslides are discussed in more detail in the Geologic Hazards section.

Sinkholes

Sinkholes, which are depressions or holes in the ground that form when the surface collapses into an underground space, are also a hazard in Hesperia. They can be formed by natural processes, such as earthquakes or subsidence, which is when the ground surface sinks as a result of underlying soil or rock being compressed, compacted, or eroded. Sinkholes can occur suddenly and can be very dangerous if they form underneath buildings, roads, or other structures.

Figure 6 Regional Fault Lines



Source: CGS, 2022; CalOES, 2024; PlaceWorks, 2024.

Geologic Hazards

Geologic hazards, such as landslides, erosion, and subsidence depend on the geologic composition of the area. Landslides and rock falls may occur in sloped areas, especially areas with steep slopes, and usually in loose and fragmented soil areas. Slope stability depends on many factors and interrelationships, including rock type, pore water pressure, slope steepness, and natural or human-made undercutting. Landslides, rockfalls, and debris flows occur continuously on all slopes; some processes act very slowly, while others occur very suddenly, often with disastrous results. Areas underlain by soluble minerals such as salt, gypsum, and carbonate rocks (limestone, dolomite) are prone to subsidence due to dissolution by groundwater.[15] Groundwater withdrawal is a major cause of subsidence, as it can lead to compaction of fine-grained sediments like clay when pore pressures decrease.[16]

Landslides

Landslides are often triggered by other natural hazards, such as heavy rain, floods, or wildfires, so landslide frequency is related to the frequency of these other hazards. In San Bernardino County, landslides typically occur during and after severe heavy rainfall, especially in areas previously burned by wildfires that have little to no slope stability. So, the risk of landslides often rises during and after sequential severe storms that saturate steep, loose soils. Landslides and mudslides are a common occurrence and have caused damage to homes, public facilities, roads, parks, and sewer lines.

The foothills in the southern portion of the city are within moderate to very high landslide susceptibility classes. Landslides present the greatest geologic hazards in the city and generally occur in winter during high precipitation years. Landslides range from small, shallow deposits of soil and weak bedrock materials to large, deep landslides involving a large amount of bedrock. **Figure 7** illustrates areas in Hesperia that are most susceptible to landslides.

Erosion

Hesperia is also susceptible to hazards related to erosion, or the geological process in which earthen materials are worn away and transported by natural forces, such as water or wind, causing the soil to deteriorate. Eroded topsoil can be transported into streams and other waterways. Highly erosive soils can damage roads, bridges, buildings, and other structures. Sinkholes can also be formed by the erosion of soil or sediment by water

flowing through the ground. This hazard can happen in areas with sandy or porous soils or in areas with a high water table. Sinkholes can pose a hazard to infrastructure and human safety. They can cause damage to buildings, roads, and other structures and pose a risk to people and animals if they are not properly identified and managed.

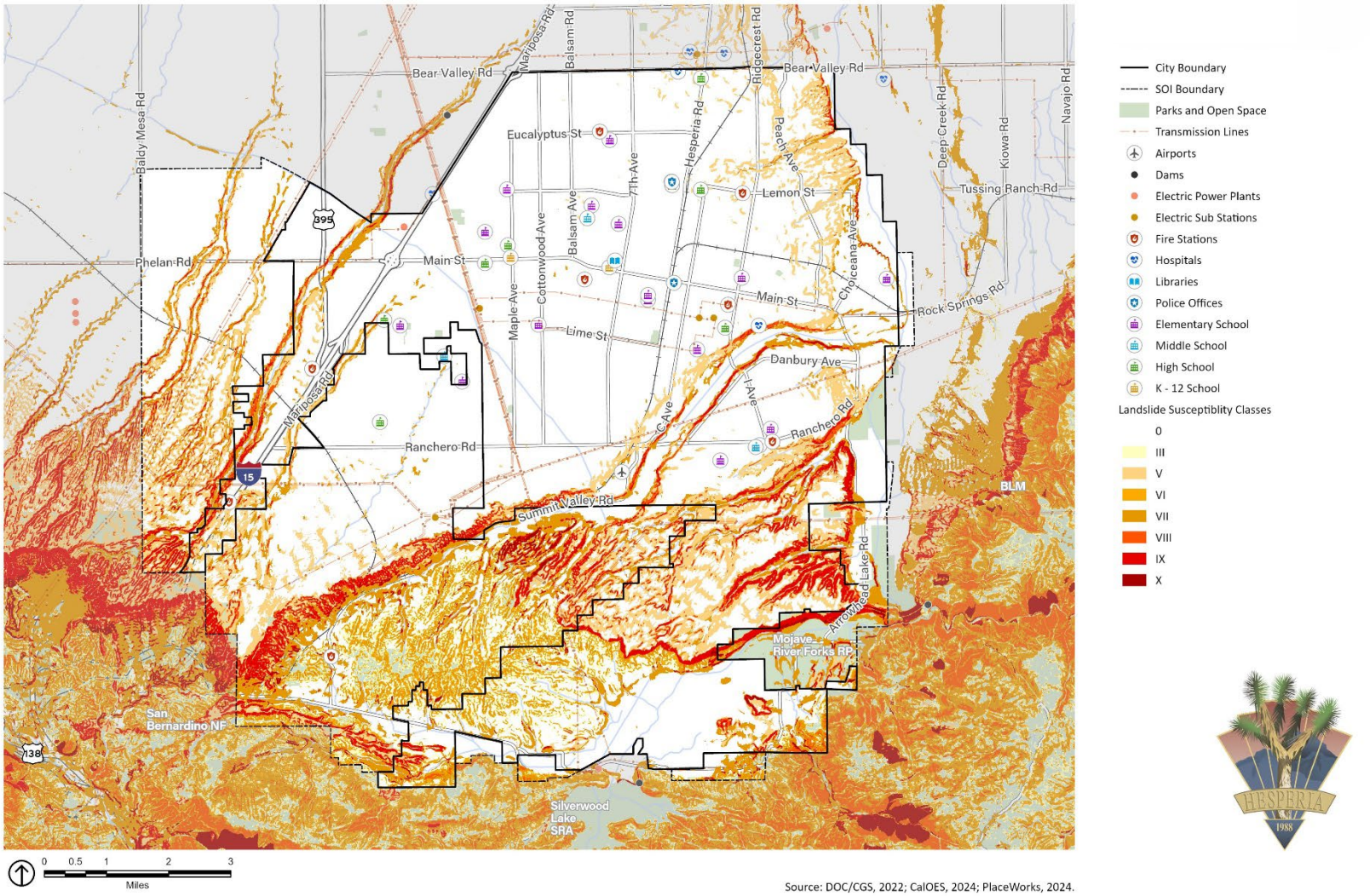
Subsidence

Subsidence refers to the sudden sinking or gradual downward settling and compaction of soil and other surface material with little or no horizontal motion. It may be caused by a variety of human and natural activities, including earthquakes, water saturation, and groundwater pumping. Subsidence occurs when large amounts of groundwater have been excessively withdrawn from an aquifer.

Past Occurrences

Hesperia is in a region of high seismicity with numerous faults nearby. Major earthquakes are rare in Hesperia, but minor earthquakes are more frequent. Landslides have occurred on hillsides in the southern portion of the city, generally in winter during high rainfall years.

Figure 7 Landslide Susceptibility Areas



Source: DOC/CGS, 2022; CalOES, 2024; PlaceWorks, 2024.

Potential Changes to Geologic and Seismic Risk in Future Years

Likelihood of Future Occurrence

Seismic Risk

Earthquakes are likely to continue to occur on an occasional basis. Most are expected to cause no substantive damage and may not even be felt by most people. Major earthquakes are rare but a possibility in the region. A major earthquake along any of the nearby faults could result in substantial casualties and damage, although the greatest risk in Hesperia is from the North Frontal Fault and San Andreas Fault due to their proximity and high potential to cause a severe earthquake. A major earthquake on either fault could damage or destroy transportation infrastructure, such as I-15, SR-138, SR-173, US-395, or bridges, limiting access in and out of the community.

Based on historical data and the location of Hesperia relative to active and potentially active faults, the city will likely experience a significantly damaging earthquake. If serious shaking occurs, newer construction is generally more earthquake resistant than older construction because of improved building codes.

Geologic Risk

Geologic risks, such as landslides, are common occurrences in Hesperia. With significant rainfall, additional failures are likely in the community's landslide hazard areas, and minor to moderate landslides will likely continue to impact the area as they have in the past when heavy precipitation occurs.

Climate Change and Geologic and Seismic Hazards

Climate change is unlikely to increase earthquake frequency or strength, though threats from seismic and geologic hazards are expected to continue. Climate change may result in precipitation extremes (i.e., wetter rainfall periods and drier dry periods). Though total average annual rainfall may not change significantly, rainfall may be concentrated in more intense precipitation events. Heavy rainfall could cause an increase in the number of landslides or make landslides larger than normal. Increased wildfire frequency can destabilize hillsides due to loss of vegetation and change soil composition, contributing to greater runoff and erosion. The combination of a generally drier climate in the future, which will increase the chance of drought, wildfires, and the occasional extreme downpour, is likely to cause more mudslides and landslides.

Implications for the Safety Element

While earthquakes are independent of climate change, they could co-occur with other emergency events, such as major flood or regional sandstorms that could be exacerbated by climate change. Given Hesperia's location in a seismically active region, seismic safety should continue to be a priority in planning and development.

The Safety Element Update can address Hesperia's ability to prepare for and respond to seismic hazards through the following strategies:

» Conduct multilingual outreach to help residents prepare for earthquakes.

» Increase public awareness regarding seismic risks.

The Safety Element Update can address Hesperia's ability to prepare for and respond to geologic hazards through the following strategies:

» Discourage new construction in areas with high landslide risk or adopt development standards for new construction in areas with high landslide potential.

» Ensure that critical facilities will remain operational in the event of a landslide.

» Increase public awareness regarding geologic risks.

2.4 FIRE HAZARDS

Fire hazards include wildfires, urban fires, and structural fires. The combination of complex terrain, climate, vegetation, and development patterns contribute to an elevated risk of wildfire. Historically, the fire season extended from early summer through late fall of each year during the hotter, dryer months, although it is increasingly a hazard that can occur year-round. Fire conditions arise from a combination of high temperatures, low moisture content in the air and plant matter, an accumulation of vegetation, and high winds.

Three types of fires are of concern to Hesperia: (1) wildfires, (2) wildland-urban interface fires, and (3) structural fires.

Wildfires

Wildfires occur on mountains, hillsides, and grasslands. Fuel, weather, and topography are primary factors that affect how wildfires spread. Hesperia

is in the lower Mojave section of the Southeastern Deserts Bioregion, an area characterized by isolated, steep-sided mountain ranges separated by broad alluvial basins.

The dominant vegetation assemblages in this area include desert shrub, creosote brush shrub, and succulent shrub. Other important vegetation types include Joshua trees, woodland, shadscale scrub, blackbrush scrub, and desert scrub-steppe. About one-third of the desert floor in the Mojave section is devoid of vegetation, limiting the amount of surface fuel loads available to burn. In and around Hesperia, the habitats provide highly flammable fuel that is conducive to wildfires. These plant species are capable of regeneration after a fire, making periodic wildfires a natural part of the ecology of these areas. The climate of Hesperia keeps the grass dry and more readily combustible during fire season.

Wildfire potential for San Bernardino County is typically greatest in the fall, when dry vegetation coexists with hot, dry Santa Ana winds, and controlling a fire becomes far more difficult. Areas adjacent to the city that are susceptible to wildfires are also of concern because these conditions could exacerbate vulnerabilities in the city. Wildfires, particularly near the end of the dry season, tend to burn fast and very hot, threatening homes and leading to serious destruction of vegetative cover. However, in Hesperia, fires with conflagration potential can increasingly occur at any time of the year. Seasonal drought conditions exacerbate fire hazards.

Fires in the Hesperia area typically start in the mountains or foothills to the south. Because areas of the city with natural vegetation are extremely flammable during late summer and fall, wildfire is a serious hazard in undeveloped hillside areas in the southern and southwestern portion of the city as well as open space areas adjacent to the city. These areas include State Responsibility Area (SRA) lands west, south, and east of the city.

Fire Hazard Severity Zone

The California Department of Forestry and Fire Protection (CAL FIRE) establishes Fire Hazard Severity Zones (FHSZs), designating each as moderate, high, or very high severity. Incorporated areas such as Hesperia are considered local responsibility areas (LRAs). **Figure 8** shows the FHSZs in and around Hesperia.

A combination of factors, including weather, topography, and vegetation, create a higher risk of wildfire hazards, particularly in the Very High FHSZ. CAL FIRE periodically reviews and revises the FHSZ boundaries based on

updated modeling and scientific information. Individuals should consult the most recent mapping available from CAL FIRE's Fire and Resource Assessment Program (FRAP) at https://frap.fire.ca.gov/. Future updates to the Safety Element will incorporate new mapping data as it becomes available.

Wildland-Urban Interface Area

In addition to the Very High FHSZ designation by CAL FIRE, the city contains areas designated as wildland-urban interface (WUI). The WUI is an area where buildings (e.g., housing) and infrastructure (e.g., cell towers and water supply facilities) mix with flammable wildland vegetation, allowing wildland fires to spread to buildings and structures easily. **Figure 9** identifies the WUI in Hesperia. There are three distinct zones in the WUI.

1. The **intermix zone** contains housing development or improved parcels interspersed in an area dominated by wildland vegetation subject to wildfire.
2. The **interface zone** is not dominated by wildland vegetation but contains dense housing next to vegetation that can burn in a wildfire.
3. The **influence zone** contains wildfire-susceptible vegetation within 1.5 miles from the WUI or wildland-urban intermix zones.

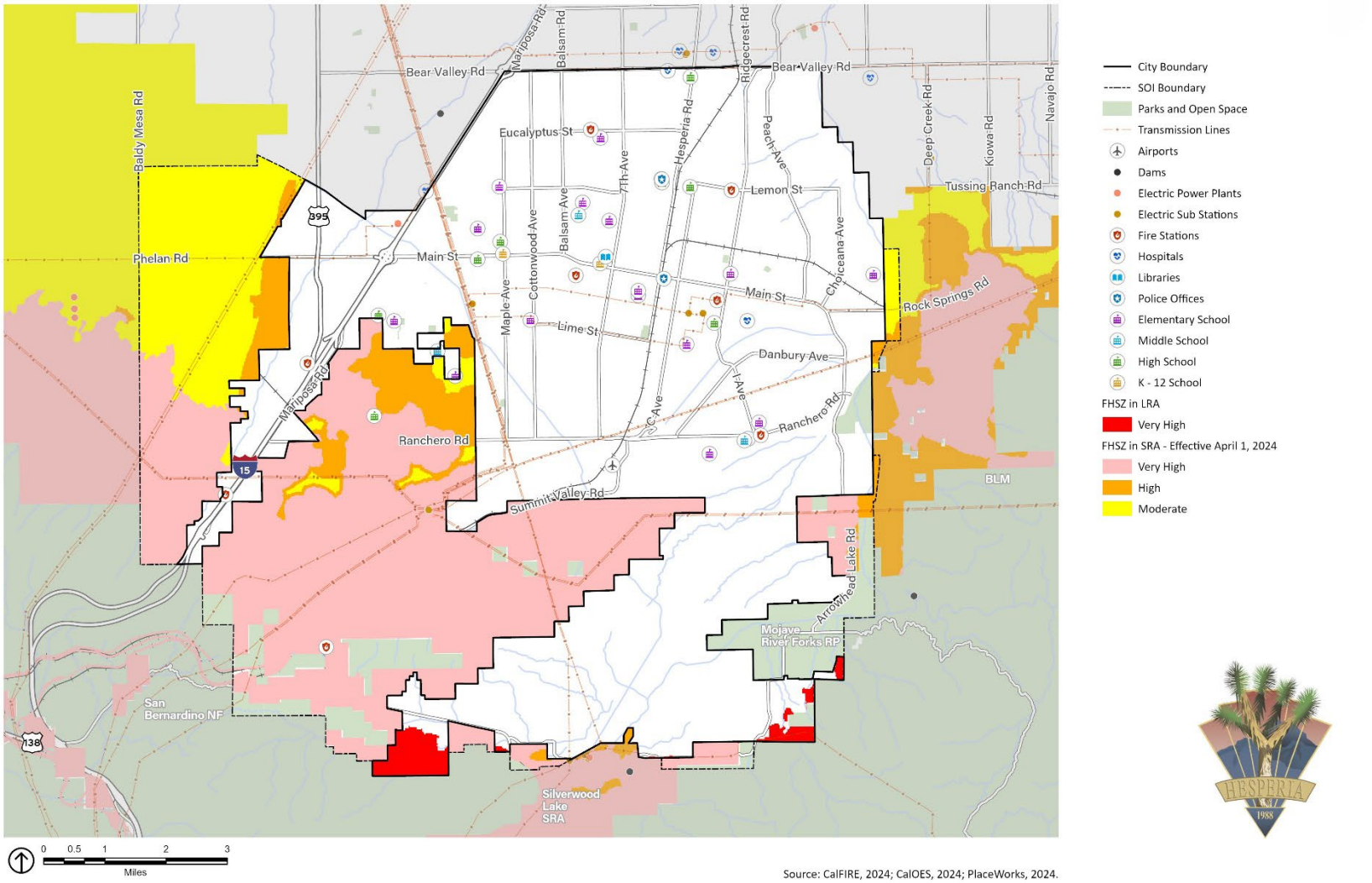
WUI areas, where high-value structures such as homes meet highly flammable native vegetation, are more vulnerable to fire than strictly urban areas and, because of serious wildland fires throughout the state in recent years, are subject to more-stringent fire-prevention regulations on development. Residential development in the WUI, the introduction and proliferation of exotic plant species, accumulated fuel because of wildfire suppression efforts, and climate change-driven compression of the historic rainy season exacerbates the fire problem. Together, these factors result in more people, property, critical infrastructure, and natural resources in harm's way more frequently. While large-scale wildfires do not occur every year, wildfire incidents driven by extreme weather conditions have repeatedly been difficult to contain.

In the WUI area, efforts to prevent ignitions and limit wildfire loss hinge on hardening structures and creating defensible space through a multifaceted approach that includes engineering, enforcement, education, emergency response, and economic incentives. Different strategies in the defense and threat zones help to limit the spread of fire and reduce the risk to people and property.

Structural Fires

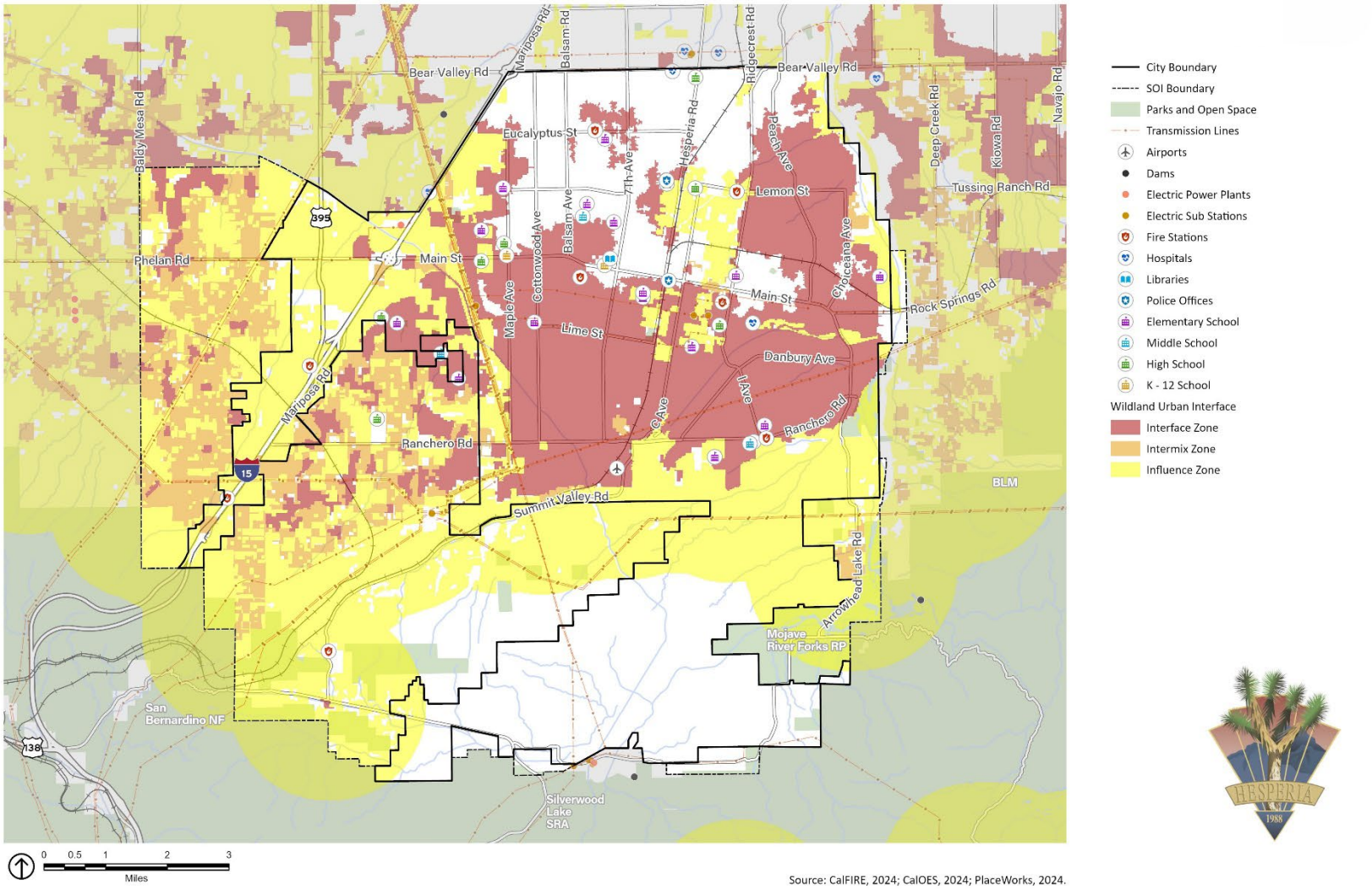
Hesperia is also at risk from structural fires. These fires occur in built-up environments, destroying buildings and other human-made structures. Structural fires are often due to faulty wiring, mechanical equipment, or combustible construction materials. The absence of fire alarms and fire sprinkler systems often exacerbates the damage associated with a structural fire. Structural fires are largely caused by human accidents, although deliberate fires (arson) may cause some events. Older buildings lacking modern fire safety features may face greater risk of fire damage.

Figure 8 Fire Hazard Severity Zones



Source: CalFIRE, 2024; CalOES, 2024; PlaceWorks, 2024.

Figure 9 Wildland-Urban Interface Areas



Source: CalFIRE, 2024; CalOES, 2024; PlaceWorks, 2024.

Fire Protection

As described in Section 2.1, *Emergency Preparedness and Response,* the San Bernardino County Fire Protection District provides fire protection in Hesperia. County Fire operates three fire stations in Hesperia:

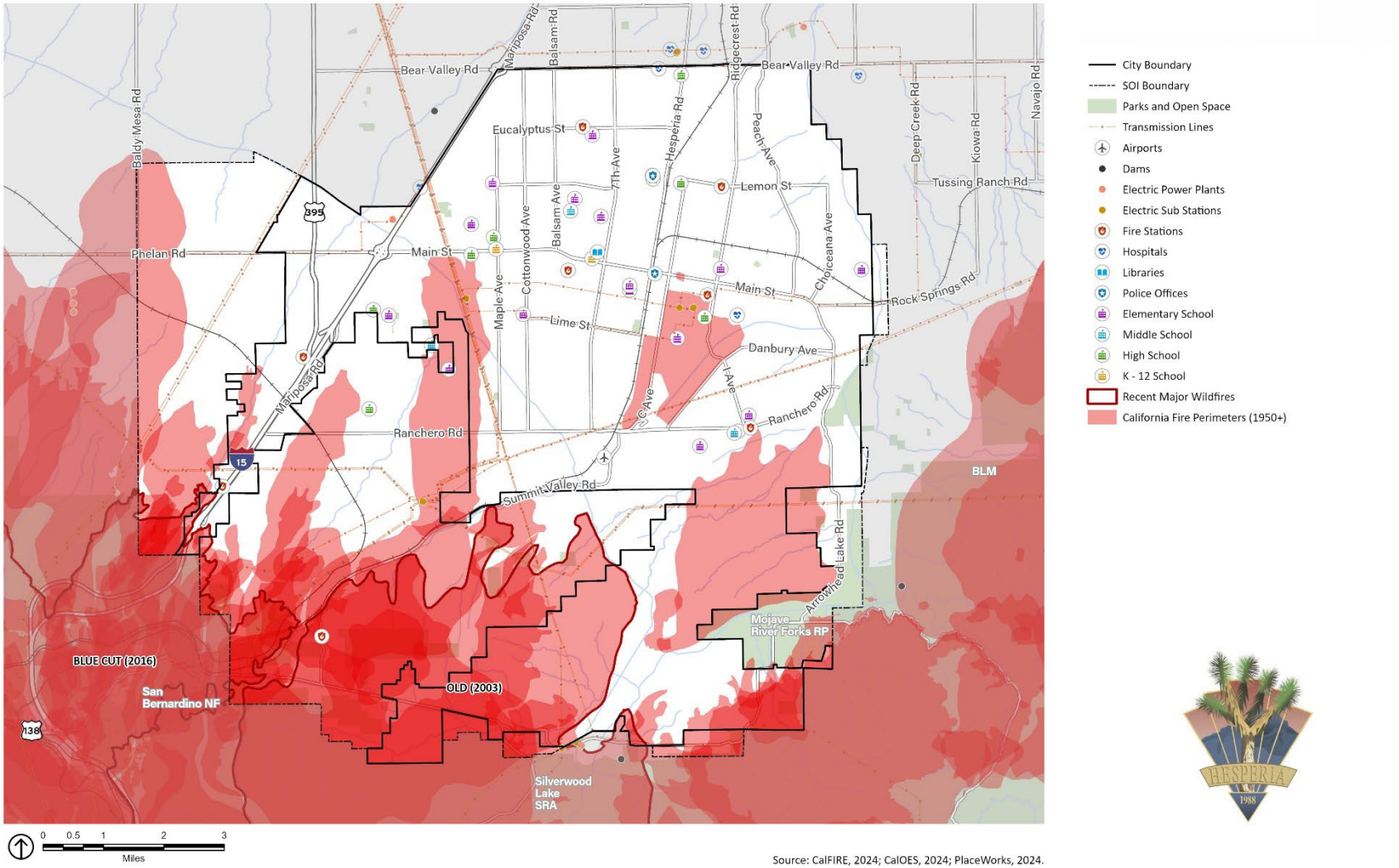
- Hesperia Fire Station #302 at 17288 Olive Street
- Hesperia Fire Station #304 at 15660 Eucalyptus Street
- Hesperia Fire Station #305 at 8331 Caliente Road

The San Bernardino Fire Protection District operates an additional 12 fire stations that are slated to provide service throughout the Fire Protection District during a significant event. County Fire conducts annual inspections to ensure buildings such as businesses, factories, restaurants, churches, schools, and housing are safe from fires. County Fire personnel assist business owners in obtaining compliance with fire code requirements to reduce the risk of an emergency occurring.

Past Occurrences

Several historic wildfires have impacted Hesperia, as shown in **Figure 10**. On June 19, 2024, the Hesperia Fire burned 1,330 acres. An evacuation warning was ordered for the Lake Arrowhead Equestrian Estates neighborhood. One structure was reportedly threatened during the early stages of the blaze, which grew to 500 acres just three hours after it was first reported. The cause of the fire is unknown, and no injuries were reported.

Figure 10 Historic Wildfire Perimeters



Source: CalFIRE, 2024; CalOES, 2024; PlaceWorks, 2024.

Potential Changes to Fire Risk in Future Years

Likelihood of Future Occurrence

As noted previously, the risk of wildfires in San Bernardino County is highest in late summer and fall. Extreme weather conditions during periods of low humidity, low fuel moisture, and high winds contribute to the severity of any potential wildfires. Fires occurring during these times typically burn hot and fast and are difficult to control unless initial suppression occurs immediately. Wildfire for Hesperia is a concern given its Very High FHSZ and WUI designations, and proximity to surrounding LRA and SRA lands with wildfire risk. Moreover, the community consists of, and is adjacent to, undeveloped hillsides in the southern portion of the city, which makes these areas at high risk for wildfire. However, high winds in the region, particularly during Santa Ana wind events, generally flow from the northeast to the southwest, which can influence wildfire behavior in the undeveloped hillsides by limiting wildfire spread toward Hesperia. Regardless, wildfires will continue to be a high-risk hazard for personal safety and property damage in Hesperia, and smoke impacts from local and regional wildfires will likely continue to be problematic. The likelihood of structural fires in the city is low since these fires are usually the result of human accidents or mechanical issues in buildings. New developments are required to incorporate fire protection measures under the Fire Code, including enhanced requirements for structures in the Very High FHSZ.

Climate Change and Wildfire

Changing climate conditions are expected to increase the fire risk in and around Hesperia. Warmer temperatures brought on by climate change can exacerbate drought conditions. Droughts can kill or dry out plants, creating more fuel for wildfires. Warmer temperatures are also expected to increase the number of pest outbreaks, such as the bark beetle, creating more dead trees and increasing the fuel load. Hot, dry spells may also increase disease and insect infestations, resulting in higher fuel loads. Increased winds will result in more erratic fire behavior, making fires harder to contain. Warmer temperatures are also expected to occur later in the year, extending the wildfire season, which is likely to begin earlier in the year and extend later than it has historically.

Implications for the Safety Element

The Safety Element Update can help Hesperia prepare for and respond to fire hazards by introducing policies to do the following:

- Encourage fire-safe practices and fire-resistant landscaping in residential developments.
- Continue regional fire response collaborations.
- Offer educational materials, rebates, and incentives for property owners looking to retrofit their buildings and properties to improve fire safety and indoor air quality.
- Educate the community about fire prevention and response to wildfires and smoke events.
- Obtain a Fire Risk Reduction Community status from CAL FIRE.

2.5 HAZARDOUS WASTE AND MATERIALS

Hazardous materials are substances that pose a significant risk to public safety, or human and 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 because of vehicle accidents.

The release or spill of bulk hazardous materials could result in fire, explosion, toxic cloud, or direct contamination of water, people, and property. The effects may involve a local site or many square miles. Health problems may be immediate, such as irritation of the skin and lungs, or gradual, such as the development of cancer from a carcinogen. Property damage could range from immediate destruction by explosion to permanent contamination by a persistent hazardous material. Most hazardous materials in the region are transported on truck routes along major roadways, such as I-15, SR-138, SR-173, and US-395 that pass through Hesperia. The most vulnerable areas along this route are considered the on-/off-ramps and interchanges. In addition to major roadways, hazardous materials are transported through Hesperia on the BNSF Railway, which bisects the city from north to south. Hazardous materials are shipped via the railway and, while unlikely, an incident involving a rail accident within the city could have devastating effects.

Hazardous materials and waste within Hesperia are managed by the Hazardous Materials Division of the San Bernardino County Fire Protection District, which is the Certified Unified Program Agency (CUPA). The CUPA

consolidates, coordinates, and makes consistent the regulatory activities of several hazardous materials and hazardous waste programs, including Hazardous Materials Management, California Accidental Release Prevention, Hazardous Waste Management, Underground Storage Tanks, Aboveground Storage Tanks, and Emergency Response.

The San Bernardino County Fire Protection District implements the Hazardous Waste Inspection Program. The purpose of this program is to ensure that all hazardous wastes generated by San Bernardino County, including the City of Hesperia, facilities are properly managed. Specialists in this program inspect facilities that generate hazardous waste, investigate complaints of unlawful hazardous waste disposal, and participate in public education. These programs are designed to provide information about laws and regulations relating to safe management of hazardous waste.

Several State agencies monitor hazardous materials/waste facilities. The Regional Water Quality Control Board (RWQCB) and the California Department of Toxic Substances Control (DTSC) monitor and document potential and known contamination sites. The leaking underground storage tank (LUST) list produced by the RWQCB and the DTSC EnviroStor database indicate 13 cleanup sites (all case closed) and 12 school investigation sites (no action required).[17, 18]

If a hazardous material spill poses an imminent public health threat, the City will support local regulating agencies in notifying the public. The transport of hazardous materials/wastes and explosives through the city is regulated by the California Department of Transportation (Caltrans). I-15, SR-138, SR-173, and US-395 are open to vehicles carrying hazardous materials/wastes. Transporters of hazardous wastes are required to be certified by the United States Department of Transportation, and manifests are required to track the hazardous waste during transport. The danger of hazardous materials/waste spills during transport does exist and can potentially increase as transportation of these materials increases on freeways as well as the BNSF Railway. San Bernardino County Fire Protection District, San Bernardino County Office of Emergency Services, and Hazardous Materials Division of the San Bernardino County Fire Protection District are responsible for hazardous materials accidents at all locations within the city.

Past Hazardous Materials Spills

Since 1970, one railway and six roadway hazardous materials incidents have occurred in Hesperia.[19]

Potential Changes to Hazardous Materials in Future Years

Likelihood of Future Occurrence

Given that there have been seven hazardous materials incidents in transport through the city in the past 54 years and land use activities that would require hazardous materials are not likely to increase in the future, it is unlikely that a hazardous materials incident will occur in Hesperia on a frequent basis. Moreover, according to Caltrans, most incidents are related to releases of fluids from the transporting vehicles themselves and not the cargo, thus the likelihood of a significant hazardous materials release within the city is more limited and difficult to predict.

Climate Change and Hazardous Materials

Climate change is unlikely to substantially affect hazardous materials transportation incidents. However, increases in the frequency and intensity of climate hazards, such as floods, landslides, and severe storms, may create a greater risk of hazardous materials releases during these events.

Implications for the Safety Element

The Safety Element Update can improve Hesperia's response to and management of hazardous materials by introducing policies to:

- Encourage business owners and residents to reduce their use of hazardous materials and to dispose of any used hazardous materials as directed by state regulations.
- Continue to work with regional, state, and federal authorities to prevent and respond to hazardous materials events.
- Ensure that buffers are maintained between major roadways and railways and sensitive uses who may be harmed by hazardous materials releases.
- Continue to engage in regular road maintenance to prevent vehicle accidents.
- Educate residents about how to reduce their personal hazardous materials use and continue to help residents safely dispose of hazardous materials.
- Prohibit the use of hazardous materials in areas where hazardous materials may be released due to flooding, landslide, or seismic activity.

2.6 AIR QUALITY

Air quality is determined by the composition of gases and particles in the atmosphere, and it is a critical aspect of environmental health. Air pollution comes from both mobile sources (e.g., cars, trucks, airplanes) and stationary sources (e.g., agricultural and industrial uses). The Mojave Air Quality Management District has the responsibility to create strategies and monitor the targets set by State and federal standards for San Bernardino County's High Desert and Riverside County's Palo Verde Valley.

Poor air quality poses significant health risks and can contribute to respiratory conditions such as asthma, increase the risks of heart attacks and stroke, and has been linked to various cancers. Children and youth, older adults, those with pre-existing conditions, pregnant women, and outdoor workers are especially vulnerable to health impacts from poor air quality. Poor air quality can also limit outdoor recreational opportunities. As reflected in the Vulnerability Assessment, agriculture, outdoor recreation, and key community services, such as public transit access, are highly vulnerable.

Outdoor recreation can be curtailed due to poor air quality conditions from lower-level ozone, particulate matter, or wildfire smoke. Residents and visitors may not travel to parks or surrounding recreational areas if poor air quality creates negative health outcomes. Transit riders may be deterred from using public transit during days with poor air quality or high smoke days during wildfires, which could reduce the fares collected from transit riders.

Wildfire Smoke

Increasing statewide fire frequency can create recurring air quality degradation events, leading to respiratory health effects. Wildfire smoke consists of a mix of gases and fine particulate matter from burning vegetation and materials. The pollutant of most concern from wildfire smoke is $PM_{2.5}$, which is damaging to human health due to its ability to deeply penetrate lung tissue and affect the heart and circulatory system. Although wildfire smoke presents a health risk to everyone, sensitive groups may experience more severe acute and chronic symptoms from exposure to wildfire smoke, such as children (particularly younger children), older adults, people with chronic respiratory or cardiovascular disease, and low-resourced persons.

Potential Changes to Air Quality in Future Years

Likelihood of Future Occurrence

Poor air quality tends to occur annually and is likely to continue. Due to Hesperia's desert climate and topography, air quality will continue to be a concern.

Climate Change and Air Quality

Climate change will worsen air pollution.[20] Ozone and $PM_{2.5}$ form when other pollutants react in the atmosphere, and warmer temperatures speed up these reactions. Warmer temperatures also lengthen the growing seasons of plants and trees, increasing allergen production. In many regions of the United States, climate-driven changes in weather conditions, including temperature and precipitation, are expected to increase ground-level ozone and particulate matter (such as windblown dust from droughts or smoke from wildfires). These changes worsen existing air pollution. More wildfires will release particulate matter and other pollutants into the air. Drier conditions increase dust. Possible changes in wind patterns may also trap air pollutants in Victor Valley, increasing exposure.

Implications for the Safety Element

The Safety Element Update can help Hesperia prepare for and respond to poor air quality by including policies to:

- Work with local agencies, healthcare providers, and community-based organizations to provide resources to help residents respond to poor air quality events (e.g., transportation to resilience centers and supply free N95 masks).
- Work with local contractors to help low-income households and community service providers obtain or upgrade indoor air filtration systems.
- Establish equitably located resilience centers in Hesperia to offer refuge from poor air quality events.

2.7 DROUGHT

A drought is an extended period when precipitation levels are well below normal. Hesperia's desert climate is characterized by low precipitation levels with most precipitation falling in the winter months and extremely dry conditions the remainder of the year. The average annual rainfall is just 5.5 to 6 inches.

Drought may affect domestic water supply, energy production, public health, and wildlife; or contribute to wildfire. Like most of California and the western United States, Hesperia chronically experiences drought cycles. Drought impacts the city's water supply, which would make less water available for people, businesses, and natural systems.

As reflected in the Vulnerability Assessment, riparian habitat is highly vulnerable to the impacts of drought, as it can cause smaller streams to run dry, subsequently harming the plants and animal habitat within the ecosystem. Trees may not have adequate water during drought periods, which can lead to pests and diseases destroying important habitat. Droughts can also indirectly lead to more wildfires, stressing plants and making them more susceptible to pests and diseases.

Hesperia's water supply comes from groundwater. Hesperia has historically relied upon groundwater from the Mojave Basin. Hesperia's primary supply is pumped groundwater from the Alto subarea of the Mojave Basin Area. The Mojave Basin Area is essentially a closed basin—meaning that a very limited amount of groundwater enters or exits the basin. However, within the basin, groundwater movement occurs between the different subareas. Groundwater is recharged into the basin predominantly by infiltration of water from the Mojave River, which accounts for approximately 80 percent of the total basin natural recharge. Other sources of recharge include infiltration of storm runoff from the mountain and desert washes, and other activities such as irrigation return flows, wastewater discharge, and enhanced recharge with imported water.[21]

The rapid expansion of groundwater pumping from the Mojave Basin and increased use of the surface water supplies to serve the region's growing population led to the Mojave Basin Area Adjudication (Adjudication). Adjudication is the primary governing structure that allocates water supplies among the regional water purveyors and individual water users to meet regional water needs. The Mojave Water Agency is the Watermaster for Adjudication.

Given Hesperia's desert climate and reliance on groundwater, the city is generally not considered especially vulnerable to drought. However, chronic drought can cause declines in groundwater levels due to decreased basin inflow and increased demand for water if resources are not managed effectively. Quality of wastewater services may decline if drought conditions result in decreased water use and subsequent declines in wastewater generation. Declines in wastewater generation may result in increased

concentrations of waste in wastewater, which may cause the buildup of debris in wastewater systems and require additional treatment. The Hesperia Water District's 2020 Water Shortage Contingency Plan contains actions to implement and enforce regulations and restrictions for managing a water shortage when it declares a water shortage emergency under the authority of the California Water Code.

As reflected in the Vulnerability Assessment (see **Appendix A** for additional details), water and wastewater services are highly vulnerable to the impacts of drought. Drought conditions may cause stress on Hesperia's groundwater supplies and reduce the overall water supply available.

Past Occurrences

California has faced numerous drought-related challenges in recent years. The U.S. Drought Monitor recognizes a five-point scale for drought events: D0 (abnormally dry), D1 (moderate drought), D2 (severe drought), D3 (extreme drought), and D4 (exceptional drought). According to the U.S. Drought Monitor, the most intensive drought in recent years occurred during most of 2022, when all of San Bernardino County was classified as "severe" drought. As of June 2024, San Bernardino County, including Hesperia, was not classified as drought. During severe drought conditions, water shortages are common, and water restrictions may be imposed to meet essential community needs.

Potential Changes to Drought in Future Years

Likelihood of Future Occurrence

Drought differs from many other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region physically and economically, affecting different sectors in different ways and with varying intensities. Adequate water is the most critical issue for commercial and domestic use. As the population in the city continues to grow, so will the water demand. However, the water supply is currently considered adequate to meet projected water needs through the year 2045.

Based on historical information, drought in California, including San Bernardino County, is cyclical, driven by climate patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts is often extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on comparing observed precipitation with what is normal (climatologic), comparing soil

moisture and crop conditions with what is normal (agricultural), or by looking at how much water is contained in snow, the level or flow rate of moving water, water in reservoirs, or groundwater levels (hydrologic). However, how individuals recognize drought depends on how it affects them.

Climate Change and Drought

Although droughts are a regular feature of California's climate, scientists expect climate change will lead to more frequent and intense droughts statewide. Overall, precipitation levels are expected to stay similar to historic levels in Hesperia, potentially increasing by the end of the century. However, there are likely to be more years with extreme levels of rainfall, both high and low, because of climate change. This is expected to cause more frequent and intense droughts, compared to historical norms, which cause soil to dry out and become hard. During droughts, water levels in aquifers may also decline because groundwater is dependent on recharge from infiltration of precipitation. Groundwater is the sole source of water supply for Hesperia. The water level that supplies wells in the city would also decrease. Well pumping would affect the total water supply because water pumped would likely exceed the rate aquifers are recharged by precipitation or other underground flow. When precipitation does return, more water runs off the surface than is absorbed into the ground, which can lead to flooding downstream. Higher air temperatures are expected to increase evaporation, exacerbating drought conditions.

Implications for the Safety Element

The Safety Element Update can help Hesperia prepare for and respond to drought by including policies to:

- Continue to implement the City's landscape water conservation development standards.
- Promote water-efficient landscaping on existing private property.
- Provide public education and outreach about water-use efficiency.
- Work with local water providers to promote water efficiency programs and rebates.

2.8 EXTREME HEAT

While there is no universal definition of extreme heat, California guidance documents define extreme heat as temperatures hotter than 98 percent of

the historical high temperatures for the area, as measured between April and October of 1961 to 1990. Days that reach this level are called extreme heat days. In Hesperia, the extreme heat threshold is 98°F.[22] A heat wave is an event with five extreme heat days in a row; in Hesperia, this would be five consecutive days with temperatures over 98 °F.

Health impacts are the primary concern with extreme heat, though economic and service impacts are also an issue. The Centers for Disease Control and Prevention (CDC) recognize extreme heat as a substantial public health concern. In 2004, 297 Americans died from heat exposure, the lowest figure recorded over the past two decades. In 2018, 1,008 Americans died as a direct result of heat exposure.[23] From 2004 to 2018, studies by the U.S. Department of Health and Human Services indicate that there is an average of 702 deaths annually that are directly or indirectly linked to extreme heat.[24] Over the past decade, the number of heat-related deaths in the United States has seen a significant increase, particularly in recent years. In 2022, the CDC reported 1,714 deaths due to heat-related causes.[25] This increase in heat-related mortality is closely associated with rising temperatures and more frequent heat waves, which have become a significant public health concern.

Extreme heat events are dangerous because people exposed to extreme heat can suffer several heat-related illnesses, including heat cramps, heat exhaustion, and (most severely) heat stroke. As reflected in the Vulnerability Assessment (see **Appendix A**), children and youth, households in poverty, immigrant/linguistically isolated communities, low-resourced people of color, outdoor workers, persons experiencing homelessness, persons living in mobile homes, persons with chronic illnesses and/or disabilities, persons without access to lifelines, and seniors are the most vulnerable to extreme heat. In addition, households in poverty may be at increased risk of extreme heat if the installation or use of air conditioning is not affordable. Outdoor workers in construction or landscaping are also much more exposed to the elements than most people, so they are more susceptible to extreme heat conditions and the potential illnesses associated with very high temperatures. Moreover, extreme heat may be highly damaging to outdoor recreational activities, such as running, bicycling, and hiking. Intense physical exertion is more dangerous during very high temperatures because people must regularly stay hydrated and not overexert themselves to avoid heat-related illnesses.

Some homes in Hesperia were constructed over 40 years ago. Given that approximately 25 percent of all housing in the city was built prior to 1980,[26]

some of these homes are unlikely to have air conditioning and may lack effective insulation to regulate indoor temperatures. During extreme heat days, temperatures in poorly insulated homes may reach unhealthy temperatures. Therefore, people living in these homes, especially vulnerable populations, are at higher risk for heat-related illnesses from extreme heat events.

Trees and vegetation are most useful as a heat reduction strategy when planted in strategic locations around buildings or to shade pavement in parking lots and streets. Trees and vegetation help to lower surface and air temperatures by providing shade and evapotranspiration. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures by 2°F to 9°F. [27, 28]

High temperatures are a characteristic feature of desert environments like Hesperia, where many plants and animals are already adapted to withstand heat. However, as temperatures continue to rise, there may still be significant ecological shifts in southern Hesperia. Extreme heat can lead to increased water temperature in lakes, streams, creeks, and other water bodies, particularly during drought conditions when water levels are lower. While the natural ecosystems may not experience immediate shock, prolonged exposure to elevated water temperatures could exceed the tolerance levels of some aquatic species, potentially leading to changes in species composition and overall ecosystem health.

As reflected in the Vulnerability Assessment, energy delivery and communication services and public transit access are highly vulnerable to extreme temperatures, specifically extreme heat. Extreme heat can regularly cause power outages due to a combination of mechanical failure of electrical grid equipment, heat damage to the wires themselves, and high demand for electricity because of cooling equipment. Additionally, extreme heat may cause fewer people to use public transit since it may be unsuitable and more difficult to wait outside for public transit. Ultimately, this would reduce ridership in the Victor Valley Transit Authority system.

Past Occurrences

Hesperia has experienced several days with extreme heat days. Most recently, Hesperia experienced a heatwave from July 2 to July 7, 2023, with high temperatures ranging from 108 to 112 degrees in Victor Valley. On July 15, 2023, Hesperia experienced a heat wave that lasted approximately three days, with temperatures reaching 112°F. The National Weather Service issued "excessive heat" warnings for San Bernardino County,

including Hesperia, urging residents to take precautions against the extreme temperatures.

Potential Changes to Extreme Heat in Future Years

Likelihood of Future Occurrence

Extreme heat tends to occur on an annual basis and is likely to continue occurring. Due to Hesperia's inland location in the Mojave Desert, high temperatures will continue to be more common than cold temperatures.

Climate Change and Extreme Heat

The warmer temperatures brought on by climate change are likely to cause an increase in extreme heat events locally. Depending on the location and emissions levels, the state Cal-Adapt database indicates the number of extreme heat days is expected to rise from a historical annual average of 5 to 36 days by the middle of the century (2035 to 2064), and an average of 59 days by the end of the century (2070 to 2099).[29]

Overall, Hesperia is expected to see an increase in the average daily high temperatures. Depending on the future severity of climate change, the state Cal-Adapt database indicates the annual average maximum temperature is expected to increase from a historical annual average of 71.7°F to an average of up to 77.6°F by the middle of the century (2035 to 2064), and an average of up to 80.9°F by the end of the century (2070 to 2099).[30] Although the temperature increases may appear modest, the projected high temperatures are substantially greater than historical norms. These increases make it more likely that an above-average high temperature will cross the extreme heat threshold. As temperatures increase, Hesperia residents, employees, and visitors will face increased risk of dehydration, heat stroke, heat exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

Implications for the Safety Element

The Safety Element Update can help Hesperia prepare for and respond to extreme heat by including policies to:

- Elevate extreme heat to a major hazard of concern in Hesperia.
- Work with local utilities, community groups, and contractors to help low-income households, small businesses, and community service providers improve the energy efficiency of their homes and businesses and their resilience to extreme heat.

- Work with local schools, libraries, and community service providers to develop resilience hubs and cooling centers that can accessed during extreme heat days. Consider equity when determining the location of resilience hubs and cooling centers and work with local transit providers to ensure that centers are accessible. Ensure that these facilities have renewable energy generation and backup power supplies.
- Support efforts to protect public facilities such as schools and bus stops from heat through tree canopy and/or built shade cover.
- Seek opportunities to ensure that workers in outdoor industries have the training and resources to be adequately protected from extreme heat.
- Promote and expand the use of drought-tolerant landscaping and green infrastructure, including street trees and landscaped areas, as part of cooling strategies in public and private spaces.

2.9 SEVERE WEATHER

Severe weather is generally any destructive weather event, but usually occurs in Hesperia as localized storms that bring heavy rain, hail, thunderstorms, and strong winds. Severe weather is usually caused by intense storm systems, although types of strong winds can occur without a storm. The types of dangers posed by severe weather vary widely and may include injuries or deaths, damage to buildings and structures, fallen trees, roads, and railways blocked by debris, and fires sparked by lightning. Severe weather often produces high winds and lightning that can damage structures and cause power outages. Lightning from these storms can ignite wildfires and structure fires that can cause damage to buildings and endanger people. Objects such as vehicles, unprotected structures (e.g., bus stops, carports), fences, telephone poles, or trees can also be struck directly by lightning, which may result in an explosion or fire. In Hesperia, most severe weather is linked to high winds. High winds, often accompanying severe storms, can cause significant property damage, threaten public safety, and have adverse economic impacts from business closures and power loss.

Santa Ana winds have caused large amounts of damage and increased the fire damage level dramatically. Santa Ana winds are generally defined as warm, dry winds that blow from the east or northeast (offshore). These winds occur below the passes and canyons of the coastal ranges of Southern California. Santa Ana winds often blow with exceptional speed in the Santa Ana Canyon. The complex topography of Southern California,

combined with various atmospheric conditions, creates numerous scenarios that may cause widespread or isolated Santa Ana events. Commonly, Santa Ana winds develop when a region of high pressure builds over the Great Basin (the high plateau east of the Sierra Nevada and west of the Rocky Mountains, including most of Nevada and Utah). Santa Ana winds commonly occur between October and February, with December having the highest frequency of events. Summer events are rare. Wind speeds are typically north to east at 40 miles per hour (mph) through and below passes and canyons, with gusts to 58 mph. Stronger Santa Ana winds can have gusts greater than 69 mph over widespread areas and, in rare instances, gusts greater than 115 mph in specific areas. Frequently, the strongest winds in the basin occur during the night and morning hours due to the absence of a sea breeze.

All wind events, including Santa Ana winds, pose several different types of threats. By themselves, the winds pose a threat to the health of people and structures in the city. High winds, as defined by the National Weather Service, are sustained wind speeds of 40 mph or greater lasting one hour or longer or wind gusts of 58 mph or greater for any duration. These winds may occur as part of a seasonal climate pattern or in relation to other severe weather events, such as thunderstorms.

Additionally, a relatively common weather pattern that brings southwest winds and heavy rain to California is an atmospheric river. Atmospheric rivers can be associated with heavy precipitation, landslides, and high winds.

All wind events, including Santa Ana winds, pose several different types of threats. By themselves, the winds threaten the health of people and structures in Hesperia. Dust and plant pollen blown by the wind can create breathing problems. The winds can blow roofs off buildings and cause tree limbs to fall on structures. High winds also increase the threat of wildfires. Winds may dry out brush, increasing the fuel load in fire-prone areas. Winds may spark wildfires by knocking down power lines or causing them to arc, creating sparks. If wildfires do start, high winds can push flames quickly into new areas, contributing to the rapid spread of wildfires and making them harder to control.

As reflected in the Vulnerability Assessment, energy and communication infrastructure and services, homes, and public transit access are highly vulnerable to severe weather. Electricity transmission and distribution lines can be damaged or destroyed by high-velocity winds. This can cause

secondary impacts, such as power outages, which would impact Hesperia residents and businesses. Homes, particularly older ones, may be constructed to less rigorous standards and/or may not be well maintained. This can increase their risk of damage during severe weather events, particularly high winds, and hail. High winds could disrupt energy delivery, causing the electrical grid to not function properly. If multiple sections or elements of the system fail (substations, power plants, electricity lines), city residents and businesses could be without power for hours, days, or weeks if severe. Communication services may be knocked out by severe weather that damages communication towers. Public transit access may be delayed or rerouted if roadways become impassable due to storms and other severe weather. If roadways completely fail, the transit services could be suspended for days or weeks.

Public Safety Power Shutoff Events

Southern California Edison (SCE) serves the City of Hesperia. Electricity utilities throughout California, including SCE, have begun to occasionally "de-energize", or turn off the electricity for power lines that run through areas with an elevated fire risk. Public safety power shutoff (PSPS) events are intended to reduce the risk of power lines sparking or being damaged and starting a wildfire. These activities result in a loss of power for customers served by the affected power lines. A PSPS event may occur at any time of the year, but usually during high wind events and dry conditions. PSPS events may be limited to specific communities or affect broad swaths of the state.

In October 2019, SCE conducted four large-scale events, shutting off power to approximately 160,000 customers, including those in San Bernardino County. The largest PSPS event during this time was on October 27 and ended on October 31, 2019. During this event, 498,660 customers in 12 counties (Fresno, Inyo, Kern, Los Angeles, Madera, Mono, Orange, Riverside, San Bernardino, Tulare, Tuolumne, and Ventura) served by 352 distribution circuits and 7 transmission lines were identified as under consideration for PSPS. Ultimately, proactive de-energization was required for 126 circuits (including 3 transmission lines), affecting 126,364 customers, including some in San Bernardino County, over two weather systems.

In December 2020, SCE conducted two large-scale events shutting off power to approximately 95,000 customers, including those in San Bernardino County. The largest PSPS event during this time was on December 4 and ended on December 14, 2020. During this event, 197,729

customers in seven counties (San Bernardino, Riverside, Orange, Kern, Los Angeles, Tuolumne, and Ventura) were identified as under consideration for PSPS. During this event, SCE de-energized circuits not originally in scope when unexpected high wind conditions were observed in the areas of concern. Ultimately, SCE proactively de-energized 73,137 customers in areas of Inyo, Kern, Mono, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties. In January 2021, SCE conducted one large-scale event in response to a Santa Ana wind event, shutting off power to approximately 114,000 customers, including those in Yucca Valley.

In October 2023, SCE conducted one large-scale event, shutting off power to 25,504 customers in Kern, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties.[31]

PSPS events can affect emergency management activities. A loss of power can make it more difficult for homes or businesses to receive emergency notifications. PSPS events can also create vulnerabilities for community members who lack backup power supplies and depend on electricity for heating or cooling homes and buildings, powering medical devices, lighting, and the internet. Additionally, community members may face economic hardships and be deprived of important services, such as grocery stores, gas stations, and banks/ATMs. Traffic lights and other traffic-control systems may not work, which can complicate evacuation needs and hinder emergency response. Although critical public health and safety facilities often have backup generators, the loss of power may also disable other key infrastructure systems.

Past Occurrences

On December 14, 2021, a storm in San Bernardino County had wind gusts of 50 mph in the San Bernardino Mountains. This resulted in flooding and wind damage, as well as significant snowfall in the higher elevations where roads were affected. On February 21, 2023, the western Mojave Desert experienced winds of 70 mph, causing $60,000 in property damage. The winds caused three semi-trucks to flip over, and one power pole was blown down. More recently, on April 26, 2024, high winds of 65 mph blew in the western Mojave Desert.[32]

Potential Changes to Severe Weather in Future Years

Likelihood of Future Occurrence

According to historical hazard data, severe weather is an annual occurrence in San Bernardino County. Damage and disaster declarations related to

severe weather have occurred and will continue to occur in the future. Heavy rain, thunderstorms, and Santa Ana winds are the county's most frequent type of severe weather occurrences. Wind and lightning often accompany these heavy rain- and thunderstorms and have caused damage in the past. However, damage associated with severe weather's primary effects has been limited. The secondary hazards caused by severe weather, such as floods and fire, have had the greatest impact on the county. In general, any severe storm that affects San Bernardino County has local effects in Hesperia as well. Thunderstorms, high winds, and lightning can each have localized impacts on infrastructure, properties, and public safety.

Climate Change and Severe Weather

Climate change is expected to cause an increase in intense rainfall and strong storm systems, such as atmospheric rivers. However, climate change is expected to lead to a decrease in the frequency of Santa Ana winds, particularly in the fall and spring months. Research indicates that Santa Ana winds may become less common as the high-pressure systems over the Great Basin weaken throughout the 21st century. Specifically, research projects an average decline of approximately 18 percent in Santa Ana wind occurrences by the end of the century, with the most significant reductions during the transitional months of October and May.[33]

An increase in intense rainfall and strong storm systems means that Hesperia could see more intense weather in the coming years and decades, although the increase may not affect all forms of severe weather. Hesperia is expected to see an increase in annual average precipitation. The city receives an average of approximately 16.4 inches of rainfall annually, which is expected to increase to 16.5 inches annually by the middle of the century (2035 to 2064), and to an average of 18.6 inches annually by the end of the century (2070 to 2099). While average annual rainfall may increase only slightly, climate change is expected to cause an increase in the number of years with intense levels of precipitation. Heavy rainfall can increase the frequency and severity of other hazards, including flooding.

Implications for the Safety Element

The Safety Element Update can help Hesperia prepare for and respond to severe weather by including policies to:

» Increase the resiliency of City-owned structures to severe weather events, including high wind events.

- Support homeowners and business owners to increase the resilience of their buildings and properties through retrofits, weatherization, and other improvements.
- Work with local contractors to help low-income households improve the resilience of their homes to wind.
- In partnership with the County, neighboring cities, and community partners, provide public education about how to prepare for and respond to severe weather events.
- Underground utility lines, as feasible.

2.10 HUMAN HEALTH HAZARDS

Human health hazards are bacteria, viruses, parasites, and other organisms that can cause diseases and illness in people. Some of these diseases may cause only mild inconvenience, but others are potentially life threatening. These diseases often are carried by animals such as mice and rats, ticks, and mosquitos. Warmer temperatures and high precipitation levels can lead to increased populations of disease-carrying animals, creating a greater risk of disease and increased rates of infection.

The members of the community most vulnerable to human health hazards include those who face elevated levels of exposure to hazard conditions, those who lack the resources to seek timely medical care, those who are physiologically more sensitive to the effects of illness, and those who lack sufficient resources to cope with illness.

Households in poverty and low-resourced people of color are more likely to live in conditions that exacerbate their disease exposure and sensitivity.[34] Outdoor workers in the construction, landscaping, and outdoor recreation sectors can be directly exposed to ticks, mosquitos, and rodents that may carry harmful illnesses and diseases, in addition to pollen, allergies, and dust from agriculture.[35] Persons with chronic health problems may have weaker immune systems due to pre-existing conditions that make it more difficult to fight off new illnesses.[36] Pollution-burdened populations may have existing illnesses or diseases due to living in close proximity to pollution sources, that may be exacerbated by human health hazards.[37] Seniors and seniors living alone often have weaker immune systems that can leave them more susceptible to vector-borne diseases and other pathogens.[38] People who live and work amid soil and dust are particularly vulnerable to Valley Fever. Widespread illness in the community could interrupt economic activity and provision of key services such as medical care and education.

As reflected in the Vulnerability Assessment (see **Appendix A**), several groups within Hesperia's population are vulnerable to human health hazards, such as households in poverty, immigrant communities/ linguistically isolated persons, low-resourced people of color, outdoor workers, persons experiencing homelessness, persons with chronic illnesses and/or disabilities, and seniors.

Past Occurrences

Low levels of human cases of Lyme disease and West Nile virus have been reported each year in San Bernardino County. In April 2015, San Bernardino County reported that ticks testing positive for the bacteria that causes Lyme disease had been collected.[39]

San Bernardino County reported the discovery of mosquitoes testing positive for West Nile virus in the county in October 2022.[40, 41] Rodents carrying the disease were reported in 2016 in Riverside County, and Riverside County reported a human case in 2021.[42, 43]

Valley Fever is endemic to the southwestern United States and is regularly reported throughout the region. While cases of Valley Fever in San Bernardino County are not unusual, reports of the disease increased significantly in 2019. In 2019, 229 cases were reported, compared to 97 in 2018, and 233 cases were reported in 2020.[44]

Potential Changes to Human Health Hazards in Future Years

Likelihood of Future Occurrence

Human health hazards have occurred in the past and therefore will likely occur in the future at various scales and levels of severity.

Climate Change and Human Health Hazards

Climate change may allow pathogens and pests to proliferate in San Bernardino County. Warmer air temperatures and wetter winters could support larger numbers of mosquitos and vector-borne diseases such as West Nile virus and hantavirus pulmonary syndrome. Mental health and stress-related disorders also increase following natural disasters such as flooding or severe weather events.[45]

Implications for the Safety Element

The Safety Element Update can address hazards posed by human health hazards through approaches such as the following:

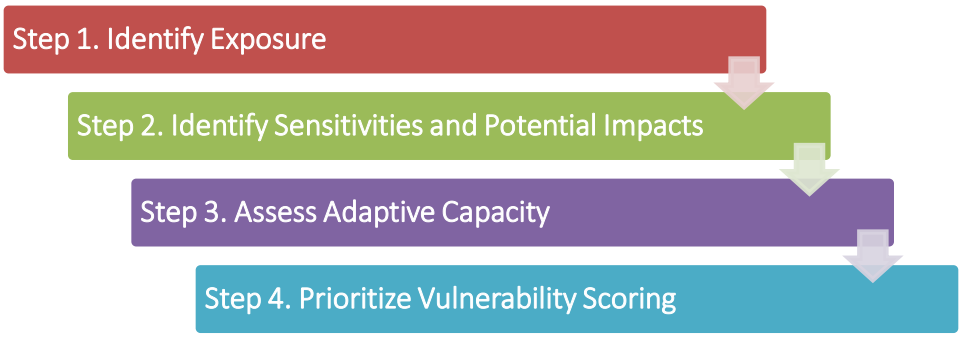
» Connect low-income residents and residents who may lack access to health insurance with local healthcare organizations.

Appendix A
Climate Vulnerability Assessment: Methods and Results

VULNERABILITY ASSESSMENT METHODS

The Vulnerability Assessment follows the recommended process in the *California Adaptation Planning Guide* (2020), or APG, by the California Governor's Office of Emergency Services. This includes a four-step process: (1) characterizing the city's exposure to current and projected climate hazards; (2) identifying potential sensitivities and potential impacts to city populations and assets; (3) evaluating the current ability of the populations and assets to cope with climate impacts, also referred to as its adaptive capacity; and (4) identifying priority vulnerabilities based on systematic scoring. **Figure A-1** presents these steps.

Figure A-1 California Adaptation Planning Guide Recommended Model



Step 1. Identify Exposure

The goal of this step is to characterize the community's exposure to current and projected climate change hazards. The climate change hazards included in the Vulnerability Assessment are poor air quality, drought, extreme temperatures, human health hazards, flooding, landslides, severe weather, and wildfire.

Projections of climate change hazards rely on multiple scenarios that reflect different levels of greenhouse gas (GHG) emissions and concentrations over time. The Cal-Adapt database, which provides California-specific climate change hazard projections, uses Representative Concentration Pathway (RCP) 4.5 for a low-emissions scenario and RCP 8.5 for a high-emissions scenario.[*] The Governor's Office of Land Use and Climate Innovation document, *Planning and Investing for a Resilient California*, and the APG recommend using RCP 8.5 for analyses considering impacts through 2050 and 2100, because the differences between scenarios are minimal for the first half of the century, and this is a more conservative and risk-averse approach for late-century projections. The RCP 8.5 scenario was used as input for global climate models on the Cal-Adapt database, the *California 4th Climate Change Assessment*, and other resources.

Step 2. Identify Sensitivities and Potential Impacts

This step involved evaluating potential future climate change impacts to community populations and assets.[†] City staff first identified a comprehensive list of populations and assets to understand how susceptible the people, places, ecosystem services, and services within the community are to climate change hazards. After confirming this list, City staff looked at which hazards are likely to affect which populations and assets.

The City included the following populations and other assets in the Vulnerability Assessment. Each list includes a description and source of data needed to support the Vulnerability Assessment.

Populations

The City collected population data from the U.S. Census, the California Healthy Places Index, and the San Bernardino County Homeless Point in Time Count. The American Community Survey data is an estimate only with some margin of error. The 16 populations evaluated are:

[*] RCPs are scenarios that include time series of emissions and concentrations of the full suite of greenhouse gases, aerosols, chemically active gases, and land use/land cover. RCP 4.5 is considered an intermediate stabilizing pathway; RCP 8.5 is considered a high-emissions pathway.

[†] Community populations are groups of people that may be uniquely vulnerable to climate change hazards due to existing stressors such as financial instability, health conditions, mobility challenges, and housing conditions.

1. Children and youth (under 18).
2. College students. Approximately 6 percent of Hesperia's population is enrolled in college or graduate school.[46]
3. Cost-burdened/low-income/overcrowded households. Households paying 30 percent or more of their income toward housing expenses.[47] The State identifies $74,550 as the low-income threshold for a household of four people in San Bernardino County in 2023.[48] Approximately 14 percent of Hesperia residents earn incomes at or below poverty level.[49] Overcrowded households include housing units that have more than 1.0 persons or more per room (excluding bathrooms and kitchens). Approximately 6 percent of Hesperia homes are overcrowded.[50]
4. Households in poverty. Households with an income below the poverty line, which is $27,750 for a household of four.[51] Approximately 14 percent of Hesperia residents earn incomes at or below poverty level.[52]
5. Immigrant communities / linguistically isolated persons. Communities consisting of foreign-born populations, including immigrants, refugees, and undocumented persons. Linguistically isolated persons include households without a member who is fluent in English. Approximately 17 percent of Hesperia's population was born outside of the United States. Approximately 14 percent of the population is not fluent in English. Spanish, Russian, and Vietnamese are the primary languages in Hesperia among households that are not fluent in English.[53, 54]
6. Low-resourced people of color. Persons identifying as a member of a racial and/or ethnic group and facing limited access to resources, such as financial, social, healthcare, or educational assistance.[55,56]
7. Outdoor workers. Workers in landscaping, construction, outdoor recreation, etc.
8. Persons experiencing homelessness. The 2023 Point In Time count reported 59 total persons experiencing homelessness (all unsheltered) in the City of Hesperia.[57]
9. Persons living in mobile homes.
10. Persons living on single access roads (roads with only a single entry or exit point).
11. Persons with chronic illnesses and/or disabilities. Approximately 12 percent of Hesperia's population has some form of disability.[58]

12. Persons without a high school degree. Approximately 23 percent of Hesperia's adult population has not obtained a high school degree or equivalent.[59]
13. Persons without access to lifelines. Persons without reliable access to a car, transit, or communication systems. Approximately 3 percent of Hesperia households do not have access to a personal vehicle.[60] Approximately 4 percent of Hesperia households do not have an internet subscription.[61]
14. Renters. Approximately 30 percent of Hesperia housing units are renter-occupied.[62]
15. Seniors (65+). Seniors constitute 9 percent of Hesperia's population.[63] Approximately 3 percent of Hesperia households consist of seniors living alone.[64]
16. Unemployed persons. Hesperia's civilian labor force unemployment rate is approximately 5 percent.[65]

Infrastructure

The City gathered details on infrastructure from State and local GIS data, and the *2017 Hesperia Local Hazard Mitigation Plan*. These nine asset groups are:

1. Airport: Hesperia Airport
2. Dams: Cedar Springs Dam, Silverwood Lake Dam, and Mojave Forks Dam
3. Energy and communication infrastructure:
   - Transmission Lines: Southern California Edison (SCE)
   - Natural gas pipelines and structures: Southwest Gas Supplies
   - Cell towers, radio sites, fiber optic lines, and internet lines
4. Flood control and stormwater infrastructure
5. Hazardous materials sites: 13 cleanup sites (all case closed) identified via the State Water Control Board's GeoTracker database[66] and 12 school investigation sites (no action required) identified via the State Department of Toxic Substance Control's EnviroStor database[67]
6. Parks, Open Space, and Trails
   - Bicycling and pedestrian trails
   - Equestrian trails
   - Hesperia Recreation and Park District: Calhoun Program Center, Datura Park, Hesperia Community Park, Lime Street Park, Live Oak

Park, Malibu Park, Maple Park, Mojave River Junction, Palm Street Park, Percy Bakker Park, Timberlane Park
    - City of Hesperia: Hesperia Civic Plaza Park, Hesperia Lake Park, Maple Park.
    - County: Mojave River Forks Regional Park
7. Transportation infrastructure
    - Freeways: I-15
    - State and federal highways: SR-138, SR-173, US-395
    - Local roads: Main Street, Bear Valley Road, Eucalyptus Street, Mojave/Mauna Loa Road, Ranchero Road, Mariposa Road, Escondido Avenue, Maple Avenue, Seventh Avenue, Peach Avenue, and I Avenue
    - Evacuation routes
    - Bridges and culverts: 20 local bridges
    - Transit facilities: Victor Valley Transit Authority stops
    - Railways: BNSF Railway, Brightline, Amtrak
8. Vehicle fuel stations
    - Electric vehicle charging stations: 8 public charging stations, 4 Tesla Supercharger stations[68]
    - 3 CNG gas stations
    - Gas stations.
9. Water and wastewater infrastructure: California Aqueduct, Hesperia Subregional Water Recycling facility, and Victor Valley Wastewater Reclamation Authority Wastewater Treatment Plant (Victorville)

Buildings

The City collected buildings data from Google Maps, the California School Database, and local agency websites and GIS records. These seven assets are:

1. Commercial centers: High Desert Gateway, Hesperia Square, Hesperia Town Center Shopping Center, Hickorytree Plaza, Joshua Crossing, Carriage Square, The Plaza on Main Street, Main Street Plaza, and Bear Valley Plaza
2. Government and community facilities: Hesperia City Offices, Hesperia Emergency Operations Center, Hesperia Public Works Building/Yard, John Swisher Community Center, Percy Bakker Community Center, Powerplay Center, Rick Novack Community Center, Hesperia Branch Library, and Hesperia Senior Center
3. Historical places: Hula Ville

4. Homes and residential structures: Multi-family and single-family residences
5. Medical and care facilities: St. Mary's Hospital (Apple Valley), Desert Valley Hospital (Victorville), St. Mary Medical Center (Hesperia), Kaiser Permanente (Hesperia), and Victor Valley Global Medical Center (Victorville)
6. Public safety buildings: San Bernardino County Sheriff's Office and San Bernardino County Fire Department (Hesperia Fire Stations 301, 302, 303, 304, 305)
7. Schools: Hesperia Unified School District (13 elementary schools, 2 middle schools, 2 sixth-grade academies, and 5 high schools) and 5 independently operated charter schools

Economic Drivers

The City determined important economic assets based on the 2023 Comprehensive Annual Financial Report and land uses within the city. These six assets are:

1. Agriculture
2. Commercial and retail centers
3. Education services
4. Major employers: Hesperia Unified School District, Wal-Mart Supercenter, County of San Bernardino, Stater Bros, Super Target, City of Hesperia, In-N-Out (2 locations), Arizona Pipeline Company, St. Mary High Desert, Robar Enterprises, Inc., Maersk (Hesperia Commerce Center)
5. Manufacturing and industrial
6. Outdoor recreation

Ecosystems and Natural Resources

The City determined the ecosystems and natural resources based on information from the 2010 Hesperia General Plan Update Environmental Impact Report. These four include:

1. Chaparral: Chamise Chaparral, Semi-Desert Chaparral, Interior Live Oak Chaparral
2. Scrub: Mojave Mixed Woody Scrub, Big Sagebrush Scrub, Northern Mixed Scrub

3. Riparian: Mojave Riparian Forest, Southern Sycamore Alder Riparian Woodland
4. Woodland: Mojavean Pinyon and Juniper Woodlands

Key Services

These assets are based on typical services provided in cities throughout California and are supported by the infrastructure and buildings listed previously. Key community services include the operation and functions needed to provide and maintain services. The Vulnerability Assessment assesses the infrastructure, and the people needed to support them separately. These seven services are:

1. Education services: Hesperia Unified School District, private schools, and childcare
2. Emergency services: Emergency Operations Center, San Bernardino County Fire Department, and San Bernardino County Sheriff's Office
3. Energy delivery and communication services: Southern California Edison (SCE), radio, television, cellular and landline phone, and internet
4. Government administration and community services
5. Public transit access: Victor Valley Transit Authority Bus Routes
6. Solid waste removal: Advance Disposal
7. Water and wastewater: Hesperia Water District and Victor Valley Wastewater Reclamation Authority

After this applicability review, City staff evaluated potential impacts to the applicable populations and community assets. Based on the results of the impact assessment, each population and asset was identified as experiencing low, medium, or high impacts for each relevant hazard. Impact is considered a negative quality, and therefore a higher impact score means that there is a higher potential for harm to a population or asset. A lower impact score means that there is less potential for harm to a population or asset.

What Is Vulnerability?

Vulnerability is the degree to which natural, built, and human systems are susceptible to harm from exposure to stresses associated with environmental and social change and from the absence of a capacity to adapt.

Source: California Governor's Office of Emergency Services. 2022. California Adaptation Planning Guide. https://www.caloes.ca.gov/climate.

Step 3. Assess Adaptive Capacity

Adaptive capacity is the ability of populations and community assets to prepare for, respond to, and recover from the impacts of climate change using existing resources and programs. Based on the results of the adaptive capacity assessment, the City ranked the adaptive capacity of each population or asset as low, medium, or high for each relevant hazard.

Adaptive capacity is considered a positive attribute, so a higher adaptive capacity score means that a population or asset may be more adaptable to the hazard. A lower adaptive capacity score means that a population or asset may have a harder time adjusting to the changing conditions given available resources.

The City of Hesperia, San Bernardino County, and community-based organizations already provide some of these tools and resources to both populations and community asset owners or managers. The following list describes the plans, projects, programs, and initiatives that increase adaptive capacity throughout the city.

Non-climate Stressors

Non-climate stressors are trends unrelated to climate hazards that can exacerbate impacts or impede adaptive capacity, making populations or assets more vulnerable. They are also known as pre-existing conditions that make populations or assets more susceptible to harm from hazards because the stressors may impair their ability to prepare for, respond to, or recover from hazards. Addressing non-climate stressors can improve the adaptive capacity of populations and community assets.

Source: United State Global Change Research Program. 2016. "U.S. Climate Resilience Toolkit."

Plans

» City of Hesperia Local Hazard Mitigation Plan

» City of Hesperia Emergency Operations Plan

Mitigation Action Plans

» 2020 Hesperia Water District Urban Water Management Plan

» Resilient Inland Empire Toolkit

Municipal Code Requirements

» Flood Hazard Protection Regulations (Municipal Code Chapter 8.28).

» Water Conservation and Water Shortage Plan (Municipal Code Chapter 14.04.170).

» Model water efficient landscaping ordinance requirements (Municipal Code Chapter 8.04.650).

» Fire Code (Municipal Code Chapter 15.04.010).

» Grading (Municipal Code Section 15.06).

Programs and Initiatives

» San Bernardino County Fire Protection District Wildland Programs

» SCE demand response program and energy efficiency rebates

» The High Desert Regional Partnership (HDR) helps municipalities and residents change the way they consume energy to improve resiliency

» Warming and cooling centers within the city

» County Wildfire Reduction Aid: Mountain Mutual Aid, Mountain Area Safety Taskforce, Fuels Management Program, County Fire Hazard

Abatement, Inland Empire Fire Safe Alliance, California Stewardship Program, CAL FIRE

» Victor Valley Transit Authority
  - Victor Valley Transit Authority paratransit services
  - Victor Valley Transit Authority Vanpool
  - Victor Valley Transit Authority Micro-Link

» San Bernardino County Department of Public Health operates low-cost clinics and communicable disease programs

» California Disaster Corps, Community Emergency Response Team, Telephone Emergency Notification System, Emergency Communication Service, Integrated Public Alert and Warning Systems (Local and regional programs and services)

» San Bernardino County's Telephone Emergency Notification System and SB Ready app

» The San Bernardino County Homeless Partnership (SBCHP) and Office of Homeless Services coordinate a broad range of homeless services in San Bernardino County, including emergency shelter and motel vouchers, transitional housing, supportive housing, rapid rehousing, security deposit and utility assistance, rental assistance, and other community support services

» The Housing Authority of the County of San Bernardino issues rental vouchers to bridge the gap between income, affordability, and market rate housing. However, the Housing Authority only receives a set amount of funding for the voucher program, so a voucher waitlist is common, and households may spend time applying for funding without receiving it based on waitlist duties.

Step 4. Conduct Vulnerability Scoring

The City used the impact and adaptive capacity scores for each population and asset for each relevant hazard to determine the vulnerability score. The vulnerability score reflects how susceptible a population or asset is to harm from a particular hazard. Vulnerability is assessed on a scale from low to high. The vulnerability scores reflect both the severity of climate-related impacts and the ability of populations and assets to resist and recover from these effects.

Having a low vulnerability score does not mean that the population or asset will be unaffected by climate change, but that the effects are likely to be

less substantial. The matrix in **Table A-1** shows how impact and adaptive capacity scores combine and translate into a vulnerability score.

Table A-1 Vulnerability Scoring Matrix

	Low Impact	Medium Impact	High Impact
Low Adaptive Capacity	Medium	High	High
Medium Adaptive Capacity	Low	Medium	High
High Adaptive Capacity	Low	Low	Medium

CLIMATE CHANGE HAZARDS

Changes to the global climate system are expected to affect future occurrences of natural hazards in and around Hesperia. Many hazards are projected to become more frequent and intense in coming years and decades, and in some cases, these trends have already begun. Key climate change considerations that affect Hesperia include increasing temperatures and changes in precipitation. Overall, precipitation levels are expected to increase slightly, with more years of extreme precipitation events and droughts that last longer and are more intense. According to California's *Fourth Climate Change Assessment,* Hesperia can expect to experience various changes from climate-related hazard events.[69]

» Wildfire risk in Hesperia is and will continue to be a concern for the community. Climate change is expected to lead to an increase in wildfires in the surrounding area and across San Bernardino County due to hotter and drier conditions. Dry conditions are anticipated earlier in the year, leaving most of the region in moderate to extreme drought conditions prior to summer. These continued dry conditions with above-normal temperatures through spring will leave fuel moisture levels lower than normal, increasing the potential for wildfire activity. Across the region, more frequent and intense wildfires may also create poor air quality for Hesperia. As the climate changes, warmer temperatures will create more pollutants, such as ozone, wildfire smoke, dust, and pollen, contributing to poor air quality.

» Warmer temperatures are projected to cause an increase in extreme heat events. The number of extreme heat days, defined in Hesperia as a day when the high temperature is at least 98°F, is expected to rise from a historical annual average of 5 to 36 days by the middle of the century (2035 to 2064), and an average of 59 days by the end of the century (2070 to 2099). In addition to the increases in extreme heat

events, Hesperia is expected to see an increase in the average daily high temperatures. The number of warm nights, defined in Hesperia as a day in April through October when the minimum temperature is above 66.5°F, is expected to rise from a historical annual average of 4 to 35 nights by the middle of the century (2035 to 2064), and to an average of 66 nights by the end of the century (2070 to 2099).

» Both droughts and floods are expected to become more frequent as rainfall is expected to occur in fewer, more intense storms due to climate change. Although Hesperia is likely to experience minimal change in overall annual rainfall levels from climate change, the region is also expected to see an increase in the number of extreme rainfall events. As a result, floods are expected to occur more often in Hesperia, primarily along Mojave River, Antelope Valley Wash and Summit Valley, near the foothills in the southwestern region of the city, and along Main Street, and climate change may expand the parts of the city that are considered prone to flood. Climate change is also expected to increase the frequency and severity of droughts that cause soil to dry out and condense. During droughts, water levels in aquifers may also decline as groundwater is dependent on recharge from infiltration of precipitation. Groundwater is the sole source of water supply for Hesperia. The water level that supplies wells in the city would also decrease. Well pumping would affect the total water supply as water pumped would likely exceed the rate aquifers are recharged by precipitation or other underground flow. When rainfall does return, dry ground means more water runs off the surface rather than being absorbed into the ground, which can lead to flooding downstream and result in debris flows along slopes and hillsides.

» Severe weather events, such as strong atmospheric river events[*] and high winds, may become more frequent and intense due to climate change. Climate change is expected to cause an increase in heavy rainfall, which may also contribute to an increased risk of landslides in the hills around Hesperia. Hesperia is expected to see an increase in annual average precipitation. The city receives an average of approximately 16.4 inches of rainfall annually, which is expected to increase to 16.5 inches annually by the middle of the century (2035 to 2064), and to an average of 18.6 inches annually by the end of the century (2070 to 2099). In Hesperia, the most severe weather consists

[*] Atmospheric rivers are long, narrow regions in the atmosphere that transport water vapor carried away from the tropics. These columns of vapor move with the weather, carrying large amounts of water vapor and strong winds. When the atmospheric rivers make landfall, they often release this water vapor in the form of rain or snow, often causing heavy rains that can lead to flooding and mudslide events.

of atmospheric rivers, high winds, or thunderstorms. The types of dangers posed by severe weather vary widely, including injuries or deaths, damage to buildings and structures, fallen trees, roads blocked by debris, and fires sparked by lightning.

» Climate change can increase infection rates from various diseases because many of the animals that carry diseases are more active during warmer weather. Several diseases are linked to climate change that can harm the health of Hesperia community members, such as hantavirus pulmonary syndrome, Lyme disease, and West Nile virus. Many of these diseases are carried by animals, such as mice and rats, ticks, and mosquitos, which are usually seen as pests even if they do not cause infections. Warmer temperatures earlier in the spring and later in the winter can cause these animals to be active for extended periods, increasing the time these diseases can be transmitted.

VULNERABILITY ASSESSMENT RESULTS

Under California law, the Safety Element is required to include a vulnerability assessment that looks at how people, buildings, infrastructure, and other key community assets may be affected by climate change. The City conducted the Climate Change Vulnerability Assessment in the summer of 2024 to analyze Hesperia's susceptibility to climate-related hazards. Hesperia's vulnerability assessment, prepared in accordance with the most recent available guidance in the *California Adaptation Planning Guide*, assesses how eight different climate-related hazards (air quality and smoke, drought, extreme temperatures, human health hazards, flooding, landslides, severe storms, and wildfire) may affect 48 different population groups and community assets. Each population or asset received a score of low, medium, or high vulnerability for each climate-related hazard. The vulnerability scores reflect both the severity of climate-related impacts and the ability of populations and assets to resist and recover from these effects.

The Climate Change Vulnerability Assessment indicates that Hesperia's populations and assets are most vulnerable to wildfire, extreme temperatures, and severe weather. Overall, residents in Hesperia tend to be most vulnerable to wildfire, extreme temperatures, and severe weather, which directly affect health outcomes. The most vulnerable population groups include persons with chronic illness and/or disabilities, seniors, households in poverty, Immigrant communities / linguistically isolated persons, and persons experiencing homelessness.

Citywide energy delivery and communication infrastructure and services are vulnerable to multiple hazards, including severe storms, such as high winds that can trigger PSPS events, extreme heat that reduces the capacity and strains the systems, and landslides that damage the systems, ultimately disrupting energy and communication services. Extreme heat can lead to power outages by causing mechanical failure of grid equipment, heat damage to power lines, and by creating a high demand for electricity to power air conditioners, all of which place stress on the network. There may be a higher demand for communication services during severe storms, potentially putting stress on the network and increasing the risk of service interruptions. This higher demand is likely to lead to greater service disruptions.

PSPS events, or interruptions in energy service, can create vulnerabilities for Hesperia community members. A loss of electricity can cause a loss of refrigeration for food and medical supplies, limit cooking, cause loss of cooling (particularly dangerous during extreme heat events) and lighting, and limited or no access to the Internet or other information systems. Many businesses are forced to close during a power outage, causing economic hardships and depriving community members of important services, such as grocery stores, gas stations, and banks/ATMs. Power outages may also be harmful to people who depend on electrically powered medical devices. For those who work from home, a power outage means a loss of access to an internet connection and other essential tools needed to carry out work-related tasks. With the increasing reliance on virtual meetings and online classes, power outages can disrupt these activities.

Flood hazards are expected to expand parts of the city currently considered prone to flooding. As a result, transportation infrastructure within and adjacent to the 100-year floodplain will likely experience more frequent inundation from floodwaters in future years. This expansion can, in turn, interrupt the City's public transit services, reducing the mobility of transit-dependent community members. Increases in damaging flood events will cause greater property damage, public health and safety concerns, displacement, and loss of life.

Climate change could affect the transportation network and associated economic activity within Hesperia by creating strain on transportation infrastructure, impacting travel behavior, goods movement, and supply chain business continuity. Transportation infrastructure, such as roadways, bridges, and railways, are all potentially at increased risk due to severe storms, floods, and higher temperatures. When parts of the transportation

infrastructure network fail, typical travel routes for both passenger travel and goods movement may be affected, including I-15, SR-138, SR-173, US-395, and other major roadways. Regional disruption of these local transportation roadways due to hazards such as flooding, landslides, or wildfire could significantly impact the transportation of goods and services provided in the city, the economic vitality of the community, and the livelihood of many businesses.

Water and wastewater services are vulnerable to the impacts of climate change. Drought conditions may cause stress on Hesperia's groundwater supplies and reduce the overall water supply available. Moreover, wastewater lines in the city could be damaged by landslides.

The Safety Element includes goals, policies, and implementation strategies to increase community resilience and help lower vulnerability, particularly for the populations and assets that received a score of high in the Vulnerability Assessment. **Table A-2** shows the results of the Vulnerability Assessment prepared for Hesperia, in accordance with the requirements of Senate Bill 379. The following matrix provides the scores for each population and assets to each relevant hazard. Gray cells with a dash (-) indicate that a specific hazard is not applicable to a specific population or asset, and therefore was not scored.

Table A-2 Vulnerability Assessment Results

Populations & Assets	Hazards							
	Air Quality and Smoke	Drought	Extreme Temperatures	Human Health Hazards	Flooding	Landslides	Severe Weather	Wildfire
Populations								
Children and youth (under 18)	High	Low	High	Medium	Medium	Medium	Medium	High
College students	Low	Low	Low	Low	Medium	Low	Medium	Medium
Cost-burdened/low-income/overcrowded households	Medium	Medium	Medium	Medium	Medium	Low	Medium	Medium
Households in poverty	High	Medium	High	High	High	Medium	High	High
Immigrant communities/linguistically isolated persons	High	Medium	High	High	High	Medium	High	High
Low-resourced people of color	Medium	Medium	High	High	High	Medium	High	High
Outdoor workers	High	Medium	High	High	Medium	Medium	Medium	High
Persons experiencing homelessness	High	Medium	High	High	High	Medium	High	High
Persons living in mobile homes	Medium	Medium	High	Medium	-	-	High	-
Persons with chronic illnesses and/or disabilities	High	Medium	High	High	High	High	High	High
Persons without a high school degree	Low	Low	Low	Low	Medium	Low	Low	Low
Persons without access to lifelines	Medium	Low	High	Medium	High	Medium	Medium	High
Renters	Medium	Low	Medium	Low	Medium	Medium	Medium	Low
Seniors (65+)	High	Medium	High	High	High	Medium	High	High
Unemployed persons	Low	Low	Medium	Medium	Medium	Low	Medium	Medium
Buildings and Infrastructure								
Airport	-	-	Low	-	-	-	Medium	Low
Commercial centers	-	-	Low	-	Medium	-	Medium	Medium
Dams	-	-	-	-	-	Medium	Low	Low
Energy and communication infrastructure	-	-	High		-	High	High	High
Flood control and stormwater infrastructure	-	-	-	-	High	Medium	Medium	Low
Government and community facilities	-	-	Low	-	-	-	Medium	Medium
Hazardous materials sites	-	-	Low	-	-	-	Medium	Low
Historical places	-	-	Low	-	-	-	Medium	Low
Homes and residential structures	-	-	Medium	-	High	Medium	High	High
Medical care and assisted living facilities	-	-	Low	-	Low	-	Medium	Low
Parks, Open Space, and Trails	-	-	Medium	-	Low	Medium	Medium	Medium
Schools	-	-	Low	-	-	-	Medium	High
Transportation infrastructure	-	-	Medium	-	High	-	Medium	Medium
Vehicle fuel stations	-	-	Low	-	Medium	Medium	Medium	High
Water and wastewater infrastructure	-	-	Low	-	-	-	Low	Low

Populations & Assets	Hazards							
	Air Quality and Smoke	Drought	Extreme Temperatures	Human Health Hazards	Flooding	Landslides	Severe Weather	Wildfire
Economic Drivers								
Agriculture	High	High	High	High	-	-	High	High
Commercial and retail centers	Medium	Medium	Medium	High	-	-	Medium	Low
Education services	Medium	Low	Medium	Medium	Medium	Medium	Medium	Medium
Major employers	Medium	Low	Low	Medium	-	-	Low	Medium
Manufacturing and industrial	Low	Low	Low	Medium	-	-	Medium	Low
Outdoor recreation	High	Medium	High	Low	Medium	Medium	Medium	High
Ecosystem and Natural Resources								
Chaparral	-	Medium	Medium	-	Low	Low	Medium	High
Scrub	-	Low	Medium	-	Low	Low	Medium	High
Riparian	-	High	Medium	-	Medium	Medium	High	High
Woodland	-	Medium	Low	-	Low	Low	Medium	High
Key Services								
Education services	Medium	Low	Medium	Medium	Medium	Medium	Medium	Medium
Emergency services	Medium	-	Medium	High	Medium	Medium	Medium	Medium
Energy delivery and communication services	Low	Low	High	Low	High	High	High	High
Government administration & community services	Medium	-	Low	Low	Medium	Low	Low	Low
Public transit access	High	-	High	Low	Medium	Medium	High	Medium
Solid waste removal	Medium	-	Medium	Medium	Medium	Medium	-	Medium
Water and wastewater	Medium	High	Medium	-	-	High	-	High

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