

City of Roseville

Multi- Hazard Mitigation Plan

2023 Update – Public Review Draft

CITY OF ROSEVILLE CALIFORNIA

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TETRA TECH

City of Roseville 2023 Multi-Hazard Mitigation Plan

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DEFINITIONS AND ACRONYMS

100-Year Flood—The term "100-year flood" can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1 percent chance of being equaled or exceeded in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1 percent annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program (NFIP).

Acre-Foot—An acre-foot is the amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Anthrax—A disease caused by the bacteria *Bacillus anthracis*. Most forms of the disease are lethal, and it affects both humans and other animals. There are effective vaccines against anthrax, and some forms of the disease respond well to antibiotic treatment.

Asset—An asset is any man-made or natural feature that has value, including, but not limited to, people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

Base Flood—The flood having a 1% chance of being equaled or exceeded in any given year, also known as the "100-year" or "1% chance" flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program (NFIP) are protected to the same degree against flooding.

Basin—A basin is the area within which all surface water—whether from rainfall, snowmelt, springs, or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as "watersheds" and "drainage basins."

Benefit/Cost Analysis—A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

Benefit—A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

CAL FIRE—California Department of Forestry and Fire Protection

Cal OES—California Office of Emergency Services

Capability Assessment—A capability assessment provides a description and analysis of a community's current capacity to address threats associated with hazards. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified.

CBC—California Building Code

CCR—California Code of Regulations

CDBG-DR—Community Development Block Grant Disaster Recovery grants

CEQA—California Environmental Quality Act

Certified Unified Program Agency—An agency (such as the City of Roseville) certified to act as a licensing agency for six hazardous materials-related programs. The Certified Unified Program Agency enables the City of Roseville to implement its own hazardous materials emergency response program. Mutual aid agreements are also in place for incident response. Each business that deals with hazardous materials generally must submit a Unified Program Consolidated Form with facility information to the Roseville Fire Department.

CFR—Code of Federal Regulations

CIP—Capital Improvements Plan

Civil Disorder—Civil disorder results from incidents intended to disrupt a community to the degree that law enforcement intervention is required to maintain public safety. Civil disorder is generally associated with controversial political, judicial, or economic issues and events and may occur at any time, although statistics indicate that civil disorder is more frequent during the summer months. Although the City of Roseville does not have a history of civil disorder or rioting, large public gatherings, often associated with concerts or sports events, have overburdened local law enforcement and fire protection resources in the past. The effects of civil disorder and riots vary and depend on the type of event and its severity, scope, and duration. Essential services (such as electricity, water, public transportation, and communications) may be disrupted, and property damage, injuries, and loss of life may occur.

Communicable Disease—For the purposes of this Plan, communicable diseases include severe acute respiratory syndrome (SARS), flu, smallpox, and diseases carried by insects. Diseases carried by insects include plague (fleas), encephalitis, malaria, West Nile virus (mosquitoes), and Lyme disease (ticks).

Community Rating System (CRS)—The CRS is a voluntary program under the NFIP that rewards participating communities (provides incentives) for exceeding the

minimum requirements of the NFIP and completing activities that reduce flood hazard risk by providing flood insurance premium discounts.

CPTED—Crime Prevention Through Environmental Design

Critical Facility—A critical facility is vital to the City's ability to provide essential services and protect life and property. Loss of a critical facility would result in a severe economic or catastrophic impact.

CRS—Community Rating System

Dam Failure—An uncontrolled release of impounded water due to structural deficiencies in dam.

Debris Flow—Dense mixtures of water-saturated debris that move down-valley, looking and behaving much like flowing concrete. They form when loose masses of unconsolidated material are saturated, become unstable, and move down slope. The source of water varies but includes rainfall, melting snow or ice, and glacial outburst floods.

Depth of Flooding—The depth of flooding is difference between regulatory flood elevation and the elevation of the lowest grade adjacent to a structure.

DFIRM—Digital Flood Insurance Rate Map

DHS—Department of Homeland Security

Disaster Mitigation Act of 2000 (DMA); The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur.

DMA—Disaster Mitigation Act

Drainage Basin—A basin is the area within which all surface water (whether from rainfall, snowmelt, springs, or other sources) flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Drainage basins are also referred to as "watersheds" and "basins." The City of Roseville is located within portions of two major drainage basins: the Pleasant Grove Creek Basin and the Dry Creek Basin. Pleasant Grove Creek and its tributaries drain most of the western and central areas of the City, and the Dry Creek Basin and its tributaries drain the remainder of the City. The Dry Creek system has year-round flows in its major watercourses, and the Pleasant Grove Creek system is intermittent, with only seasonal flows. As a result, portions of the City lie within a flood hazard area. However, since 1950, there have been no reports of structural flood damage along Pleasant Grove Creek and there are presently no structures subject to flooding within the Pleasant Grove Creek Basin.

Drought—The cumulative impacts of several dry years on water users. It can include deficiencies in surface and subsurface water supplies and generally impacts health, well being, and quality of life.

Duration—For the purposes of this Plan, duration is defined as the length of time that a hazard occurs. For example, the duration of a tornado can be minutes, but release of a chemical warfare agent such as mustard gas can persist for hours or weeks if not remediated.

DWR—Department of Water Resources

Earthquake—An earthquake is defined as a sudden slip on a fault, volcanic or magmatic activity, and sudden stress changes in the earth that result in ground shaking and radiated seismic energy. Earthquakes can last from a few seconds to over 5 minutes, and have been known to occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties may result from falling objects and debris as shocks shake, damage, or demolish buildings and other structures.

Earthquake—The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth or a contact zone between tectonic plates. Earthquakes are typically measured in both magnitude and intensity.

Emergency Action Plan—A formal document that identifies potential emergency conditions at a dam and specifies actions to be followed to minimize property damage and loss of life. The plan specifies actions the dam owner should take to alleviate problems at a dam. It contains procedures and information to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities of the emergency situation. It also contains inundation maps to show emergency management authorities the critical areas for action in case of an emergency. (FEMA 2013)

EOP—Emergency Operations Plan

EPA—U.S. Environmental Protection Agency

Epidemic—The spread of an infectious disease beyond a local population, reaching people in a wider geographical area. Several factors determine whether an outbreak will become an epidemic: the ease with which the disease spreads from vectors, such as animals, to people and the ease with which it spreads from person to person.

ESA—Endangered Species Act

EUD—Environmental Utilities Department

Exposure—Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Extent—The extent is the size of an area affected by a hazard.

FEMA—Federal Emergency Management Agency

Fire Behavior—Fire behavior refers to the physical characteristics of a fire and is a function of the interaction between the fuel characteristics (such as type of vegetation and structures that could burn), topography, and weather. Variables that affect fire behavior include the rate of spread, intensity, fuel consumption, and fire type (such as underbrush versus crown fire).

Fire Frequency—Fire frequency is the broad measure of the rate of fire occurrence in a particular area. An estimate of

the areas most likely to burn is based on past fire history or fire rotation in the area, fuel conditions, weather, ignition sources (such as human or lightning), fire suppression response, and other factors.

FIRM—Flood Insurance Rate Map

Flash Flood—A flash flood occurs with little or no warning when water levels rise at an extremely fast rate

Flood Insurance Rate Map (FIRM)—FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area (SFHA).

Flood Insurance Study—A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's Flood Insurance rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain—Any land area susceptible to being inundated by flood waters from any source. A flood insurance rate map identifies most, but not necessarily all, of a community's floodplain as the Special Flood Hazard Area (SFHA).

Floodway Fringe—Floodway fringe areas are located in the floodplain but outside of the floodway. Some development is generally allowed in these areas, with a variety of restrictions. On maps that have identified and delineated a floodway, this would be the area beyond the floodway boundary that can be subject to different regulations.

Floodway—Floodways are areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Freeboard—Freeboard is the margin of safety added to the base flood elevation.

Frequency—For the purposes of this Plan, frequency refers to how often a hazard of specific magnitude, duration, and/or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

General Plan—California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The plan must consist of an integrated and internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. City actions, such as those relating to land-use allocation, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with such a plan. The City of Roseville's general plan serves these purposes. As the principle planning document that directs the City's growth and land use, the general plan is as an integral part of the Roseville hazard mitigation plan. A technical update to Roseville's general plan was completed in January 2003.

Geographic Information System (GIS)—GIS is a computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

GIS—Geographic Information System

Goal—A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of the Roseville hazard mitigation plan, once implemented, should be measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

H1N1 "Swine Flu"—A subtype of the Influenza A virus that has mutated into various strains including the Spanish Flu strain, mild human flu strains, endemic pig strains, and various strains found in birds.

H5N1/H7N9 "Bird Flu"—A subtype of the Influenza A virus that causes the flu commonly known as "avian influenza" or "bird flu.

Hazard—A hazard is a source of potential danger or adverse condition that could harm people and/or cause property damage. Natural hazards include floods, winds, and earthquakes. Man-made hazards include acts of terrorism and hazardous material spills.

Hazardous Material Incident—This type of incident involves the accidental or intentional release of hazardous materials to the environment. Such incidents typically occur as fixed facility incidents or transportation incidents. It is possible to identify and prepare for a fixed facility incident because federal and state laws require facilities to notify state and local authorities about hazardous materials used or produced at the facility. Transportation incidents are more difficult to prepare for because there is little (if any) notice about the materials involved. Except for severe weather and flooding, hazardous materials incidents are the most likely hazards to affect the City of Roseville.

Hazardous Material—A substance or combination of substances that, because of quantity, concentration, physical, chemical, or infectious characteristics, may cause or contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or pose a present or potential hazard to human life, property, or the environment. Hazardous waste is included in the City's working definition.

Hazards U.S. Hazard (Hazus) Loss Estimation Program—Hazus is a GIS-based program used to support the development of risk assessments as required under the DMA. The Hazus software program assesses risk in a quantitative manner to estimate damages and losses associated with natural hazards. Hazus is FEMA's nationally

applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. Hazus has also been used to assess vulnerability (exposure) for other hazards facing Roseville.

Hazus—Hazards, United States-Multi Hazard

High Hazard Dam—Dams where failure or improper operation will probably cause loss of human life. (FEMA 2013)

Hydraulics—Hydraulics is the branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

Hydrological Drought—Deficiencies in surface and subsurface water supplies.

Hydrology—Hydrology is the analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

IBC—International Building Code

Influenza—A viral infection that attacks the respiratory system; commonly called flu.

Intensity—For the purposes of this Plan, intensity refers to the measure of the effects of a hazard.

Inventory—The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Landslide—The movement of masses of loosened rock and soil down a hillside or slope. Slope failures occur when the strength of the soils forming the slope is exceeded by the pressure, such as weight or saturation, acting upon them.

Liquefaction—A condition in which water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and “float” freely in the water, turning the ground into a pudding-like liquid.

Local Government—Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Magnitude—Magnitude is the measure of the strength of an earthquake, and is typically measured by the Richter scale. As an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

MCI—Multi-Casualty Incident

Mitigation Actions—Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Mitigation—A preventive action that can be taken in advance of an event that will reduce or eliminate the risk to life or property.

NEHRP—National Earthquake Hazards Reduction Program

NFIP—National Flood Insurance Program

NIMS—National Incident Management System

NOAA—National Oceanic and Atmospheric Administration

Nolte Future Floodplain—The Nolte Future Floodplain is the portion of the regulatory floodplain based on the Roseville City of Roseville Floodplain Analysis published by Nolte and Associates in August 1986. This analysis used hydrologic parameters that better represented the observed flooding scenarios that caused flooding in Roseville. The study also used hydrologic parameters based on projected growth for the region assuming total development of the watershed instead of existing conditions used by FEMA. This approach generated a floodplain area greater than that reflected of on the FIRM for portions of Roseville. Although this study was never formally adopted, it is used by the City as the best available information for regulatory and land- use programs such as the specific plan program and improvement standards.

Objective—For the purposes of this Plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

OSPOMP—Open Space Preserve Overarching Management Plan

Pandemic—A worldwide epidemic.

PCFCD—Placer County Flood Control District

PCWA—Placer County Water Agency

Peak Ground Acceleration—Peak Ground Acceleration (PGA) is a measure of the highest amplitude of ground shaking that accompanies an earthquake, based on a percentage of the force of gravity.

PGA—Peak Ground Acceleration

Preparedness—Preparedness refers to actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Presidential Disaster Declaration—These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

Probability of Occurrence—A statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

Regulatory Floodplain—This term refers to an area regulated by the City of Roseville as floodplain through its land-use regulations and improvement standards. It includes areas identified by FEMA and published on FIRMs and additional areas identified by Roseville as being susceptible to flooding. These areas are delineated based on detailed hydrologic and hydraulic floodplain modeling that meets or exceeds FEMA criteria for mapping and modeling floodplains. The flood event used to delineate these boundaries is referred to as "the regulatory flood" in this Plan to differentiate it from the "base flood" used by FEMA. The City of Roseville designates the 100-year floodplain area on its land-use map in accordance with best available floodplain information as determined by the Public Works Director. In many portions of the City, the Nolte Future Floodplain (May 1987) has been used to designate floodplain boundaries. When Nolte Future Floodplain information does not exist or does not represent the best available information, new floodplain information is generated by the project proponent. New floodplain information is generally developed (1) consistent with build-out development assumptions used by the Nolte Future Floodplain analysis, and (2) in compliance with the most recent Placer County floodplain manual. Floodplain boundaries can normally be terminated where the 100-year floodplain narrows to a width of 200 feet or less and where the associated drainage area is less than 300 acres. Precise termination of boundaries must be approved by the Public Works Director.

Repetitive Loss Property—NFIP-insured properties that have experienced multiple qualifying flood losses.

Risk Assessment—Risk assessment is the process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Risk Ranking—A ranking of hazards based on the probability that the hazard will occur, and the impact the hazard will have on the people, property, and economy of the community.

Risk—Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Riverine—Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

RMC—Roseville Municipal Code

Robert T. Stafford Act—The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

SARS—Severe acute respiratory syndrome

SEMS—Standardized Emergency Management System

Severe Acute Respiratory Syndrome (SARS)-—An infectious respiratory illness characterized by fever, dry cough, and breathing difficulties, often accompanied by headache and body aches; believed to be caused by a coronavirus.

SFHA—Special Flood Hazard Area

Significant Hazard Dam—Dams where failure or improper operation will result in no probable loss of human life but can cause economic loss, environmental damage or disruption of lifeline facilities, or can impact other concerns. Significant hazard dams are often located in rural or agricultural areas but could be located in areas with population and significant infrastructure. (FEMA 2013)

SJWD—San Juan Water District

Smallpox—An infection caused by the variola virus, a member of the poxvirus family. Throughout history, smallpox has been responsible for epidemics that resulted in large numbers of deaths. The last outbreak was in 1977. The disease was declared eradicated in 1980.

Special Flood Hazard Area—The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A in riverine situations and zone V in coastal situations. The SFHA may or may not encompass all of a community's flood problems

Stakeholder—Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

Steering Committee—The Steering Committee is the Roseville City Council-approved group that oversaw all phases of the hazard mitigation plan's development. The members of this committee included key city personnel, citizens, and other stakeholders from within the planning area.

STEMI—ST-elevation myocardial infarction

Stream Bank Erosion—Stream bank erosion is common along rivers, streams and drains where banks have been eroded, sloughed or undercut. However, it is important to

remember that a stream is a dynamic and constantly changing system. It is natural for a stream to want to meander, so not all eroding banks are “bad” and in need of repair. Generally, stream bank erosion becomes a problem where development has limited the meandering nature of streams, where streams have been channelized, or where stream bank structures (like bridges, culverts, etc.) are located in places where they can actually cause damage to downstream areas. Stabilizing these areas can help protect watercourses from continued sedimentation, damage to adjacent land uses, control unwanted meander, and improvement of habitat for fish and wildlife.

Subduction Zone Earthquake—This type of quake occurs along two converging plates, attached to one another along their interface. When the interface between these two plates slips, a sudden, dramatic release of energy results, propagated along the entire fault line.

Technological Hazards—Hazards from accidents associated with human activities such as the manufacture, transportation, storage and use of hazardous materials.

Terrorism—A violent act or an act dangerous to human life, in violation of the criminal laws of the United States or of any state, to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social goals. Acts of terrorism are intentional, criminal, and malicious and can be foreign or domestic, depending on the origin, base, and objectives of the terrorist or organization. Acts of terrorism can involve the use of weapons of mass destruction, arson, and incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; agro-terrorism; and cyber-terrorism.

UBC—Uniform Building Code

ULOP—Urban Level of Flood Protection

USBR—U.S. Bureau of Reclamation

USGS—United States Geological Survey

Vector—An organism (such as an insect or rodent) that transmits pathogens that cause disease

Vector-Borne Illness—Diseases transmitted to people from insects and other animals. These include, but are not limited to, Hanta Virus, Plague, Tularemia, Lyme Disease, West Nile Virus and the Zika Virus.

VHF—Viral Hemorrhagic Fevers

Viral Hemorrhagic Fever (VHF)-—A group of illnesses caused by a viral infection (usually restricted to a specific geographic area) resulting in fever and gastrointestinal symptoms followed by capillary hemorrhage. These include, but are not limited to, Ebola, Dengue Fever and Yellow Fever.

Vulnerability—Vulnerability describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset’s construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power. Flooding of an electric substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Water Supply Strategy—A water supply strategy is a comprehensive approach to ensure water reliability for Roseville’s customers. The City has a diverse set of water supply options, including surface water contracts, recycled water, and groundwater wells to ensure that even after a period of dry years, a combination of available water supplies and water conservation measures will ensure that the community has adequate water. The City has contracts for surface water with three agencies

Watershed—A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Weapon of Mass Destruction (WMD)—WMDs include chemical, biological, radiological, nuclear, and explosive weapons associated with terrorism.

West Nile Virus—West Nile virus is a recent natural hazard affecting California. Mosquitoes transmit this potentially deadly disease to livestock and humans alike. West Nile virus first struck the northern hemisphere in Queens, New York, in 1999 and killed four people. In 2003, all 50 states warned of an outbreak from any of the 30 mosquito species known to carry it. From 62 severe cases in 1999, confirmed human cases of the virus spread to 39 states in 2002 and killed 284 people. Less than 1 percent of those infected develop severe illness. People over 50 years of age appear to be at high risk for the severe aspects of the disease.

Wildfire—A fire that causes uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property in non-urban areas.

Wildland-Urban Interface Area—An area susceptible to wildfires where wildland vegetation and urban or suburban development occur together. Examples include dispersed rural housing in forested areas.

WMD—Weapon of Mass Destruction

WNV—West Nile Virus

Zoning Ordinance—The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

EXECUTIVE SUMMARY

HAZARD MITIGATION OVERVIEW

Hazard mitigation is the use of long-term and short-term policies, programs, projects, and other activities to minimize the loss of life, injury, and property damage that can result from a disaster. The City of Roseville has developed a hazard mitigation plan to reduce risks from disasters to the people, property, economy, and environment within the city. The plan complies with federal and state hazard mitigation planning requirements to establish eligibility for funding under Federal Emergency Management Agency (FEMA) grant programs.

PLAN DEVELOPMENT APPROACH

The City of Roseville managed the development of the *City of Roseville Hazard Mitigation Plan.* The planning area for the hazard mitigation plan was defined as the entire incorporated area of the city.

A planning team facilitated the development of this plan, consisting of staff from several departments of the City and a contract consultant. A 14-member steering committee of local stakeholders oversaw the plan development. Coordination with other local, state, and federal agencies involved in hazard mitigation occurred throughout the planning process. The planning team and Steering Committee reviewed previous City planning documents, the 2018 *State of California Multi-Hazard Mitigation Plan*, and existing programs that may support hazard mitigation actions.

The planning team implemented a multi-media public involvement strategy that was approved by the Steering Committee. This plan was drafted under an expedited project timeline. The Steering Committee met six times between October 2022 and May 2023. Public outreach efforts included a hazard mitigation survey, the use of social media, distribution of city-wide public notice, and a public comment period for review of the draft hazard mitigation plan.

Based on the review of existing plans and programs, the input received through the public involvement strategy, the direction of the Steering Committee, and the findings of a new, detailed risk assessment, this hazard mitigation plan meets federal hazard mitigation planning requirements. The plan has been formally adopted by the Roseville City Council and submitted to the California Governor's Office of Emergency Services and FEMA Region 9 for approval.

RISK ASSESSMENT

Risk assessment is the process of measuring the potential loss of life resulting from hazards, as well as personal injury, property damage and environmental damage. The assessment determines a community's overall

vulnerability to hazard events. The Steering Committee used the risk assessment to gauge the potential impacts of hazards identified as "hazards of concern" for this plan. For this plan, risk assessment models for hazards of concern were based on current data and technologies. The assessment of each hazard of concern includes discussion of the following:

- Hazard identification and profile
- The exposure of population, property, and the environment to of hazards
- The estimated cost of potential damage, where applicable

Based on the risk assessment, natural hazards were ranked for the risk they pose to the overall planning area, as shown in Figure ES-1.

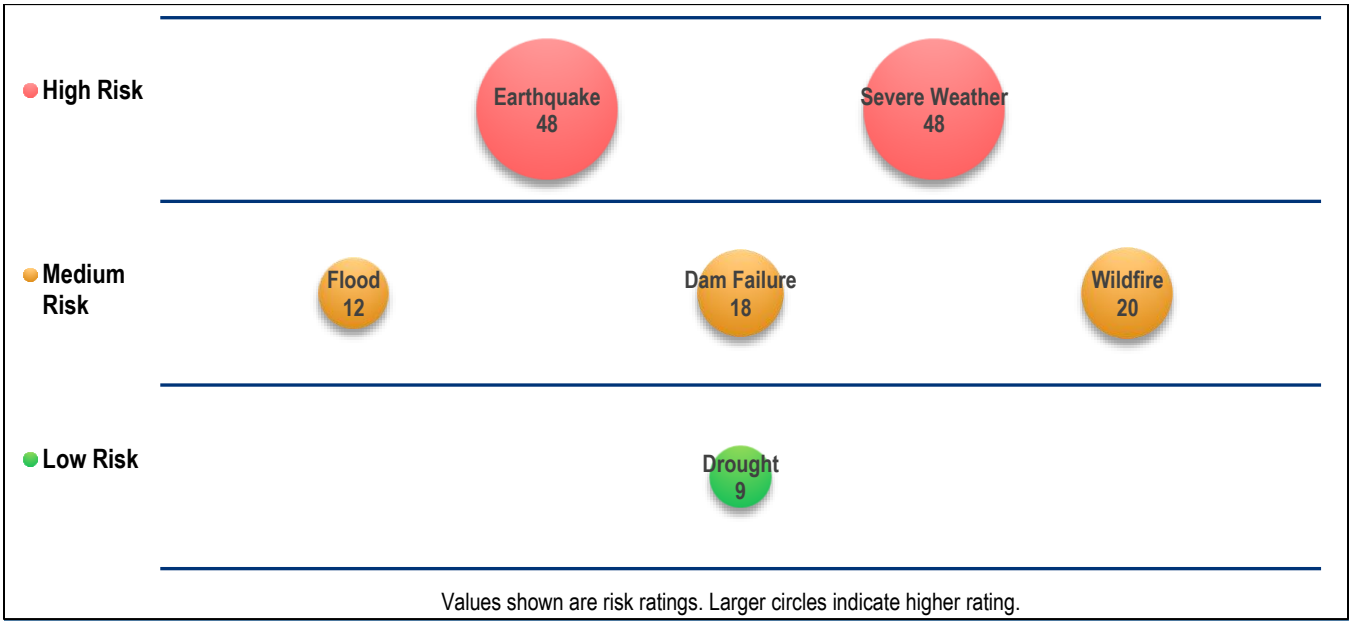


Figure ES-1. Hazard Risk Rating

Additional hazards, identified as "hazards of interest," are identified and briefly described in this plan, but full risk assessments were not conducted for these hazards. Risk was not ranked for the identified hazards of interest.

MITIGATION GUIDING PRINCIPLE, GOALS, AND OBJECTIVES

Guiding Principle

The following guiding principle was identified for this hazard mitigation plan:

> Through community partnerships, establish a plan to reduce vulnerability to hazards in order to protect the health, safety, welfare, and economy of the City for all Roseville residents, businesses, and visitors.

Goals

The Steering Committee established the following goals for the Plan update:

- G-1: Protect lives and reduce injury.
- G-2: Promote hazard mitigation as an integrated policy.
- G-3: Protect the continuity of local government to ensure no significant disruption of services during or due to a disaster.
- G-4: Maintain a safe community using emergency management principles through collaboration and outreach.
- G-5: Minimize or reduce damage to property, including critical facilities.
- G-6: Develop and implement mitigation strategies that optimize funding in an efficient and cost-effective way to maintain a fiscally sound city.
- G-7: Monitor and support the natural environment's capacity to deal with the impacts of natural hazards, taking into account the potential impacts of global climate change.
- G-8: Strengthen inclusiveness, equality, and justice efforts for all in partnership by building a resilient community.

Objectives

Plan objectives were developed via a facilitated exercise that focused on finding objectives that meet multiple goals. During this exercise, Steering Committee members were requested to review the 2011 objectives in addition to newly proposed objectives. The selected objectives are listed in Table ES-1.

Table ES-1. Objectives for 2023 Multi-Hazard Mitigation Plan

Objective Number	Objective Statement	Goals for which it can be applied
O-1	Consider the impacts of hazards on future land uses in the City of Roseville by coordinating with other planning mechanisms such as the General Plan and land-use code development.	1, 2, 5, 7
O-2	Protect and sustain reliable local emergency operations and communication facilities during and after disasters.	1, 3, 4
O-3	Develop new or enhance existing early warning response systems and plans.	1, 3, 4, 5
O-4	Seek to enhance emergency response capabilities through improvements to infrastructure and City programs.	1, 4, 5
O-5	Enhance the understanding of all present and future hazards that impact the City of Roseville and the risk they pose.	1, 3, 4, 5, 7
O-6	Seek mitigation projects that provide the highest degree of hazard protection at the least cost.	1, 5, 6
O-7	Seek to update information on natural, environmental, and human-caused hazards, vulnerabilities, and mitigation measures by coordinating planning efforts and creating partnerships with appropriate local, private, county, state, and federal agencies.	1, 2, 3, 4, 5, 7
O-8	Seek to implement codes, standards, and policies that will protect life and property, including natural habitat, from the impacts of hazards within the City of Roseville.	1, 2, 3, 5, 6
O-9	Educate the whole community on preparedness for and mitigation of potential impacts of hazards on the City of Roseville.	1, 2, 4
O-10	Support efforts to retrofit, purchase, or relocate structures in high hazard areas, including those known to be repetitively damaged.	3, 5, 6
O-11	Increase the resilience of the City's Lifelines.	1,2,3,4,5,6, 7,8

MITIGATION ACTION PLAN

Mitigation actions presented in this plan are designed to reduce or eliminate losses resulting from hazard events. The development process resulted in the identification of (number) mitigation actions. Each action was given a priority rating for implementation and a separate priority rating for seeking grant funding. Table ES-1 summarizes the number of actions with each combination of implementation and grant funding priorities. Several of these actions are within the current capabilities of the City of Roseville, resulting in a high priority for implementation over the next five years. Table ES-2 lists the mitigation actions with high implementation priority and no need for grant funding.

Table ES-1. Number of Recommended Mitigation Actions by Priority

	High Grant Funding Priority	Medium Grant Funding Priority	Grant Funding Not Needed
High Implementation Priority	1 action	0 actions	31 actions
Medium Implementation Priority	8 actions	8 actions	21 actions

Table ES-2. High Implementation Priority Mitigation Actions with No Need for Grant Funding

Action #	Action Description	Lead Agency
D-3	Continue to implement the Environmental Utility Department's recycled water program and seek all opportunities to expand its coverage, currently focusing on urban growth areas. The City pumps recycled water through a system of purple pipes completely separate from potable (drinking water) pipes. The City pumps the recycled water to customers such as streetscapes, golf courses and parks, where it irrigates turf and shrubs. Using recycled water for uses such as landscape irrigation reduces demand on the potable water system, creating a more reliable water supply for the entire City. Recycled water is not subject to the effects of drought.	Environmental Utilities Department
D-4	Promote active water conservation techniques and strategies to private property owners through Roseville-sponsored outreach projects such as printed media and the City's website.	Environmental Utilities Department
DF-1	Create a dam failure element for the City's emergency response plan that includes a phased warning protocol in response to the findings of the Folsom Dam Containment Dike Risk Assessment.	Roseville Police and Fire
EQ-2	Incorporate earthquake mitigation measures for private property into existing City-sponsored outreach programs such as printed media and the City's website.	Development Services Department
F-1	The City shall designate all areas identified as the 100-year floodplain. The boundaries of the 100-year floodplain shall be as specified in the floodplain designations section of this component of the City's General Plan. Floodplain areas shall be preserved as specified in the open space and conservation element. Such preservation may include required dedication to the City. If needed, modify the City's ordinances to include floodplain use regulations consistent with the goals, policies, and implementation measures of the safety, land use, open space and conservation, and parks and recreation elements of the City's General Plan.	Development Services Department
F-2	Refer any development proposal that has a direct or indirect impact on flood protection to Public Works for comment. In addition, forward such proposals to other agencies as applicable, including the U.S. Army Corps of Engineers, California Central Valley Flood Protection Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and Placer County Flood Control District. Consider the comments of the agencies during the development review process.	Development Services Department
F-3	Continue City participation in the National Flood Insurance Program and the Community Rating System (CRS). Seek CRS classification improvements within capabilities of City programs, including adoption and administration of FEMA-approved ordinances and flood insurance rate maps (FIRM).	Public Works Department
F-4	Maintain Roseville's compliance and good standing under the National Flood Insurance program.	Public Works Department

Action #	Action Description	Lead Agency
F-5	Continue the City's outreach program to flood-prone property owners and the citizens of Roseville, to help make them aware of the flood threat and how best to deal with them. This includes a full-page message in the City's Summer Recreation Guide which is mailed to all Roseville households. Additionally, messages are shared through the City's utility mailer inserts, email newsletter, website, video, social media channels, and news media throughout the year.	Public Works Department
F-6	Continue to pursue a regional approach to flood issues by remaining actively involved in the Placer County Flood Control District. This involvement includes cooperation in the development of a comprehensive regional database. Continue to participate in regional flooding studies, including the Auburn Creek/Coon Creek/Pleasant Grove Creek flood mitigation plan (i.e., Natomas Cross Canal Watershed Plan) and the Dry Creek Watershed Flood Control Plan.	Public Works Department
F-7	Continue City coordination with other agencies on issues of flood control. Coordination between the City and adjacent jurisdictions occurs through several mechanisms, including distribution of development proposals for review and comment. Continue City cooperation with federal, state, and local agencies, including the U.S. Army Corps of Engineers, California Central Valley Flood Protection Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and the Placer County Flood Control District.	Public Works Department
F-9	Ensure that future specific plans and specific plan amendments are consistent with the goals and policies of the General Plan. The specific plans shall include the designation and preservation of floodplain areas and adjacent habitat. Provisions shall be incorporated to ensure that public infrastructure, utilities, and emergency services remain functional during flood conditions. Such infrastructure and facilities include water, sewer and gas mains, telephone and electric lines, streets and bridges, hospitals, and fire and police stations. Financing mechanisms shall be explored to fund necessary flood protection improvements and maintenance. Development agreements may be used to secure implementation and funding provisions.	Development Services Department
F-21	Continue the Tree Mitigation Fund program administered by the Parks Division in conjunction with non-profit organizations. The planting of oak trees in the open spaces adjacent to riparian zones increases infiltration and slows storm water surges.	Parks, Recreation & Libraries Department: Parks Division
F-22	Manage beaver dam sites for flood control protection and habitat restoration after dam removal. One primary issue is impacts to floodwater capacity of creeks. Part of the desired comprehensive approach to beaver management includes establishment of quantitative and qualitative "carrying capacity," including acre-feet of flood capacity lost. Implement a standard monitoring and reporting process to track beaver dam locations, population, and impacts. Gain regulatory approval for beaver management techniques such as biological control and habitat manipulation using the most benign options first.	Parks, Recreation & Libraries Department: Parks Division
HC-3	Seek to establish appropriate staffing levels of public safety personnel to address vulnerabilities identified through an incremental targeted study that provides immediate needs as well as anticipated needs in 1 year, 5 years, and 10 years.	City Council
HC-6	Support first responding agencies during emergencies by adhering to state and local laws for the inventory, storage, and maintenance of the utility's hazardous materials.	Roseville Electric Utility
HC-7	Maintain compliance with federal, state, and local laws and regulations for the operation and generation of the Roseville's power plants and the utility's engineering & operational activities.	Roseville Electric Utility
HC-9	Protect the City's data, technology infrastructure and staff against malicious cyber-attacks and Cyber terrorism.	Information Technology Division
HH-2	Support the public education efforts of the Placer County Health Department and the Placer Mosquito & Vector Control District. This includes sharing important health and safety information through the City's communication channels, including but not limited to email newsletters, social media channels, video updates, website, collateral materials, and news media.	Public Affairs & Communications Department
HH-3	Collaborate with the Placer County Mosquito Abatement District to review resource protection policies that conflict with human health protection in the City of Roseville and work to resolve these policy issues.	City Manager's Office

Action #	Action Description	Lead Agency
MH-2	Continue to maintain the hazard mitigation page on City website.	Public Affairs & Communications Department
MH-7	Strive to maintain high availability of essential communication services	Information Technology Division
MH-8	Secure the City's physical locations that contain technology infrastructure	Information Technology Division
MH-9	Work towards implementing the Multi-Hazard Mitigation Plan and associated action items.	Coordination among all city departments
MH-10	Enhance the efficiency of the City's emergency operations and public communication by creating a dedicated space for Public Information Officers within an existing City building.	Public Affairs & Communications Department
MH-11	Continued purchase of critical equipment, impacted by supply chain availability and/or regulatory requirements. These items are critical to the success (build out, maintenance) of Power Generation and Electric Operational Assets.	Roseville Electric Utility
SW-1	Continue the Shade Tree Program, an energy conservation rebate program provided by Roseville Electric	Roseville Electric Utility
SW-2	Continue ongoing line clearing and weed abatement of electrical utility facilities in order to reduce public exposure to vegetation hazards and maintain higher reliability during severe weather conditions.	Roseville Electric Utility
SW-5	Continue to operate the Roseville Energy Park to support the City's electrical requirements and maintain service continuity during severe weather events.	Roseville Electric Utility
SW-6	Continue to maintain and operate Roseville Power Plant #2 to support the City's electrical requirements and maintain service continuity during severe weather events.	Roseville Electric Utility
WF-1	Continue "Goat Grazing" program for removal of grassland in areas of Roseville potentially vulnerable to wildfire. Implement goat grazing in City open space and preserve areas for fire and invasive plant species management and native plant restoration.	Parks, Recreation & Libraries Department: Parks Division

IMPLEMENTATION AND MAINTENANCE

Full implementation of the recommendations of this Plan will require time and resources. This Plan reflects an adaptive management approach in that specific recommendations and plan review protocols are provided to evaluate changes in vulnerability and action plan prioritization after the Plan is adopted. Funding resources are always evolving, as are requirements under state or federal mandates, and the true measure of the Plan's success will be its ability to adapt to the ever-changing climate of hazard mitigation.

Roseville has a long-standing tradition of progressive, proactive response to issues that may impact its citizens. This tradition is reflected in the development of this Plan. The Roseville City Council will assume responsibility for adopting the recommendations of this Plan and committing City resources toward its implementation. The City's track record in the mitigation of hazards impacting its citizens is exemplary. The framework established by this Plan will help maintain this tradition in that it identifies a strategy to maximize the potential for implementation based on available and potential resources. It commits the City to pursue actions when the benefits of a project exceed its costs. Most important, the City developed this Plan with extensive public input, which sets the stage for acceptance of the actions recommended for implementation in this Plan.

PART 1—INTRODUCTION AND THE PLANNING PROCESS

1. INTRODUCTION TO HAZARD MITIGATION PLANNING

1.1 WHY PREPARE THIS PLAN?

1.1.1 The Big Picture

Hazard mitigation is defined as any action taken to reduce or alleviate the loss of life, personal injury, and property damage that can result from a disaster. It involves long- and short-term actions implemented before, during and after disasters. Hazard mitigation activities include planning efforts, policy changes, programs, studies, improvement projects, and other steps to reduce the impacts of hazards.

The federal Disaster Mitigation Act (DMA) of 2000 emphasizes planning for disasters before they occur. The DMA requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. Regulations developed to fulfill the DMA's requirements are included in Title 44 of the Code of Federal Regulations (44 CFR).

The responsibility for hazard mitigation lies with many, including private property owners, commercial interests, and local, state and federal governments. The DMA encourages cooperation among state and local authorities in pre-disaster planning. The planning network called for by the DMA helps local governments to articulate accurate needs for mitigation, resulting in faster allocation of funding and more cost-effective risk-reduction projects.

The DMA also promotes sustainability in hazard mitigation. To be sustainable, hazard mitigation needs to incorporate sound management of natural resources and address hazards and mitigation in the largest possible social and economic context.

1.1.2 Roseville's Response to the DMA

Roseville has a long-standing reputation as a national leader in risk reduction through proactive mitigation. This reputation has been built through innovative planning and a commitment to protecting its citizens from the impacts of natural disasters. Embracing the goals of the DMA, Roseville adopted its first hazard mitigation plan in 2005. That plan became a model nationally and has been touted by the Federal Emergency Management Agency (FEMA) as a "mitigation success story."

Local hazard mitigation plans must be regularly updated to comply with the DMA. The City responded to this requirement with plan updates in 2011 and 2016 and now this 2023 Multi-Hazard Mitigation Plan. This update identifies resources, information, and strategies for reducing risk from natural hazards. Elements and strategies in the Plan were selected because they meet a program requirement and because they best meet the needs City residents. The Plan will help guide and coordinate mitigation activities throughout the planning area. It was developed to meet the following needs:

- Meet or exceed program requirements specified under the DMA, thereby enabling the City of Roseville to continue using federal grant funding to reduce risk through mitigation.
- Meet the planning requirements of FEMA's Community Rating System (CRS), allowing the City of Roseville to maintain its CRS Class 1 rating.
- Create a risk assessment that focuses on City of Roseville hazards of concern.
- Coordinate existing plans and programs so that high-priority actions and projects to mitigate possible disaster impacts are funded and implemented.

1.2 WHO WILL BENEFIT FROM THIS PLAN?

All residents and businesses of the City of Roseville are the ultimate beneficiaries of this hazard mitigation plan update. The Plan reduces risk for those who live in, work in, and visit the City. It provides a viable planning framework for all foreseeable natural hazards. Participation in development of the Plan by key stakeholders helped ensure that outcomes will be mutually beneficial. The Plan's goals and recommendations can lay groundwork for the development and implementation of local mitigation activities and partnerships.

1.3 CONTENTS OF THIS PLAN

This hazard mitigation plan is organized into three primary parts:

- Part 1—Planning Process and Community Profile
- Part 2—Risk Assessment
- Part 3—Mitigation Strategy.

Each part includes elements required under federal guidelines. DMA compliance requirements are cited at the beginning of subsections as appropriate to illustrate compliance. Appendices provided at the end of the plan include information or explanations to support the main content of the plan.

2. PLAN UPDATE—WHAT HAS CHANGED

2.1 THE PREVIOUS PLANS

2.1.1 2005 Initial Plan

Several factors initiated the first hazard mitigation planning effort for the City of Roseville:

- The Roseville area has significant exposure to numerous natural hazards that have caused millions of dollars in past damage.
- Limited local resources make it difficult to be pre-emptive in risk reduction actions. Being able to leverage federal financial assistance is paramount to successful hazard mitigation in the area.
- The City wanted to be proactive in its preparedness for natural hazards.

With these factors in mind, the City of Roseville committed to the preparation of its initial plan by attaining grant funding for the effort and then securing technical assistance to complete a planning process that complied with all requirements.

2.1.2 2011 Update

Due to the success of the 2005 effort, no major changes were made to the Plan's approach and function during the 2011 planning process. The 2011 update enhanced the 2005 effort but remained consistent on discussion points for each hazard of concern. The 2011 Plan format changed to address required elements for plan updates. A major addition to the 2011 Plan, per recommendations from FEMA Region 9, was the inclusion of dam failure as a hazard of concern. The 2011 Plan update followed a phased approach to planning per FEMA's July 2008 *Local Hazard Mitigation Planning Guidance*.

2.1.3 2016 Update

The 2016 hazard mitigation plan update differed from the previous versions in several ways:

- **Climate Change Impacts**—The 2016 Plan update dedicated a comprehensive chapter to the issue of climate change and its effects on state-identified climate-related hazards.
- **Separation of Natural from Non-Natural Hazards**—Descriptions and assessments of non-natural hazards were presented after the natural hazards to better distinguish the two kinds of hazards.
- **Additional Demographic Information**—Additional demographic data were included—beyond age and disability/access and function need—addressing Roseville's industry, business and institutional footprint. Employment trends and occupations were included.

- **Disabilities, Access and Functional Need Language Revision**—The entire Plan was updated to reflect appropriate references when discussing individuals with disabilities and others with access and functional needs. This includes person-first language and references to individuals instead of the more general term of populations.
- **Guiding Principle**—A guiding principle for the hazard mitigation plan was developed. The goals and objectives of the Plan support the guiding principle.

2.2 MITIGATION SUCCESS STORIES

One of the principal objectives of the initial plan was to create a plan that would help the City achieve the highest possible rating under FEMA's Community Rating System (CRS) program. The CRS program has stringent requirements for Classes 4 or better, and especially for Class 1. Several of these requirements are related to planning, and the initial plan was developed to meet these requirements. The Insurance Services Office (ISO), which performs classification reviews for the CRS, determined that the initial plan met the Class 1 requirements. In December 2005, the City was verified with sufficient credit to become the nation's first and only CRS Class 1 community. As of the writing of this Plan, the City of Roseville remains one of only two CRS Class 1 communities in the nation.

On March 13, 2023, as parts of the state were reacting to massive flooding from atmospheric storms, CBS Sacramento broadcast a report about the success of flood mitigation projects in the City of Roseville (see Figure 2-1).



Figure 2-1. Flood Mitigation News Report

2.3 WHY UPDATE?

2.3.1 Federal Eligibility

Under 44 CFR, hazard mitigation plans must present a schedule for monitoring, evaluating, and updating the Plan. This provides an opportunity to reevaluate recommendations, monitor the impacts of actions that have been accomplished, and determine if there is a need to change the focus of mitigation strategies. A jurisdiction covered by a plan that has expired is not able to pursue elements of federal funding for which a current hazard mitigation plan is a prerequisite.

2.3.2 Changes in Development

Hazard mitigation plan updates must be revised to reflect changes in development within the planning area during the previous performance period of the Plan (44 CFR Section 201.6(d)(3)). The Plan must describe changes in development in hazard-prone areas that increased or decreased vulnerability since the last plan was approved. If no changes in development impacted the jurisdiction's overall vulnerability, then plan updates may validate the information in the previously approved plan. The intent of this requirement is to ensure that the mitigation strategy continues to address the risk and vulnerability of existing and potential development and takes into consideration possible future conditions that could impact vulnerability.

Roseville's population as of January 1, 2023, was 152,928, an increase of 62 percent since 2003. This hazard mitigation plan update assumes that some new development over the intervening period occurred in hazard areas. All such new development would have been regulated pursuant to local programs and codes. The City has adopted a general plan that governs land-use decisions and policy-making, as well as a building code and specialty ordinances based on state and federal mandates. Therefore, it is assumed that hazard vulnerability did not measurably increase even if exposure did. Any new development would have accounted for potential hazard impacts under codes and standards such as the International Building Code and flood damage prevention requirements of the National Flood Insurance Program (NFIP).

2.4 THE UPDATED PLAN—WHAT IS DIFFERENT?

Table 2-1 indicates the major changes between the 2011 and 2016 plans as they relate to 44 CFR planning requirements.

Table 2-1. Plan Changes Crosswalk

44 CFR Requirement	2016 Plan	Updated 2023 Plan
§201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: • **An opportunity for the public to comment on the Plan during the drafting stage and prior to Plan approval;** • **An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and** • **Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**	The plan development process deployed under this update was similar to the 2011 Plan; however, additional public outreach initiatives were conducted through new social media platforms. Chapters 1, 2, and 3 describe the planning process for the 2016 updated Plan.	The plan development process was essentially the same as for previous plan updates, with a greater use of social media and internet platforms in the public involvement strategy. Chapter 3 describes the approach.
§201.6(c)(2): The Plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.	The 2016 Plan presents a risk assessment of the same hazards as the 2011 Plan—in Chapters 6 through 16. Each hazard was updated with new occurrence information from 2011 through 2015 where applicable, and a new comprehensive risk assessment was conducted using updated building stock, demographics, and land use information.	The landslide hazard was dropped from the risk assessment for this update. All other hazards were carried forward. The risk assessment, presented in Chapters 8 through 16, made use of the most current data, and results are presented in graphs rather than tables.
§201.6(c)(2)(i): [The risk assessment shall include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The Plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.	The 2016 Plan presents a risk assessment of the same hazards as the 2011 Plan—from Chapters 6 through 16. Each hazard was updated with new occurrence information from 2011 through 2015 where applicable, and a new comprehensive risk assessment was conducted using updated building stock, demographics, and land use information. Climate change impacts were omitted from the individual hazards of concern, as the new climate change chapter provides a more detailed and comprehensive overview of climate change impacts for identified hazards.	Much of the description of hazard location and extent was carried forward from the previous update. The lists of past events and prediction of future frequency were updated to account for the hazard history since the last plan update.
§201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i). This description shall include an overall summary of each hazard and its impact on the community	Vulnerability was again assessed for all hazards of concern using the Hazus computer model for dam failure, earthquake, and flood hazards. Level 2 analysis was again conducted for these hazards. Site-specific data on City-identified critical facilities was entered into the Hazus model. Hazus outputs were generated for other hazards by applying an estimated damage function to an asset inventory extracted from Hazus. All assets were updated using current available data.	The approach to evaluating vulnerability was unchanged from the previous update, but new analyses were run with the most current data. An assessment social vulnerability, based on household income, was added to the vulnerability evaluation.

44 CFR Requirement	2016 Plan	Updated 2023 Plan
§201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program insured structures that have been repetitively damaged floods	The Plan includes a comprehensive analysis of repetitive loss areas that includes an inventory of the number and types of structures in the repetitive loss area. Repetitive loss areas are delineated, causes of repetitive flooding are cited, and these areas are reflected on maps.	The repetitive loss area analysis was updated based on the most current data from FEMA.
§201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.	Building inventory was updated and the Steering Committee revised the critical facilities definition to reflect 2016 priorities. Each hazard chapter again provides a discussion on future development trends.	Inventories of building stock and critical facilities were updated to account for development changes since the previous plan.
§201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) and a description of the methodology used to prepare the estimate.	Loss estimates were recalculated using new data and the new asset inventory.	Loss estimates were recalculated using new data and the new asset inventory.
§201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.	The Plan contains a discussion on development trends from the previous planning period, through future trends anticipated in the next five years as they pertain to each hazard.	The most current information on land use and development was incorporated into the risk assessment.
§201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.	The Steering Committee reviewed the 2011 guiding principle, goals, objectives, and actions and made minor adjustments to reflect 2016 priorities. The City of Roseville updated its capability assessment to reflect regulatory revisions and new initiatives.	The same process used to update the mitigation strategy in 2016 was applied to create a new strategy for the current update. The City updated its capability assessment to reflect regulatory revisions and new initiatives.
§201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.	The Steering Committee reviewed the 2011 guiding principle, goals, objectives, and actions and made minor adjustments to reflect 2016 priorities.	Guiding principle, goals and objectives from the previous update were carried forward with a few minor wording revisions. One new goal was added, to highlight a priority for equity consideration in hazard mitigation.
§201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.	The hazard mitigation catalog developed in 2011 was enhanced with results of the 2016 planning effort focusing on updated program capabilities and the dam failure and cyber threat hazards.	The catalog of potential mitigation actions was revised to show separate focus on actions that reduce risk for new development and those that reduce risk for existing development. A new list of actions was provided that would enhance the City's adaptive capacity to respond to climate change.

44 CFR Requirement	2016 Plan	Updated 2023 Plan
§201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program, and continued compliance with the program's requirements, as appropriate.	The City of Roseville has identified an action stating its commitment to maintain compliance and good standing under the National Flood Insurance Program. Additionally, the City identified multiple actions to maintain its Class 1 standing under the CRS program.	The approach to NFIP participation and compliance is the same as in the previous update. A new analysis of flood insurance in use in the City was included.
§201.6(c)(3)(iii): [The mitigation strategy shall describe] how the actions identified in Section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.	The updated Plan uses the same qualitative approach to prioritization as used for the 2011 Plan.	In addition to the prioritization for project implementation that was included in previous plans, a second prioritization was performed, establishing each mitigation action's priority for grant funding.
§201.6(c)(4)(i): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.	Chapter 19 retains the plan maintenance strategy developed in 2011.	This plan retains the plan maintenance strategy developed for previous updates.
§201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.	Recommendations are provided for incorporating the Plan into other planning mechanisms. This update additionally discusses current and future integration opportunities.	This plan retains the plan integration strategy developed for previous updates.
§201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.	A comprehensive strategy is provided for continuing public involvement with additional information regarding social media.	The comprehensive strategy for continuing public involvement is carried over from the previous plan.
§201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commission, Tribal Council).	The implementation chapter for this update contains the resolution of adoption.	The FEMA plan approval letter and City's adoption resolution are included in an appendix.

3. PLAN UPDATE APPROACH

3.1 FORMATION OF THE PLANNING TEAM

The City hired Tetra Tech, Inc. as a consultant to assist with the 2023 Plan update. The Tetra Tech project manager acted as lead project planner, reporting directly to a City project manager. Once the technical assistance was secured, a planning team made up of the following members was formed to lead the planning effort:

- Joe Anderson (City of Roseville)—Associate Engineer/Floodplain Management, Project Lead
- Brian Walker (City of Roseville)—Floodplain Manager
- Jeff Beigh (City of Roseville)—Police Lieutenant, Emergency Manager
- Helen Dyda (City of Roseville)
- Jason Rizzi (City of Roseville)—Assistant Fire Chief, Emergency Manager
- Rob Flaner (Tetra Tech)—Project Manager
- Bart Spencer (Tetra Tech)—Lead Planner
- Carol Baumann (Tetra Tech)—Hazus/GIS lead
- Megan Brotherton (Tetra Tech)—Planner
- Jake Poland (Tetra Tech)—Planner
- Dan Portman (Tetra Tech)—Editor

3.2 DEFINING THE PLANNING AREA

The planning area consists of the entire area within the Roseville city limits. Relevant planning area characteristics are described in Chapter 4. The risk assessment for this hazard mitigation plan is performed for the entire planning area.

3.3 THE STEERING COMMITTEE

A steering committee was formed to oversee all phases of the plan. The members of this committee included key City of Concord staff, residents, and other stakeholders from within the planning area. The planning team assembled a list of candidates representing interests within the planning area that could have recommendations for the plan or be impacted by its recommendations. The team confirmed a committee of 12 members as listed in Table 3-1.

Table 3-1. Steering Committee Members

Name	Title	Jurisdiction/Agency
George Booth[a]	Floodplain Manager	Sacramento County
Joe Anderson[b]	Associate Engineer	City of Roseville
Michael Algots	Manager – Hazardous Materials	Union Pacific Railroad
Erik Angle	Emergency Preparedness Program Coordinator	Sutter Roseville Medical Center
Dave Atkinson	Assistant Director	Placer County Office of Emergency Services
Jeff Beigh	Emergency Manager/Police Lieutenant	City of Roseville
Ryan DeVore	Assistant City Manager	City of Roseville
Helen Dyda	Public Information Officer	City of Roseville
Gina McColl	Economic Development Analyst/Associate Planner	City of Roseville
Kevin McGoldrick	Support Services Administrator	Kaiser Permanente
Steve Parker	Vice President	Roseville Coalition of Neighborhood Associations
Kinnie Shallow	Associate Planner	City of Roseville

a. Steering Committee Chair
b. Steering Committee Vice Chair

Leadership roles and ground rules were reconfirmed during the Steering Committee's initial meeting for the plan update on October 10, 2022. The Steering Committee agreed to meet on the second Monday of every month as needed throughout the course of the 2023 Plan's development. The planning team facilitated each Steering Committee meeting, which addressed a set of objectives based on the work plan established for the update. The Steering Committee met six times from October 2022 through May 2023. Meeting agendas, minutes and attendance logs are on the City's hazard mitigation website (www.roseville.ca.us/HazardPlan). All Steering Committee meetings were open to the public, and agendas and meeting minutes were posted to the internet.

3.4 COORDINATION WITH STAKEHOLDERS AND OTHER AGENCIES

Coordination with other local, state and federal agencies involved in hazard mitigation in the region helped to ensure consistency with other ongoing efforts. 44 CFR requires that opportunities for involvement in the planning process be provided to neighboring communities, local and regional agencies involved in hazard mitigation, agencies with authority to regulate development, businesses, academia, and other interests (Section 201.6.b.2). Agency coordination was accomplished as follows:

- **Steering Committee Involvement**—Agency representatives were invited to participate on the Steering Committee.
- **Agency Notification**—The following agencies were invited to participate in the process and were kept apprised of plan development milestones:
  - FEMA Region 9
  - California Governor's Office of Emergency Services (Cal OES)
  - California Department of Water Resources
  - Placer County Office of Emergency Services
  - Placer County Flood Control District
  - Placer County Office of Education
  - City of Rocklin
  - City of Citrus Heights
  - Roseville City School District
  - Eureka School District
  - Dry Creek School District
  - Center School Districts
  - Roseville Joint Union High School District
  - U.S. Bureau of Reclamation

- Sacramento County Department of Water Resources
- Placer Mosquito & Vector Control District
- Placer County Air Pollution Control District

All of these agencies received meeting announcements, meeting agendas, and meeting minutes by e-mail throughout the plan development process. This approach proved to be beneficial when these agencies supported the effort by attending meetings or providing feedback on issues. All of these agencies were also informed about the plan update web page for up-to-date information.

- **Pre-Adoption Review**—All the agencies listed above were provided means to review and comment on the mitigation action plan for the 2023 Plan. The predominant means for this review was through the project web page. Each agency was sent an e-mail informing them that draft portions of the update were available for review.

3.5 REVIEW OF EXISTING PROGRAMS

Hazard mitigation planning must include review and incorporation, if appropriate, of existing plans, studies, reports and technical information (44 CFR Section 201.6.b(3)). Section 6.2 of this Plan provides a review of laws and ordinances in effect within the planning area that can affect hazard mitigation actions. Section 6.3 presents an assessment of the City's regulatory, technical and financial capabilities to implement hazard mitigation actions. Information from the following plans, studies, reports, and technical information is incorporated as appropriate into the mitigation plan:

- **State Hazard Mitigation Plan**—The State Hazard Mitigation Plan was reviewed for recent updates on state-wide hazard events and hazard information.
- **Placer County Hazard Mitigation Plan**—The Placer County Hazard Mitigation Plan was reviewed for planning consistency and augmented event history for hazards that extend beyond Roseville city limits, such as drought and severe weather.
- **General Plan and Specific Plans**—General Plan demographics and land use were cross-referenced for inclusion into this Plan as part of the overall community profile. Vulnerabilities identified in Specific Plan Areas were included as part of the vulnerability and risk assessment for wildfire, landslide, and flood. The General Plan and Specific Plans were included as part of the capability inventory for the City's capability assessment.
- **Urban Water Management Plan**—Information in the City's UWMP provided the main resource for illustrating historical and current conditions for the drought chapter. The UWMP was also included as part of the capability inventory for the City's capability assessment.
- **Open Space Preserve Overarching Management Plan**—This document was reviewed for open space policies related to the City's floodplain management program and the flood chapter of this Plan.
- **Emergency Operations Plan**—The EOP was reviewed for information related to response to the assessed natural hazards. A gap analysis review of the EOP identified further consistency opportunities among documents. The EOP was included as part of the capability inventory for the City's capability assessment.
- **Additional Resources and Technical Information**—A complete listing of technical reports, research materials, and articles used during development of this Plan is found in the References section.

3.6 PUBLIC INVOLVEMENT

Broad public participation in the planning process helps ensure that diverse points of view about the planning area's needs are considered and addressed. The public must have opportunities to comment on disaster mitigation plans during the drafting stages and prior to plan approval (44 CFR, Section 201.6(b)(1)). The Community Rating System expands on these requirements by making CRS credits available for optional public involvement activities.

3.6.1 Strategy

The Steering Committee drafted a comprehensive public involvement strategy for this update using multiple media sources. This strategy was built upon the Steering Committee's perception of what was effective during development of the update, in addition to the use of social media as a major message distribution vehicle. The planning team identified stakeholders to target through the multi-disciplinary public involvement strategy. The strategy for involving the public in the development of the Plan emphasized the following elements:

- Include members of the public on the Steering Committee.
- Use a survey to reassess the public's perception of risk and support of hazard mitigation and to get direction on alternatives.
- Hold public meetings to describe the plan update process and progress and to collect input from a wide range of the public.
- Develop a unified message for distribution on social media platforms.
- Attempt to reach as many citizens in the planning area as possible through the use of multiple media, including websites and brochures.

Stakeholders and the Steering Committee

Stakeholders are the individuals, departments, agencies and jurisdictions that have a vested interest in the recommendations of the hazard mitigation plan. The effort to include stakeholders in this process included stakeholder participation on the Steering Committee. The following federal, state, regional, and local stakeholders also played a role in the planning process:

- **Federal Agencies**—FEMA Region 9 provided updated planning guidance, provided summary and detailed data for the City from the National Flood Insurance Program (including repetitive loss information), and conducted a plan review.
- **State Agencies**—Cal OES provided updated planning guidance and reviewed the draft and final versions of the plan update as part of their state hazard mitigation planning process required by the DMA.

Survey

The Steering Committee elected to use a survey to collect new information from the public about household preparedness for hazards, the level of knowledge about tools and techniques for reducing loss from hazards, and areas of public concern about hazards. The survey asked 21 quantifiable questions and provided opportunities for written comment.

The web-based survey tool "Survey Monkey" was used to set up and deploy the survey. The survey was made available to all citizens of Roseville via a link posted on the City's website, advertised via press releases, sent via

e-mail to community residents, and linked through various forms of social media, including Facebook and Nextdoor. A total of 520 surveys were completed during the course of the plan update process. These results were distributed to the Steering Committee to inform the Steering Committee of public concerns and opportunities for new public engagement strategies. The survey and a summary of its findings are provided in Appendix A.

Public Meetings

A virtual public meeting was held on March 16, 2023, that was attended by about 30 people. The purpose of this meeting was to inform the community about potential risks in the area, the steps the City is taking to mitigate those risks, and suggestions for how community members can be better prepared and educated. Figure 3-1 shows an example social media post advertising the meeting. The second public meeting on May 25, 2023, allowed the City to present the draft plan, discuss the risk assessment, and encourage public comment on the draft.



Figure 3-1. Social Media Post Promoting the March 2023 Public Meeting

Public Comment Period

Once the draft updated Plan was assembled, a comment period for public input was open from Month Day, 2023 through Month Day, 2023. The public comment period was advertised via the City website, a press release, and through the use of social media. A public comment link was established on the City's Hazard Mitigation Plan website. During this public comment period, the City received XX comments from the public on the Draft Plan.

Press Releases

Press releases were distributed over the course of the 2023 Plan's development as key milestones were achieved and prior to the public meeting.

Social Media

The planning effort made use of multiple social media platforms (Facebook, Nextdoor, and Twitter) to reach a variety of audiences.

Internet

The City used its website to inform the public of the plan update process. A permanent hazard mitigation plan webpage has been established on the Roseville website (see Figure 3-2): www.roseville.ca.us/HazardPlan. This page housed all pertinent information on the hazard mitigation plan, its progress, and its implementation status. This site has proven to be a highly effective measure for ongoing public access to the Plan. Steering Committee meeting announcements, agendas and meeting summaries were also made available on the site. This website also was the principal means of disseminating the hazard awareness public survey for the 2023 Plan.

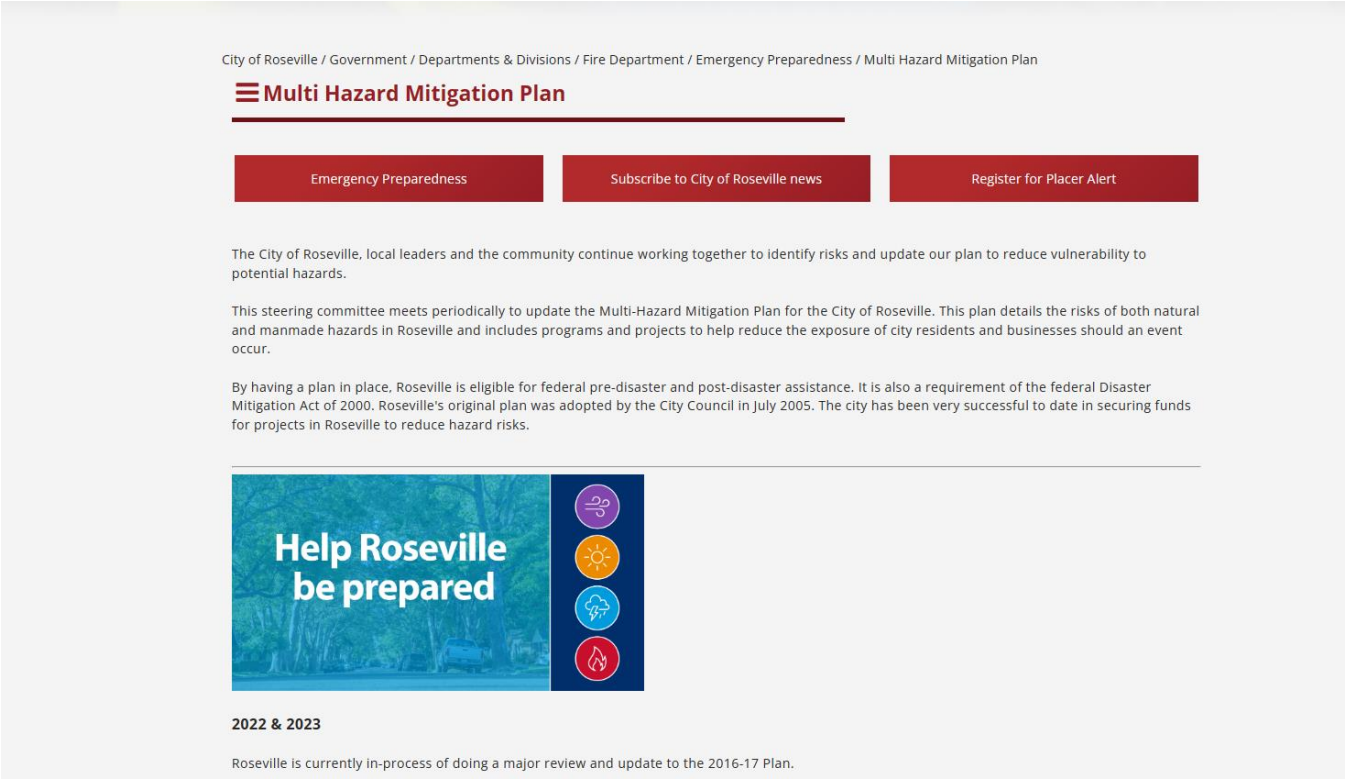


Figure 3-2. Sample Page from Hazard Mitigation Plan Website

3.6.2 Public Involvement Results

The public involvement strategy used for the plan update introduced the concept of mitigation to the public and provided the Steering Committee with feedback to use in developing the Plan. All citizens of Roseville were provided ample opportunities to provide comment during all phases of this plan update process. Table 3-2 summarizes public meeting attendance. Detailed analysis of the survey findings is presented in Appendix A.

Table 3-2. Summary of Public Meetings

Date	Location	Attendance
March 16, 2023	Virtual—Microsoft Teams	27
May 25, 2023	Riley Library, Roseville	TBD

3.7 PLAN DEVELOPMENT CHRONOLOGY/MILESTONES

Table 3-3 summarizes important milestones in the plan update process.

Table 3-3. Plan Development Chronology/Milestones

Date	Event	Description	Attendance
2022			
9/21	Planning Team Meeting #1	• Introductions • Planning Process Overview • Goals, Objectives, Mission Statement • Review previous hazards of concern • Outreach and Engagement strategies and methodology	9
10/5	Planning Team Meeting #2	• Planning Process Update • Reconciliation of Prior Action Items • Goals, Objectives, Mission Statement • Review previous hazards of concern • Outreach and Engagement strategies and methodology	9
10/10	Steering Committee Meeting #1	• Introductions • Project Overview • Project Coordination • Hazard Assessment & Risk Assessment • Outreach and Engagement • Requests from Committee Members • Public Comments	19
10/19	Planning Team Meeting #3	• Planning Process Updates • Hazards of Concern • Outreach and Engagement Status Update	6
10/26	Public Outreach	• Hazard Awareness Survey Released	N/A
11/14	Steering Committee Meeting #2	• Project Coordination • Hazards Assessment • Outreach and Engagement • Requests from Committee Members • Public Comment Periods (3)	16
12/12	Steering Committee Meeting #3	• Project Update • Hazard Assessment Update • Outreach and Engagement Update	16

Date	Event	Description	Attendance
2023			
1/11	Planning Team Meeting #4	• Mitigation Action Reconciliation • Plan Maintenance • Public Survey Update	8
1/25	Planning Team Meeting #5	• Mitigation Action Development • StoryMap and Public Survey Update	6
1/31	Public Outreach	• Public survey closed with 520 responses	N/A
2/8	Planning Team Meeting #6	• Mitigation Action Development • Social Vulnerability Dataset Discussion • Folsom Dam Dike Preparedness Discussion	7
2/13	Steering Committee Meeting #4	• Project Update • Social Vulnerability Index Decision • Hazard Assessment Update • Outreach and Engagement Update	18
2/22	Planning Team Meeting #7	• Planning Process and Status Update	6
3/8	Planning Team Meeting #8	• Planning Process and Status Update • Steering Committee Meeting Prep	7
3/13	Steering Committee Meeting #5	• Mitigation Action Update Guidance • Hazard Assessment Update • StoryMap and Public Survey Results Review	14
3/16	Public Outreach	• Virtual meeting to discuss hazard mitigation, the plan update process, and encourage public input	31
3/22	Planning Team Meeting #9	• Planning Process and Status Update	5
5/9	Steering Committee Input	• The Steering Committee used an online survey to validate new mitigation actions to include in the plan update	9
TBD	Public Comment Period Opens	• Draft Plan posted on Hazard Mitigation Plan website. • Press release advertising public comment period	N/A
5/25	Public Outreach	• Draft plan discussion • Public input and comments	TBD
TBD	Public Comment Period Ends	• XX comments received	N/A
TBD	Plan review	• Plan sent to Cal OES and ISO for review and approval pending adoption (APA)	N/A
TBD	Final public meeting and Plan adoption	• APA plan presented to City Council for adoption. The public was provided opportunity to provide comment prior to formal adoption.	___
TBD	CRS approval	• Plan was approved by ISO for CRS credit at XX points	N/A
TBD	Final approval	• FEMA granted final approval of the adopted plan	N/A

4. CITY OF ROSEVILLE PROFILE

4.1 LOCATION AND PLANNING AREA

The City of Roseville lies to the west of the foothills of the Sierra Nevada Range, about 16 miles northeast of downtown Sacramento. It is the largest city in Placer County and has experienced considerable residential and commercial growth in the past two decades.

The focus of this Hazard Mitigation Plan is the primary planning area defined in the *City of Roseville General Plan 2035*. The planning area includes 43.39 square miles of incorporated lands and an additional 796 acres making up the City's sphere of influence, as shown in Figure 4-1. It is divided into smaller areas called "Specific Plan Areas" for which more detailed individual plans have been developed to implement the General Plan. Fourteen specific plans have been adopted, containing detailed design guidelines and agreements to guide development and ensure that it is funded and built as planned.

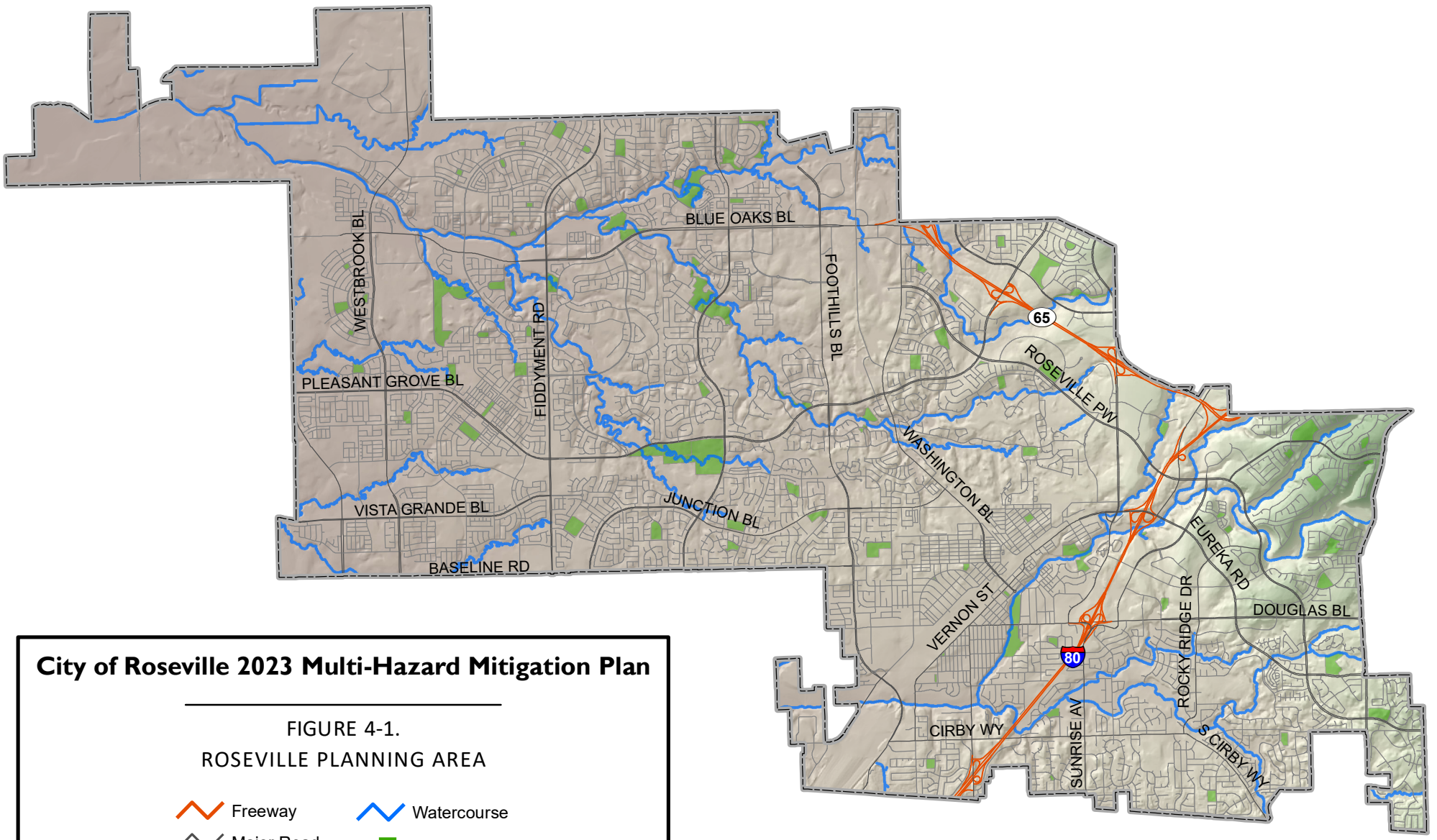
Roseville is largely urbanized. The incorporated area and sphere of influence are the primary focus of General Plan policies, but "secondary planning areas" also bear relationship to Roseville planning efforts, depending on the planning issue. For example:

- For the issue of air quality, the secondary planning area includes the City and all areas outside the City that are within the associated Sacramento Valley air basin.
- For flood protection, the secondary planning area encompasses the complete drainage basins of surface waters that flow through Roseville.
- Other secondary planning areas encompass varying boundaries beyond the primary planning area for issues such as solid waste, recycling, transportation and wastewater treatment.

4.2 HISTORICAL OVERVIEW

4.2.1 Pre-Development

The Placer County region was first inhabited by the Maidu Indians, whose territory extended from the Sacramento River Valley to the Sierra Nevada Range. The Southern Maidu occupied the American River basin, along with the Bear and Yuba River basins in the area now recognized as the City of Roseville. An abundance of plants and animals supported the Maidu tribes' large population. Evidence of the Maidu communities still exists along the banks of Strap Ravine and Dry Creek.



City of Roseville 2023 Multi-Hazard Mitigation Plan

FIGURE 4-1.
ROSEVILLE PLANNING AREA

- Freeway
- Major Road
- Minor Road
- Watercourse
- Park

Data Souces
CIty of Roseville

CITY OF ROSEVILLE CALIFORNIA

0 1 2 Miles

N W E S

4.2.2 Founding of the Community

Fur trapping expeditions came to the area in the early 1800s, and James Marshall discovered gold in the region in 1848. Some of the miners who came in search of gold became the area's first pioneers, taking up farming along the fertile creeks. Eventually, disease, gold miners and early settlers killed or forcibly removed the Maidu from their traditional lands. By 1864, track-laying crews from the Central Pacific Railroad had pushed eastward from Sacramento building the western half of the nation's first transcontinental railroad line. At the site of today's Roseville, the rails of the Central Pacific intersected with those of the California Central, a small line which then linked the towns of Folsom and Lincoln. The place where the two lines joined was labeled on railroad maps as "The Junction." The small freight and passenger center called Roseville developed around the junction.

For many years, Roseville remained a small railroad shipping point of about 250 inhabitants, centered on the train depot and a few small businesses and houses lining the two principal streets, Atlantic and Pacific. This changed between 1906 and 1908, when railroad roundhouse and repair facilities were moved to Roseville from nearby Rocklin. By 1908, the population increased to 2,000. New subdivisions were laid out to accommodate newcomers, many of whom moved from Rocklin. The business district expanded along Lincoln, Main, Church, and Vernon Streets. A chamber of commerce was organized to provide municipal services such as water, electricity, police and fire protection. In April 1909, the town incorporated and began to grow until it became Placer County's largest city.

4.2.3 Post-Incorporation Development

Railroad expansion continued, and local businesses grew as well. In the 1920s, the Pacific Fruit Express ice plant was the world's largest artificial ice plant. Also by the 1920s, the Southern Pacific Railroad boasted the largest freight marshaling yards west of the Mississippi River at Roseville. By the start of the Great Depression in 1929, Roseville's population had risen to 6,425.

During World War II, thousands of troop and munitions trains made their way through Roseville. The City continued to boom as a railroad center into the post-war years, but by the 1950s it faced competition from airlines and interstate trucking. The introduction of jet aircraft and the construction of Interstate 80 through Roseville caused the once-booming passenger train service to decline abruptly. The local depot was closed in 1972 and razed the following year. The Pacific Fruit Express ice plant closed in 1974, rendered obsolete by the introduction of self-refrigerating shipping options.

Completion of Roseville Community Hospital in 1952, the Folsom Dam in 1955, and the Roseville Freeway (Interstate 80) in 1956 gradually shifted the population away from downtown Roseville to what would become known as East Roseville. Roseville Square, the town's first shopping complex, was completed in 1961. Today, Roseville has more than 28 million square feet of commercial, office, and industrial floor space, and is ranked 10th statewide in total taxable retail sales.

In 1964, Roseville was selected as one of Look magazine's All America Cities. Roseville experienced a population surge in the 1980s as developers built up its broad expanses of cheap open land with easy transportation access. As the population expanded, so did the need for water, electrical, sewage, police, fire protection, recreational and educational services.

4.2.4 Current Conditions

The City has continued to grow outward. An expansive industrial zone lies north of Roseville adjacent to Highway 65, along with numerous corporate headquarters along Douglas Boulevard and the Eureka Road area. Although Roseville is no longer just a railroad town, the railroad remains a major factor in the local economy, and Roseville is still one of the principal railroad centers of the West. Passenger service was reintroduced in 1987 and a new intermodal depot facility was completed.

Today Roseville is an emerging urban center with a mix of residential and employment uses. The center of the City is typified by the downtown and small lot, single-family residences, while newer commercial and office development and larger suburban-type residences characterize the edges of town. As of January 2020, the California Department of Finance estimated the City's population to be 143,493—a 20.8-percent increase since 2010. It is anticipated that Roseville, along with the remainder of the South Placer/Sacramento Region, will continue to be the focus of significant development. Currently, the focus of new development is along the eastern, western, and northern portions of the community.

4.3 PHYSICAL SETTING

4.3.1 Geology

Roseville is within the Great Valley and Sierra Nevada geomorphic provinces of California. Located on the east side of the Sacramento Valley, Roseville's geology consists of water deposited (alluvial) sediments from the erosion of the Sierra Nevada mountain range. The City's area is characterized by gently sloping terrain with areas of steep ravines in the northeast, and relatively flat valley on the western portion of the City.

4.3.2 Soils

Soils in Roseville include some Quaternary (less than 1.8 million years old) sands, sandstones and mudstones, some Upper Tertiary (1.8 to 24 million years old) sandstones, mudstones and limestone, some Lower Tertiary (24 to 64 million years old) mudstones and sandstones, and Franciscan melange and serpentinite. These soils are very dense or, in some areas, soft rock. Some Quaternary muds, sands, gravels, silts and mud are located along 100-year floodplains. Soils in Roseville also include Mehrten formation lava flow, which restricts permeability.

4.3.3 Climate

Roseville and the northern Central Valley have a Mediterranean climate with warm, dry days and cool nights during the summer, when the average temperature is 93ºF during the day and 57ºF at night. The California Energy Commission has developed climate zones based on energy use, temperature, and other factors and created representative temperature data for each zone. Roseville is located in Zone 11: Red Bluff. As a whole, Zone 11 experiences sharply defined seasons with summers consisting of almost constant sunshine and dry air and winters with piercing winds and thick ground fog.

Table 4-1 presents a summary of annual climate conditions. Precipitation from May through October is rare, with most of the rainfall in the Greater Sacramento area, including Roseville, occurring between November and April. Prevailing winds in the summer can be light to gusty from the south. In the late summer and early fall, several wind events typically occur, with northerly winds that cause critical fire weather conditions in the City and surrounding areas.

Table 4-1. Roseville Climate

	Average High Temperature (°F)	Average Low Temperature (°F)	Record High Temperature (°F)	Record Low Temperature (°F)	Total Inches of Precipitation
January	56	41	73	17	4.1
February	61	44	78	19	4.6
March	67	46	86	26	3.4
April	73	49	106	60	1.6
May	82	55	112	35	0.7
June	90	60	115	43	0.2
July	95	63	115	50	0.0
August	94	62	114	45	0.0
September	88	59	115	46	0.3
October	78	52	102	32	1.2
November	64	45	86	26	2.9
December	56	40	74	16	4.2
Annual Average or Total	**77**	**51**	**98**	**36**	**23.2**

Source: Weather Spark

4.4 SENSITIVE RESOURCES

The City recognizes that sensitive resources are limited and that they must be conserved wherever possible. For many, the City's open space setting is a highly valued natural resource. Given the strong interrelationship between open space and conservation issues, the City of Roseville has chosen to address these issues in a single element of its General Plan: the Open Space and Conservation Element. Vegetation and wildlife resources and corridors are an important component of the overall open space system and have been the historical focus of preservation efforts in Roseville. If future generations are to enjoy and benefit from the resources available to the present generation, these finite and fragile resources must be preserved and managed.

The vegetation and wildlife resources of Roseville can be broadly classified by habitat type—grasslands, oak woodlands, riparian areas, and seasonal wetlands—as discussed below. Whenever possible, the focus of preservation efforts is multipurpose. It is therefore preferred, for example, to preserve woodlands, grasslands, and wetlands in combined rather than separate and unconnected settings.

4.4.1 Grasslands

Relatively small amounts of self-sustaining grasslands remain in the northern and western undeveloped edges of Roseville. Less extensive areas of grassland are present in smaller undeveloped areas scattered throughout the City. Before Spanish and later settlers arrived in the Central Valley, the grasslands contained native species. The effects of grazing and clearing of large tracts for agriculture resulted in the decline of native species. Today, most of the grasslands in the region contain non-native species. These areas do, however, provide important habitat for birds and other wildlife.

4.4.2 Oak Woodlands and Riparian Areas

Oak woodlands are generally present near the City's major stream channels. The microclimates and alluvial soils in the woodlands provide ideal conditions for deep-rooting shrubs and trees. Most woodland areas are relatively open, with little shrub growth.

Riparian areas support a much wider biological diversity. Situated along and within the City's creeks and watercourses, riparian corridors are a source of food and water and provide cover, nesting sites, and migration and dispersal corridors for wildlife. Riparian areas are also important in flood protection and improve air and water quality through natural filtering.

Oak woodland and riparian areas are City resources not only because of the diversity of species they support but also because they provide natural open space and aesthetic value. The City's creek systems are described in detail in the groundwater recharge and water quality component of the Open Space and Conservation Element. The City regulates the protection of native oak trees through the Tree Preservation Ordinance, which includes standards that limit disturbance within protected zones of oaks and emphasizes avoidance of tree removal. Where avoidance is not feasible and tree removal is authorized by the City, mitigation is required on an inch-for-inch basis. The Tree Preservation Ordinance is a valuable tool in protecting Roseville's oak trees and habitats. A creek and riparian management and restoration plan is being developed that will provide standards for riparian area management and enhancement. Additionally, the City maintains an overarching management plan for upholding the City's requirements in maintaining open space.

4.4.3 Seasonal Wetlands

Many of the wetland areas in Roseville are seasonal and therefore receive, retain, and transport water only during the wet season. Wetlands are subject to the regulations of the U.S. Army Corps of Engineers under the provisions of Section 404 of the Clean Water Act. Two primary types of seasonal wetlands are present in the City: intermittent drainage and vernal pool wetlands.

Intermittent drainage wetlands typically consist of channels 1 to 10 feet wide that flow over a variety of substrata. Most are wet only during winter and transport runoff. They are typically dry during summer, with scattered ponds, but they may contain water from adjacent urban runoff.

Vernal pools represent a significant seasonal wetland resource in Roseville. Although relatively abundant in Roseville and the Sacramento/Placer County region, they are considered rare statewide for their limited natural occurrence and distribution and for the unique native plant and animal species they support. Found in valley grassland areas, vernal pools are typically small, shallow, hardpan-floored depressions that fill with water during the winter wet season, gradually drying by late spring or early summer. Several plant species occur only in association with these special habitats, which has triggered concern about their inventory and preservation. Two types of vernal pools are present in the Roseville area:

- Northern volcanic mud flow vernal pools occur in shallow depressions on Mehrten mud flow formations where the slope is generally less than 2 percent.
- Northern hardpan pools generally occur on the Inks or Cometa soil series at the lower basin portions of creek floodplains. During the wet season, the pools provide special habitat for unique plant and animal species whose germination, growth, and reproductive cycles coincide with the availability of collected water. Individual pools vary significantly in the length of time they remain wet and in the diversity of plant species present.

4.4.4 Sensitive Species

The California Department of Fish and Wildlife maintains the California Natural Diversity Data Base, which includes known locations of state and federally listed endangered, rare, and threatened plant and animal species, including species considered by the scientific community to be deserving of such listing.

The sensitive plant species that may be present in Roseville are primarily associated with vernal pool environments and include the following: Bogg's Lakehedge Hyssop (*Gratiola heterosepala*), Dwarf Downingia *(Downingia humilis*), and Vernal Pool Brodiaca (*Dichelostemma lacunavernalis*). Bogg's Lake Hyssop is listed as endangered by the state and California Native Plant Society. Dwarf Downingia and Vernal Pool Brodiaca are both included on the California Native Plant Society "watch list" and have sufficiently limited distribution to warrant continued monitoring. Vernal pools in the City may also contain federally listed endangered vernal pool tadpole shrimp (*Lepidurus packardi*) and federally listed threatened vernal pool fairy shrimp (*Branchinecta lynchi*).

Anadromous chinook salmon (*Oncorhynchus tshawytscha*) and Central Valley steelhead (*Oncorhynchus mykiss*) are known to be present seasonally in Dry Creek and its upper tributaries. Steelhead is listed by the U.S. Fish and Wildlife Service as a threatened species under the Endangered Species Act. Chinook salmon within the Central Valley Fall/Late Fall Run are listed as a candidate species. In addition to the federal and state classified rare or endangered wildlife species known to inhabit Roseville, favorable habitats for other listed species are present in the area. Other special status species potentially present in Roseville include Cooper's Hawk, Swainson's Hawk, Valley Elderberry Longhorn Beetle, Sanford's Arrowhead, and the Northwestern Pond Turtle. Bald eagles have been sighted near Folsom Lake, and the American peregrine falcon is present in the Sacramento Valley. All of these species thrive in the riparian habitats of floodplain environments.

4.5 DEVELOPMENT PROFILE

4.5.1 Land Use Policies

In addition to a considerable jump in residential growth, Roseville has experienced considerable growth in commercial and industrial development. Based on growth projections and current land use allocations in the General Plan, the City has sufficient development potential through 2035 for both residential and commercial uses. Typically, residential land uses will be built out well before complete buildout of nonresidential land could occur, anticipated after 2050.

Numerous factors will influence growth throughout the South Placer County/Sacramento region:

- Global, national, state, and regional economic conditions
- Federal and state budgets and regulatory actions
- Perceptions about the quality of life
- Housing costs and availability
- Job and educational opportunities
- Infrastructure, resource, and land availability.

Management of the City's growth is guided by the Land Use Element of Roseville's General Plan, which consists of a land use map and land use policies. The overall goal of the Land Use Element is to promote a balanced and

innovative land use pattern that retains and enhances the distinct character and identity of Roseville. The land use map included in the Land Use Element generally shows the City's existing and planned land use mix and pattern.

Land use decision-making is guided not only by the land use map but also by the goals, policies and implementation measures in the Land Use Element. The City's land use policies are built upon underlying principles that were established based on input the City received from its residents and the Growth Management Committee established in 2005. These principles have impacted the overall policy direction and land use pattern in the City of Roseville. They include the following:

- Promote and enhance Roseville's unique character and identity.
- Distinguish Roseville from adjacent communities through the quality of development and design and the level of public services and facilities provided.
- Protect and enhance Downtown and the City's established neighborhoods.
- Promote new development and ensure that development is an integrated and connected part of the City's land use pattern.
- ➢ Provide a variety of housing types and opportunities to serve the needs and incomes of all households.
- Create a balanced land use pattern with an appropriate mix of uses to accommodate residential, employment, service, and social needs within the community.
- Preserve open space in areas with sensitive environmental resources and provide high-quality, accessible recreational amenities.
- Ensure fiscal responsibility.
- Create a land use mix and development pattern that accommodates and promotes alternative transportation modes for ease of access and improved air quality and public health.
- Proactively manage and plan for growth

State, regional and local growth projections indicate that Roseville and the South Placer County/Sacramento region will continue to draw residential and employment growth. Much of this attraction can be attributed to desirable location and access, availability of an educated and skilled workforce, land costs and overall quality of life. Local and regional economic conditions will drive the local growth potential, and existing land use allocations may require modification in the near future.

4.5.2 Residential Development

The Land Use Element of the General Plan identifies three primary residential land uses:

- **Low-Density Residential**—The low-density residential land use category is for development of the single-family dwelling units that make up the majority of Roseville's housing supply. The lower densities are assigned to lands that require flexibility to accommodate development constraints (e.g., slopes, trees, etc.). Typically, low-density residential lands should require minimal grading or disturbance of natural features.
- **Medium-Density Residential**—The medium-density residential land use category is for small-lot single-family detached dwelling units and attached patio homes, half-plexes, townhouses, condominiums, and mobile home parks. This residential land use accommodates a variety of housing types and designs, and is often used as a transition or buffer between higher intensity land uses and low-density residential land

use. It may also be applied as a transition between higher volume roadways and lower density residential uses.

- **High-Density Residential**—The high-density residential land use category is normally developed with multiple-story apartment or condominium structures containing multiple attached dwelling units. The broad range of densities in this category yields a variety of design options. In some areas, this land use category may be combined with commercial uses to form a mixed-use development where higher densities are desirable and beneficial.

According to the State Department of Finance, there are 60,082 housing units in the City. Single-family detached homes made up about 74 percent of the housing stock as of January 2022. Multi-family homes made up 22 percent, and mobile homes accounted for less than 1 percent. The Building Division reported that 498 permits were approved in October 2022, representing $25,900,513.99 in job value to the City. The Placer County Association of Realtors provided statistics indicating that the median purchase price of single-family houses in Roseville rose approximately .78 percent between August 2021 and October 2022, from $640,000 to $645,000. As indicated by the increase in housing prices, the demand for single-family homes continues and available land for single-family homes is ample.

4.5.3 Non-Residential Development

Roseville's non-residential land use designations include areas designated for commercial, office, industrial uses, special areas, and combining districts. Special designations include Central Business District, Public and Quasi-Public uses, Parks and Recreation, Open Space, and Urban Reserve. Like the residential designations, each non-residential designation includes a purpose statement, primary and secondary uses, and development standards, including a floor area ratio. Unlike the specific secondary uses listed for residential designations, which are intended to be subordinate and may be permitted only to support neighborhood convenience, the non-residential land use designations permit secondary land uses that are supportive and complementary of the primary uses, not necessarily subordinate. Typically, the size of secondary uses is limited and therefore does not warrant a separate land use designation. Table 4-2 summarizes the non-residential land uses.

Table 4-2. Non-Residential Land Uses

Land Use	Purpose
Neighborhood Commercial	The neighborhood commercial land use designation is intended to provide basic commercial services for the convenience of surrounding neighborhoods within walking distance of major residential areas.
Community Commercial	The community commercial land use designation is distinguished from the neighborhood commercial designation by providing a broader range of goods and services to an expanded service area.
Regional Commercial	The regional commercial land use designation is intended to accommodate larger shopping centers and commercial activities where uses provide goods and services to a citywide and regional service area.
Business Professional	The business professional land use designation provides areas for small and large office uses, including uses supportive of offices.
Light Industrial	The light industrial land use designation is applied to lands reserved for office, industrial, and research and development uses that generate very limited noise, vibration, odor, dust, smoke, light, or other pollutants, and are either integrated or compatible with surrounding uses.
Tech/Business Park	Variant of the light industrial designation envisioned as more of a campus type use. The land use designation provides for a mix of uses that are compatible with and act as a transition between the light industrial use types and commercial and residential uses.

Land Use	Purpose
General Industrial	The general industrial land use designation is intended to provide areas for industrial uses that tend to generate noise, vibration, odor, dust, smoke, light, and an aesthetic appearance not compatible with residential and other sensitive receptors. The intent of this category is to provide a place for industrial uses within the City that is properly buffered from other uses.
Transfer Station	The transfer station land use designation is intended to preserve and protect industrial areas suitable for a solid waste transfer station.
Central Business District	The Central Business District is a distinct land use category that acknowledges land use patterns of significantly greater intensities and traditional mixed uses of retail, office, and apartment. The district is limited in its application to Central Roseville, the West Roseville Village Center, and areas of greater urban intensity.
Park/ Recreation	The park and recreation designation is used to identify public parks in Roseville
Open Space	The open space land use designation is used to preserve and protect public and private lands that are significant due to wildlife habitat, natural features, or flood hazard. Within new development areas, the 100-year floodplain boundaries will be designated as Open Space. In addition, sensitive or unique natural features, including, but not limited to, wetlands, vernal pools, and oak woodlands, are to be designated as open space as part of specific plans and other major development review processes.
Public/Quasi-Public	The public/quasi-public land use designation is used to establish areas for education, religious assembly, governmental offices, municipal corporation yards, and water treatment plants.
Urban Reserve	The urban reserve land use designation is applied to lands that are anticipated to receive urban land entitlements, but at the present time are constrained by growth management policies, availability of services or other limitations.
Floodplain	The floodplain designation identifies lands that are within the 100-year floodplain boundaries as defined in the Safety Element of the General Plan. Development of lands with a floodplain land use designation is strictly regulated by the City of Roseville. In areas with existing development, the floodplain designation is an overlay or combining land use. As part of a specific plan, the land use designation may be combined with an open space or parks designation, if found consistent with the policies of the Safety Element.
Study Area	The study area land use designation is used as a combining land use to identify future General Plan or neighborhood study areas. This combining designation may be applied to any area where the City believes that additional land use analysis and amendment of the General Plan may be desirable to resolve specific neighborhood or land use issues.
Village Center	The Village Center land use designation is intended allow for a mix and density of land uses common to a traditional downtown, urban setting. It allows for flexibility and deviation from the standards and permitted uses contained in the primary land use designation for which it is combined.

4.5.4 Building Stock Used for Risk Assessments

According to assessor records, there are 50,516 buildings in the planning area, with a total replacement value of $47.4 billion. The City's housing stock, predominantly characterized by single-family detached dwelling units, makes up 96 percent of the total building stock. Table 4-3 shows the distribution of buildings by type of use.

Table 4-3. Distribution of Buildings in the Planning Area by Use Type

Use Type	Number of Buildings	Replacement Cost
Residential	48,288	$27,733,494,567
Commercial	1,736	$15,320,115,726
Industrial	334	$1,873,405,841
Agricultural	7	$40,971,589
Religion	53	$409,382,787
Government	17	$139,887,051
Education	81	$1,854,390,958
Total	**50,516**	**$47,371,648,518**

4.5.5 Critical Facilities

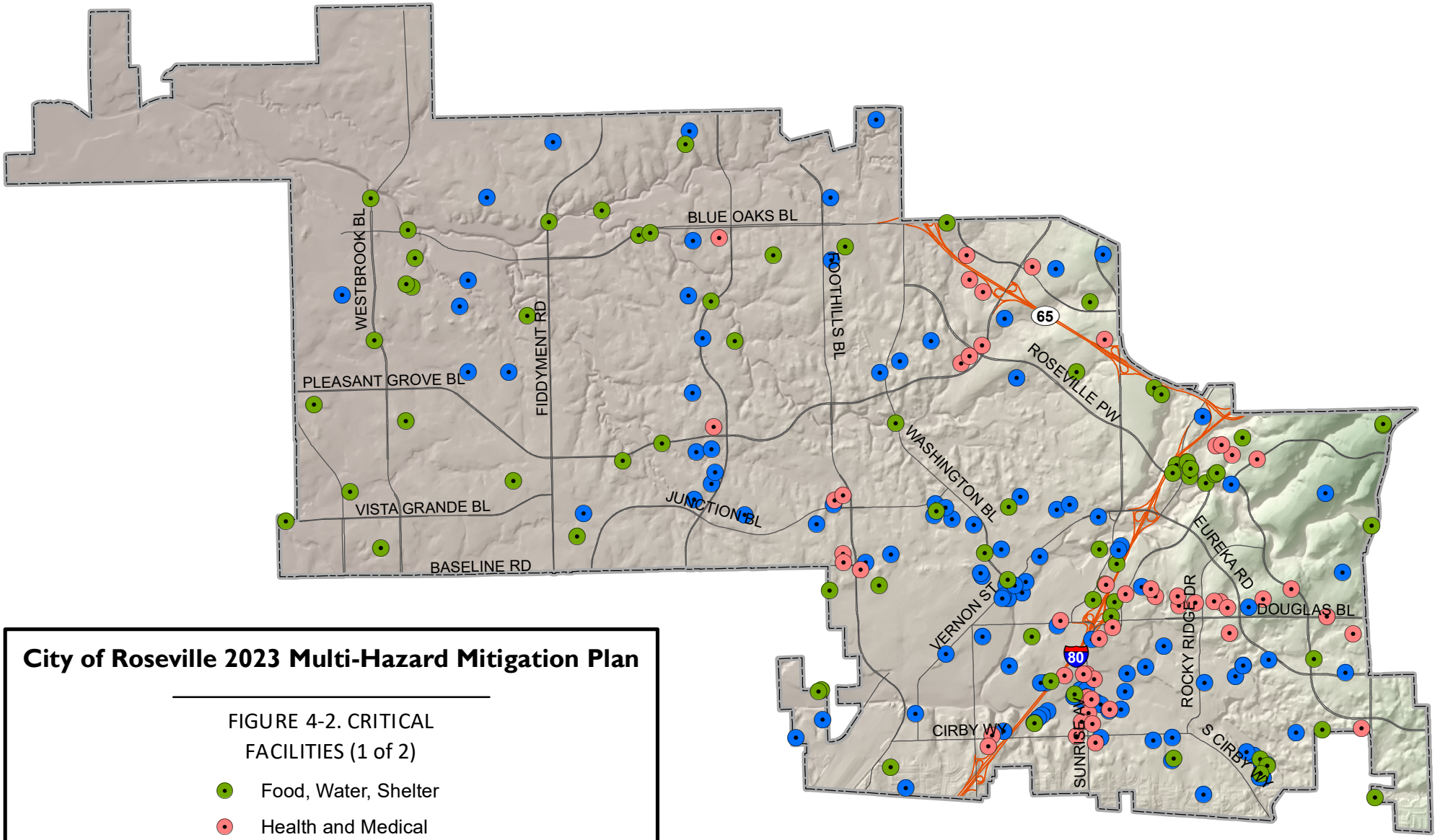
Critical facilities—those that are essential to the health and welfare of the population (or have a potential to impact public health and welfare)—are especially important after a hazard event. The risk assessment for each hazard in this plan discusses that hazard's potential impact on critical facilities. For some hazards, potential damage to critical facilities was estimated using the Hazards U.S. (Hazus) computer model developed by FEMA. For this reason, the list of critical facilities was categorized using the following FEMA-defined lifeline categories:

- **Communications**—Infrastructure, Alerts, Warnings, Messages, 911 and Dispatch, Responder Communications and Financial Services
- **Energy**—Power (Grid), Temporary Power and Fuel
- **Food, Water and Sheltering**—Evacuations, Schools, Food/Potable Water, Shelter, Durable Goods, Water Infrastructure, and Agriculture
- **Hazardous Materials**—Facilities, Hazardous Debris, Pollutants and Contaminants
- **Health and Medical**—Medical Care/Hospitals: Patient Movement, Public Health, Fatality Management, Health Care, and Supply Chain
- **Safety and Security**—Law Enforcement/Security, Search and Rescue, Fire Services, Government Service, Responder Safety, and Imminent Hazard Mitigation
- **Transportation**—Highway/Roadway, Mass Transit, Railway, Long Beach Airport, Maritime and Pipeline, Port of Long Beach

In the analysis for this plan, the hazardous materials facilities were grouped with various, mostly privately owned facilities (churches, a shopping center, major employers, libraries, etc.) in a category labeled "Other." Table 4-4 provides summaries of the general types of critical facilities. The location of critical facilities in the planning area is shown on Figure 4-2 and Figure 4-3.

Table 4-4. Planning Area Critical Facilities

Facility Type	Number in Planning Area
Communications	121
Energy	22
Food, Water & Sheltering	69
Health and Medical	52
Safety and Security	82
Transportation	88
Other	105
Total	**539**



City of Roseville 2023 Multi-Hazard Mitigation Plan

FIGURE 4-2. CRITICAL FACILITIES (1 of 2)

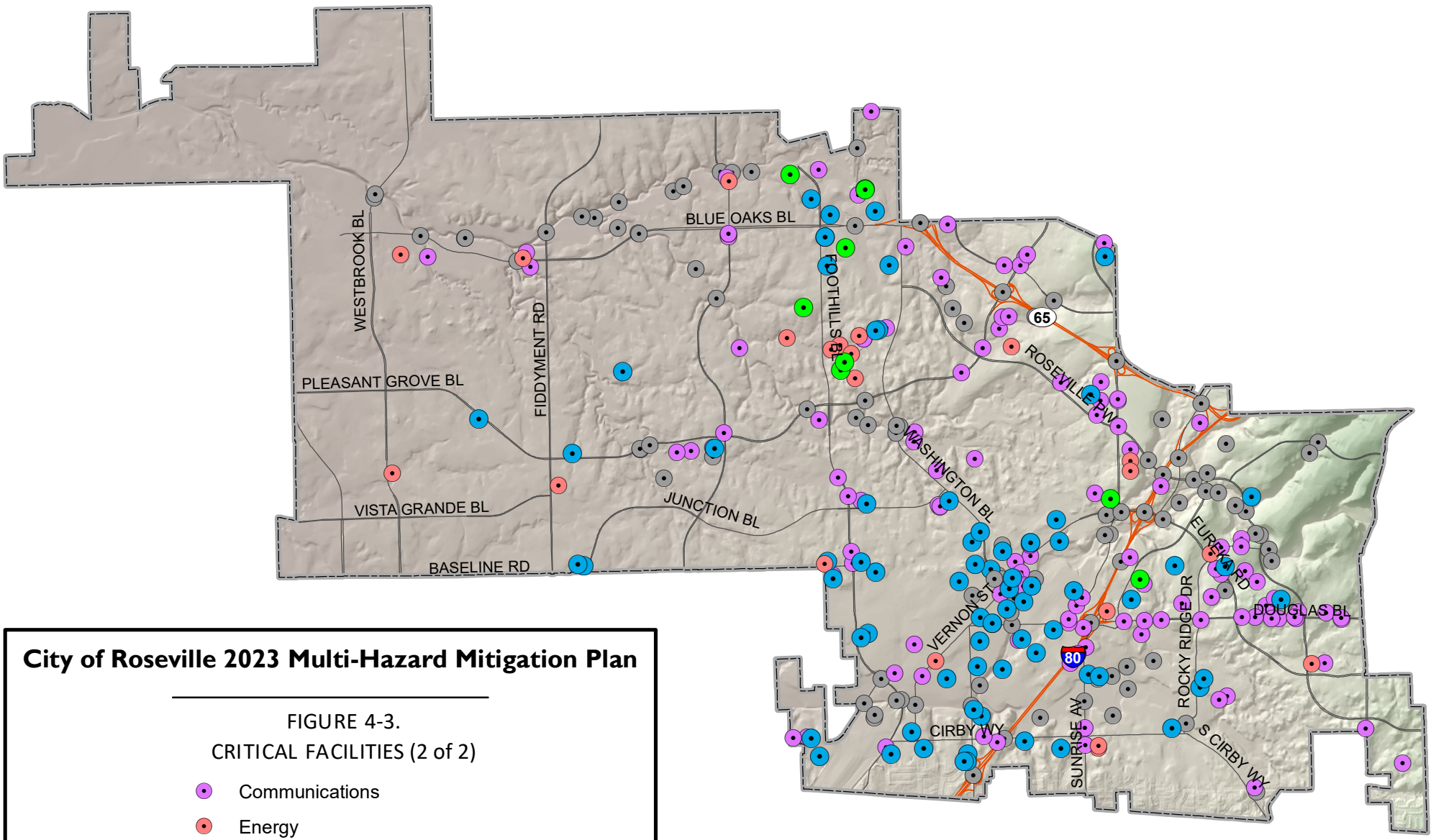
- Food, Water, Shelter
- Health and Medical
- Safety and Security

Data Souces
CIty of Roseville

CITY OF ROSEVILLE CALIFORNIA

0 1 2 Miles

N W E S



City of Roseville 2023 Multi-Hazard Mitigation Plan

FIGURE 4-3.
CRITICAL FACILITIES (2 of 2)

- Communications
- Energy
- Hazardous Materials
- Other
- Transportation

Data Souces
CIty of Roseville

CITY OF ROSEVILLE CALIFORNIA

0 1 2 Miles

N W E S

4.5.6 Development Trends

Table 4-5 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 4-5. Recent and Expected Future Development Trends

Criterion	Response
Land annexed since last hazard mitigation plan	Amoruso Ranch Specific Plan annexed in 2018. Approximately 694 acres.
Land targeted for annexation in next five years	None
Areas targeted for development or major redevelopment in the next five years, and whether any of the areas interface with known hazard risk areas.	Yes. The adopted West Roseville, Sierra Vista, Creekview, and Amoruso Ranch Specific Plans and the North Industrial Planning Area all include vacant land that is currently developing.
Number of permits for new construction issued in the City since the preparation of the previous hazard mitigation plan	See nested table below
Number of new construction permits for each hazard area (or qualitative description of where development has occurred).	• Special Flood Hazard Areas: 1 - within Infill area only, all new development areas described above include all floodplain area within designated open space. • Wildfire Risk Areas:0 • High Liquefaction Areas: 0
Level of buildout in the City, based on a buildable lands inventory.	As of 2023, the City has a developed residential inventory of 60,543 units with a further 16,656 units of allocated capacity remaining to be built.

	2018	2019	2020	2021	2022
Single Family	814	998	1225	1883	1444
Multi-Family	1	4	15	0	154
Other (commercial, mixed use, etc.)	28	20	25	27	39
Total	843	1022	1265	1910	1637

The Roseville General Plan and specific area plans govern land use decision and policy-making. Decisions on land use will be governed by these programs. This Plan will work together with these programs to support wise land use in the future by providing vital information on the risk associated with natural hazards in the planning area. The City of Roseville will incorporate by reference the updated Hazard Mitigation Plan in the Safety Element of its General Plan. In addition to proactively planning for the implementation of Senate Bill (SB) 379 upon the next plan update process, this incorporation will ensure that all future trends in development can be established with the benefits of the information on risk and vulnerability to natural hazards identified in this Plan.

4.5.7 Transportation Network

Roseville is segmented by physical features such as streams, natural parkways, open space, freeways, railroads, and industrial facilities. Restrictions associated with these features may create traffic congestion and delay emergency response. Traffic congestion at peak commute times on major roadways is a barrier to timely response for emergency services. In the event of an accident or other emergency at one of the key intersections between a road and a stream, freeway, or railway, sections of the City could be isolated or have response time slowed. The U.S. Census estimates that over 82.4 percent of workers in the planning area commute alone (by car, truck or van) to work, and mean travel time to work is 27.2 minutes (the state average is 29.8 minutes).

4.5.8 Attractions and Education

The City of Roseville is a local shopping destination with the Fountains at Roseville and the Westfield Galleria at Roseville serving as the main shopping center in the city and the second-largest shopping mall in Northern California. Extension campuses of Brandman University and Sierra College are located in Roseville.

4.6 DEMOGRAPHICS PROFILE

4.6.1 Population Estimates

Current and Historical Population

The California Department of Finance estimated the population of Roseville to be 152,928 as of January 1, 2023. Table 4-6 shows past population estimates from 2000 to 2023. The risk assessments included in this hazard mitigation plan use a planning area population of 147,773, based on a 2020 California Department of Finance estimate drawn from Census data.

Table 4-6. Annual Population Data

Year	Population	Year	Population	Year	Population
2000	79,921	**2008**	111,259	**2016**	132,627
2001	83,230	**2009**	114,869	**2017**	135,300
2002	87,977	**2010**	118,788	**2018**	137,824
2003	94,099	**2011**	121,290	**2019**	141,097
2004	99,371	**2012**	123,686	**2020**	147,245
2005	104,105	**2013**	126,310	**2021**	148,736
2006	106,451	**2014**	128,327	**2022**	151,450
2007	108,503	**2015**	129,730	**2023**	152,928

Source: (CA Department of Finance n.d.)

The full-time population increased by 58,829 from 2003 to 2023, a 62.5 percent increase (see Table 4-6). The 2022 population was more than six times that of 1982, when the City had 26,127 residents. Between 2010 and the end of 2020, Roseville experienced an estimated 21.4 percent increase in population—averaging 2.1 percent per year (see Figure 4-4). This trend indicates that the population of Roseville will continue to grow through the end of the decade, albeit more slowly than the population boom experienced between 2000 and 2010.

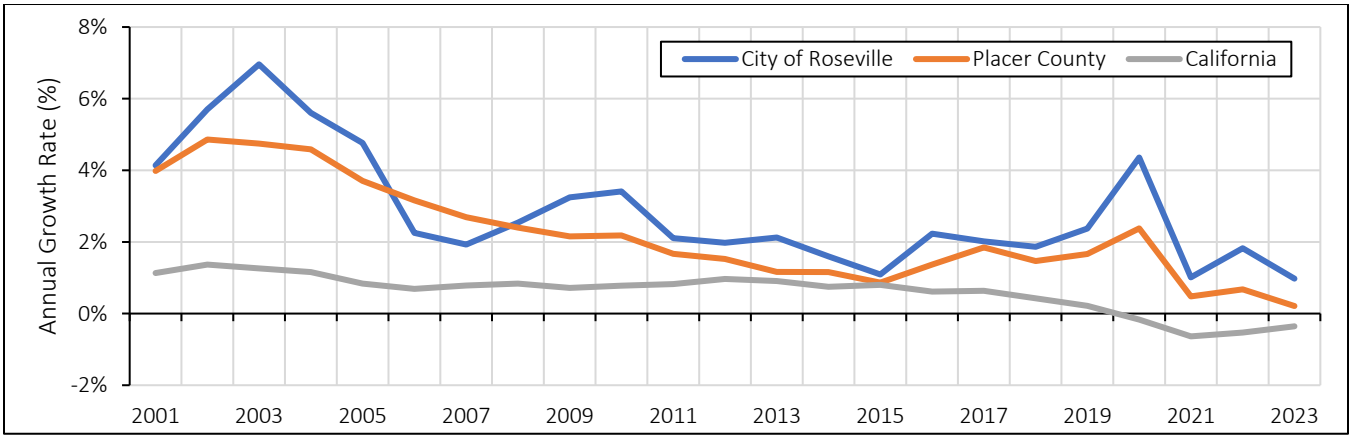


Figure 4-4. Placer County and Roseville Population Growth

The average household size in Roseville is 2.66 persons, according to U.S. Census Bureau American Community Survey estimates for 2016-2020. This household average may vary by land use and location in the City. For example, the 3,814 age-restricted low-density residential units in the Del Webb and West Roseville planning areas have an estimated average household size of 1.8.

Projected Future Population

Roseville's General Plan estimates a buildout population of 198,000, with 75,200 dwelling units, 60 million square feet of non-residential building square footage, and between 120,000 and 150,000 local jobs. Table 4-7 shows the General Plan estimates for existing (2016) and future development. Table 4-8 shows the Regional Housing Needs Allocation for Roseville for 2021 through 2029.

Table 4-7. General Plan Projections of Existing and Future Development

	2016	2035
Dwelling Units	52,900	75,200
Population	135,800	198,000
Non-Residential Square Footage	33,000,000	60,000,000
Jobs	82,000	120,000 to 150,000
Jobs to Dwelling Units	1.55	1.6 to 2

Table 4-8. City of Roseville Regional Housing Needs Allocation, 2021 - 2029

	Regional Housing Needs Allocation	
Income Category	**Number of Units**	**Percentage of Total Units**
Extremely Low	1,927	16.0%
Very Low	1,928	16.0%
Low	2,323	19.2%
Lower Income Total	6,178	51.2%
Moderate	1,746	14.5%
Above Moderate	4,142	34.3%
Total	**12,066**	**100.0%**

4.6.2 Demographic Indicators for Social Vulnerability

Some populations are at greater risk from hazard events because of decreased resources or physical abilities. People living near or below the poverty line, the elderly, individuals with disabilities, women, children, ethnic minorities, and renters all experience, to some degree, more severe effects from disasters than the general population. These vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a hazard event, capabilities during an event, and access to resources for post-disaster recovery. Indicators of vulnerability—such as disability, age, poverty, and minority race and ethnicity—often overlap spatially and often in the geographically most vulnerable locations.

Indicators from Census data are commonly used to assess social vulnerability. For the social vulnerability demographic profile component for this plan, the following indicators were selected:

- **Population Under 15 Years of Age—**Children, especially in the youngest age groups, often cannot protect themselves during a disaster because they lack the necessary resources, knowledge, or life experiences to effectively cope with the situation. Hazard mitigation planning needs to be tailored such

that the community is prepared to ensure that children are safe during disaster events and that families with children have access to necessary information and tools.

- **Population Over 65 years of Age—**People 65 years old and older are likely to require financial support, transportation, medical care, or assistance with ordinary daily activities, especially during disasters. They are more likely to be vision, hearing, and/or mobility impaired, more likely to experience mental impairment or dementia, and more likely to live in assisted-living facilities where emergency preparedness is at the discretion of facility operators. Hazard mitigation needs to account for such needs.
- **People of Color—**Social and economic marginalization of certain racial and ethnic groups, including real estate discrimination, has resulted in greater vulnerability of these groups to all types of hazards. Based on data from a number of studies, African Americans, Native Americans, and populations of Asian, Pacific Islander, or Hispanic origin are likely to be more vulnerable than the broader community. Research shows that minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during disaster events. Post-disaster recovery often exhibits cultural insensitivity. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poverty can compound vulnerability. Hazard mitigation plans need to identify the spatial distribution of these population groups and direct resources to reduce their vulnerability to hazards.
- **Limited English-Speaking Households—**For populations with limited English proficiency, disaster communication may be difficult, especially in communities for whom translators and accurate translations of advisories may be scarce. Such households are likely to rely on relatives and local social networks (i.e., friends and neighbors) for information for preparing for a disaster event.
- **Persons with Disabilities—**Persons with disabilities or other access and functional needs are more likely to have difficulty responding to a hazard event than the general population. Family, neighbors, and local government are the first level of response to assist these individuals, and coordination of efforts to meet their access and functional needs is paramount to life safety efforts. Emergency managers need to distinguish between functional and medical needs to plan for incidents that require evacuation and sheltering. Knowing the percentage of population with access and functional needs allows emergency management personnel and first responders to anticipate the services needed by that population.
- **Families Below the Poverty Level—**Economically disadvantaged families have limited ability to absorb losses due to hazard impacts. Wealth enables families to absorb and recover from losses more quickly, due to insurance, savings, and often the availability of low-cost credit. People with lower incomes tend not to have access to these resources. At the same time, poorer families are likely to inhabit poor quality housing and reside in locations that are most vulnerable to hazard events. Economically disadvantaged neighborhoods are also likely to have relatively poor infrastructure and facilities, which exacerbate the disaster consequences for community members there.

These indicators were selected based on the availability of datasets at a small enough resolution to determine probable characteristics of populations within identified hazard areas. The following sections describe these indicators for the planning area.

Age Distribution

According to the 2021 U.S. Census American Community Survey estimates, 16.6 percent of Roseville's population is 65 or older, 19 percent of the population is under the age of 14 and the median age is 39.4. Figure 4-5 shows the age distribution for Roseville.

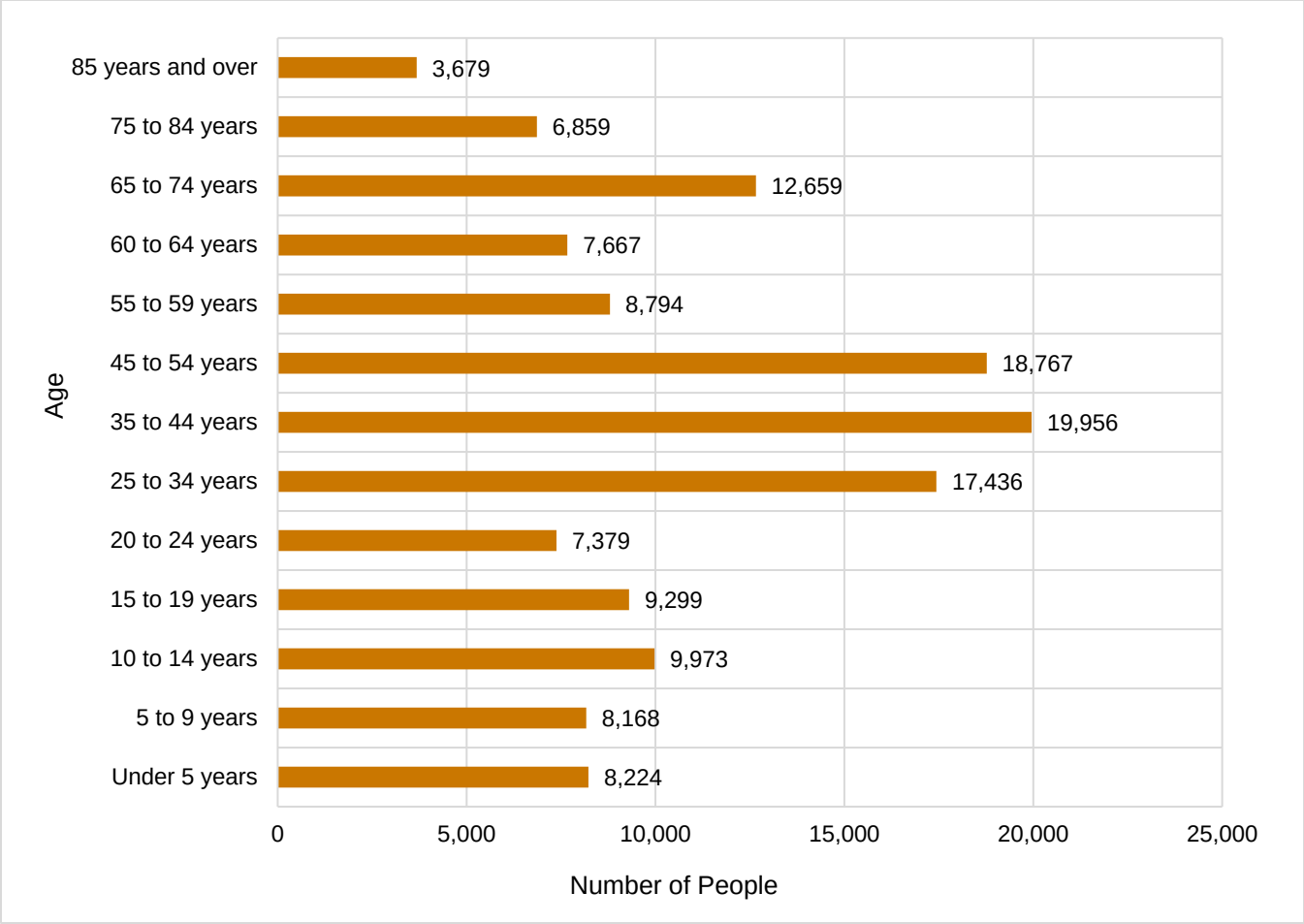


Figure 4-5. Planning Area Age Distribution

Race, Ethnicity and Language

According to the U.S. Census, Roseville's racial composition is predominately white, at about 75 percent of the City population. The largest minority population in Roseville is Asian. Figure 4-6 shows the racial distribution of Roseville.

The U.S. Census Bureau classifies respondents as "Hispanic or Latino" or "Not Hispanic or Latino," identifying Hispanic and Latino, the largest minority group in the nation, as an ethnicity not a race. Hispanic and Latino Americans have ethnic origins in a Spanish-speaking country or Brazil. Latin American countries are, like the United States, racially diverse. Consequently, no separate racial category exists for Hispanic and Latino Americans, as they do not constitute a race or a national group. Any racial category may contain people of Hispanic or Latino ethnicity. For example: the White or European-American race category contains Non-Hispanic Whites and Hispanic Whites; the Black or African American category contains Non-Hispanic Blacks and Hispanic Blacks; the Asian-American category contains Non-Hispanic Asians and Hispanic Asians. The 2020 Census data for Roseville indicates that 16 percent of the City population is Hispanic or Latino.

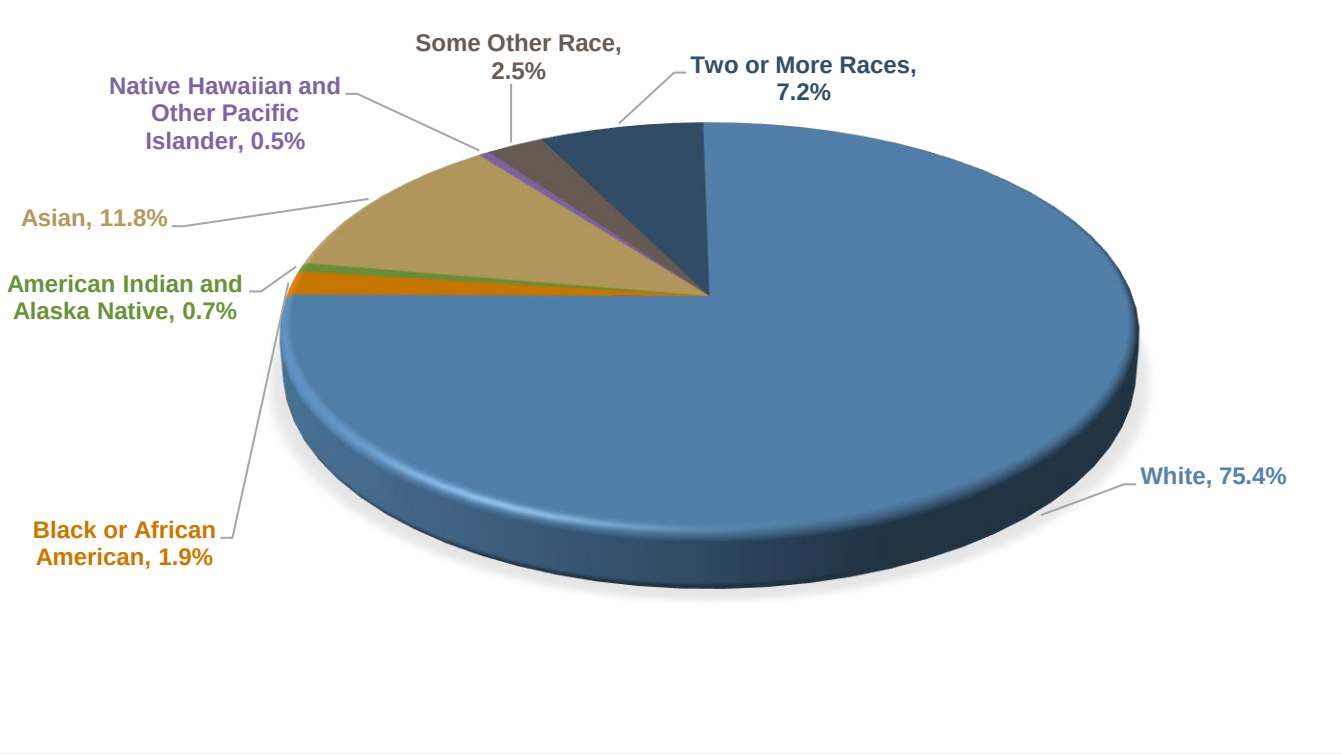


Figure 4-6. Planning Area Race Distribution

About 1.6 percent of Roseville's population is foreign-born, with the majority born in Latin America, according to 2020 U.S. Census estimates. Other than English, the most commonly spoken language in the City is Spanish. In the U.S. Census estimates, 5.1 percent of the City's residents reported speaking English "less than very well." Of the foreign born population, 5.5 percent speak English "less than very well." This has important implications for emergency managers, who must get crucial information out to all members of the population before, during and after emergency events.

Individuals with Disabilities and Others with Access and Functional Needs

While the City of Roseville's percentage of individuals with disabilities and others with access and functional needs does not differ much from that of the state as a whole, the overall numbers are significant and warrant attention from planners and emergency managers (see Table 4-9). According to 2020 U.S. Census data, 10.8 percent of the City's population over the age of 5 has a disability.

Table 4-9. Status of Non-Institutionalized Population with Disabilities

Age	Individuals with Disabilities and Others with Access and Functional Needs	% of Age Group Population
5-17 years	1,063	4.4
18-64 years	6,014	14.0
65+ years	7,794	71.2

Income

Based on U.S. Census American Community Survey estimates for 2020, per capita income in Roseville was $115,318, and the median household income was $95,519. Table 4-10 compares the income and poverty estimates at the city, county, and state level. About 7.5 percent of Roseville residents are below the poverty level (meaning they spend more than a third of income on an economy food budget); this includes 8.2 percent of those under the age of 18 and 8.9 percent of those 65 or older.

Table 4-10. Population Under the Poverty Level

	Median Household Income	Percent of Total Population Below Poverty Level	Percent of Children (18 and Under) Below Poverty Level	Percent of Elderly (65 and Older) Below Poverty Level
City of Roseville	$95,519	7.5	8.2	8.9
Placer County	$93,677	6.6	8.0	8.0
California	$78,672	12.3	15.8	11.1

Quantifying Social Vulnerability

State and federal agencies have developed a variety of indices for assessing social vulnerability in a geographic area based on multiple indicators. Initial review of several of these indices found that they do not provide meaningful demographic data for Roseville. Therefore, the analysis of social vulnerability in the risk assessment for this plan focuses on household income. For this analysis, economically disadvantaged households were defined as those with total income of $40,000 or less. A GIS analysis determined that there are 10,714 such households in Roseville, 19.4 percent of all 55,236 households in the city.

4.7 ECONOMY

4.7.1 Industry, Businesses and Institutions

The planning area's economy is strongly based in the educational/health care/social service industry (24.9 percent), followed by professional/scientific industries and retail trade. Information, wholesale trade, and agriculture make up the smallest sources of the local economy, with less than 1 percent of local economy driven by agriculture. Figure 4-7 shows the breakdown of industry types in the planning area. The planning area benefits from a variety of business activity. Major employers in the City of Roseville include the following:

- City of Roseville
- Costco Wholesale
- Kaiser Permanente
- Roseville Toyota
- Stagg Howard A Pro Corporation
- Sutter Roseville Medical Center Foundation
- Union Pacific Railroad Company
- Walmart Supercenter

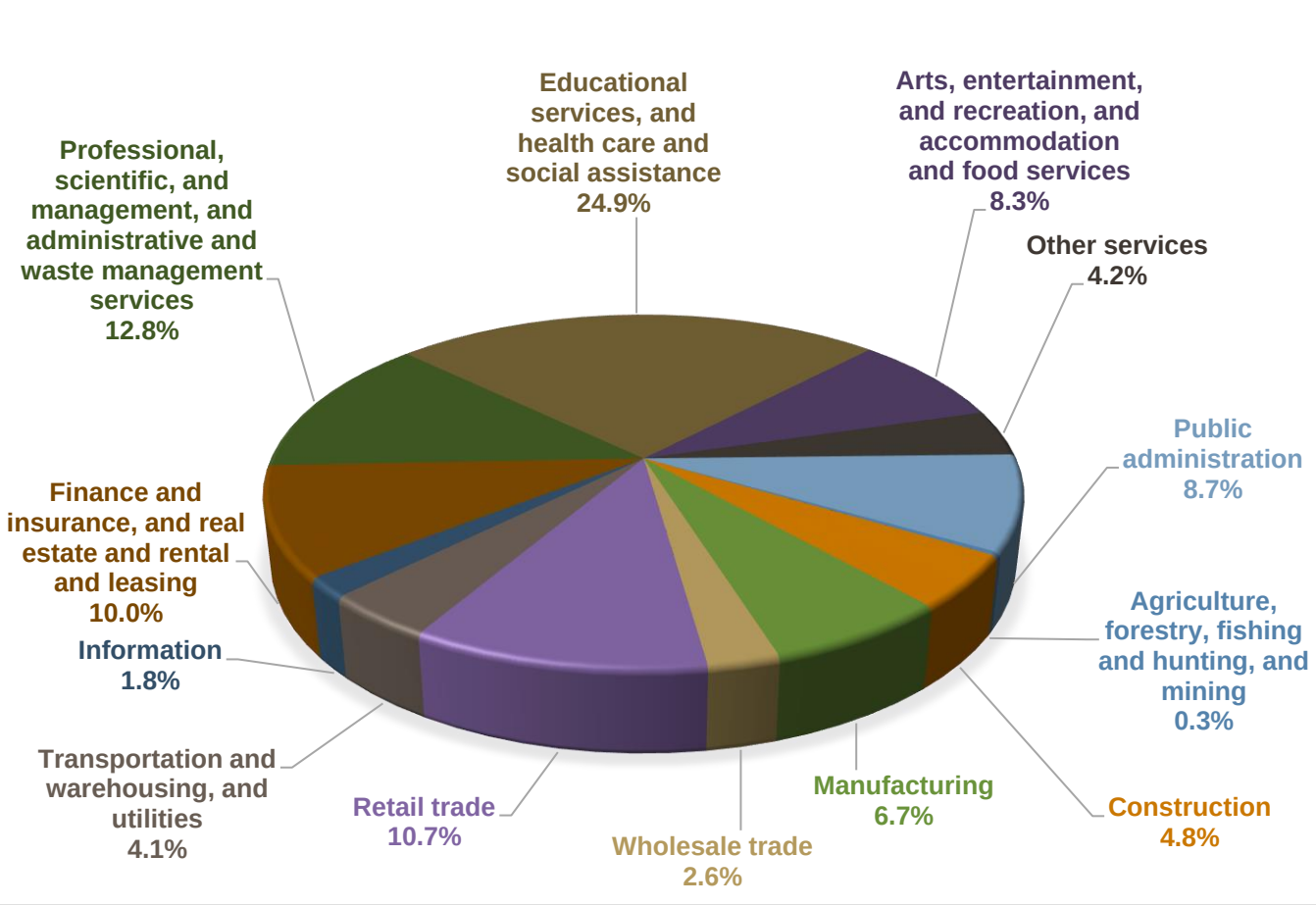


Figure 4-7. Industry in the Planning Area

4.7.2 Employment Trends and Occupations

According to the American Community Survey, about 63.9 percent of the planning area's population is in the labor force. Of the working-age population group (ages 20 to 64), 86.8 percent of men and 75.1 percent of women are in the labor force. Figure 4-8 compares California's and Roseville's unemployment trends from 2015 through 2021. Roseville's unemployment rate was lowest in 2019, at 3.0 percent. Unemployment rates significantly rose from 3.0 percent to 7.5 percent between 2019 and 2020.

Management, business, science and arts occupations and sales and office occupations make up 73.4 percent of the jobs in the planning area (see Figure 4-9). Service occupations make up 15.1 percent of the local working population.

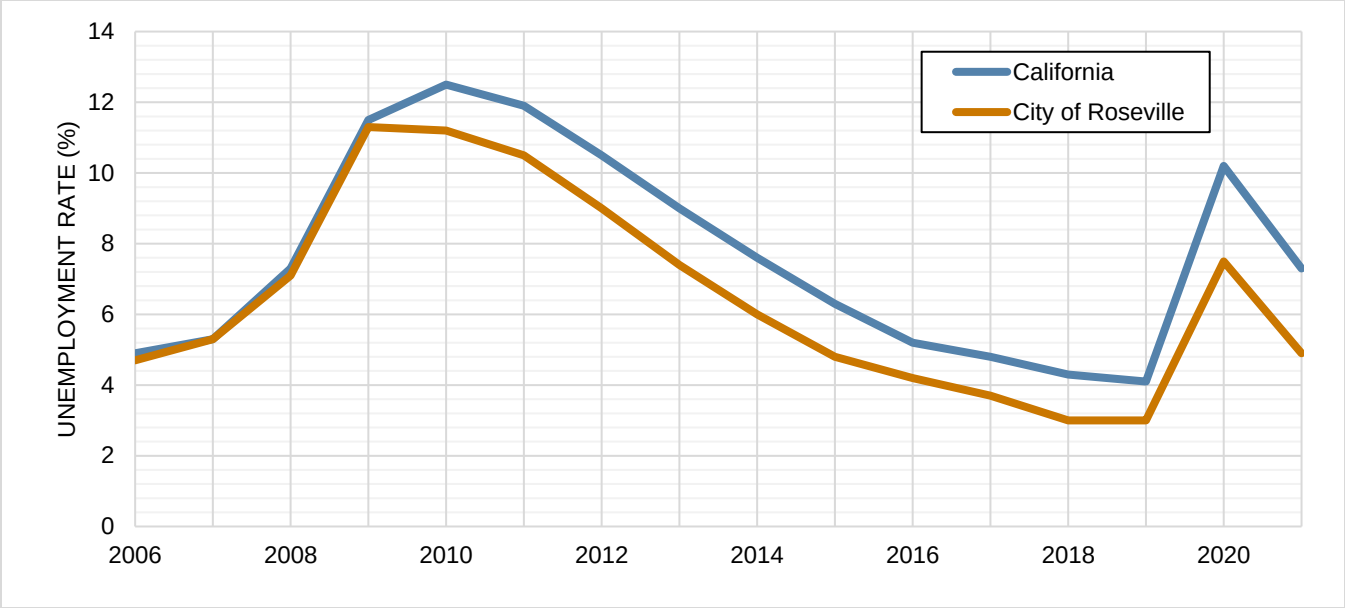


Figure 4-8. California and Roseville Unemployment Rate (U.S. Census, 2015 – 2021)

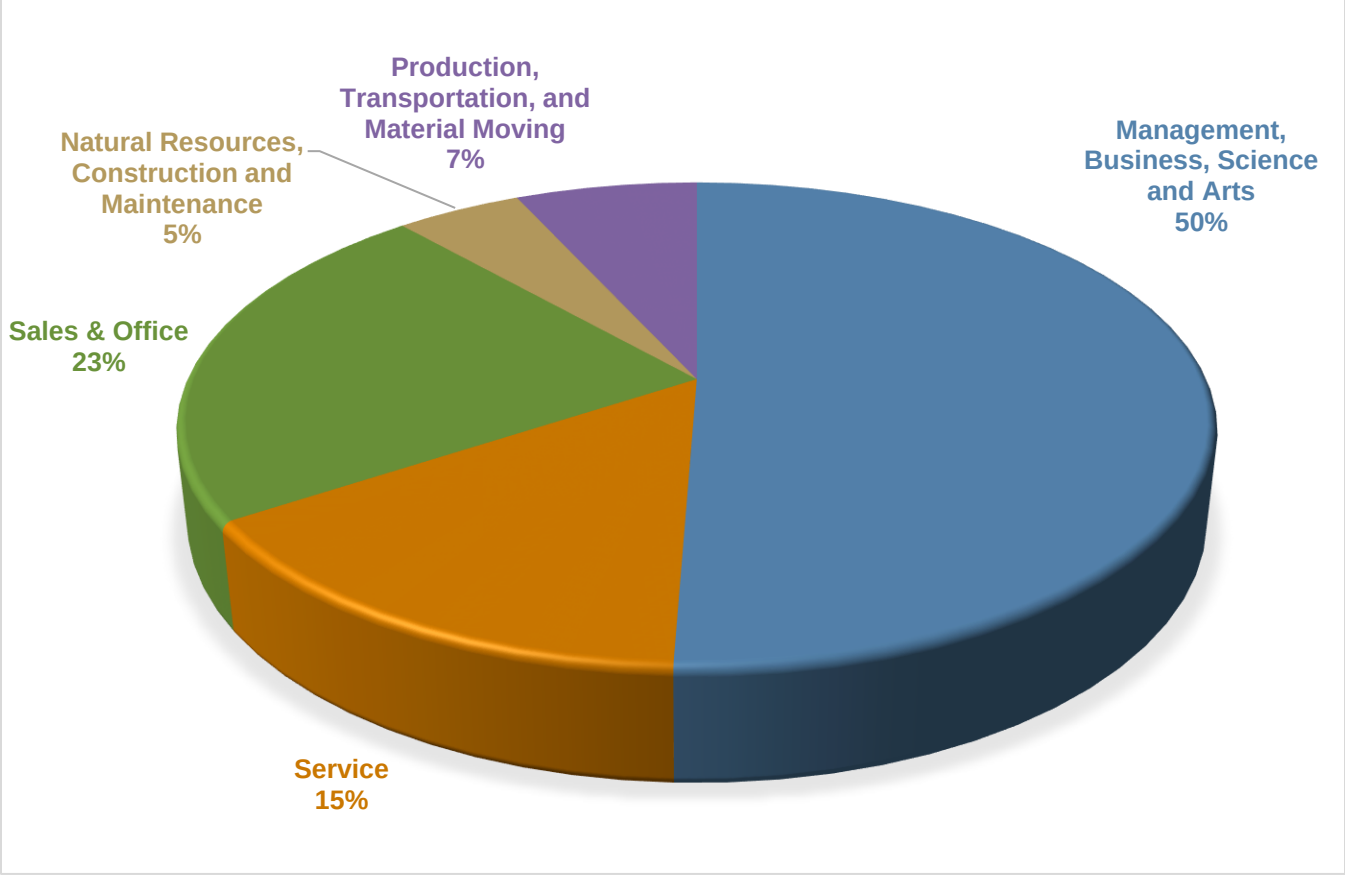


Figure 4-9. Occupations in the Planning Area

5. HAZARDS ADDRESSED IN THIS PLAN

5.1 MAJOR PAST HAZARD EVENTS

Presidential disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses and public entities. Some of the programs are matched by state programs. Table 5-1 lists the presidential major disasters and other federal declarations since 1950 that have affected Placer County, according to Placer County's Multi-Hazard Mitigation Plan, Cal OES, and FEMA.

Table 5-1. Presidential Major Disaster, Emergency, and Fire Management Assistance Declarations

Type of Event	FEMA Disaster #	Date
Flooding	DR-47	12/23/1955
Flooding	DR-82	4/4/1958
Flooding	DR-138	10/24/1962
Late Winter Storms/Flooding	DR-145	2/7/1963
Late Winter Storms/Flooding	DR-183	12/28/1964
1969 Storms	DR-253	1/26/1969
Winter storms	DR-682	2/9/1983
Spring Storms/Flooding	DR-758	2/18/1986
Severe Winter Storms	DR-1044	1/10/1995
Late Winter Storms	DR-1046	1/13/1995
Winter Storms/Flooding	DR-1155	1/4/1997
Sierra Fire	FM-2463	9/19/2002
Stevens Fire	FM-2541	8/8/2004
Hurricane Katrina Evacuations: Economic	EM-3248	9/13/2005
Severe Rainstorms, Flooding, Landslides, and Mudslides	DR-1628	2/3/2006
Severe Storms, Flooding, Landslides, and Mudslides	DR-1646	6/5/2006
Wildfire	FM-2786	9/1/2008
Wildfire	FM-2832	8/31/2009
Wildfire	FM-5081	9/17/2014
Wildfire	FM-5082	10/8/2014
Severe Winter Storms, Flooding, and Mudslides	DR-4305	3/16/2017
COVID-19 Pandemic	DR-4482	1/20/2020
Wildfire	FM-5405	8/5/2021
Wildfire	DR-4610	8/24/2021
Wildfire	EM-3571	9/1/2021
Wildfire	FM-5453	9/9/2022

Source: FEMA, Placer County Multi-Hazard Mitigation Plan, 2021

Review of these events helps identify targets for risk reduction and ways to increase a community's capability to avoid large-scale events in the future. Many natural hazard events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for hazards of concern.

5.2 IDENTIFIED HAZARDS OF CONCERN

The Steering Committee considered the full range of natural and human-caused hazards assessed in the 2023 State of California Hazard Mitigation Plan (Table 5-2) that could affect the planning area and then listed hazards that present the greatest concern.

Table 5-2. City of Roseville Hazard Comparison with California State Hazards

2023 California State Hazard Mitigation Plan	2023 City of Roseville Multi-Hazard Mitigation Plan	Comment
Air Pollution	Not included	This is a concern for the City, but it is dealt with in other planning mechanisms
Civil Disorder	Human-Caused Hazards	Civil disorder is included in a combined discussion of human-caused hazards
Cyber Threats	Other Hazards of Interest	Cyber security threats are included in a combined discussion of human-caused hazards
Dam Failure	Dam Failure	This local hazard aligns with the state
Drought	Drought	This local hazard aligns with the state
Earthquake	Earthquake	This local hazard aligns with the state
Electromagnetic Pulse Attack	Not included	This is not a concern for the City
Energy Shortage	Not included	This is a concern for the City, but it is dealt with in other planning mechanisms
Epidemic/Pandemic/Vector-Borne Disease	Human Health Hazards	This hazard is addressed as "human health hazards" in this plan
Extreme Cold or Freeze	Not included	This is not a concern for the City
Extreme Heat	Severe Weather	This hazard was included in a combined discussion of severe weather hazards
Geomagnetic Storm (Space Weather)	Not included	This is a concern for the City, but it is dealt with in other planning mechanisms
Hazardous Materials Release	Human-Caused Hazards	Hazardous materials incidents are included in a combined discussion of human-caused hazards
Invasive and Nuisance Species	Not included	This is not a concern for the City
Landslide, Debris Flow, and other Mass Movements	Multiple sections	While the City has not chosen to profile this hazard in its own section, landslide is included as a secondary hazard for numerous other hazards
Levee Failure	Flooding	This hazard was included in a combined discussion of flooding hazards
Natural Gas Pipeline Hazards	Human-Caused Hazards	Pipeline interruptions are included in a combined discussion of human-caused hazards
Oil Spills	Not included	This is not a concern for the City
Other Potential Causes of Long-Term Electrical Outage	Not included	This is not a concern for the City

2023 California State Hazard Mitigation Plan	2023 City of Roseville Multi-Hazard Mitigation Plan	Comment
Public Safety Power Shutoff	Not included	This is a concern for the City, but it is dealt with in other planning mechanisms
Radiological Accidents	Human-Caused Hazards	Radiological materials are mentioned in connection with hazardous materials incidents
Riverine, Stream and Alluvial Flood	Flooding	The flooding chapter addresses urban stormwater runoff floods, riverine floods, flash floods, and levee failure
Sea-Level Rise, Coastal Flooding and Erosion	Climate Change Considerations for Hazard Mitigation	This hazard is included in a combined discussion of various hazards and considerations related to climate change
Severe Wind, Weather, and Storms	Severe Weather	The severe weather chapter addresses heavy rain, extreme heat, ice, freezing rain, tornado, fog, thunder, lightning and windstorms
Snow Avalanche	Not included	This is not a concern for the City
Subsidence	Not included	This is not a concern for the City
Terrorism	Human-Caused Hazards	Terrorism is included in a combined discussion of human-caused hazards
Transportation Accidents Resulting in Explosions or Toxic Releases	Human-Caused Hazards	This hazard is included in a combined discussion of human-caused hazards
Tree Mortality	Not included	This is not a concern for the City
Tsunami and Seiche	Not included	The City does not border the ocean or contain any large bodies of water
Urban Structural Fire	Not included	This is a concern for the City, but it is dealt with in other planning mechanisms
Volcano	Not included	This is not a concern for the City
Well Stimulation and Hydraulic Fracturing	Not included	This is not occurring in the City
Wildfire	Wildfire	This local hazard aligns with the state

The process incorporated a review of local hazard planning documents as well as information on the frequency of, magnitude of, and costs associated with hazards that have struck the planning area or could do so. Anecdotal information regarding natural hazards and the perceived vulnerability of the planning area's assets to them was also used. Based on the review, this plan presents complete risk assessment for the following hazards of concern (presented in alphabetical order; the order of listing does not indicate the hazards' relative severity):

- Dam failure
- Drought
- Earthquake
- Flood
- Severe Weather
- Wildfire
- Human Health Hazards
- Human-Caused Hazards.

- Air and transportation accidents
- Civil Disorder
- Cyber threats
- Data and telecommunication disruptions
- Hazardous material incidents
- Power utility losses
- Terrorism and WMDs
- Water and wastewater disruptions

Climate change is not assessed as a stand-alone hazard, but Chapter 8 describes the significance of climate change in hazard mitigation and its potential impacts on the natural hazards that are assessed in this plan.

6. REGULATIONS AND PROGRAMS

Existing laws, ordinances and plans at the federal, state and local level can support or impact hazard mitigation actions identified in this Plan. Hazard mitigation plans are required by 44 CFR to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (Section 201.6.b(3)). The federal, state, and local laws described below were reviewed to inform this plan update process. Not all laws and ordinances reviewed during this process are relevant to the immediate process of developing the hazard mitigation plan. The City will ensure compliance, where relevant, upon implementation of recommended mitigation actions that overlap with the requirements of any of the following regulations.

6.1 FEDERAL AND STATE

This section summarizes federal and state programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement mitigation actions or has a nexus with a mitigation action in this plan. State and federal regulations and programs that need to be considered in hazard mitigation are constantly evolving. For this plan, a review was performed to determine which regulations and programs are currently most relevant to hazard mitigation planning. The findings are summarized in Table 6-1 and Table 6-2. Short descriptions of each program are provided in Appendix B.

Table 6-1. Summary of Relevant Federal Agencies, Programs and Regulations

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
Americans with Disabilities Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Civil Rights Act of 1964	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Clean Water Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Community Development Block Grant Disaster Resilience Program	Action Plan Funding	This is a potential alternative source of funding for actions identified in this plan.
Community Rating System	Flood Hazard	This voluntary program encourages floodplain management activities that exceed the minimum National Flood Insurance Program requirements.
Disaster Mitigation Act	Hazard Mitigation Planning	This is the current federal legislation addressing hazard mitigation planning.
Emergency Relief for Federally Owned Roads Program	Action Plan Funding	This is a possible funding source for actions identified in this plan.
Emergency Watershed Program	Action Plan Funding	This is a possible funding source for actions identified in this plan.
Endangered Species Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
Federal Energy Regulatory Commission Dam Safety Program	Dam Failure Hazard	This program cooperates with a large number of federal and state agencies to ensure and promote dam safety.
National Dam Safety Act	Dam Failure Hazard	This act requires a periodic engineering analysis of most dams in the country
National Environmental Policy Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
National Flood Insurance Program	Flood Hazard	This program makes federally backed flood insurance available to homeowners, renters, and business owners in exchange for communities enacting floodplain regulations
National Incident Management System	Action Plan Development	Adoption of this system for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards is a prerequisite for federal preparedness grants and awards
Presidential Executive Order 11988 (Floodplain Management)	Flood Hazard	This order requires federal agencies to avoid long and short-term adverse impacts associated with modification of floodplains
Presidential Executive Order 11990 (Protection of Wetlands)	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable presidential executive orders.
U.S. Army Corps of Engineers Dam Safety Program	Dam Failure Hazard	This program is responsible for safety inspections of dams that meet size and storage limitations specified in the National Dam Safety Act.
U.S. Army Corps of Engineers Flood Hazard Management	Flood Hazard, Action Plan Implementation, Action Plan Funding	The Corps of Engineers offers multiple funding and technical assistance programs available for flood hazard mitigation actions

Table 6-2. Summary of Relevant State Agencies, Programs and Regulations

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
AB 32: The California Global Warming Solutions Act	Action Plan Development	This act establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020
AB 70: Flood Liability	Flood Hazard	A city or county may be required to partially compensate for property damage caused by a flood if it unreasonably approves new development in areas protected by a state flood control project
AB 162: Flood Planning	Flood Hazard	Cities and counties must address flood-related matters in the land use, conservation, and safety and housing elements of their general plans.
AB 747: General Plans—Safety Element	Hazard Mitigation Planning	The safety elements of cities' and counties' general plans must address evacuation routes and include any new information on flood and fire hazards and climate adaptation and resiliency strategies.
AB 2140: General Plans—Safety Element	Hazard Mitigation Planning	This bill enables state and federal disaster assistance and mitigation funding to communities with compliant hazard mitigation plans.
AB 2800: Climate Change—Infrastructure Planning	Action Plan Development	This act requires state agencies to take into account the impacts of climate change when developing state infrastructure.
Alquist-Priolo Earthquake Fault Zoning Act	Earthquake Hazard	This act restricts construction of buildings used for human occupancy on the surface trace of active faults.
California Department of Water Resources	Flood Hazard	This state department is the state coordinating agency for floodplain management.
California Division of Safety of Dams	Dam Failure Hazard	This division monitors the dam safety program at the state level and maintains a working list of dams in the state.

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
California Environmental Quality Act	Action Plan Implementation	This act establishes a protocol of analysis and public disclosure of the potential environmental impacts of development projects. Any project action identified in this plan will seek full California Environmental Quality Act compliance upon implementation.
California General Planning Law	Hazard Mitigation Planning	This law requires every county and city to adopt a comprehensive long-range plan for community development, and related laws call for integration of hazard mitigation plans with general plans.
California Multi-Hazard Mitigation Plan	Hazard Mitigation Planning	Local hazard mitigation plans must be consistent with their state's hazard mitigation plan.
California Residential Mitigation Program	Earthquake Hazard	This program helps homeowners with seismic retrofits to lessen the potential for damage to their houses during an earthquake.
California State Building Code	Action Plan Implementation	Local communities must adopt and enforce building codes, which include measures to improve buildings' ability to withstand hazard events.
Disadvantaged and Low-Income Communities Investments	Action Plan Funding	This is a potential source of funding for actions located in disadvantaged or low-income communities.
Division of the State Architect's AB 300 List of Seismically At-Risk Schools	Earthquake Hazard, Action Plan Development	The Division of the State Architect recommends that local school districts conduct detailed seismic evaluations of seismically at-risk schools identified in the inventory that was required by AB 300.
Governor's Executive Order S-13-08 (Climate Impacts)	Action Plan Implementation	This order includes guidance on planning for sea-level rise in designated coastal and floodplain areas for new projects.
Senate Bill 92: Public Resources Portion of Biennial Budget Bill	Dam Failure Hazard	This bill requires dams (except for low-risk dams) to have emergency action plans that are updated every 10 years and inundation maps updated every 10 years, or sooner if specific circumstances change.
Senate Bill 97: Guidelines for Greenhouse Gas Emissions	Action Plan Implementation	This bill establishes that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for California Environmental Quality Act analysis.
Senate Bill 99: General Plans: Safety Element: Emergency Evacuation Routes	Action Plan Implementation	This bill requires the safety element must include information to identify residential developments in hazard areas that do not have at least two emergency evacuation routes.
Senate Bill 379: General Plans: Safety Element—Climate Adaptation	Action Plan Implementation	This bill requires cities and counties to include climate adaptation and resiliency strategies in the safety element of their general plans.
Senate Bill 1000: General Plan Amendments—Safety and Environmental Justice Elements	Action Plan Implementation	Under this bill, review and revision of general plan safety elements are required to address only flooding and fires (not climate adaptation and resilience), and environmental justice is required to be included in general plans.
Senate Bill 1035: Fire, Flood, and Adaptation Safety Element Updates	Action Plan Implementation	Clarifies that revisions to the Safety Element to address fire hazards, flood hazards, and climate adaptation and resilience strategies all must occur upon each revision to a Housing Element or Local Hazard Mitigation Program.
Standardized Emergency Management System	Action Plan Implementation	Local governments must use this system to be eligible for state funding of response-related personnel costs.

6.2 CITY PLANS AND PROGRAMS

6.2.1 General Plan

Roseville proactively addresses problems through the City of Roseville General Plan 2035, which includes a Safety Element designed to address hazards. The General Plan and the Multi-Hazard Mitigation Plan will work

together to achieve the goal of hazard risk reduction. Many of the action items identified in this hazard mitigation plan are recommendations of the General Plan. Updating the General Plan will serve as a trigger for future updates of the hazard mitigation plan.

Purpose

The General Plan serves as a long-term policy guide for physical, economic, and environmental growth. It is a statement of the community's vision of its ultimate physical growth. City actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, as well as capital improvements, must be consistent with the General Plan. The General Plan also designates land use categories for the entire city. Each land use category is identified and defined within the General Plan and includes information on the general uses, development, intensity, siting and compatibility standards. The General Plan 2035 was adopted by the City Council on August 5, 2020, and addresses California's 2017 General Plan Guidelines and updates to California Environmental Quality Act guidelines and case law. The General Plan serves these purposes:

- It enables the Roseville City Council and Planning Commission to establish long-range development policies.
- It provides a basis for judging whether private development proposals and public projects are in harmony with the policies.
- It guides public agencies and private developers in designing projects consistent with City policies.

The General Plan is designed to be:

- **Long-range**—Most development decisions have effects lasting more than 20 years. In order to create a useful context for development decisions, the General Plan looks toward 2035 and beyond.
- **Comprehensive**—The General Plan provides direction to coordinate all major components of the community's physical development.
- **General**—The General Plan's purpose is to serve as a framework for detailed public and private development proposals. It establishes requirements for additional planning studies that must be completed before modifying land-use allocations.

Contents

Two primary components constitute the City of Roseville General Plan:

- The General Plan document, which presents goals, policies, and implementation measures
- The land use map, which graphically represents the City's existing and planned land use mix and pattern.

The General Plan document is organized into nine elements. The state-mandated elements are land use, circulation, open space and conservation, safety, housing, and noise. The optional elements are air quality, parks and recreation, and public facilities. Each element includes a brief setting and outlook section describing existing conditions and critical issues for the topic area, followed by goals, policies and implementation measures. The goals state the overall desired conditions that the City would like to achieve. The policies indicate an action or direction that the City must take as a step toward achieving the goals. The implementation measures include precise actions to achieve the stated policies. The general content of each element is as follows:

- **Land Use Element** discusses existing and projected land-use conditions, land-use designations and standards, community form, community design, and growth management. The goals and policies are

intended to promote a balanced land-use pattern that supports innovative land-use approaches and retains and enhances the distinct character and identity of Roseville.

- **Circulation Element** identifies the general locations and extent of existing and proposed roadways, highways, railroads, and transit routes. The element identifies policies and programs to reduce traffic congestion, promote alternative forms of transportation, and provide safe travel throughout the City.
- **Air Quality and Climate Change Element** integrates related land-use, transportation and circulation, transit, and energy issues. The policies and implementation measures are intended to improve air quality and encourage cooperation among the jurisdictions involved in regional air quality efforts.
- **Open Space and Conservation Element** provides for the conservation, development, and use of natural resources; details plans and measures for the preservation of open space; and provides for outdoor recreation, public health and safety. It is the overall goal of the element to preserve a comprehensive interconnected system of open space encompassing preservation and enhancement of natural habitat areas for the use and enjoyment of the community.
- **Parks and Recreation Element** provides goals and policies for both traditional "active" park lands and non-traditional "open space recreational" park lands. It specifies standards and conditions as guidelines for planning parks and recreation facilities, including size, type, and location.
- **Public Facilities Element** identifies facility and service needs of the community and performance standards to ensure that desired service levels are maintained. Discussed under this element are civic facilities, libraries, schools, electric and privately owned utilities, water and wastewater systems, solid waste and recycling, water and energy conservation, and the extension of City services. Emphasis is placed on the fair-share contribution of new development toward the provision of services and facilities.
- **Safety Element** establishes standards and plans for the protection of the community from a variety of hazards, including earthquakes, flooding, crime, fire, hazardous materials, and electromagnetic fields.
- **Noise Element** establishes standards for transportation and fixed noise sources to protect the health and welfare of the community.
- **Housing Element** identifies the existing and projected housing needs and establishes goals, policies, and implementation measures for the preservation, improvement and development of housing to meet the needs of all economic sectors of the community.

6.2.2 Specific Plans

Roseville's specific plans are comprehensive planning documents that guide the development of defined geographic areas. Specific plans typically include more detailed information than the General Plan about land use, traffic circulation, affordable housing programs, resource management strategies, development standards and a comprehensive infrastructure plan. Specific plans currently exist for the Amoruso Ranch, Creekview, Del Webb, Downtown, Highland Reserve North, North Central Roseville, Northeast Roseville, North Industrial, North Roseville, Northwest Roseville, Riverside Gateway, Sierra Vista, Southeast Roseville, Stoneridge, West Roseville, and the Infill Area. All of these specific plans were adopted by the City Council after extensive review by City staff, commissions and the public. Specific plans contain detailed regulations, conditions, programs and design criteria unique to specific areas of the City and serve to implement the General Plan. Each specific plan includes a menu of strategies.

6.2.3 Development Agreements

California planning law authorizes cities and developers to enter into contracts to lock in regulations and policies governing a property. Development agreements benefit the City and its residents by detailing the developer's responsibilities for public improvements and infrastructure, such as streetlights and roads. Development agreements also give developers the certainty they need to develop their property. With the obligations of both the City and the developer detailed and in writing, the project is able to move ahead smoothly with few obstacles.

6.2.4 Community Design Guidelines

Community design guidelines identify the City's expectations for planning, designing and reviewing development proposals in Roseville. They establish standards for high quality development and design. The community design guidelines provide design professionals, property owners, commissioners, staff, and residents with a clear and common understanding of the City's expectations for the planning, design, and review of development proposals in Roseville. They also increase the community's awareness and appreciation of design considerations.

6.2.5 Open Space Preserve Overarching Management Plan

In August 2011, the City of Roseville adopted an Open Space Preserve Overarching Management Plan (OSPOMP), which provides a City-wide approach to open space management, maintenance, and monitoring of the City's open space preserves. The OSPOMP also provides the same approach for the management and maintenance of open space areas outside of a preserve areas. Prior to adoption of the OSPOMP, the City managed, monitored, and provided reports to the U.S. Army Corps of Engineers for over 30 individual preserve management plans regulated by natural resource agencies, with various requirements for management and monitoring that had evolved in comprehensiveness and complexity since the 1990s. Adoption of the OSPOMP eliminates the need for additional management plans when new open space is dedicated through the development process or habitat conservation efforts.

6.2.6 Urban Water Management Plan

The City of Roseville Urban Water Management Plan plays an important role in water supply planning and management. Current drought conditions have resulted in unprecedented state mandates for water conservation. The 2020 UWMP is the primary compliance document for interim water use targets required by the Water Conservation Act of 2009. The primary objective of the UWMP is to provide a framework for long-term water supply planning and document how urban water suppliers carry out long-term resource planning responsibilities.

The 2020 UWMP describes the City water system, historical and projected use, and water supply sources. It compares projected water supply to water demand during normal, single-dry, and multiple dry years in 5-year increments from 2025 to 2045.

6.2.7 Emergency Operations Plan

The City of Roseville Emergency Operations Plan (EOP) establishes an emergency management organization and assigns functions and tasks consistent with California's Standardized Emergency Management System. It provides for the integration and coordination of planning efforts of multiple jurisdictions. This plan was reviewed and approved by representatives from each City of Roseville department, local special districts with emergency services responsibilities in the City, and the Placer County Office of Emergency Services. The content is based on

guidance approved and provided by the State of California and FEMA. The EOP provides direction on how to respond to an emergency from the initial onset, through an extended response, and into the recovery process.

A key element of the update process for this hazard mitigation plan was the simultaneous review of the EOP. The Steering Committee remained informed of major review findings of the EOP with an eye toward integration with key components of the hazard mitigation plan. Updates to the EOP will continue to coincide with the future updates of the multi-hazard mitigation plan.

6.3 CAPABILITY ASSESSMENT

The planning team performed an inventory and analysis of existing authorities and capabilities called a "capability assessment." A capability assessment creates an inventory of a jurisdiction's codes, programs and policies, and evaluates its capacity to carry them out. It presents a toolkit for implementing the hazard mitigation plan and for identifying opportunities to increase the City's core capabilities to support mitigation actions. The assessment identifies potential gaps in core capabilities. Filling those gaps may eventually become mitigation actions in the plan. Assessment findings were shared with City departments as they developed the recommended mitigation actions. If a department identified an opportunity to add or expand a capability, then doing so has been identified as a mitigation action. The City views each core capability to be fully adaptable as needed to meet the best interests of the City. This adaptability is an overarching City capability that is acknowledged by this reference.

6.3.1 Planning and Regulatory Capabilities

Jurisdictions have the ability to develop policies and programs and to implement rules and regulations to protect and serve residents. Local policies are typically identified in a variety of community plans, implemented via a local ordinance, and enforced through a governmental body. An assessment of planning and regulatory capabilities is presented in Table 6-3.

Table 6-3. Planning and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances and Requirements				
Building Code	Yes	No	Yes	No
Comment: The 2022 California Building Standards Code was adopted by the City of Roseville and incorporated by reference into the City of Roseville Municipal Code				
Zoning Code	Yes	No	No	No
Comment: Roseville Municipal Code, Title 19				
Subdivisions	Yes	No	Yes	No
Comment: Roseville Municipal Code, Title 18				
Stormwater Management	Yes	No	Yes	Yes
Comment: Roseville Municipal Code, Chapter 14.20				
Post-Disaster Recovery	No	No	No	No
Comment:				
Real Estate Disclosure	No	Yes	Yes	No
Comment: State of California Natural Hazards Disclosure Act, effective 6/1/1998 (California Civil Code Section 1003) states that real estate sellers and brokers are legally required to disclose if a property being sold lies within one or more state or locally mapped hazard areas.				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Flood Damage Prevention Ordinance	Yes	Yes	Yes	Yes
Comment: The Roseville Zoning Ordinance incorporates combining or overlay of districts to regulate floodplain development, open space preservation, and other sensitive habitat. The Flood Damage Prevention Ordinance (RMC 9.80) regulates development in special flood hazard areas. Outside agencies with jurisdiction over sensitive habitats include the U.S. Army Corps of Engineers and California Department of Fish and Wildlife.				
Growth Management	Yes	No	Yes	Yes
Comment: Growth management strategies are incorporated into the Land Use Element and Housing Element of the General Plan.				
Site Plan Review	Yes	No	No	No
Comment: The Zoning Ordinance (RMC 19.74.010.(C)) requires a design review permit for all new construction except single-family and two-family residences. Site design, building architecture, landscape design, and lighting are reviewed through the design review permit. Design review permits are reviewed and approved by the City's Design Committee or Planning Commission.				
Environmental Protection	Yes	No	Yes	Yes
Comment: The City's General Plan Open Space and Conservation Element includes policies for all new planning areas, including requirements to preserve and protect natural habitat areas (including riparian corridors), protect special-status species, and preserve floodplain areas within open space. The City's Tree Ordinance specifically regulates the removal of and mitigation for native oak trees.				
Emergency Management	Yes	No	Yes	Yes
Comment: Roseville Municipal Code, Chapter 9.28.075 (Emergency Management System).				
Climate Change	Yes	No	Yes	Yes
Comment: The City's General Plan has integrated climate change resilience and adaptation goals and policies throughout the General Plan, including within the Safety Element, Open Space and Conservation Element, and Air Quality and Climate Change Element. Municipal Climate Action Plan adopted 2009.				
Planning Documents				
General Plan	Yes	No	Yes	Yes
Is the plan compliant with Assembly Bill 2140? Yes				
Comment: The City's General Plan 2035 was adopted by the City Council on August 5, 2020, and is implemented through 14 specific plans (Amoruso Ranch, Sierra Vista, Creekview, Downtown, Riverside Gateway, Southeast Roseville, Northeast Roseville, Northwest Roseville, North Central Roseville, North Roseville, Highland Reserve North, Stoneridge, Del Webb, and West Roseville) and one other planning area (North Industrial). Infill Area is also accounted for.				
Capital Improvement Plan	Yes	No	No	Yes
How often is the plan updated? Every 2-3 years				
Comment: The 5-year Capital Improvement Plan addresses roads, water, sewer, electric, and park facilities. FY 2022-2023 – 2026-2027.				
Floodplain or Watershed Plan	No	No	No	No
Comment:				
Stormwater Plan	Yes	No	Yes	Yes
Comment: Stormwater Management Plan, February 2004. The plan is required by the State of California as part of the federal National Pollution Discharge Elimination System program. Outside jurisdictional authority is through the State Water Resources Control Board and Regional Water Quality Control Board (Central Valley Region). City also revised Sewer System Management Plan on February 20, 2022.				
Urban Water Management Plan	Yes	No	Yes	Yes
Comment: The 2020 Urban Water Management Plan is updated every 5 years in accordance with the Urban Water Management Planning Act and chart the course toward ensuring a reliable water future for the community.				
Habitat Conservation Plan	No	No	No	No
Comment: There are no Habitat Conservation Plans within the City. However, preserve areas have been established as a condition of Section 404 permits and biological opinions of the U.S. Fish and Wildlife Service and are regulated through the City's Overarching Open Space Preserve Management Plan approved by the U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers. The Open Space and Conservation Element of the City's General Plan also contains policies relative to habitat conservation.				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Economic Development Plan	Yes	No	No	No
Comment: Current economic development strategy was adopted by the City Council in 2022. This document will guide the City for efforts related to business attraction, retention, expansion, and creation.				
Community Wildfire Protection Plan	No	Yes, Placer County	No	Yes
Comment: 2012 Placer County Community Wildfire Protection Plan, currently updating				
Climate Action Plan	Yes	No	Yes	Yes
Comment: Municipal Climate Action Plan adopted 2009				
Response/Recovery Planning				
Emergency Operations Plan	Yes	No	Yes	Yes
Comment: The City of Roseville emergency operations plan was adopted by the City Council on July 21, 2004 (Resolution #04-301) and previously updated in January 2011 conjunction with the 2011 Multi-Hazard Mitigation Plan update. The EOP was subsequently reviewed parallel to the 2023 hazard mitigation plan update. The plan is mandated by the California Office of Emergency Services.				
Threat and Hazard Identification and Risk Assessment	No	No	No	No
Comment:				
Terrorism Plan	Yes	No	No	No
Comment: Terrorism Contingency Plan, 2010				
Post-Disaster Recovery Plan	No	No	No	No
Comment:				
Continuity of Operations Plan	No	No	No	No
Comment: The EOP contains a general overview of continuity of government and continuity of operations guidelines. The city does not currently have a stand-alone plan, but is currently in the process of developing a continuity of government and continuity of operations plan.				
Public Health Plan	No	No	No	No
Comment:				

6.3.2 Integration Opportunity

The assessment looked for opportunities to integrate this mitigation plan with the planning and regulatory capabilities identified. Capabilities were identified as integration opportunities if they can support or enhance the actions identified in this plan or be supported or enhanced by components of this plan. The City considered actions to implement this integration. The column in Table 6-3 labeled “Integration Opportunity” identifies capabilities that can support or be supported by components of this plan. Where “yes” is indicated in this column, the City has considered actions to integrate these capabilities with the plan.

6.3.3 Administrative and Technical Capabilities

A mitigation strategy cannot be successfully implemented without appropriate personnel. The assessment of administrative and technical capabilities focuses on the availability of personnel resources responsible for implementing hazard mitigation. These resources include technical experts, such as engineers and scientists, as well as personnel with capabilities that may be found in multiple departments, such as grant writers. The assessment is presented in Table 6-4.

Table 6-4. Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department or Agency (Positions)
Planners or engineers with knowledge of land development and land management practices	Y	Departments of Development Services, Public Works, Environmental Utilities, Electric, and Parks, Recreation & Libraries (Planners, Engineers, Landscape Architect)
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Y	Public Works, Development Services Department- Engineering Division (Engineering Inspectors); Building Inspection Division (Building Inspectors); Environmental Utilities Department (Engineers and Inspectors for Water/Sewer/Storm water), Parks, Recreation & Libraries (Park Development)
Planners or engineers with an understanding of natural hazards	Y	Development Services Department (Planners, Engineering); Public Works (Engineers); Environmental Utilities (Engineers)
Floodplain manager	Y	Public Works, Floodplain Management Division (Engineer)
Surveyors	N	No licensed surveyors on City staff. City can and has contracted for survey work on as-needed basis.
Personnel skilled or trained in GIS Applications	Y	Development Services Department (Business Services Technicians); Public Works (Engineering Assistants); Fire Department (GIS Analysts); Environmental Utilities Department (Mapping Manager); Information Technology Division (GIS Manager)
Scientist familiar with local natural hazards	N	
Emergency manager	Y	Fire Department, Police Department (Emergency Preparedness Co-Managers)
Mutual aid agreements	Y	Fire Department (Fire Marshal)
Grant writers	Y	City Manager's Office (Government Relations Manager)
Resilience Officer	Y	City Manager's Office (City Manager)
Staff with expertise or training in benefit/cost analysis	Y	Finance Department (administration and budget); City Manager's Office (Economic Development Team); Public Works; Environmental Utilities Department; Electric Department

6.3.4 Fiscal Capabilities

Assessing a jurisdiction's fiscal capability provides an understanding of the ability to fulfill the financial needs associated with hazard mitigation projects. This assessment identifies both outside resources, such as grant-funding eligibility, and local jurisdictional authority to generate internal financial capability, such as through impact fees. The assessment of fiscal capabilities is presented in Table 6-5.

Table 6-5. Fiscal Capability

Financial Resources	Accessible or Eligible to Use (Y or N)
Community Development Block Grants	Y
Capital Improvements Project Funding	Y
Authority to Levy Taxes for Specific Purposes	Y
User Fees for Water, Wastewater, and Electric Service	Y
Impact Fees for Buyers or Developers of New Development/Homes	Y
Incur Debt through General Obligation Bonds	Y
Incur Debt through Special Tax Bonds	Y
Incur Debt through Private Activity Bonds	N
Could Withhold Public Expenditures in Hazard-Prone Areas	N
State-Sponsored Grant Programs	Y

6.3.5 Development and Permitting Capability

Jurisdictions regulate land use through the adoption and enforcement of zoning, subdivision and land development ordinances, building codes, building permit ordinances, floodplain, and stormwater management ordinances. When effectively prepared and administered, these regulations can lead to hazard mitigation. Development and permitting capabilities are presented in Table 6-6.

Table 6-6. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • *If no, who does? If yes, which department?*	Yes Development Services Department
Does your jurisdiction have the ability to track permits by hazard area?	Yes, for certain hazards
Does your jurisdiction have a buildable lands inventory? • *If yes, please briefly describe.*	Yes As of 2023, the City has a developed residential inventory of 60,543 units with a further 16,656 units of allocated capacity remaining to be built.

6.3.6 NFIP Compliance

Flooding is the costliest natural hazard in the United States. Community participation in the NFIP opens up opportunity for additional grant funding associated specifically with flooding issues. Assessment of the jurisdiction's current NFIP status and compliance provides planners with a greater understanding of the local flood management program, opportunities for improvement, and available grant funding opportunities. Information on NFIP compliance is presented in Table 6-7.

6.3.7 Public Outreach Capacity

Regular engagement with the public on issues regarding hazard mitigation provides an opportunity to directly interface with community members. Assessing this outreach and education capability illustrates the connection between the government and community members, which opens a two-way dialogue that can result in a more resilient community based on education and public engagement. An assessment of education and outreach capabilities is presented in Table 6-8.

6.3.8 Participation in Other Programs

Other programs, such as the Community Rating System and Firewise USA, can enhance a jurisdiction's ability to mitigate, prepare for, and respond to natural hazards. These programs indicate a jurisdiction's desire to go beyond minimum requirements set forth by local, state, and federal regulations in order to create a more resilient community. These programs complement each other by focusing on communication, mitigation, and community preparedness to save lives and minimize the impact of natural hazards on a community. Classifications under various community mitigation programs are presented in Table 6-9.

Table 6-7. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Public Works
Who is your floodplain administrator? (department/position)	Public Works/Senior Civil Engineer
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	2010
Does your floodplain management program meet or exceed minimum requirements? *If exceeds, in what ways?*	Meets
When was the most recent Community Assistance Visit or Community Assistance Contact?	March 27, 2023
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? *If so, state what they are.*	No
How does your jurisdiction make Substantial Damage determinations?	All permits for improvements or damage to buildings within the Regulatory Floodplain have eligible costs totaled on a rolling 10-year cumulative basis. If costs exceed 50 percent of building value, building must be made compliant with current NFIP regulations.
How many substantial damage closed paid losses?	67
Are any RiskMAP projects currently underway in your jurisdiction? *If so, state what they are.*	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? *If no, state why.*	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? *If so, what type of assistance/training is needed?*	Yes Training on changes to the NFIP and CRS, driven by flood insurance reform.
Does your jurisdiction participate in the Community Rating System (CRS)? *If yes, is your jurisdiction interested in improving its CRS Classification?* *If no, is your jurisdiction interested in joining the CRS program?*	Yes Class 1 Community N/A
How many flood insurance policies are in force in your jurisdiction?[a] *What is the insurance in force?* *What is the premium in force?*	311 $101,453,200 $212,151
How many total loss claims have been filed in your jurisdiction?[a] *What were the total payments for losses?*	300 $9,864,992

a. As of December 2, 2022

Table 6-8. Education and Outreach

Criteria	Response
Do you have a public information officer or communications office?	Yes – A Public Affairs & Communications Department and multiple Public Information Officers serving the City, including Public Works, Police, and Fire departments. Staff is heavily involved in developing and sharing mitigation-specific information and other related communication.
Do you have personnel skilled or trained in website development?	Yes, multiple
Do you have hazard mitigation information available on your website? • *If yes, please briefly describe.*	Yes City website contains the maintained mitigation website: Roseville.ca.us/hazardplan. This page includes information on the Hazard Mitigation Plan, meetings, input opportunities, and progress reports.
Do you utilize social media for hazard mitigation education and outreach? • *If yes, please briefly describe.*	Yes Facebook, Twitter, Nextdoor, and other communication channels are regularly used for educating and engaging the public.
Do you have any resident boards or commissions that address issues related to hazard mitigation?	Yes—the Roseville Coalition of Neighborhood Associations is an active neighborhood association that participated in the 2023 Plan Steering Committee. The City engages this group on an ongoing basis.
Do you have any other programs already in place that could be used to communicate hazard-related information? • *If yes, please briefly describe.*	Yes Roseville has regular email news updates, community events, Neighborhood Fire Station Tours, media coverage, and other opportunities for the public to receive information.
Do you have any established warning systems for hazard events?	Yes—Alert Roseville, which is a community notification system to alert the public about emergency events and other important public safety information. People can elect to receive alerts for multiple locations, like a child's school or elderly parent's residence, for example.

Table 6-9. Community Classifications

	Participating? (Yes or No)	ID or Classification	Date Classified
FIPS Code	Yes	061-62938	N/A
Unique Entity Identifier (UEI)	Yes	W49TKZLUYCJ3	N/A
Community Rating System	Yes	1	10/01/06
Building Code Effectiveness Grading Schedule	Yes	2/2	11/28/2011
Public Protection	Yes	2	May 2015
Storm Ready	Yes	Blue	N/A
Firewise	No	N/A	N/A

6.3.9 Adaptive Capacity

An adaptive capacity assessment evaluates a jurisdiction's ability to anticipate impacts from future conditions. By looking at public support, technical adaptive capacity, and other factors, jurisdictions identify their core capability for resilience against issues such as sea level rise. The adaptive capacity assessment provides jurisdictions with an opportunity to identify areas for improvement by ranking their capacity high, medium, or low. The community's adaptive capacity for the impacts of climate change is presented in Table 6-10.

Table 6-10. Adaptive Capacity for Climate Change

Adaptive Capacity Assessment Questions	Jurisdiction Rating
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts	High
***Comment*:** Air Quality and Climate Change Element of *General Plan 2035*, Communitywide Sustainability Action Plan, Specific Plans, Municipal Climate Action Plan	
Jurisdiction-level monitoring of climate change impacts	Medium
Comment: Communitywide Sustainability Action Plan details primary and supporting measures, last updated in 2010	
Technical resources to assess proposed strategies for feasibility and externalities	Medium
Comment: Various project-specific Air Quality Impact Analyses	
Jurisdiction-level capacity for development of greenhouse gas emissions inventory	High
Comment: City of Roseville Greenhouse Gas Emissions Reduction Plan Analysis, Placer County GHG Emissions Inventories available, determined locally in Roseville on a project by project basis (ex. Greenhouse Gas Emissions from implementation of proposed project).	
Capital planning and land use decisions informed by potential climate impacts	High
Comment: Goal LU6.3 in Land Use Element - Coordinate and take a lead role, where feasible, with local, state, federal, and other agencies on regional issues of importance, including but not limited to air quality, climate change mitigation and resiliency, transportation, water supply, sewage treatment, solid waste disposal and recycling, flood control, hazardous waste management, resource protection, and transit.	
Participation in regional groups addressing climate risks	Medium
Comment: Placer County Air Pollution Control District	
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes	High
Comment: GHG emissions and climate change The California Environmental Quality Act (CEQA) requires evaluation of greenhouse gases and climate change for all land development projects. These impacts were evaluated citywide as part of the updated 2035 General Plan adopted in 2035, and are also addressed for individual projects which require CEQA compliance.	
Identified strategies for greenhouse gas mitigation efforts	Medium
Comment: 2035 General Plan	
Identified strategies for adaptation to impacts	High
Comment: Community Sustainability Action Plan, Hazard Mitigation Plan	
Champions for climate action in local government departments	Medium
Comment: Development Services Planning Department	
Political support for implementing climate change adaptation strategies	Medium
Comment: City Council	
Financial resources devoted to climate change adaptation	Medium
Comment: FY2022-23 budget mentions “intensified [the] focus on ways to mitigate climate change.” Roseville Transit Strategy – reduce air emissions and traffic; Electric Vehicle Program and Campaign; Building Electrification – CA 2045 carbon neutrality goal	
Local authority over sectors likely to be negative impacted	Medium
Comment: Roseville Environmental Utilities and Roseville Electric	
Public Capacity	
Residents’ knowledge and understanding of climate change risks	Medium
Comment: Communitywide Sustainability Action Plan had opportunities for community participation/input in the development process;	
Residents’ support of adaptation efforts	Unsure
Comment: Dry Creek Conservancy	
Residents’ capacity to adapt to climate impacts	Medium
Comment: Roseville Water Future Initiative	

Adaptive Capacity Assessment Questions	Jurisdiction Rating
Local economy current capacity to adapt to climate impacts	Hight
Comment: Green pricing program through Roseville Electric, Property Assessed Clean Energy (PACE) financing for homeowners to make renewable energy, energy and water efficiency upgrades and wildfire & earthquake hardening to homes	
Local ecosystems capacity to adapt to climate impacts	Medium
Comment: Watershed restoration along Dry Creek in 2021	

PART 2—RISK ASSESSMENT

7. RISK ASSESSMENT METHODOLOGY

The risk assessments in this plan describe the risks associated with each identified hazard of concern. The following steps were used to define the risk of each hazard:

- **Identify and profile each hazard**—The following information is given for each hazard:
  - A summary of past events that have impacted the planning area
  - Geographic areas most affected by the hazard
  - Event frequency estimates
  - Severity descriptions
  - Warning time likely to be available for response.
- **Determine exposure to each hazard**—Exposure was assessed by overlaying hazard maps with an inventory of structures, facilities, and systems to decide which of them would be exposed to each hazard.
- **Assess the vulnerability of exposed facilities**—Vulnerability of exposed structures and infrastructure was evaluated by interpreting the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard. Tools such as GIS and Hazus were used for this assessment for the dam failure, earthquake, and flood hazards. Outputs similar to those from Hazus were generated for other hazards, using data generated through GIS.

7.1 RISK ASSESSMENT TOOLS

7.1.1 Mapping

National, state, and local databases were reviewed to locate spatially based data relevant to this planning effort. Maps were produced using geographic information system (GIS) software to show the spatial extent and location of identified hazards when such data was available.

7.1.2 Modeling

Overview

FEMA developed the standardized GIS-based software program Hazards U.S. (Hazus) to estimate losses caused by earthquakes, hurricanes and floods and identify areas that face the highest risk and potential for loss. Hazus is used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, critical facilities, and transportation and utility infrastructure, and multiple models to estimate potential losses from natural disasters. The program maps and calculates hazard data and damage and economic loss estimates for buildings and infrastructure. Its advantages include the following:

- Provides a consistent methodology for assessing risk across geographic and political entities.

- Provides a way to save data so that they can readily be updated as population, inventory, and other factors change and as mitigation planning efforts evolve.
- Facilitates review of mitigation plans because it helps to ensure that FEMA methodologies are incorporated.
- Supports grant applications by calculating benefits using FEMA definitions and terminology.
- Produces hazard data and loss estimates that can be used in communication with local stakeholders.
- Is administered by the local government and can be used to manage and update a hazard mitigation plan throughout its implementation.

For flood-related hazards, Hazus calculates losses to structures due to inundation based on depth of flooding and type of structure. Using historical flood insurance claim data, Hazus estimates the percentage of damage to structures and their contents by applying established damage functions to an inventory. The Hazus analysis also estimates the quantity of debris that would be caused by the flooding.

For earthquake, once the location and size of a hypothetical earthquake are identified, Hazus estimates the intensity of the ground shaking, the number of buildings damaged, the number of casualties, the damage to transportation systems and utilities, the number of people displaced from their homes, and the estimated cost of repair and clean up.

Levels of Detail for Evaluation

Hazus provides default data for inventory, vulnerability and hazards; this default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information about the planning area:

- **Level 1**—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the planning area.
- **Level 2**—More accurate estimates of losses require more detailed information about the planning area. Level 2 estimates of losses require detailed information on local geology, hydrology, hydraulics, building inventory, utilities, and critical facilities. This information is needed in a GIS format.
- **Level 3**—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the planning area.

7.2 RISK ASSESSMENT APPROACH

7.2.1 Hazard Profile Development

Hazard profiles were developed through web-based research and review of previously developed reports and plans, including general plans and state and local hazard mitigation plans. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists, and others.

7.2.2 Assessment of Exposure and Vulnerability

The risk assessment for this plan determined exposure and vulnerability to identified hazards of concern for the overall planning area and individual cities. The approach used for each hazard is described below.

Flood, Dam Failure, and Earthquake

Exposure and vulnerability to flood, dam failure, and earthquake were evaluated using Hazus as follows:

- **Flood**—A Level 2, user-defined analysis was performed to assess the risk and vulnerability to flooding in the planning area for general building stock and for critical facilities. To estimate damage that would result from a flood, Hazus uses pre-defined relationships between flood depth at a structure and resulting damage, with damage given as a percent of total replacement value. Curves defining these relationships have been developed for damage to structures and for damage to typical contents within a structure. By inputting flood depth data and known property replacement cost values, dollar-value estimates of damage were generated.
- **Dam Failure**—A Level 2 analysis was run for the Folsom Dam failure inundation area using the flood methodology described above.
- **Earthquake**—Once the location and size of a hypothetical earthquake are identified, Hazus estimates the intensity of the ground shaking, the number of buildings damaged, the number of casualties, the amount of damage to transportation systems and utilities, the number of people displaced from their homes, and the estimated cost of repair and clean up. A Level 2 analysis was performed to assess earthquake exposure and vulnerability for two scenario events and one probabilistic event:
  - A Magnitude-6.8 event on the Concord-Green Valley Fault with an epicenter 56 miles southwest of Roseville
  - A Magnitude-7.1 event on the Great Valley Fault with an epicenter 58 miles west northwest of Roseville
  - The standard Hazus 100-year probabilistic event.

Severe Weather and Wildfire

For most of the hazards of concern, historical data was not adequate to model future losses. However, areas and inventory susceptible to some of the hazards of concern were mapped, and exposure was evaluated. For other hazards, a qualitative analysis was conducted using the best available data and professional judgment.

Drought

The risk assessment methodologies used for this update focus on impacts to structures. Because drought does not impact structures, the risk assessment for drought was more limited and qualitative than the assessment for the other hazards of concern.

Health Hazards and Human-Caused Hazards

The non-natural hazards of concern were assessed to different standards for the following reasons:

- The assessment of non-natural hazards is optional under federal hazard mitigation planning requirements (44 CFR Section 201.6).
- The data needed to assess risk, such as maps of extent and location and applied damage functions, are not readily available for these types of hazards.
- A key element of risk is the probability of occurrence. Probabilities are usually assigned based on past historical occurrences. While human-caused and human health hazards have had significant impacts on our nation as a whole, they have not impacted regions of the country uniformly as do natural hazard

events. The lack of record of past occurrences within a planning area makes it difficult to assign probability of occurrence.

Socially Vulnerable Populations

Hazard impacts on socially vulnerable populations were assessed based on household income; households with incomes of $40,000 or less were defined as economically disadvantaged. Demographic numbers were calculated using 2020 Census data at the Census block level provided with Hazus. The household income level of $40,000 is the closest interval in the Census data to $35,000 which is the upper limit of low income as defined in the Roseville General Plan. For the geographic analysis, hazard areas were intersected with the Census block polygons. All households in the intersected blocks were considered to be in the hazard area when determining the count of households.

7.3 SOURCES OF DATA USED IN MODELING

7.3.1 Building and Cost Data

Replacement cost values and detailed structure information derived from parcel and tax assessor data provided by the City of Roseville were loaded into Hazus. When available, an updated inventory was used in place of the Hazus defaults for critical facilities.

Replacement cost is the cost to replace the entire structure with one of equal quality and utility. Replacement cost is based on industry-standard cost-estimation models published in *RS Means Square Foot Costs* (Gordian n.d.). It is calculated using the RS Means square foot cost for a structure, which is based on the Hazus occupancy class (e.g., multi-family residential, commercial retail trade), multiplied by the square footage of the structure from the tax assessor data. For single-family residential, the construction class and number of stories also factor into determining the square foot costs.

7.3.2 Hazus Data Inputs

The following hazard data were used for the Hazus Level 2 analysis conducted for the risk assessment:

- **Flood**—The effective Digital Flood Insurance Rate Map (DFIRM) for the planning area was used to delineate flood hazard areas and estimate potential losses from the 100-year, 500-year and 10-year flood events and the "area with reduced risk due to levee" that is delineated in the DFIRM data. Using the DFIRM floodplain boundaries and base flood elevation information, and the Central Valley Flood Delineation Project 3-foot digital elevation model data, flood depth grids were generated and integrated into the Hazus model. Hazus used Census data at the block level, FEMA floodplain data, and GIS data for the City's regulatory floodplain.
- **Dam Failure**—Inundation area data from the Folsom Dam Containment Dike Failure Risk Assessment Project, provided by the City of Roseville, and the 3-foot digital elevation model were used to develop depth grids that were integrated into the Hazus model.
- **Earthquake**—Earthquake shake maps prepared by the USGS were used for the analysis of this hazard. Data from the California Geological Survey on National Earthquake Hazard Reduction Program soil types and liquefaction zones were also integrated into the Hazus model.

7.3.3 Other Local Hazard Data

Locally relevant information on hazards was gathered from a variety of sources. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists and others. Data sources for specific hazards were as follows:

- **Severe Storm**—No GIS format severe storm area data were identified for the City of Roseville.
- **Wildfire**—California Department of Forestry and Fire Protection (CAL FIRE) fire severity data was downloaded from the CAL FIRE website.

7.3.4 Data Source Summary

Table 7-1 summarizes the data sources used for the risk assessment for this project.

Table 7-1. Hazus Model Data Documentation

Data	Source	Date	Format
Property parcel data[a]	City of Roseville	2022	Digital (GIS) format
Address points	City of Roseville	2022	Digital (GIS) format
Building footprints	City of Roseville	2022	Digital (GIS) format
Building information[b]	City of Roseville	2022	Digital (GIS) format
Building replacement cost	RS Means	2022	Printed. Updated RS Means values
Population data	California, Department of Finance	2020	Digital (GIS and tabular) format
Digital Flood Insurance Rate Map[c]	FEMA	2018	Digital (GIS) format
First floor elevation data	Hazus Default Methodology	2022	Digital (tabular) format
Earthquake shake maps	USGS Earthquake Hazards Program website	2017	Digital (GIS) format
NEHRP Soils	California Department of Conservation	2015	Digital (GIS) format
Dam inundation area	City of Roseville, Bureau of Reclamation	2010	Digital (GIS) format
Landslide	California Geological Survey	2016	Digital (GIS) format
Wildfire	CAL FIRE	2008	Digital (GIS) format
Digital Elevation Model	City of Roseville	2016	Digital (GIS) format
CRITICAL FACILITIES AND ASSETS			
Landmarks[d]	City of Roseville	2022	Digital (GIS) format
State and local bridges	Caltrans	2022	Digital (GIS) forma
Rail facilities	Caltrans	2022	Digital (GIS) format
Telecommunications facilities	City or Roseville	2022	Digital (GIS) format
Consolidated communications facilities	Consolidated Communications	2022	Digital (GIS) format
Hazardous material facilities	U.S. EPA Toxic Release Inventory	2022	Digital (GIS) format
Potable water facilities	City of Roseville	2022	Digital (GIS) format
Sewer facilities	City of Roseville	2022	Digital (GIS) format

a. Parcel data included county tax assessor information such as use code, year built, and building square footage
b. Building information includes area, occupancy, date of construction, and stories
c. Placer County FIRM, effective 11/02/2018
d. Landmarks include fire stations, police stations, schools, medical care facilities, helipads, rail facilities, electric power facilities, potable water facilities, sewer facilities, and various government facilities

7.4 LIMITATIONS

Loss estimates, exposure assessments and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximations and simplifications necessary to conduct a study
- Incomplete or outdated inventory, demographic, or economic parameter data
- The unique nature, geographic extent and severity of each hazard
- Mitigation measures already employed
- The amount of advance notice residents have to prepare for a specific hazard event.
- The uncertain spatial accuracy of the dam inundation area data.

These factors can affect loss estimates by a factor of two or more. Therefore, potential exposure and loss estimates are approximate and should be used only to understand relative risk. Over the long term, the City of Roseville will collect additional data to assist in estimating potential losses associated with other hazards.

8. CLIMATE CHANGE CONSIDERATIONS FOR HAZARD MITIGATION

Climate change will affect the people, property, economy and ecosystems of the City of Roseville in a variety of ways. Climate change impacts are most frequently associated with negative consequences, such as increased flood vulnerability or increased heat-related illnesses and other public health concerns; however, other changes may present opportunities. The most important effect for the development of this Plan is that climate change will have a measurable impact on the occurrence and severity of natural hazards.

8.1 GENERAL BACKGROUND

"Climate change" refers to alterations in the long-term patterns of temperature, precipitation, humidity, wind, and seasons that play a fundamental role in shaping natural ecosystems and the human economies and cultures that depend on them. These shifts may result from natural processes (e.g., cyclical ocean patterns like El Niño, La Niña and the Pacific Decadal Oscillation, volcanic activity, changes in the sun's energy output, variations in Earth's orbit), but they can also be driven by human activity. Many of the changes observed in Earth's climate since the early 20th century have been attributed to human activity.

8.1.1 Greenhouse Gases

The well-established worldwide warming trend of recent decades and its related impacts are caused by increasing concentrations of carbon dioxide and other greenhouse gases in the earth's atmosphere. Greenhouse gases are gases that trap heat in the atmosphere, resulting in a warming effect. Carbon dioxide is the most commonly known greenhouse gas; however, methane, nitrous oxide and fluorinated gases also contribute to warming. Emissions of these gases come from a variety of sources, such as fossil fuel combustion for energy and transportation, wastewater treatment, agricultural production, livestock, landfills, and changes in land use. Figure 8-1 shows greenhouse gas emissions by economic sector in California for 2019, the most current data. Transportation is the largest source of CO_2 for the state.

8.1.2 Atmospheric Carbon Dioxide

According to the U.S. Environmental Protection Agency (EPA), carbon dioxide concentrations measured about 280 parts per million (ppm) before the industrial era began in the late 1700s and have risen 43 percent since then, reaching 399 ppm in 2014 (see Figure 8-2). Scientists are able to place this rise in carbon dioxide in a longer historical context through the measurement of carbon dioxide in ice cores. According to these records, carbon dioxide concentrations in the atmosphere are the highest that they have been in 800,000 years (NASA 2022). The latest carbon dioxide measurement taken in February 2022 was 418 ppm (NASA 2022). According to NASA, most of this trend is likely human-induced (NASA 2022).

Source: (California Air Resources Board 2022)

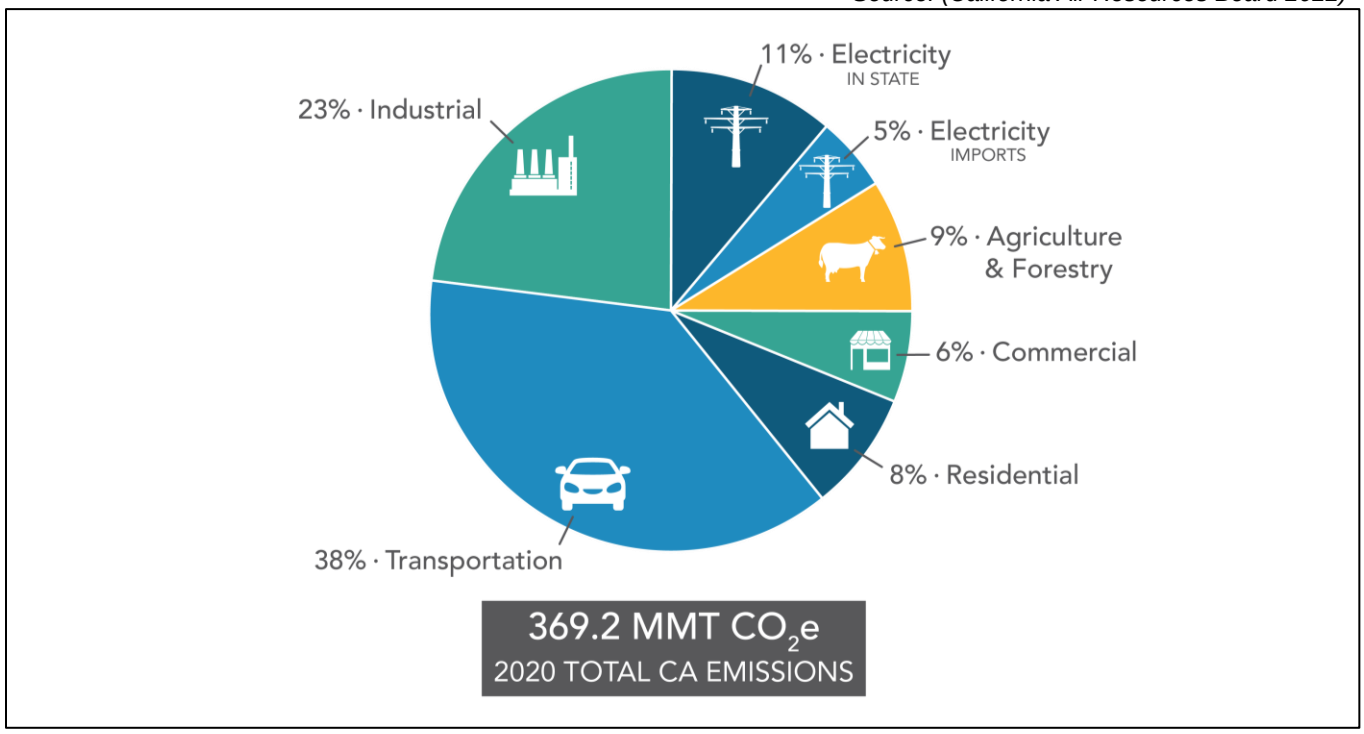


Figure 8-1. California's 2020 Greenhouse Gas Emission Inventory by Sector

Source: (NASA 2022)

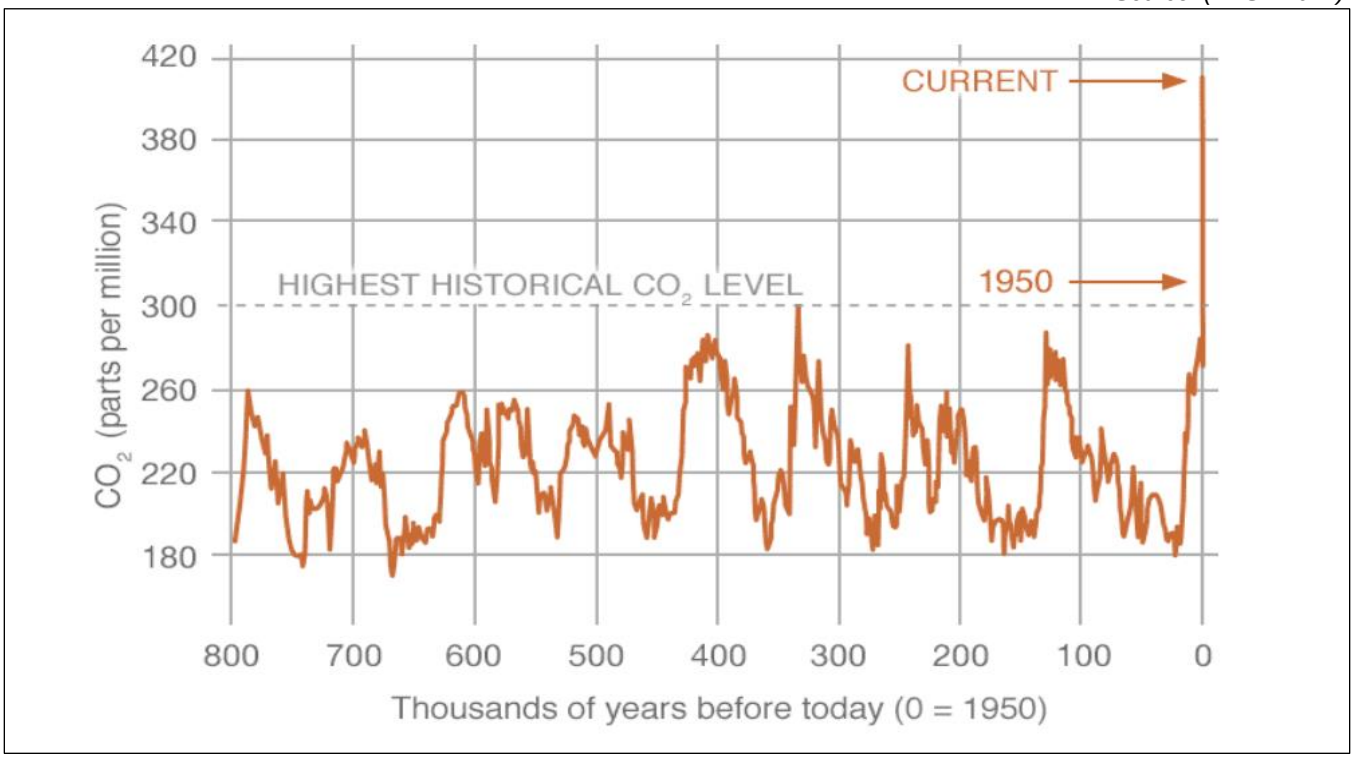


Figure 8-2. Global Carbon Dioxide Concentrations Over Time

8.2 HOW CLIMATE CHANGE AFFECTS HAZARD MITIGATION

Climate change will affect the people, property, economy, and ecosystems of the planning area in a variety of ways. Consequences of climate change include increased flood vulnerability and increased heat-related illnesses. The most important effect for the development of this plan is that climate change will have a measurable impact on the occurrence and severity of natural hazards.

An essential aspect of hazard mitigation is predicting the likelihood of hazard events in a planning area. Typically, predictions are based on statistical projections from records of past events. This approach assumes that the likelihood of hazard events remains essentially unchanged over time. Thus, averages based on the past frequencies of, for example, floods are used to estimate future frequencies: if a river has flooded an average of once every 5 years for the past 100 years, then it can be expected to continue to flood an average of once every 5 years.

For hazards that are affected by climate conditions, the assumption that future behavior will be equivalent to past behavior is not valid if climate conditions are changing. As flooding is generally associated with precipitation frequency and quantity, for example, the frequency of flooding will not remain constant if broad precipitation patterns change over time. Specifically, as hydrology changes, storms currently considered to be the 100-year flood might strike more often, leaving many communities at greater risk. For this reason, an understanding of climate change is pertinent to efforts to mitigate natural hazards. Information about how climate patterns are changing provides insight on the reliability of future hazard projections used in mitigation analysis.

8.2.1 Current Indications of Climate Change

Global Indicators

The major scientific agencies of the United States—including NASA and the National Oceanic and Atmospheric Administration (NOAA)—have presented evidence that climate change is occurring. NASA summarizes key evidence as follows (National Aeronautics and Space Administration 2022):

- **Global Temperature Rise**—The planet's average surface temperature has risen about 2.12 ºF since the late 19th century, a change driven largely by increased carbon dioxide emissions into the atmosphere and other human activities. Most of the warming occurred in the past 40 years, with the seven most recent years being the warmest. The years 2016 and 2020 are tied for the warmest year on record.
- **Warming Oceans**—The ocean has absorbed much of the worlds' increased heat, with the top 300 feet of ocean showing warming of more than 0.6 ºF since 1969. Earth stores 90 percent of its extra energy in the ocean.
- **Shrinking Ice Sheets**—The Greenland and Antarctic ice sheets have decreased in mass. Data from NASA's Gravity Recovery and Climate Experiment show Greenland lost an average of 279 billion tons of ice per year between 1993 and 2019, and Antarctica lost about 148 billion tons of ice per year.
- **Glacial Retreat**—Glaciers are retreating almost everywhere around the world—including in the Alps, Himalayas, Andes, Rockies, Alaska and Africa.
- **Decreased Snow Cover**—Satellite observations reveal that the amount of spring snow cover in the northern hemisphere has decreased over the past five decades and that snow is melting earlier.
- **Sea Level Rise**—Global sea level rose about 8 inches in the last century. The rate in the last two decades is nearly double that of the last century and is accelerating slightly every year.

- **Declining Arctic Sea Ice**—Both the extent and thickness of Arctic sea ice has declined rapidly over the last several decades.
- **Extreme Events**—The number of record high temperature events in the United States has been increasing since 1950, while the number of record low temperature events has been decreasing. The U.S. has also witnessed increasing numbers of intense rainfall events.
- **Ocean Acidification**—Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 7 to 10 billion tons per year.

California Indicators

Monitoring and research efforts across California have generated data that describe changes already underway in the state. Notable examples across the state include the following (California Office of Environmental Health Hazard Assessment 2018):

- Dissolved oxygen in coastal waters is declining throughout the south coast survey region
- Since 1950, the northern Sierra Nevada showed an overall snowpack decline of 7.4 inches.
- Unusually warm waters occurred in the Pacific Ocean in 2014-2015, leading to widespread impacts on marine life. This marine heat wave first appeared as a large area of exceptionally high sea surface temperatures in the Gulf of Alaska in November 2013 and later extended along the entire west coast of North America.
- The surface area of seven Sierra Nevada glaciers has decreased dramatically since the beginning of the 20th century. In 2014, the size of these glaciers ranged from 14 to 52 percent of their 1903 area.
- Sea level has risen by about 7 inches since 1900 at San Francisco and by about 6 inches since 1924 at La Jolla.
- Since 1906, the fraction of annual snowmelt runoff that flows into the Sacramento River between April and July has decreased by about 9 percent.
- Compared to the 1930s, forests across much of California today have lower densities of large trees, and higher densities of small trees. Water stress, which increases in a warming climate, poses a greater risk to large trees than to small trees.
- Annual tree mortality in California forests increased in 2014, and steep increases in mortality followed in subsequent years; the highest number, 62 million tree deaths, was recorded in 2016.
- Future droughts may be hotter, as warm temperatures coincide with periodic dry years; 2016 and 2020 were the warmest years on record.
- Heat-related deaths and illnesses in California increased dramatically in 2006 following a record-breaking heat wave. At least 140 deaths occurred between July 15 and August 1. Deaths related to this heat wave were largely attributed to elevated nighttime temperatures.
- The number of acres burned by wildfires statewide has been increasing since 1950. Large fires affecting 1,000 acres or more account for most of the area burned each year.

8.2.2 Projected Future Impacts

Climate change projections contain inherent uncertainty, largely because they depend on projections of future greenhouse gas emissions. Uncertainty about future greenhouse gas emissions is addressed by assessing multiple scenarios—low-emissions or high-emissions. In low-emissions scenarios, greenhouse gas emissions are assumed to be reduced substantially from current levels. In high-emissions scenarios, greenhouse gas emissions generally are assumed to increase or continue at current levels. Uncertainty in outcomes is generally addressed by averaging a variety of model outcomes. Despite this uncertainty, climate change projections present valuable information to help guide decision-making for possible future conditions.

Global and National Projections

The Intergovernmental Panel on Climate Change, which includes more than 1,300 scientists from the United States and other countries, project that Earth's average temperatures will raise 2.5 to 10 ºF over the next century. The Third and Fourth *National Climate Assessment Reports* indicate the following (National Aeronautics and Space Administration 2022):

- **Change continuing through this century and beyond**—Global climate is projected to continue to change over this century and beyond. The magnitude of climate change beyond the next few decades depends primarily on the amount of heat-trapping gases emitted globally, and how sensitive the Earth's climate is to those emissions.
- **Temperatures continuing to rise**—Because human-induced warming is superimposed on a naturally varying climate, the temperature rise has not been, and will not be, uniform or smooth across the country or over time.
- **Lengthening frost-free season and growing season**—The lengths of the frost-free season and the corresponding growing season have been increasing nationally since the 1980s, with the largest increases in the western United States, affecting ecosystems and agriculture. Across the United States, the growing season is projected to continue to lengthen. Increases of a month or more in the lengths of the frost-free and growing seasons are projected across most of the United States by the end of the century, with slightly smaller increases in the northern Great Plains. The largest increases in the frost-free season (more than eight weeks) are projected for the western United States, particularly in high elevation and coastal areas. The increases will be smaller if heat-trapping gas emissions are reduced.
- **Changing precipitation patterns**—Average U.S. precipitation has increased since 1900. Some areas have had increases greater than the national average, and some areas have had decreases. More winter and spring precipitation is projected over this century for the northern United States, with less for the Southwest. The recent trend toward increased heavy precipitation events will continue, even where total precipitation is expected to decrease, such as the Southwest.
- **More droughts and heat waves**—Droughts in the Southwest and heat waves everywhere are projected to become more intense, and cold waves less intense everywhere. Summer temperatures are projected to continue rising, and a reduction of soil moisture, which exacerbates heat waves, is projected for much of the western and central United States in summer. By the end of this century, what have been once-in-20-year extreme heat days (one-day events) are projected to occur every two or three years over most of the nation.
- **Stronger and more intense hurricanes**—The intensity, frequency, and duration of North Atlantic hurricanes, as well as the frequency of the strongest (Category 4 and 5) hurricanes, have all increased since the early 1980s. The relative contributions of human and natural causes to these increases are still

uncertain. Hurricane-associated storm intensity and rainfall rates are projected to increase as the climate continues to warm.

- **Arctic Ocean likely ice-free in summer**—The Arctic Ocean is currently expected to become essentially ice free in summer before 2050.
- **Sea level rising 1 to 8 feet by 2100**—Global sea level has risen by about 8 inches since reliable record keeping began in 1880. It is projected to rise another 1 to 8 feet by 2100. This is the result of added water from melting land ice and the expansion of seawater as it warms. In the next several decades, storm surges and high tides could combine with sea-level rise and land subsidence, resulting in increased flooding in many regions. Sea-level rise will continue past 2100 because the oceans take a very long time to respond to temperature conditions at the Earth's surface.

Projections for California

According to *California's Fourth Climate Change Assessment*, the state can expect the following climate change impacts (State of California 2022):

- By 2100, the average annual maximum daily temperature is projected to increase by 5.6 to 8.8 ºF.
- By 2100, the water supply from snowpack is projected to decline by two-thirds.
- By 2050, agricultural production could face climate-related water shortages of up to 16 percent in certain regions.
- By 2100, the frequency of extreme wildfires will increase, and the average area burned statewide would increase by 77 percent.
- By 2100, 31 to 67 percent of Southern California beaches may completely erode due to sea-level rise.
- By 2100, the miles of highways susceptible to coastal flooding in a 100-year storm event will triple.
- By 2050, heat waves in cities could cause 2 to 3 times more heat-related deaths.

Projections for Roseville

The California Climate Adaptation Strategy outlines the following climate change impact concerns for the Northern Sierra Nevada Region communities (California Natural Resources Agency 2021):

- Increased temperature
- Decreased precipitation
- Reduced snowpack
- Reduced tourism
- Ecosystem change
- Sensitive species stress
- Increased wildfire frequency and area burned.

Cal-Adapt, a publicly available resource, offers information on how climate change might impact local communities. It presents visualization tools that present the most current data available whenever possible. The following sections summarize projections by Cal-Adapt for the Roseville area's local climate.

Temperature

The historical average (1961-1990) temperature in the Roseville area is 74.6ºF (Cal-Adapt 2022). By 2099, the average temperature in the City is expected to increase above this baseline in the medium- and high-emissions scenarios by 5.2ºF and 8.5ºF, respectively, as shown in Figure 8-3.

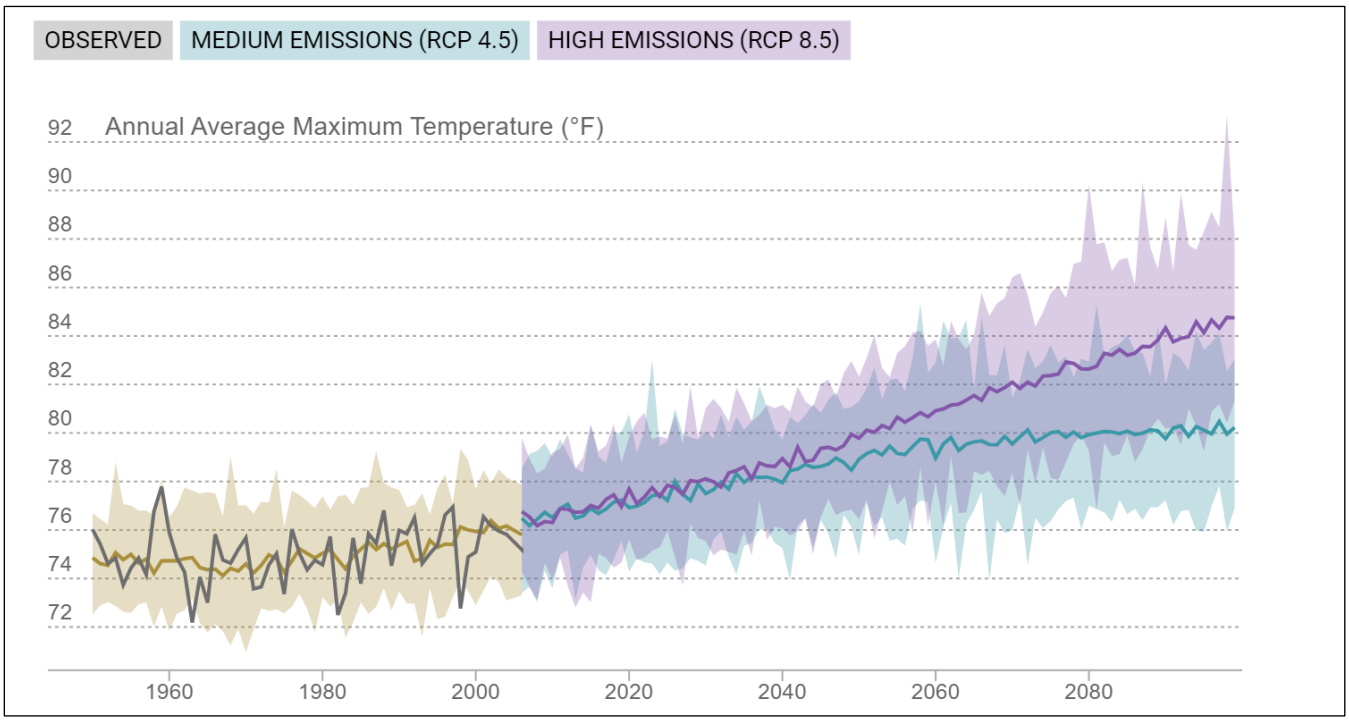


Figure 8-3. Observed and Projected Average Temperatures in the Roseville Area

Precipitation

According to Cal-Adapt, precipitation projections for California remain uncertain. Models show differing impacts from slightly wetter winters to slightly drier winters, with potential for up to a 0.3-inch decrease in total annual precipitation by the end of the century (Cal-Adapt 2022). Changes in precipitation patterns, coupled with warmer temperatures, may lead to significant changes in hydrology. In high-emissions scenarios, more precipitation may fall as rain rather than snow, and snow may melt earlier in the season, impacting the timing of stream flow changes and floods (Cal-Adapt 2022).

Wildfire

Wildfire risk is expected to change in the coming decades. Under the high-emissions scenario, the annual average area burned is expected to decrease by 17.8 acres by 2099 (see Figure 8-4).

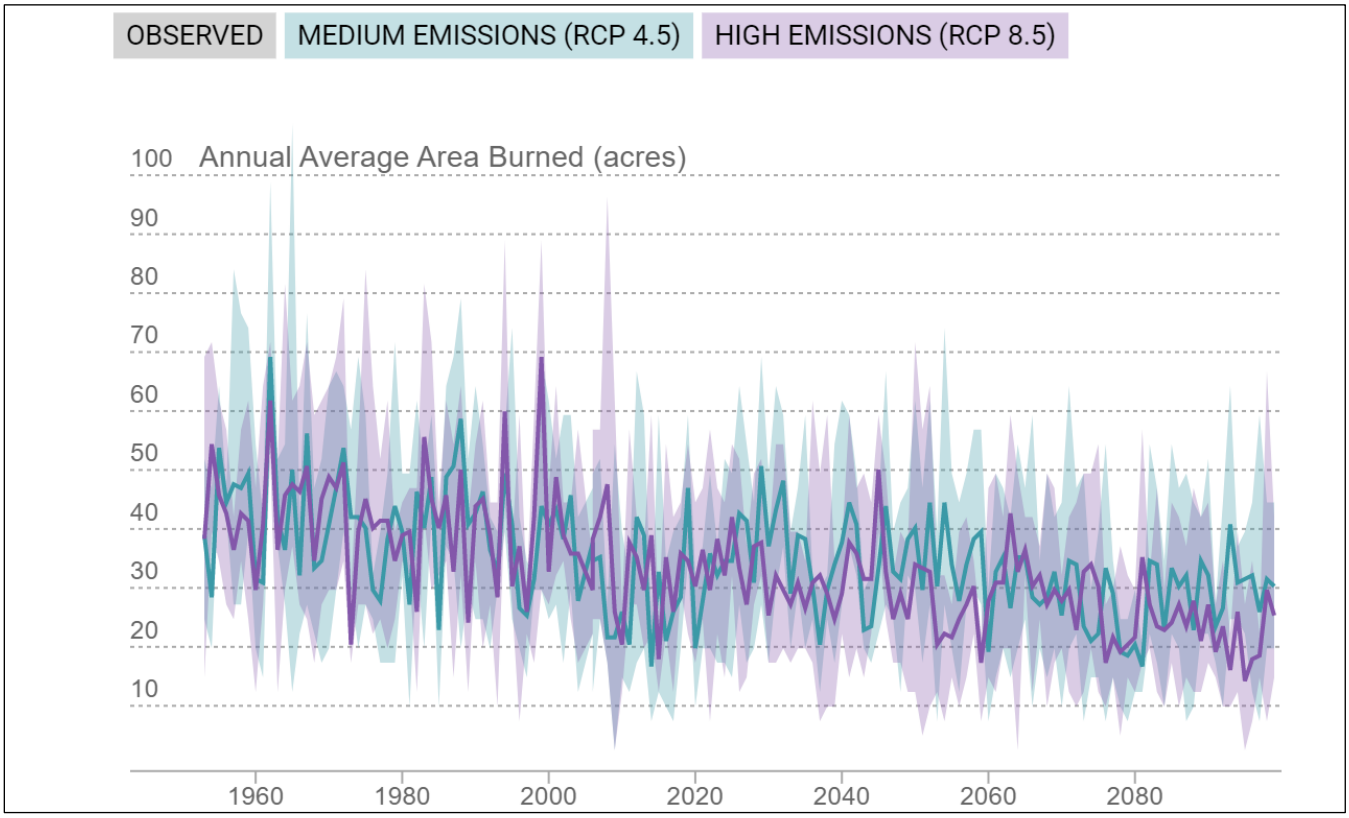


Figure 8-4. Annual Average Area Burned (acres) in Roseville, California

8.3 RESPONSES TO CLIMATE CHANGE

8.3.1 California Senate Bill No. 379

California Senate Bill 379, adopted October 8, 2015, requires that local hazard mitigation plans include all of the following:

- A vulnerability assessment that identifies the risks that climate change poses to the local jurisdiction and the geographic areas at risk from climate change impacts, including but not limited to flood and fire hazards. Information available from federal, state, regional and local agencies should be used in the development of this assessment, including the following:
  - Information from the Internet-based Cal-Adapt tool
  - Information from the most recent version of the California Adaptation Planning Guide
  - Information from local agencies on the types of assets, resources, and populations that will be sensitive to various climate change exposures
  - Information from local agencies on their current ability to deal with the impacts of climate change
  - Historical data on natural events and hazards, including locally prepared maps of areas subject to previous risk, areas that are vulnerable, and sites that have been repeatedly damaged
  - Existing and planned development in identified at-risk areas, including structures, roads, utilities, and essential public facilities

  - Federal, state, regional, and local agencies with responsibility for the protection of public health and safety and the environment, including special districts and local offices of emergency services

- A set of adaptation and resilience goals, policies, and objectives based on the available information
- A set of feasible implementation measures designed to carry out the goals, policies, and objectives including, but not limited to, all of the following:
  - Feasible ways to avoid or minimize climate change impacts associated with new uses of land
  - Siting new essential public facilities outside of at-risk areas when feasible (including, but not limited to, hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities) or, if these facilities are located in at-risk areas, using construction or other methods to minimize damage
  - The designation of adequate and feasible infrastructure in an at-risk area
  - Guidelines for working cooperatively with relevant local, regional, state, and federal agencies.
  - The identification of natural infrastructure that may be used in adaptation projects, where feasible. Where feasible, the plan shall use existing natural features and ecosystem processes or restore natural features and ecosystem processes, when developing alternatives for consideration.

8.3.2 City of Roseville Sustainability Efforts

The City of Roseville has taken steps to reduce the impacts of climate change through greenhouse gas mitigation and community sustainability efforts:

- The City of Roseville's general plan highlights existing policies and programs that either reduce greenhouse gas emissions, improve air quality, or assist in protecting residents from the potential adverse impacts of climate change (City of Roseville 2020).
- In 2009, the City Council adopted the City-operations Climate Action Plan, which set a greenhouse gas emission reduction goal of 22.8 percent (City of Roseville 2009).
- In 2010 the Community-wide Sustainability Action Plan was developed, recommending 11 steps to reach the greenhouse gas emission targets.) (City of Roseville 2010).

8.4 CLIMATE CHANGE IMPACTS ON HAZARDS

The following sections provide information on how each identified hazard of concern for this planning process may be impacted by climate change. They describe how these impacts may alter current exposure and vulnerability to these hazards of the people, property, critical facilities and environment in the City of Roseville. Detailed hazard profiles and risk assessment information on each hazard of concern are presented in Chapters 9 through 16.

8.4.1 Dam Failure

Climate Change Impacts on the Hazard

On average, changes in California's annual precipitation levels are not expected to be dramatic; however, small changes may have significant impacts for water resource systems, including dams. Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam or levee. If the hygrograph changes, it is conceivable that the dam can lose some or all of its designed margin of safety, also known as freeboard.

If dam freeboard is reduced, dam operators may be forced to release increased volumes earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream. According to the California Department of Water Resources, flood flows on many California rivers have been record-setting since the 1950s. This means that water infrastructure, such as dams, have been forced to manage flows for which they were not designed (DWR, 2007). The California Division of Dam Safety has indicated that climate change may result in the need for increased safety precautions to address higher winter runoff, frequent fluctuations of water levels, and increased potential for sedimentation and debris accumulation from changing erosion patterns and increases in wildfires. According to the Division, climate change also will impact the ability of dam operators to estimate extreme flood events (DWR, 2008).

Dams are constructed with safety features known as "spillways." Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events, often referred to as "design failures," result in increased discharges downstream and increased flooding potential. Although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

Exposure and Vulnerability

The following summarizes changes in exposure and vulnerability to the drought hazard resulting from climate change:

- **Population—**Population exposure and vulnerability to the dam failure hazard are unlikely to change as a result of climate change.
- **Property—**Property exposure and vulnerability to the dam failure hazard are unlikely to change as a result of climate change.
- **Critical facilities—**The exposure and vulnerability of critical facilities are unlikely to change as result of climate change. Dam owners and operators are sensitive to the risk and may need to alter maintenance and operations to account for changes in the hydrograph and increased sedimentation.
- **Environment—**The exposure and vulnerability of the environment to dam failure are unlikely to change as a result of climate change. Ecosystem services may be used to mitigate some factors that could increase the risk of design failures, such as increasing the natural water storage capacity in watersheds above dams.

8.4.2 Drought

Climate Change Impacts on Hazard

The long-term effects of climate change on regional water resources are unknown, but global water resources are already experiencing the following stresses without climate change:

- Growing populations
- Increased competition for available water
- Poor water quality
- Environmental claims
- Uncertain reserved water rights
- Groundwater overdraft

- Aging urban water infrastructure.

With a warmer climate, droughts could become more frequent, more severe, and longer lasting. According to the National Climate Assessment, "higher surface temperatures brought about by global warming increase the potential for drought. Evaporation and the higher rate at which plants lose moisture through their leaves both increase with temperature. Unless higher evapotranspiration rates are matched by increases in precipitation, environments will tend to dry, promoting drought conditions" (U.S. Climate Resilience Toolkit 2021).

Because changes in precipitation patterns are still uncertain, the potential impacts and likelihood of drought are uncertain. California's Department of Water Resources (DWR) has noted impacts of climate change on statewide water resources by charting changes in snowpack, sea level, and river flow. As temperatures rise and more precipitation comes in the form of rain instead of snow, these changes will likely continue or grow even more significant. DWR estimates that parts of the state will experience a 48- to 65-percent loss in snowpack by the end of the century compared to historical averages (California Department of Water Resources 2022). Projections for the planning area show a significant decline in projected snow water equivalent in April snowpack. Increasing temperatures may also increase net evaporation from reservoirs, which would reduce water availability for ecosystems and human use (Mount, Escriva-Bou and Sencan 2021).

Exposure and Vulnerability

The following summarizes changes in exposure and vulnerability to the drought hazard resulting from climate change:

- **Population**—Population exposure and vulnerability to drought are unlikely to increase as a result of climate change. While greater numbers of people may need to engage in behavior change, such as water saving efforts, significant life or health impacts are unlikely.
- **Property**—Property exposure and vulnerability may increase as a result of increased drought resulting from climate change, although this would most likely occur in non-structural property such as crops and landscaping. It is unlikely that structure exposure and vulnerability would increase as a direct result of drought, although secondary impacts of drought, such as wildfire, may increase and threaten structures.
- **Critical facilities**—Critical facility exposure and vulnerability are unlikely to increase as a result of increased drought resulting from climate change; however, critical facility operators may be sensitive to changes and need to alter standard management practices and actively manage resources, particularly in water-related service sectors
- **Environment**—The vulnerability of the environment may increase as a result of increased drought resulting from climate change. Prolonged or more frequent drought resulting from climate change may stress ecosystems in the region, which include many special-status species.

8.4.3 Earthquake

Climate Change Impacts on Hazard

The impacts of global climate change on earthquake probability are unknown, although scientists have identified tiny earthquakes triggered by the change of fault stress loads from rain and snow. Similarly, long-term drought can result in a significant change in the stress load on the Earth's crust.

Pumping of groundwater from underground aquifers by humans, which is exacerbated during times of drought, has also been shown to impact patterns of stress loads by "unweighting" the Earth's crust. A 2014 study looked at the effects of groundwater extraction in California's Central Valley on seismicity on the adjacent San Andreas Fault. The researchers found that such extractions can promote lateral changes in stress to the two sides of the San Andreas, which move horizontally against each other along the boundary of two major tectonic plates. This could cause them to unclamp and slip, resulting in an earthquake (National Aeronautics and Space Administration 2019).

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms or heavy precipitation could experience liquefaction during seismic activity due to the increased saturation. Dams storing increased volumes of water due to changes in the hydrograph could fail during seismic events.

Exposure and Vulnerability

Because impacts of climate change on the earthquake hazard are not well understood, increases in exposure and vulnerability of the local resources are not able to be determined.

8.4.4 Flood

Impacts on Hazard

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example, historical data are used for flood forecasting models and to forecast snowmelt runoff for water supply. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, scientists project greater storm intensity with climate change, resulting in more direct runoff and flooding. High frequency flood events (e.g., 10-year floods) in particular will likely increase with a changing climate. What is currently considered a 1-percent-annual-chance (100-year) flood also may strike more often, leaving many communities at greater risk. Going forward, model calibration must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted.

Climate change is already impacting water resources, and resource managers have observed the following:

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management and ecosystem functions.
- Extreme climatic events will become more frequent, necessitating improvement in flood protection, drought preparedness and emergency response.

The amount of snow is critical for water supply and environmental needs, but so is the timing of snowmelt runoff into rivers and streams. Rising snowlines caused by climate change will allow more mountain areas, such as the Sierra Nevada watersheds, to contribute to peak storm runoff. Changes in watershed vegetation and soil moisture conditions will likewise change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will also change, altering channel shapes and depths, possibly increasing sedimentation behind dams, and affecting habitat and water quality.

Exposure and Vulnerability

The following summarizes changes in exposure and vulnerability to the flood hazard resulting from climate change:

- **Population and Property**—Population and property exposure and vulnerability may increase as a result of climate change impacts on the flood hazard. Runoff patterns may change, resulting in flooding in areas where it has not previously occurred.
- **Critical facilities**—Critical facility exposure and vulnerability may increase as a result of climate change impacts on the flood hazard. Runoff patterns may change, resulting in risk to facilities that have not historically been at risk from flooding. Changes in the management and design of flood protection critical facilities may be needed as additional stress is placed on these systems. Planners will need to factor a new level of safety into the design, operation, and regulation of flood protection facilities such as dams, bypass channels and levees, as well as the design of local sewers and storm drains.
- **Environment**—The exposure and vulnerability of the environment may increase as a result of climate change impacts on the flood hazard. Changes in the timing and frequency of flood events may have broader ecosystem impacts that alter the ability of already stressed species to survive.

8.4.5 Severe Weather

Climate Change Impacts on the Hazard

The science for linking the severity of specific severe weather events to climate change is still evolving; however, some trends provide an indication of how climate change may be impacting these events:

- An increase in average surface temperatures can lead to more intense heat waves. Evidence suggests that heat waves are already increasing, especially in western states. According to information on Cal-Adapt, extreme heat days in Roseville (103ºF is the extreme heat day threshold) are likely to increase from a historical average for four days annually. This increase would be coupled with an increase in heat waves and warm nights (67ºF threshold).
- Climate change impacts on winds are not well understood. Until recently, scientists had predicted rapid inland warming would weaken one of the primary drivers for Santa Ana winds and reduce their frequency. But a 2021 study found that bouts of hot Santa Ana winds are not declining and could even be increasing (Science 2021).
- Climate change may increase the frequency and intensity of thunderstorms and lightning. Thunderstorms occur when the heating of the Earth's surface by sunlight and infrared radiation causes water to condense as buoyant air rises. As land surface warms, stronger updrafts are more likely to produce lightning (Environmental Journal 2021).

Exposure and Vulnerability

The following summarizes changes in exposure and vulnerability to the severe weather hazard resulting from climate change:

- **Population and Property**—Population and property exposure and vulnerability would be unlikely to increase as a direct result of climate change impacts on the severe weather hazard. Severe weather events may occur more frequently, but exposure and vulnerability will remain the same. Secondary impacts, such as the extent of localized flooding, may increase, impacting greater numbers of people and

structures. Exposure of the population to higher heat stress and lower air quality could lead to lower quality of health in the City.

- **Critical facilities**—Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the severe weather hazard; however, critical facility owners and operators may experience more frequent disruption to service provision. For example, more frequent and intense storms may cause more frequent disruptions in power service.
- **Environment**—Exposure and vulnerability of the environment would be unlikely to increase; however, more frequent heat events and more intense rainfall may place additional stress on already stressed systems.

8.4.6 Wildfire

Climate Change Impacts on Hazard

Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation.

Changes in climate patterns may impact the distribution and perseverance of insect outbreaks that create dead trees (increase fuel). When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

Exposure and Vulnerability

The following summarizes changes in exposure and vulnerability to the wildfire hazard resulting from climate change:

- **Population**, **Property and Critical facilities**—According to the Cal-Adapt projections, wildfire risk in the areas surrounding the City of Roseville is expected to increase by 2099. Larger, more frequent fires may impact people, property and critical facilities by increasing the risk of ignition from nearby fire sources. Additionally, secondary impacts such as air quality issues may increase.
- **Environment**—It is likely that the exposure and vulnerability of the environment will be impacted by changes in wildfire risk due to climate change. Natural fire regimes may change, resulting in more frequent or higher intensity burns. These impacts may alter the composition of the ecosystems in areas in and surrounding planning area. Whether areas burn more frequently, or more acreage is burned in each fire, wildlife has the potential to become more stressed as suitable habitat is lost.

9. DAM FAILURE

9.1 GENERAL BACKGROUND

9.1.1 Definition and Classification of Dams

A dam is an artificial barrier that can store water, wastewater, or liquid-borne materials for many reasons—flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, or pollution control. Many dams fulfill a combination of these functions. They are an important resource in the United States. In California, dams are regulated by the State of California Division of Safety of Dams. Additional regulatory oversight of dams is cited in Chapter 6 and described in Appendix B.

The California Water Code (Division 3) defines a dam as any artificial barrier, together with appurtenant works, that does or may impound or divert water, and that either:

- Has a height of more than 6 feet and it impounds 50 acre-feet or more of water, or
- Has a height of 25 feet or higher and impounds more than 15 acre-feet of water

Dams can be classified according to their purpose, the construction material or methods used, their slope or cross-section, the way they resist the force of the water pressure, or the means used for controlling seepage. Materials used to construct dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, plastic, rubber, and combinations of these.

9.1.2 Causes of Dam Failure

Partial or full failure of dams has the potential to cause massive destruction to the ecosystems and communities located downstream. Partial or full failure can occur as a result of one or a combination of the following reasons (FEMA 2016):

- Overtopping caused by floods that exceed the dam capacity (inadequate spillway capacity)
- Prolonged periods of rainfall and flooding
- Deliberate acts of sabotage (terrorism)
- Structural failure of materials used in dam construction
- Movement and/or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams
- Inadequate or negligent operation, maintenance, and upkeep

- Failure of upstream dams on the same waterway
- Earthquake (liquefaction/landslides)

Many dam failures in the United States have been secondary results of other disasters. The most common causes are earthquakes, landslides, extreme storms, equipment malfunction, structural damage, foundation failures, and sabotage. Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable by a program of regular inspections. Terrorism and vandalism are serious concerns that all operators of public facilities must plan for; these threats are under continuous review by public safety agencies.

9.1.3 Planning Requirements

State of California

All dams whose inundation areas may impact the planning area have emergency action plans (EAPs) on file. The EAPs must include the following (Cal OES 2021):

- Emergency notification flow charts
- Information on a four-step response process
- Description of agencies' roles and actions in response to an emergency incident
- Description of actions to be taken in advance of an emergency
- Inundation maps
- Additional information such as revision records and distribution lists

After the EAPs are approved by the state, the law requires dam owners to send the approved EAPs to relevant stakeholders. Local public agencies can then adopt emergency procedures that incorporate the information in the EAP in a manner that conforms to local needs and includes methods and procedures for alerting and warning the public and other response and preparedness related items (Cal OES 2021).

Federal Energy Regulatory Commission

Dams that fall under the jurisdiction of the Federal Energy Regulatory Commission (FERC) also have specified planning requirements. FERC has the largest dam safety program in the United States. It cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more recently, homeland security. FERC requires licensees to prepare emergency action plans and conducts training sessions on how to develop and test these plans. The plans are designed to serve as an early warning system if there is a potential for, or a sudden release of water from, a dam failure or accident to the dam. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows and procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that in emergency situations everyone knows what to do, thus saving lives and minimizing property damage.

FEMA Guidance for Flood Mapping

FEMA's *Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures* is part of the National Dam Safety Program, a partnership of states, federal agencies, and other stakeholders formed to encourage individual and community responsibility for dam safety. Under this program, states are

responsible for regulating non-federal dams. The guidelines provide information for federal and state agencies, local governments, dam owners, and emergency management officials to use for reducing flood hazards and the resulting potential for economic damage and loss of life. It is a resource for developing state-specific guidelines for dam safety and as a reference manual for mapping dam breach inundation zones (FEMA 2013).

Rehabilitation of High Hazard Potential Dams

FEMA's Rehabilitation of High Hazard Potential Dams grant program provides technical, planning, design, and construction assistance for eligible rehabilitation activities that reduce dam risk and increase community preparedness. For the purposes of the HHPD program, the term "rehabilitation" means the repair, replacement, reconstruction, or removal of a dam that is carried out to meet applicable state dam safety and security standards (FEMA 2020).

9.1.4 Rating Dam Hazards

Dam failure can be catastrophic to all life and property downstream. The Division of Safety of Dams has developed a hazard potential classification system for state-jurisdiction dams, as shown on Table 9-1. This system is modified from federal guidelines, which recommend three-tier classification. The California system adds a fourth hazard classification of "extremely high." Dams classified as extremely high hazard may impact highly populated areas or critical infrastructure or have short evacuation warning times.

Table 9-1. State of California Downstream Hazard Potential Classification

Hazard Classification	Potential Downstream Impacts on Life and Property
Low	No probable loss of human life and low economic and environmental losses. Losses are expected to be principally limited to the owner's property.
Significant	No probable loss of human life but can cause economic loss, environmental damage, impacts to critical facilities, or other significant impacts.
High	Expected to cause loss of at least one human life.
Extremely High	Expected to cause loss of at least one human life and one of the following: result in an inundation area with a population of 1,000 or more; or result in the inundation of facilities or infrastructure, the inundation of which poses a significant threat to public safety as determined by the department on a case-by-case basis.

9.1.5 Secondary Hazards

Dam failure can cause severe downstream flooding depending on the magnitude of the failure. Other potential secondary hazards of dam failure include landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat.

9.2 HAZARD PROFILE

9.2.1 Past Events

According to the 2021 Placer County Multi-Hazard Mitigation Plan, there have been six dam failures in or affecting Placer County (none are known to have impacted the Roseville planning area):

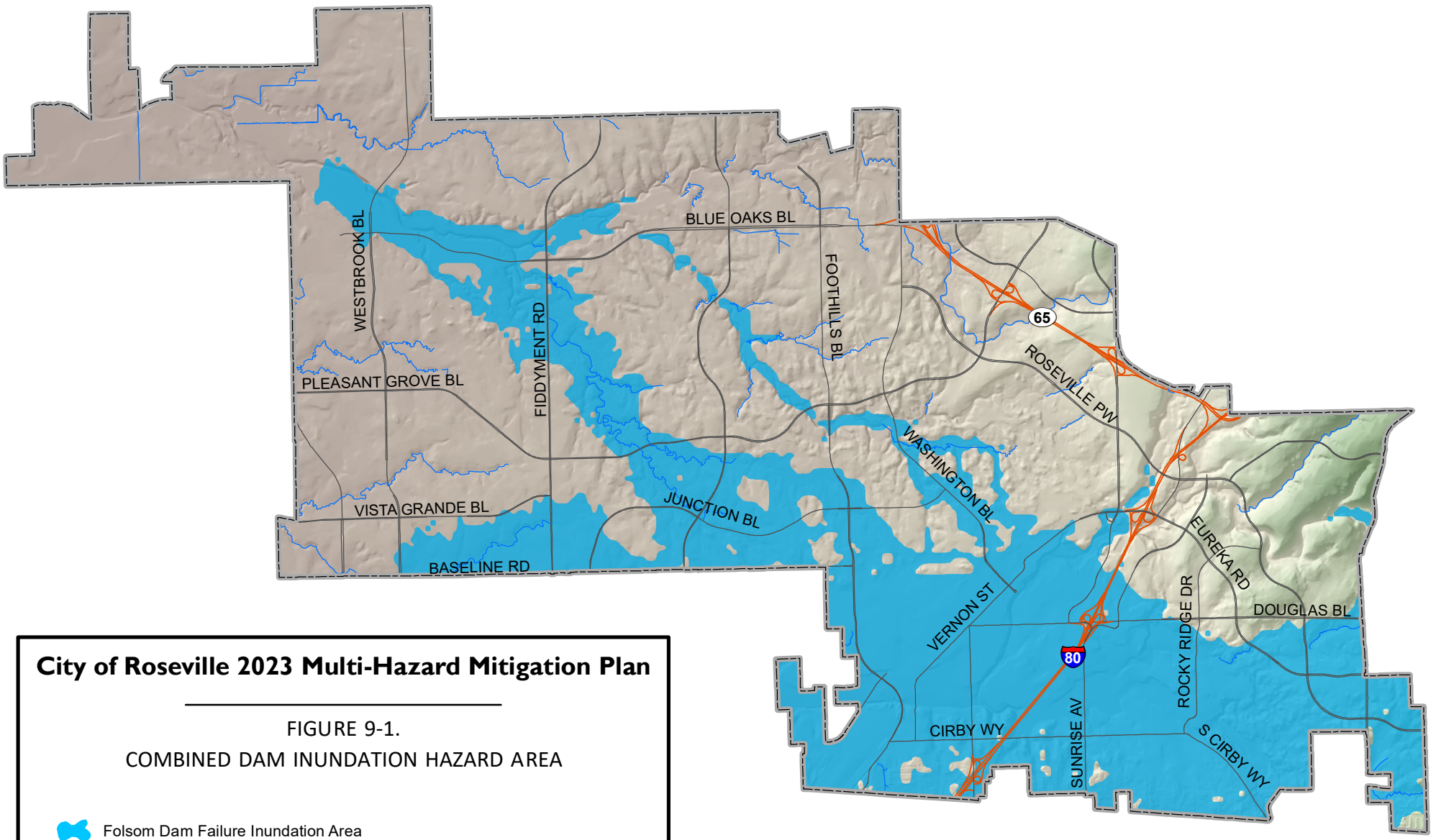
- **Hell Hole Dam Failure**—In 1964, construction of the Hell Hole Dam was underway and the contractor had stopped operations for the winter. A major storm event in December caused the Hell Hole Reservoir

to fill, and since the dam was not completed, it failed, sending a considerable amount of water toward Auburn. The water washed out a bridge on Highway 49 over the American River at the confluence of the North and Middle Forks and flooded a quarry. Due to the way the construction contract was worded, the contractor had to rebuild the dam at his own expense. As a result, Placer County incurred no costs related to this event. No claims for damage were filed against the Placer County Water Agency (PCWA) by either the quarry owner or the state.

- **1986 Auburn Coffer Dam Failure**—As a result of area flooding, the Coffer Dam at Auburn breached and partially washed away. The U.S. Bureau of Reclamation had designed the Coffer Dam for a controlled failure by building a soft earthen plug into the dam for this purpose. It appears the dam failed as designed.
- **August 2004 Ralston Dam Release Gate Break—**A broken release gate on Ralston Dam in the Middle Fork of the American River prompted the National Weather Service to issue a flash flood warning in Placer County. According to the PCWA, the gate near the Ralston Powerhouse malfunctioned, and the sudden release of water from Ralston Reservoir south of Auburn sent a wall of water 3 to 4 feet high down the river. The volume of water released was 800 to 1,000 acre-feet. Sheriff's deputies and California Highway Patrol officers alerted campers in the Auburn State Recreation Area to move to higher ground. The CHP monitored the muddy water as it approached Highway 49. There were no reports of injuries or damage along the river, which is popular with rafters, kayakers and residents during summer.
- **August 2009 Cottonwood Dam**—A privately owned and constructed dam on Miners Ravine in the Hidden Valley Estates subdivision (the Auburn Folsom Road and Twin Rocks Road area of Granite Bay), failed and leached flows and sediment into Miners Ravine. NOAA Fisheries quickly became involved because of the impacts on critical fish species. A temporary fix—a notch in the concrete portion of the dam—was approved and made while the homeowners association and interested agencies determined next steps. A dam removal project with creek restoration is now being proposed.
- **January 2016 Folsom Dam**—Seepage occurred at the Folsom cofferdam during final construction of the new Folsom Dam Auxiliary Spillway on January 20, 2016. The seepage was in the spillway basin. At no time was there a threat of a dam failure.
- **February 2017 Oroville Spillway**—The Oroville Spillway in Butte County was at threat of collapse. An emergency was declared. Placer County supplied evacuation and mutual aid support to Butte County and other affected nearby counties. No damage was sustained in Placer County.

9.2.2 Location

According to the California Division of Safety of Dams, as of 2022 there are 33 dams in Placer County. Of these, the western levees along Folsom Lake, which is a reservoir lined by a series of containment dikes, have the potential to significantly impact the City of Roseville in the event of a failure. Another dam, the Miners Ravine Detention Facility located near Roseville's eastern boundary, has the potential to adversely impact Roseville should it fail. Table 9-2 provides summary information about these two facilities. Figure 9-1 shows the area expected to be inundated in the event of a failure of these dams.



City of Roseville 2023 Multi-Hazard Mitigation Plan

FIGURE 9-1.
COMBINED DAM INUNDATION HAZARD AREA

Folsom Dam Failure Inundation Area

Data Souces
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N W E S

Table 9-2. Dams in Placer and Sacramento Counties With Potential to impact Roseville

Name	Hazard Class[a]	Water Course	Owner	Year Built	Dam Type	Crest Length (feet)	Height (feet)	Storage Capacity (acre-feet)	Drainage area (sq. mi.)
Folsom	1A	American River	US Bureau of Reclamation	1956	Gravity	102,000	275	975,000	1,885
Miners Ravine Detention Facility	1B	Dry Creek	Placer County Flood & Water Conservation District	2007	Earthen	2000	22.5	120	14

a. Downstream Hazard Class 1A: > 300 lives at risk, 1B: 31 to 300 lives at risk

9.2.3 Frequency

Dam failure events are infrequent and usually coincide with the events that cause them, such as earthquakes, landslides and excessive rainfall and snowmelt. A Stanford University study found an average of about 10 dam failures per year nationwide over a period of record from 1848 through 2017 (Stanford University 2018).

All dams face a "residual risk" of failure, which represents the risk that conditions may exceed those for which the dam was designed. For example, dams may be designed to withstand a probable maximum precipitation, defined as "the maximum depth of precipitation at a location for a given duration that is meteorologically possible" (Sarkar and Maity 2020). The chance of a precipitation event of a greater magnitude than that represents residual risk for such dams. This represents a theoretical probability of future occurrence for a dam failure event, though the probability of an event exceeding the assumed maximum is not generally calculated as part of dam design.

9.2.4 Severity

Dam failure can be catastrophic to all life and property downstream. California's hazard ratings, as described in Table 9-1 describe the potential consequences of dam failure based on hazard ratings. For the dams assessed in this plan, with hazard ratings of extremely high, complete failure is expected to cause loss of at least one human life and inundate an area with a population of 1,000 or more or critical facilities whose inundation poses a significant threat to public safety.

The Stanford University study of dam failures nationwide found that many failures were of small dams, with limited flooding or downstream impact. More than 96 percent of the failures did not result in life-safety consequences or significant property damage (Stanford University 2018).

9.2.5 Warning Time

Warning time for dam failure varies depending on the cause of the failure. In events of extreme precipitation or massive snowmelt, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, it is possible that there would be no warning time. The USGS Earthquake Hazards Program has several dam-safety related earthquake programs, including dam-specific earthquake monitoring programs in California to help monitor safety concerns following seismic events.

A dam's structural type affects warning time. Earthen dams do not tend to fail completely or instantaneously. Once a breach is initiated, discharging water erodes the breach until the reservoir is empty or the erosion stops.

Concrete dams also tend to begin with a partial breach. The time of breach formation ranges from a few minutes to a few hours (U.S. Army Corps of Engineers 2014).

The City of Roseville has established protocols for flood warning and response to imminent dam failure in the flood warning portion of its adopted emergency operations plan. Residents should check with City Officials regarding specific evacuation directions and routes.

9.2.6 Folsom Dam Containment Dike Failure Risk Assessment

During the 2005 review of the initial Roseville Hazard Mitigation Plan, FEMA Region IX plan reviewers indicated that there was sufficient risk of dam failure of the western dikes on Folsom Lake (see Figure 9-2). Six dikes, increasing in size and numeric designation (from 1 to 6) from north to south, fill gaps along the western edge of Folsom Lake.

Source: United States Army Corps of Engineers, Michael Nevins



Figure 9-2. Folsom Dam and Folsom Lake on the American River, Looking Northeast

The City developed a comprehensive, scenario-based risk assessment of the western dikes on the Folsom Dam complex during the 2011 Plan update. Detailed inundation modeling and mapping performed as part of this assessment are available to inform the City's preparedness and response to a dam breach of the Folsom Lake containment dike system. Figure 9-3 shows mapping that was created by the City to inform citizens of the direction of flow and possible routes for evacuation during a dam failure event.

The study provided inundation mapping to determine the probable impact of flooding in Roseville if any of the western dikes were to fail. It addressed the relative risk of failure of each dike based on the frequency with which the dikes impound water, the potential for overtopping, recent work to upgrade the dikes to reduce the risk of failure due to piping, and a new reservoir spillway. Models were prepared to simulate dike failures and resulting inundation. These simulations provide the basis for inundation area mapping and other emergency management tools such as maps that illustrate the time from failure to flooding.

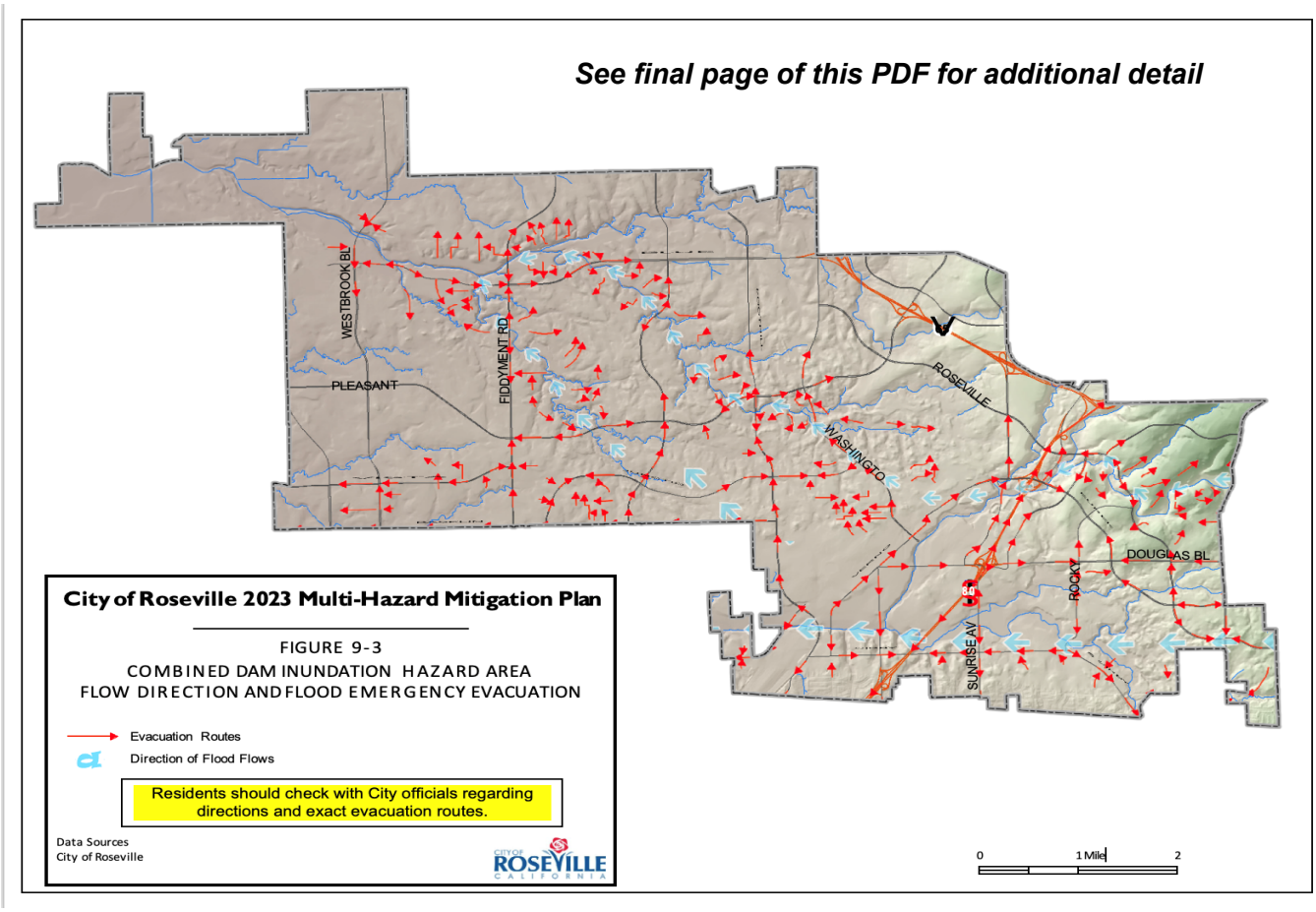


Figure 9-3. Combined Dam Inundation Area Flow Direction and Flood Evacuation Routes

The northern most dikes are relatively low height embankments above the normal operating range of the lake. Though the occurrence of inundation due to dam failure is based on extremely remote conditions, failure of these facilities has the potential to cause significant property damage and loss of life in the City. The degree of impact would be affected by the water level of the lake at the time of failure, which could be just above the top of the dikes in the case of failure by over-topping. The study mapped the maximum depth of flooding and the timing of the flood wave from the time of failure for various scenarios. The study found that flood depths could reach as much as 58 feet in parts of the City.

9.3 EXPOSURE

The flood module of Hazus was used for a Level 2 risk assessment of exposure for the Folsom Dam failure inundation area.

9.3.1 Population and Property

Table 9-3 summarizes the estimated population living in the evaluated flood hazard areas and the estimated property exposure. The number and value of exposed structures by occupancy class is shown in Figure 9-4 and Figure 9-5, respectively.

Table 9-3. Exposed Population and Property in Folsom Dam Failure Inundation Area

Population	
Population Exposed	56,468
% of Total Planning Area Population	38.2%
Property	
Acres of Inundation Area	9,690
Number of Buildings Exposed	19,535
Value of Exposed Structures	$9,510,224,560
Value of Exposed Contents	$6,554,512,266
Total Exposed Property Value	$16,064,736,825
Total Exposed Value as % of Planning Area Total	33.9%

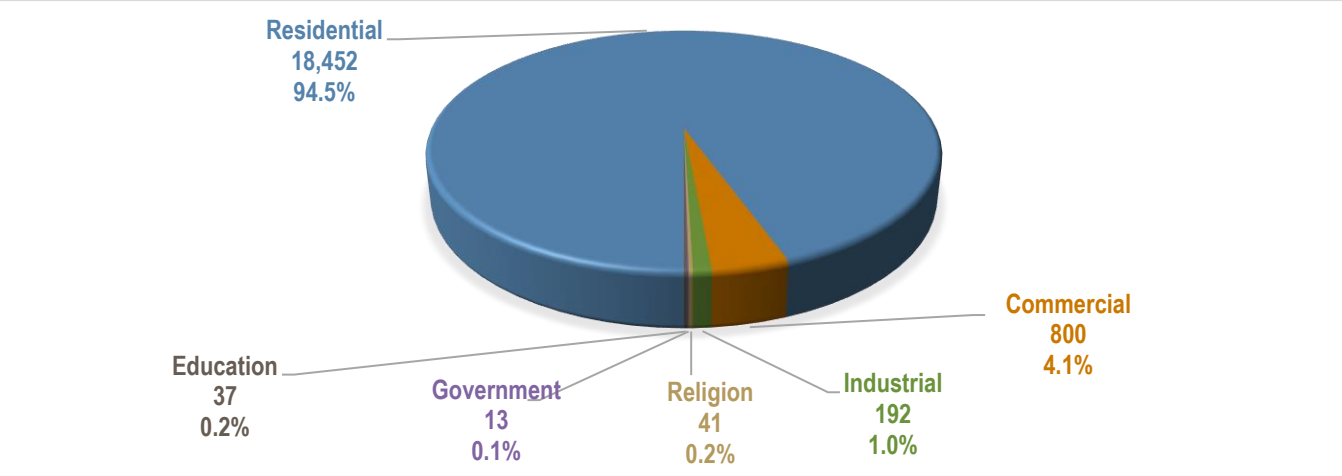


Figure 9-4. Number of Structures in the Dam Failure Inundation Area, by Occupancy Class

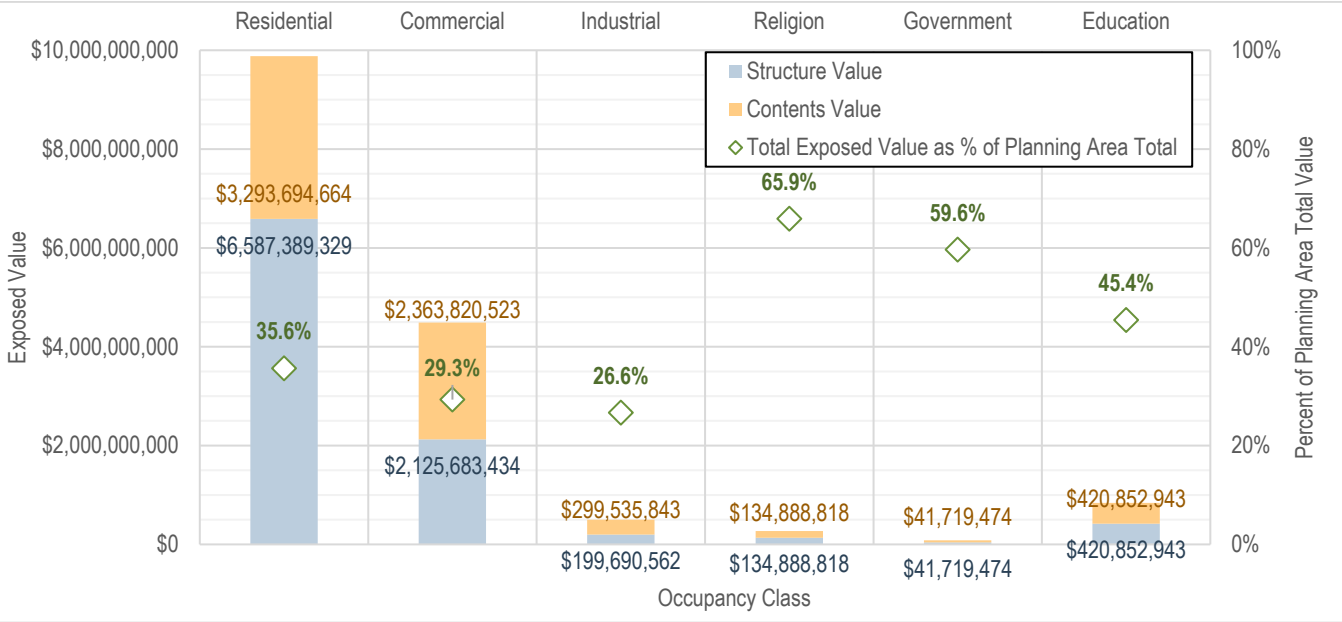


Figure 9-5. Value of Structures in the Dam Failure Inundation Area, by Occupancy Class

9.3.2 Critical Facilities

GIS analysis was used to determine that 291 of the planning area's critical facilities (48.4 percent of the total) are in the Folsom Dam failure inundation area. Figure 9-6 shows the distribution of exposed critical facilities by occupancy class.

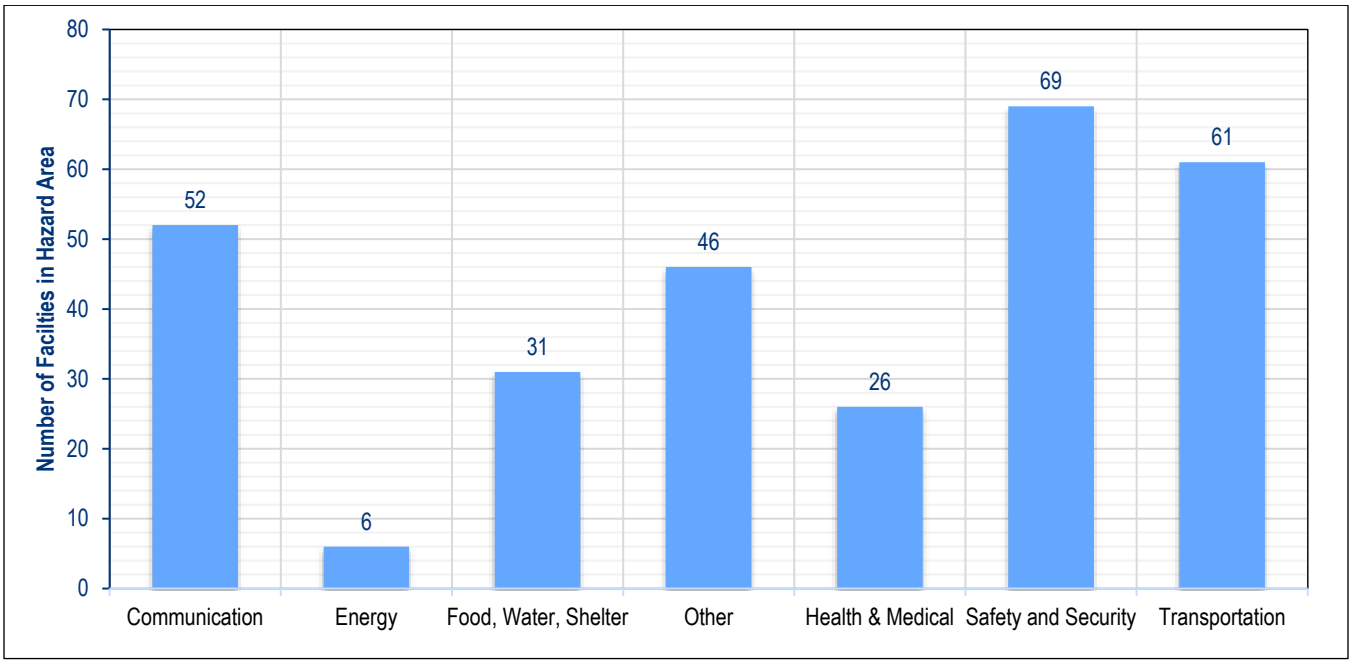


Figure 9-6. Number of Critical Facilities in Folsom Dam Failure Inundation Area

9.3.3 Environment

The environment would be exposed to a number of risks in the event of dam failure. The inundation could introduce many foreign elements into local waterways. This could result in destruction of downstream habitat and could have detrimental effects on many species of animals, especially endangered species such as salmon.

9.4 VULNERABILITY

The flood module of Hazus was used for a Level 2 risk assessment of vulnerability for the Folsom Dam failure inundation area.

9.4.1 Population

Impacts on Persons and Households

The following dam failure impacts on persons and households were estimated through the Level 2 Hazus analysis:

- Displaced Population – 22,335
- Population Requiring Short-Term Shelter – 51

Vulnerable Populations

The GIS analysis of social vulnerability for dam failure found that

Vulnerable populations are all populations downstream from dam failures that are incapable of escaping the area within the allowable time frame. Socially vulnerable populations include the very young, the elderly, and those experiencing poverty. These socially vulnerable populations are most susceptible based on many factors, including their physical and financial ability to react or respond during a hazard and the ability to be self-sustaining for prolonged periods of time after an incident because of limited ability to stockpile supplies. Socially vulnerable populations may live in areas with substantial population density, inhibiting their ability to escape to safety in enough time. Vulnerable populations may also lack adequate warning from television, radio emergency warning systems, or alert and warning messages released on social media due to a lack of access to these tools caused by disparities in economic opportunity and socioeconomic status. The potential for loss of life is affected by the capacity and number of evacuation routes available to populations living in areas of potential inundation.

An especially vulnerable population is found among those experiencing homelessness. Not only do those experiencing homelessness face an inequitable lack of access to resources and basic needs, they also face an exceptional risk of injury due to common shelter locations. Those experiencing homelessness often set up shelter under bridges near or along waterways, presenting an exceptional threat to their lives in the event of dam failure and subsequent flooding.

Table 9-4 shows the findings of the social vulnerability assessment for dam failure, based on economically disadvantaged households.

Table 9-4. Economically Disadvantaged Households in the Mapped Dam Failure Inundation Area

	Number within the Mapped Hazard Area	% of Total in Mapped Hazard Area
All Households	30,652	100.0%
Households with Income Below $40,000	7,456	24.3%

9.4.2 Property

The most vulnerable properties are those closest to the dam failure inundation area. These properties would experience the largest, most destructive surge of water. Low-lying areas are also vulnerable since they are where the dam waters would collect. Transportation routes are vulnerable to dam failure inundation and have the potential to be wiped out, creating isolation issues. This includes all roads, railroads and bridges in the path of the dam failure inundation. Those that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

Table 9-5 summarizes Hazus estimates of dam failure damage in the planning area. The debris estimate includes only structural debris and building finishes; it does not include additional debris that may result from a flood event, such as from trees, sediment, building contents, bridges, or utility lines. Figure 9-7 shows estimated damage by occupancy class.

Table 9-5. Estimated Property Impacts of a Dam Failure Event in the Planning Area

Impacted Structures	
Number of Structures Impacted	19,093
Estimated Loss	
Structures	$3,769,937,244
Contents	$3,358,591,189
Total	***$7,128,528,433***
% of Total Planning Area Replacement Value	**15.0%**
Debris	
Debris to Be Removed	422,413 tons

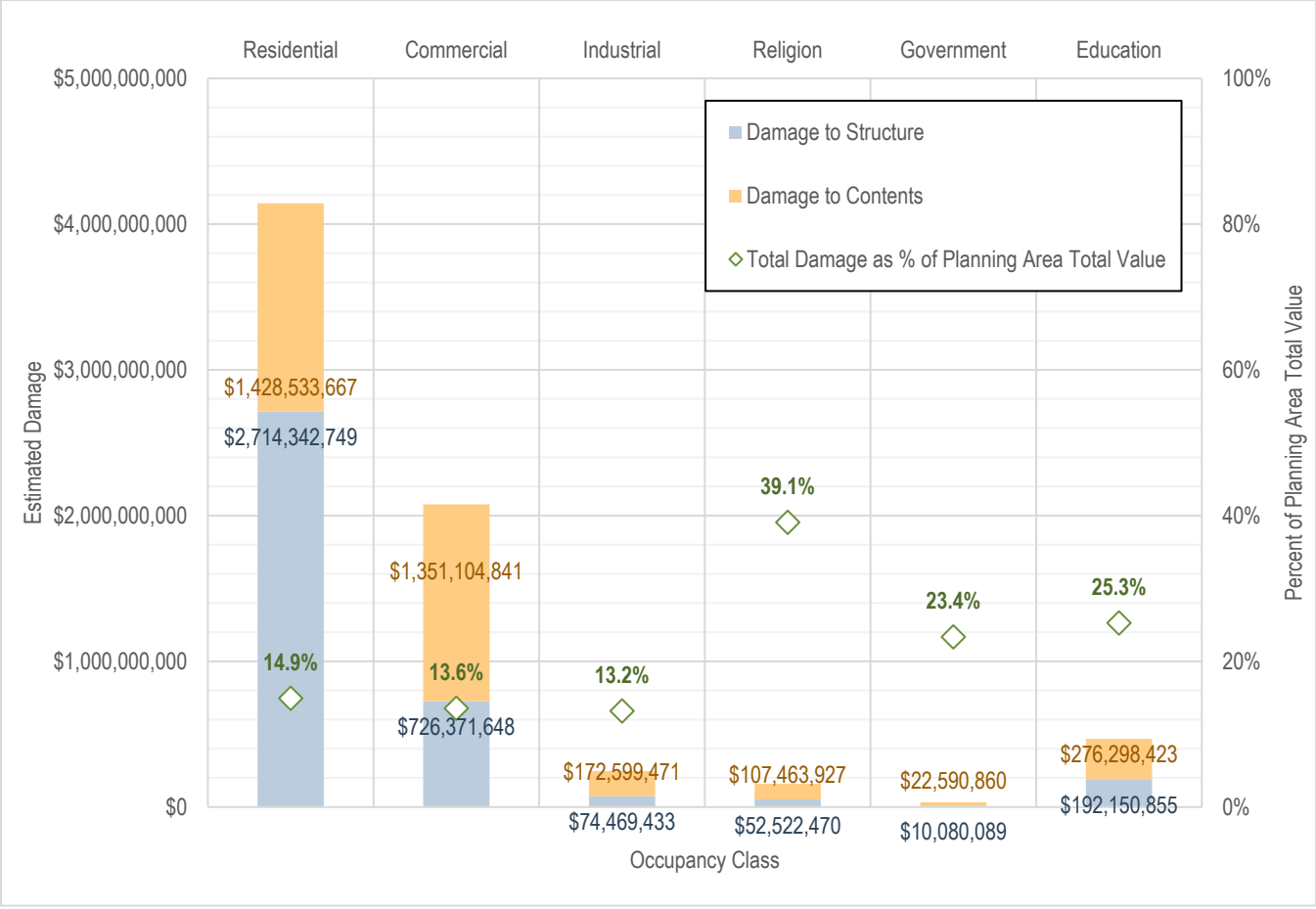


Figure 9-7. Damage to Structures in the Dam Failure Inundation Area, by Occupancy Class

9.4.3 Critical Facilities

Significant Facilities Affected

Critical facilities that would be affected by failure of the Folsom Dam include the following:

- 7 fire stations
- 1 police station
- 26 schools
- 5 government facilities
- 4 community centers
- 15 wastewater collection or treatment facilities
- 12 potable water distribution facilities
- 12 medical care facilities
- 6 electrical power facilities
- 30 communications transmitters
- 57 bridges

Estimated Damage

Figure 9-8 shows the estimated number of affected critical facilities and the estimated damage for the Folsom Dam failure scenario. Depending on community lifeline category, the average amount of damage to structures, measured as a percentage of total value, ranges from 7 to 39 percent of total value. Average damage to contents ranges from 53 to 77 percent.

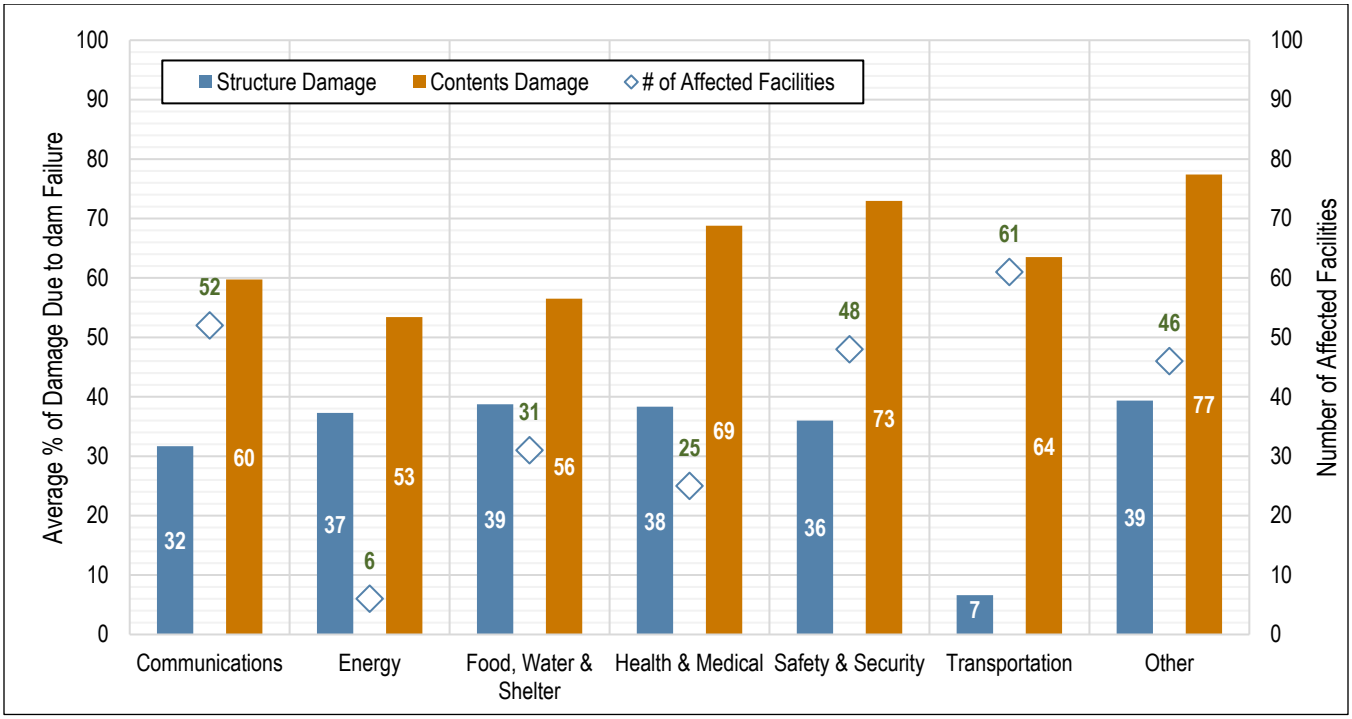


Figure 9-8. Average Damage to Critical Facilities from the Folsom Dam Failure Scenario

9.4.4 Environment

The environment would be vulnerable to a number of risks in the event of dam failure. The inundation could introduce foreign elements into local waterways, resulting in destruction of downstream habitat and detrimental

effects on many species of animals, especially endangered species such as coho salmon. The extent of the vulnerability of the environment is the same as the exposure of the environment.

9.5 FUTURE TRENDS IN DEVELOPMENT

All land use decision-making is guided by the goals, policies and implementation measures contained in the Land Use Element of Roseville's General Plan. The Safety Element of the General Plan establishes standards and plans for the protection of the community from hazards. Dam failure is currently not addressed as a stand-alone hazard in the Safety Element, but flooding is. The City has established comprehensive policies regarding sound land use in identified flood hazard areas. Most of the areas vulnerable to the more severe impacts from the bank-full Folsom Dam failure scenario intersect the City's flood hazard areas. Flood-related policies in the General Plan will help to reduce the risk associated with the dam failure hazard for all future development within the City.

The dam failure risk exposure in the planning area (the value of property within the dam failure inundation area) increased by 22 percent since the last update to this Plan, an increase in value of over $2 billion dollars. This increase in risk exposure can be attributed to a population growth rate of 14.5 percent over the performance period of the prior plan. The planning area also saw in increase in assessed valuation of real property of over 34 percent. This increase in value can be attributed to the continued economic recovery from the 2008 economic downturn, which had a significant impact on the State of California as well as the City of Roseville. Any increase in asset value increases risk exposure when risk is measured by assets exposed, as it is in this Plan.

While the value of property within the dam failure inundation area increased, the estimated loss value in the event of a dam failure decreased by over 28 percent. This decrease in vulnerability could be attributed to two factors:

- New construction that occurred during the performance period for the plan was built to high code standards that reduce the risk. The City of Roseville does not have standards adopted specifically for the dam failure inundation area, but its standards, applied city-wide, include several that would reduce inundation risk within a dam failure inundation area.
- The accuracy of the Hazus model has increased for the current update. The digital elevation model used in current Hazus was based on LiDAR data available to the City and is more accurate than the DEM from the last update.

9.6 REVIEW OF EXISTING ORDINANCES, PROGRAMS AND PLANS

Since most of the dam failure inundation areas overlay the regulated floodplain within the planning area, ordinances and programs in Chapter 4 are applicable to this hazard. The extent of dam failure inundation as well as the estimated flood depths significantly exceed those projected for flooding. Future revisions to the flood programs may want to consider the potential impacts of dam failure in their scope, even though the statistical probability of such an event is low.

9.7 SCENARIO

According to the 2011 Folsom Dam Containment Dike Failure Risk Assessment Project, the worst-case scenario would be a bank-full failure of Dikes 4, 5 and 6 due to overtopping. Overtopping flows may quickly erode the top and downstream portions of the dikes, causing failure. Therefore, there is a possibility of simultaneous failure due to overtopping. However, the likelihood of reservoir inflows that could cause overtopping is extremely low. The

completion of the new Folsom Dam spillway in early 2016 decreased the likelihood even further. Failure from piping could occur at any water surface elevation within the reservoir.

An earthquake within the region could lead to liquefaction of soils around the dams. This could occur without warning during any time of the day. A human-caused failure such as a terrorist attack also could trigger a catastrophic failure of a dam that impacts the planning area.

9.8 ISSUES

The most significant issue associated with dam failure involves the properties and populations in the inundation zones. Flooding as a result of a dam failure would significantly impact these areas. There is often limited warning time for dam failure. These events are frequently associated with other natural hazard events such as earthquakes, landslides or severe weather, which limits their predictability and compounds the hazard. Another significant issue is the loss of the City's primary potable water supply source if the dam were to fail (not overtop). The City would have to rely on significant water demand reductions, interties with other water agencies not dependent on Folsom and groundwater wells to provide some level of water supply to the community. Other important issues associated with dam failure include the following:

- Federally regulated dams have an adequate level of oversight and sophistication in the development of emergency action plans for public notification in the unlikely event of failure. However, the protocol for notification of downstream citizens of imminent failure needs to be tied to local emergency response planning.
- Mapping for federally regulated dams is already required and available; however, mapping that estimates inundation depths is needed for dams that are not federally regulated, in order to better assess the risk associated with failure of these facilities.
- Most dam failure mapping required at federal levels requires determination of the probable maximum flood. While the probable maximum flood represents a worst-case scenario, it is generally the event with the lowest probability of occurrence. For dams that are not federally regulated, mapping of failure scenarios that are less extreme than the probable maximum flood but have a higher probability of occurrence can be valuable to downstream community officials and emergency managers. This type of mapping can illustrate areas potentially impacted by more frequent events to support emergency response and preparedness actions.
- The concept of residual risk associated with structural flood control projects should be considered in the design of capital projects and the application of land use regulations.
- Addressing security concerns and the need to inform the public of the risk associated with dam failure is a challenge for public officials.

10. DROUGHT

10.1 GENERAL BACKGROUND

Drought is a significant decrease in water supply relative to what is typical in a given location. It is a normal phase in the climate cycle of most regions, originating from a deficiency of precipitation over an extended period of time, usually a season or more. This leads to a water shortage for some activity, group or environmental sector. Drought can be characterized based on the following:

- Meteorological measurements such as rainfall deficit compared to normal or expected rainfall
- Agricultural impacts due to reduced rainfall and water supply (e.g., crop loss, herd culling, etc.)
- Hydrological measurements of stream flows, groundwater, and reservoir levels relative to normal conditions
- Direct and indirect socio-economic impacts on society and the economy (e.g., increased unemployment due to failure of an industry because of drought)

Droughts are climatic patterns that occur over long periods of time as the result of many causes. Global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast result in warm, dry air and reduced precipitation. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depend on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of global weather systems.

Droughts originate from a deficiency of precipitation resulting from an unusual weather pattern. If the weather pattern lasts a short time (a few weeks or a couple of months), the drought is considered short-term. If the weather pattern becomes entrenched and the precipitation deficits last for several months or years, the drought is considered long-term. It is possible for a region to experience a long-term pattern that produces drought, and to have short-term changes that result in wet spells within the long-term pattern. Likewise, it is possible for a long-term wet pattern to be interrupted by weather spells that result in short-term drought.

10.1.1 Monitoring and Rating Drought

NOAA Drought Indices

The National Oceanic and Atmospheric Administration (NOAA) has developed several indices to measure drought impacts and severity and to map their extent and locations:

- The ***Palmer Drought Index*** is based on long-term weather patterns. The intensity of drought in a given month is dependent on current weather plus the cumulative patterns of previous months. Weather patterns can change quickly, and the Palmer Drought Severity Index can respond fairly rapidly.

- The ***Palmer Z Index*** measures short-term drought on a monthly scale.
- The ***Palmer Hydrological Drought Index*** quantifies hydrological effects (reservoir levels, groundwater levels, etc.), which take longer to develop and last longer. This index responds more slowly to changing conditions than the Palmer Drought Index.
- The ***Palmer Crop Moisture Index*** measures short-term drought weekly to assess impacts on agriculture.
- The ***Standardized Precipitation Index*** considers only precipitation. A value of zero indicates the median precipitation amount; the index is negative for drought and positive for wet conditions. The Standardized Precipitation Index is computed for time scales ranging from one month to 24 months.

Maps of these indices show drought conditions nationwide at a given point in time. They are not necessarily indicators of any given area's long-term susceptibility to drought. The most current versions of the maps at the time of this plan's preparation are shown on Figure 10-1.

U.S. Drought Monitor

The U.S. Drought Monitor (USDM) is a map that is updated weekly to show the intensity of drought across the country. The USDM uses a five-category system (National Integrated Drought Information System 2022):

- D0—Abnormally Dry
  - Short-term dryness slowing planting, growth of crops
  - Some lingering water deficits
  - Pastures or crops not fully recovered
- D1—Moderate Drought
  - Some damage to crops, pastures
  - Some water shortages developing
  - Voluntary water-use restrictions requested
- D2—Severe Drought
  - Crop or pasture loss likely
  - Water shortages common
  - Water restrictions imposed
- D3—Extreme Drought
  - Major crop/pasture losses
  - Widespread water shortages or restrictions
- D4—Exceptional Drought
  - Exceptional and widespread crop/pasture losses
  - Shortages of water creating water emergencies

The USDM categories show experts' assessments of conditions related to drought. These experts check variables including temperature, soil moisture, water levels in streams and lakes, snow cover, and meltwater runoff. They also check whether areas are showing drought impacts such as water shortages and business interruptions. Associated statistics show what proportion of various geographic areas are in each category of dryness or drought, and how many people are affected. U.S. Drought Monitor data go back to 2000.

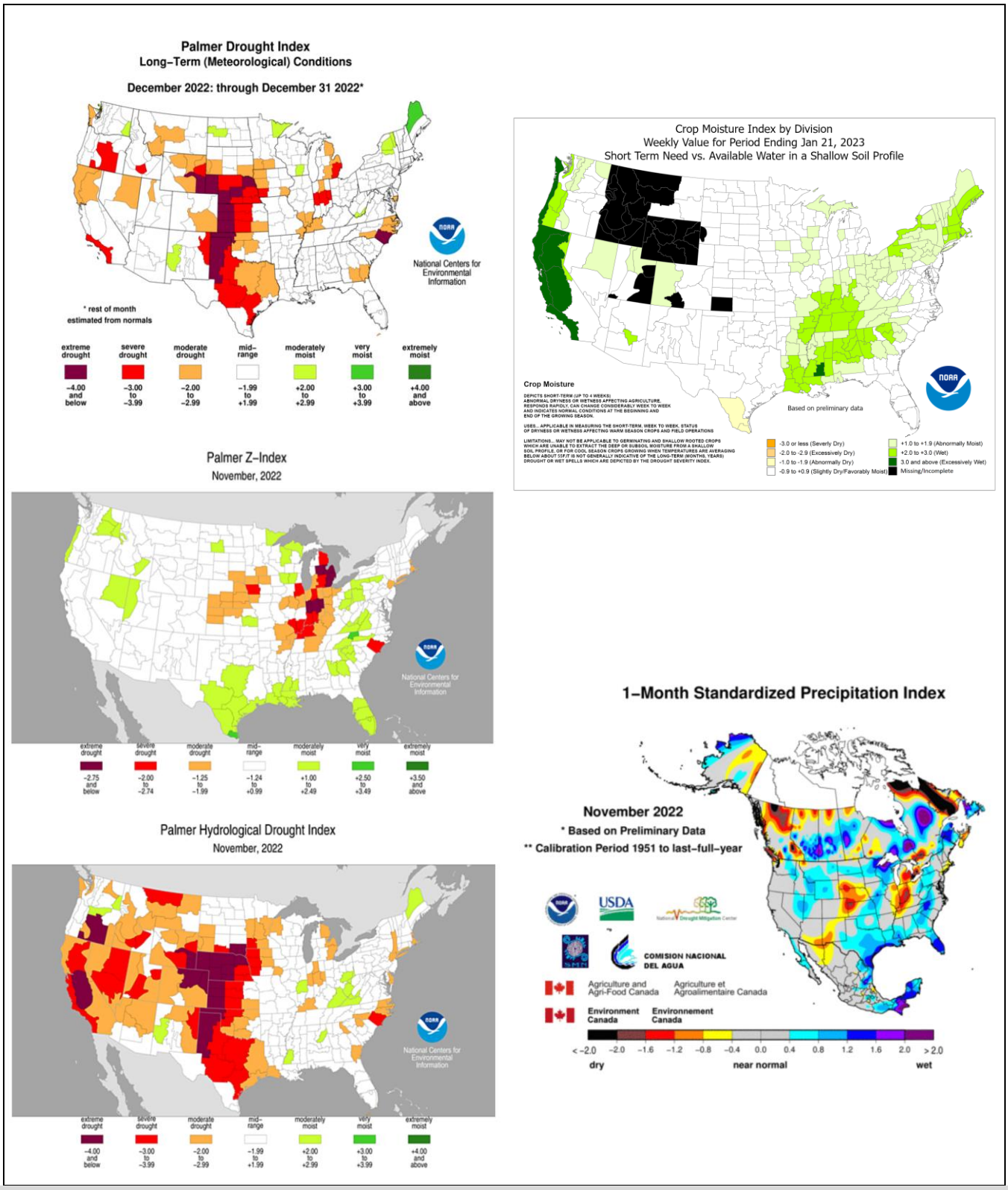


Figure 10-1. Example Drought Index Maps (November and December 2022)

10.1.2 Drought Impacts

Drought can have a widespread impact on the environment and the economy, although it typically does not result in loss of life or damage to structures, as do other natural disasters.

The National Drought Mitigation Center uses three categories to describe likely drought impacts:

- **Economic Impacts**—These impacts of drought cost people (or businesses) money. Farmers' crops are destroyed; low water supply necessitates spending on irrigation or drilling of new wells; water-related businesses (such as sales of boats and fishing equipment) may experience reduced revenue.
- **Environmental Impacts**—Plants and animals depend on water. When a drought occurs, their food supply can shrink, and their habitat can be damaged.
- **Social Impacts**—Social impacts include public safety, health, conflicts between people when there is not enough water to go around, and changes in lifestyle.

The demand that society places on water systems and supplies—such as expanding populations, irrigation, and environmental needs—contributes to drought impacts. Drought can lead to difficult decisions regarding the allocation of water, as well as stringent water use restrictions, water quality problems, and inadequate water supplies for fire suppression. There are also issues such as growing conflicts between agricultural uses of surface water and in-stream uses, surface water and groundwater interrelationships, and the effects of growing water demand on uses of water.

Vulnerability of an activity to drought depends on its water demand and the water supplies available to meet the demand. The impacts of drought vary between sectors of the community in both timing and severity:

- **Water supply—**The water supply sector encompasses urban and rural drinking water systems that are affected when a drought depletes groundwater supplies due to reduced recharge from rainfall.
- **Agriculture and commerce—**Impacts on the agriculture and commerce sectors include the reduction of crop yield and livestock sizes due to insufficient water supply for crop irrigation and maintenance of ground cover for grazing.
- **Environment, public health, and safety—**The environmental, public health, and safety sector focuses on wildfires that are both detrimental to the forest ecosystem and hazardous to the public. It also includes the impact of desiccating streams, such as the reduction of in-stream habitats for native species.

10.1.3 Secondary Hazards

The secondary hazard most commonly associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends. Millions of board feet of timber have been lost, and in many cases erosion occurred, which caused serious damage to aquatic life, irrigation, and power production by heavy silting of streams, reservoirs, and rivers.

Drought also is often accompanied by extreme heat, exposing people to the risk of sunstroke, heat cramps and heat exhaustion. Pets and livestock are also vulnerable to heat-related injuries.

10.2 HAZARD PROFILE

10.2.1 Roseville Water System and Drought Response

Water Supply Infrastructure

Rain and snowfall in the American River watershed eventually flow into Folsom Lake, a reservoir within the U.S. Central Valley Project. These flows directly affect water availability for Roseville water users. The City of Roseville owns the Roseville water system and water treatment plant and has negotiated contracts with the U.S. Bureau of Reclamation, the Placer County Water Agency (PCWA), and the San Juan Water District (SJWD) to ensure that water needs are met for existing and future growth.

The City of Roseville Water Treatment Plant is on Barton Road east of Roseville. Constructed in 1971, the plant treats water from Folsom Lake to Environmental Protection Agency (EPA) domestic drinking water standards. The City owns a water system network consisting of water mains ranging from 4 to 66 inches in diameter. The system is designed to deliver an adequate supply of water throughout the community at an acceptable pressure level for domestic and fire flow purposes. A booster pump station near East Roseville Parkway and North Sunrise Boulevard is designed to provide sufficient water pressure to the higher elevations of the City and to fill and manage reservoirs in the system. Some areas within the Roseville city limits are served by PCWA, SJWD, or the City of Citrus Heights where topography and facility locations make it beneficial to do so.

The City maintains the capability to supplement its water supply in drought conditions with groundwater wells. These wells are planned to be used primarily to offset surface water cutbacks in times of drought or other emergencies. The City's groundwater wells are equipped to implement aquifer storage and recovery, in which potable water can be injected into the underground aquifers in wet years and recovered in dry years for public use. In addition, the City operates a recycled water system to lessen the use of potable water for irrigating landscaped areas.

The Water Forum

The Water Forum is a group of business and agricultural leaders, citizens groups, environmentalists, water managers, and local governments originally formed in Sacramento County. Water managers in Placer and El Dorado Counties joined the group in 1995. The City of Roseville is a member of the Water Forum and a signatory to the January 2000 Water Forum Agreement. The agreement provides a framework for how future surface water and groundwater supplies will be used in the region through 2040.

Although Roseville's water contract entitlements total 66,000 acre-feet per year, the City's diversions from the American River are limited by the Water Forum Agreement. In normal/wet years, the City has agreed to limit diversions from the American River to 58,900 acre-feet per year. In driest years (also called critically dry years), the maximum diversion from the American River is 39,800 acre-feet. In drier years, the City may divert between 39,800 and 54,900 acre-feet, depending on the unimpaired flow into Folsom Lake.

During the drier and driest years, the City agreed to have PCWA release an additional 20,000 acre-feet per year of water down the American River on the City's behalf through re-operation of PCWA's American River Middle Fork Project. This is not part of the City's contracted supply of 66,000 acre-feet per year. The intent of Middle Fork Project re-operational releases during drier and driest years is to mitigate environmental impacts resulting from increased diversions above 1995 baseline levels.

Roseville's water supply contracts, in combination with future planned supply sources, base level conservation measures, and groundwater resources, ensure that the City is well positioned to meet projected water needs.

Local Water Contracts—Definition of Drought

Roseville's drought levels are defined by the 2000 Water Forum agreement. The definition is based on the type of hydrologic year for inflow to Folsom Lake, as defined by 70 years of hydrologic data into the lake. The hydrological year types are as follows:

- **Baseline**—Baseline means the maximum amount of water that suppliers diverted from the American River in any one year through 1995 or, in certain instances, other amounts specified in a Purveyor Specific Agreement. For the City of Roseville, the baseline amount is 19,800 acre-feet per year.
- **Normal/Wet Years**—When the projected unimpaired flow into Folsom Reservoir is greater than or equal to 950,000 acre-feet
- **Drier Years**—When the projected unimpaired flow into Folsom Reservoir is between 400,00 acre-feet and 950,000 acre-feet
- **Driest Years**—When the projected unimpaired flow into Folsom Reservoir is less than 400,000 acre-feet.

Water Future Initiative

In the face of water supply challenges related to changing weather conditions and increasingly stringent State regulations, the City has embarked on the Roseville Water Future Initiative—a proactive, comprehensive planning effort to diversify water supplies and maintain a high level of reliability for years to come. The Roseville Water Future Initiative will ensure that the City can work through all regulatory hurdles and build an investment strategy that includes funding mechanisms to cover any costs should a project component become viable (City of Roseville 2022).

The Water Future Initiative will improve the system's drought resilience and increase drinking water supply by providing additional storage of recycled water for the City. The project will construct a new 12 million-gallon-per-day tertiary filtration system and use innovative technology to pilot a carbon-based advanced treatment train to recycle water for reuse. It will also expand Roseville's Aquifer Storage and Recover Program with six new well sites to store the recycled water in the aquifer, protecting the water supply from the impacts of climate change while promoting statewide water conservation (EPA 2022). The project will achieve the following (EPA 2022):

- Diversify drinking water supplies and improve reliability, reducing impacts of drought due to climate change.
- Promote water reuse in a water-constrained region by advancing an alternative water recycling technology.
- Provide greater flexibility for operations of Folsom Lake by storing flood water for beneficial uses locally.
- Save the City of Roseville an estimated $8 million from financing with a WIFIA loan.

Water Supply Strategy

The water supply strategy for the City of Roseville uses a comprehensive approach to ensure water reliability for customers. The City has a diverse set of water supply options—including surface water contracts, recycled water,

and groundwater wells—to ensure that even following a period of dry years, a combination of available water supplies and water conservation measures will meet the community's water needs. The City has contracts for surface water with three agencies (see Table 10-1):

- The primary water contract is with the U.S. Bureau of Reclamation (USBR) for 32,000 acre-feet per year of surface water from Folsom Lake.
- The City also has a contract with PCWA for 30,000 acre-feet of water from PCWA's American River Middle Fork Project. The City has a long-term agreement with the USBR to wheel PCWA water supplies through Folsom Reservoir for delivery to the City's water treatment plant.
- The third source of surface water for the City of Roseville is an additional 4,000 acre-feet of PCWA water transferred through SJWD. SJWD is a water district in Sacramento and Placer Counties that draws water from Folsom Lake. SJWD also wholesales water to Citrus Heights Water District, Fair Oaks Water District and Orangevale Water Company in Sacramento County. The City of Roseville has entered into a reallocation agreement with SJWD for this 4,000 acre-feet per year, which is a normal-year water supply only—it is not available for use during drought conditions.
- With the approval of the Amoruso Ranch Specific Plan, the City is pursuing an additional contract through PCWA, through its planned Ophir Water Treatment Plant facility. This new source and supply of water will not be dependent on Folsom Lake deliveries and will increase water reliability citywide. It is not subject to cutbacks during dry or driest years, and is estimated to provide 1,500 acre-feet of additional supply once the plant is online.
- The City maintains six groundwater wells for emergency and dry-year supply, with plans to install 10 more in coming years as new development progresses. All wells are equipped for aquifer storage and recovery.

Table 10-1. City of Roseville Water Supply Contracts and Resources

Source	Contract Amount (acre-feet per year) [a]	Supply Projections [b]				
		2025	2030	2035	2040	2045
U.S. Bureau of Reclamation	32,000	32,000	32,000	32,000	32,000	32,000
San Juan Water District	4,000	4,000	4,000	4,000	4,000	4,000
Placer County Water Agency		30,000	30,000	30,000	30,000	30,000
Treated Water (Additional Future Purchase)	N/A	0	1,500	1,500	1,500	1,500
Exercised	10,000					
Two additional options	20,000					
Placer County Water Agency Total	***30,000***					
Recycled Water	N/A	*4,022*	*4,435*	*4,933*	*4,933*	4,933
Total	**66,000**	**70,022**	**71,935**	**72,433**	**72,433**	**72,433**

a. N/A = Not Applicable based on future contract or existing recycled resources
b. Based on reasonable available volume.

Based on hydrologic data for the American River, there is a probability that rainfall will be insufficient once every 17 years to supply Folsom Lake and guarantee the City of Roseville its existing contract amounts. In these years, the City by agreement is required to find alternate sources of supply.

Having the flexibility to use both the USBR and PCWA contractual supplies during a drier year or driest year enables the City to provide a reliable surface water supply for municipal and industrial uses. Any shortages can easily be compensated for by water use reductions through conservation (implementation of drought stages as

outlined in the Roseville Municipal Code). By incorporating emergency groundwater reserves into the water supply strategy, the City's reliability is increased further still.

The City's 2020 Urban Water Management Plan outlines the potable water supply reliability for normal and dry years, as well as for a three-year drought. Water would be supplied by the American River through Folsom Lake, with conservation measures and groundwater reserves implemented as needed. Roseville's recycled water utility is expected to provide an offset to demand for irrigation supply, thereby reducing the demand for potable water. A summary of the water supply reliability until 2040 for multiple dry water years is provided in Table 10-2.

Table 10-2. Water Supply Reliability by 2040

	Normal Water Year	Single Dry Water Year	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
Surface Water (acre-feet)	60,400[a]	39,500[b]	52,894[b]	55,500	46,926[c]
Groundwater (acre-feet)	0	6569	0	0	0
Recycled Water (acre-feet)	4,838	4,838	4,838	4,838	4,838
Projected Demand (acre-feet)	50,907[d]	50,907[d]	50,907 [d]	50,907 [d]	50,907 [d]
Surplus or (Deficit) (acre-feet)[e]	4,655	0	6,826	8,931	857

a. Although additional water is under contract, surface water supplies are available based on Water Forum agreement diversion commitments. This projection includes anticipated PCWA supply from the future Ophir Water Treatment Plant project.
b. Although contracts are in place for normal water year supplies of 67,500 acre-feet, the supply shown is consistent with Water Forum agreement diversion limits and the limitation that 4,000 acre-feet of SJWD supplies are only available for use in normal years.
c. Surface supply reduction is consistent with Water Forum supply agreement anticipating worst case shortage (driest years).
d. No conservation measures are assumed for any year type.
e. Assume full use of available recycled water to offset potable demand for landscape irrigation.

Source: (Contra Costa Health Services 2022)

10.2.2 Past Events

State of California

The California Department of Water Resources has state hydrologic data back to the early 1900s (http://watersupplyconditions.water.ca.gov). The hydrologic data show multi-year droughts from 1912 to 1913, 1918 to 1920 and 1922 to 1924. Since then, four prolonged periods of drought occurred in California:

- **1929 to 1934 Drought**—The 1929 to 1934 drought established the criteria for designing the supply and yield of many large Northern California reservoirs. The Sacramento Valley runoff was 55 percent of average for the time period from 1901 to 1996, with only 9.8 million acre-feet received.
- **1975 to 1977 Drought**—California had one of its most severe droughts due to lack of rainfall during the winters of 1976 and 1977. 1977 was the driest period on record in California, with the previous winter recorded as the fourth driest in California's hydrological history. The cumulative impact led to widespread water shortages and severe water conservation measures throughout the state. Only 37 percent of the average Sacramento Valley runoff was received, with just 6.6 million acre-feet recorded. Over $2.6 billion in crop damage was recorded in 31 counties. A federal disaster declaration was declared in Placer County and surrounding counties.
- **1987 to 1992 Drought**—California received precipitation well below average levels for four consecutive years. While the Central Coast was most affected by the lack of rainfall and low runoff, the Sierra Nevada range in Northern California and Central Valley counties including Placer County were also affected. During this drought, only 56 percent of average runoff for the Sacramento Valley was received, totaling

just 10 million acre-feet. By February 1991, all 58 counties in California were suffering from drought conditions. Urban areas as well as rural and agricultural areas were impacted.

- **2012 to 2016 Drought**—California's 2012 – 2016 drought set several records for the state:
  - The period from 2012 to 2014 ranked as the driest three consecutive years for statewide precipitation.
  - 2014 set new climate records for statewide average temperatures and for record-low water allocations in the State Water Project and federal Central Valley Project.
  - 2013 set minimum annual precipitation records for many communities.
- **2020 – 2022**—The drought from 2020 to 2022 set a new record for the driest three-year period in the state; 2022 saw the driest January, February, and March in over 100 years (California Department of Water Resources 2022). On March 28, 2022, the Governor signed an executive order proclaiming continuing drought conditions. The 2022 water year ended with statewide precipitation at 76 percent of average. As of October 3, 2022, statewide reservoir storage was 69 percent of average for that time of year. Lake Oroville, the State Water Project's largest reservoir, was at 64 percent of average for that time of year (California Department of Water Resources 2022).

Placer County

The following additional drought impacts have affected Placer County:

- **1977**—A federal disaster declaration was made as a result of a drought affecting Placer and surrounding counties. The PCWA declared a water shortage and restricted water use for both irrigation and treated water users. The restrictions included a 50-percent reduction in water usage by customers and rate increases. This shortage lasted until January 1978 when the PCWA terminated its restrictions.
- **1988**—Again the PCWA declared a water emergency. All customers had their water use reduced by 25 percent, and rates were again increased for excessive usage. The countywide emergency prohibited washing of sidewalks, driveways, parking lots and other hard surfaces, restricted the washing of vehicles, airplanes, and trailers to 3 gallons of water, prohibited fire hydrant flushing and drills, prohibited filling of pools, and prohibited new agricultural land irrigation.
- **1991—**Raw water customers had their water usage reduced by 50 percent annually and by 25 percent seasonally. Treated water users were given most of the same restrictions and prohibitions as in 1988. Due to a very late storm season, the emergency was lifted by April 1991.
- **2008—**The Governor of California declared a drought on June 4, 2008. In July 2009, PCWA reported the implementation of normal ongoing conservation measures.
- **2014—**On February 6, 2014, PCWA adopted a resolution declaring a water shortage emergency. This is the most recent declaration from PCWA. It was rescinded in February 2016.
- **2022**—On May 24, the PCWA moved to Stage 2 of its Water Shortage Contingency Plan, asking users to reduce their water usage by 20 percent. This requested resale water suppliers to implement comparative conservation measures; restricted landscape and turf watering to specific hours; and prohibited washing impervious surfaces and non-essential flushing of mains and fire hydrants (PCWA 2022).

Roseville Drought History

Roseville's drought history parallels the water shortages for the State of California and Placer County. The Roseville City Council has declared official drought alerts three times:

- From April 1991 to March 1993 when Stage 2 drought water restrictions were in effect and enforced through full-time water patrols.
- In May 2008 when the City of Roseville's Environmental Utilities Department activated a Stage 1 drought alert.
- In 2014, when the City enacted a Stage 3 drought alert asking residents to reduce water demand by 28 percent compared to 2013 water use.
  - In response to the 2014 drought, the City of Roseville took a proactive approach to water conservation. The City enacted water waste patrols, limited watering for residential and non-residential customers to specific days of the week depending on the time of year, and enacted funding for utility support. With a 2015 reduction target of 278 gallons per capital per day, Roseville's conservation efforts resulted in an actual accomplishment of 165 gallons per capital per day, far exceeding goals and expectations (City of Roseville 2022).
  - In May 2016, the City of Roseville adopted a 10 percent voluntary water reduction goal for water customers that lasted through January 2017 (City of Roseville 2016).
- In August 2021, the City of Roseville announced a mandatory 20 percent water use reduction, building upon a voluntary water use reduction announced in May of the same year. This was in response to severe reductions in water supply at Folsom Lake and Stage 2 drought conditions (City of Roseville 2021)

10.2.3 Location

Drought is a regional phenomenon. A drought that affects the planning area would affect the entirety of the area simultaneously and has the potential to directly or indirectly impact every person in the county as well as adversely affect the local economy.

10.2.4 Frequency

Drought has a high probability of occurrence in the planning area. From January 2000 to April 2023, some part of Placer County experienced a USDM rating of D1 or higher in 669 out of 1,218 weeks (see Figure 10-2). Historical drought data for the Placer County region indicate that, in the 93 years from 1929 through 2021, five multi-year droughts have spanned a total of 22 years. This averages to a five-year drought about every 18 years, or an 18.6 percent chance of a drought in any given year.

10.2.5 Severity

Placer County and Roseville have a history of severe droughts. As shown in Figure 10-2, at least part of the county has experienced extreme (D3) or exceptional (D4) droughts multiple times since 2014.

Drought can have a widespread impact on the environment and the economy, although it typically does not result in loss of life or damage to property, as do other natural disasters. Nationwide, the impacts of drought occur primarily in the agriculture, transportation, recreation and tourism, forestry, and energy sectors. Social and environmental impacts are also significant, although it is difficult to put a precise cost on these impacts. The National Drought Mitigation Center uses the following categories to describe likely drought impacts:

- Water supply—Drought threatens supplies of water for irrigated crops and for communities.
- Fire hazard—Drought increases the threat of wildfires from dry conditions in forest and rangelands.

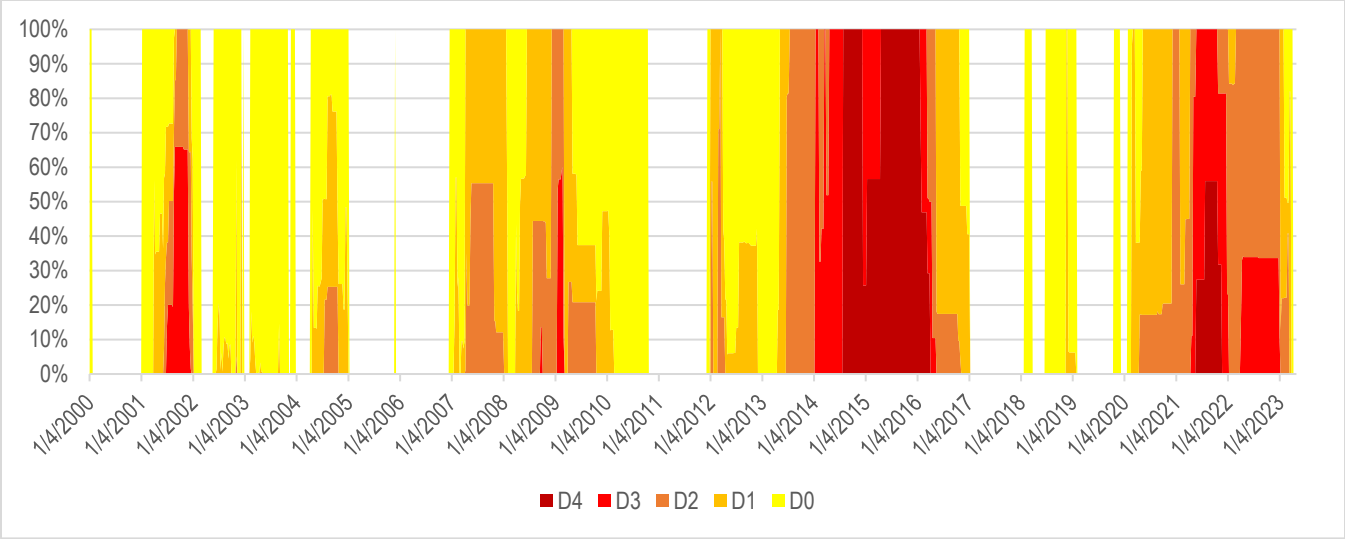


Figure 10-2. Percent of Placer County Affected by USDM Ratings, 2000 – 2023

The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts. When measuring the severity of droughts, analysts typically look at economic impacts. All people could pay more for water if utilities increase their rates due to shortages. Other water- or electricity-dependent industries are commonly forced to shut down all or a portion of their facilities, resulting in further layoffs. A drought can harm recreational companies that use water (e.g., swimming pools, water parks, and river rafting companies) as well as landscape and nursery businesses.

Drought generally does not affect groundwater sources as quickly as surface water supplies, but groundwater supplies generally take longer to recover. Reduced precipitation during a drought means that groundwater supplies are not replenished at a normal rate. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry. Shallow wells are more susceptible than deep wells. Reduced replenishment of groundwater affects streams. Much of the flow in streams comes from groundwater, especially during the summer when there is less precipitation and after snowmelt ends. Reduced groundwater levels mean that even less water will enter streams when steam flows are lowest.

Roseville is largely urbanized with little agricultural interest remaining. Lack of sufficient water supply would affect residents and businesses that rely on water for their daily household, employee, and industrial needs.

10.2.6 Warning Time

Droughts are climatic patterns that occur over long periods of time. Only generalized warning can take place due to the numerous variables that scientists have not pieced together well enough to make accurate and precise predictions.

Empirical studies conducted over the past century have shown that meteorological drought is never the result of a single cause. It is the result of many causes, often synergistic in nature; these include global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast with warm, dry air resulting in less precipitation.

At this time, scientists do not know how to predict drought more than a month in advance for most locations. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades.

10.3 EXPOSURE AND VULNERABILITY

All people, property and environments within the City of Roseville would be exposed to some degree to the impacts of moderate to extreme drought conditions.

10.3.1 Population

Drought can affect people's health and safety as well as other impacts. Health problems related to low water flows, poor water quality, or dust could arise. Additional possible impacts include recreational risks; air quality reduction; diminished living conditions related to compromised, local hydroelectric power sources; compromised food and nutrition; and increased incidence of illness and disease. Vulnerable populations who rely on rainfall catchment for residential water supply may be especially impacted if they do not have the physical or financial ability to obtain imported water to refill dry catchment tanks. How and to what degree drought affects the City's vulnerable populations does vary depending on scope and severity.

The City of Roseville, regional water purveyors, members of the Water Forum, and the USBR have spent considerable time and effort to protect life, safety and health should several consecutive dry years occur. Provisions and measures have been taken to analyze and account for anticipated water shortages. The City has the ability to minimize any impacts on residents and water consumers in Roseville. No significant life or health impacts are anticipated as a result of drought in Roseville.

10.3.2 Property

No structures will be directly affected by drought conditions in Roseville, though some structures may become vulnerable to wildfires, which are more likely following years of drought.

10.3.3 Critical Facilities

Critical facilities as defined for this Plan will continue to be operational during a drought. Critical facility elements such as landscaping may not be maintained due to limited resources, but the risk to the City's critical facilities inventory will be largely aesthetic. These aesthetic impacts are not considered significant.

10.3.4 Environment

Environmental losses are the result of damage to plants, animals, habitat, and air and water quality; wildfires; degradation of landscape; loss of biodiversity; and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes, and vegetation. However, many species will eventually recover from this temporary aberration. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity. Although environmental losses are difficult to quantify, growing public awareness and concern for environmental quality has forced public officials to focus greater attention and resources on these effects.

10.3.5 Economic Impact

Economic impact will be largely associated with industries that use water or depend on water for their business. For example, landscaping businesses were affected in the droughts of the past as the demand for service significantly declined because landscaping was not watered. The City's Environmental Utilities Department, through the water conservation programs, works to ensure that businesses that rely on water receive allotments to continue operating.

There is always the possibility of some financial exposure for the City as a result of drought conditions. The Environmental Utilities Department plans proactively for this possibility in order to mitigate these impacts to the greatest extent possible.

10.4 FUTURE TRENDS IN DEVELOPMENT

Since the entire planning area is susceptible to drought, any increase in building stock valuation represents an increase in property value exposed to the drought hazard. However, since droughts typically do not kill or injure people or damage structures, the increased exposure is not associated with any increase in vulnerability to the drought hazard.

Table 10-3 lists past, current, and projected water use from 2010 to 2040. Water use projections for 2020 through 2040 are based on land use-based water demand projections documented in the City's General Plan.

Table 10-3. City of Roseville Past, Current, and Projected Water Use

	Water Use (acre-feet/year)						
	2010	2015	2020	2025	2030	2035	2040
Single family residential	15,836	11,680	21,262	22,425	23,862	25,254	26,365
Multi-Family residential	2,196	1,464	2,399	2,530	2,692	2,849	2,974
Commercial	2,042	1,930	3,402	3,588	3,818	4,041	4,219
Industrial	891	934	1,699	1,792	1,907	2,018	2,107
Institutional and Governmental	667	561	1,001	1,056	1,123	1,189	1,241
Landscape	5,534	4,152	7,559	7,973	8,483	8,978	9,373
Losses[a]	1,195	2,160	3,732	3,936	4,189	4,433	4,628
Total	**28,361**	**22,881**	**41,054**	**43,300**	**46,074**	**48,762**	**50,907**

a. Losses include unbilled/unmetered losses for 2010 and 2015
Source: (City of Roseville 2022)

10.5 REVIEW OF EXISTING ORDINANCES, PROGRAMS AND PLANS

Since California's 1975 to 1977 drought, Roseville has had a policy of no water waste supported by City ordinances. The City adopted a "No Waste" ordinance in 1989 and updated the Water Conservation Ordinance (Roseville Municipal Code Chapter 14.09—Water Conservation) to include drought mitigation measures in April 1991. The ordinance provides conservation measures for shortages in water supply due to drought. Drought mitigation is achieved through a tiered approach that is based on the surface water available to Roseville. As water supplies decrease, additional restrictions are imposed. Conservation measures (water use restrictions) have been established to address conditions from adequate water supplies to conditions in which surface water supplies are capable of meeting only 50 percent of Roseville's water needs.

A significant portion of Roseville's water is used for landscape irrigation. Landscape irrigation also accounts for a large portion of water wasted in Roseville. Conservation patrols are used to enforce City ordinances restricting water waste. These patrols generally consist of existing service workers that identify and document water waste during daily travels or when responding to complaints. Evening calls are made in response to resident complaints.

In times of reduced water availability, higher drought stages are implemented. In summer 1991, Roseville hired temporary employees to serve as the first dedicated water patrol. This patrol supplemented existing service crew coverage and provided 24-hour-per-day capability. These patrols led to the issuance of over 500 water waste citations that greatly decreased water wasted through malfunctioning irrigation systems and/or excessive watering. In response to the current drought, Roseville instituted these water patrols once more.

Roseville has a number of programs and policies that are implemented as early as possible to reduce water use in the event of a prolonged water shortage. As a USBR contractor, Roseville is required to develop and maintain a water conservation plan consistent with the requirements of the Central Valley Project Improvement Act of 1992. In addition, Roseville is a member and signatory to the American River Water Forum, which also includes requirements for water conservation programs.

To proactively promote water conservation and to be prepared in the event of a water shortage, the City implements demand management (conservation) measures, is developing supplemental water supplies, and has a water shortage contingency plan. These are summarized in the City of Roseville 2010 Urban Water Management Plan Update and detailed in the work programs for the Environmental Utilities Department Water Division.

The Roseville City Council adopted a revised Water Efficient Landscape Ordinance on March 16, 2016. The revised ordinance responded to state legislation mandating stricter requirements for reducing landscape irrigation, water consumption and waste. The revised ordinance addresses the objectives of the Department of Water Resources model ordinance by incorporating the new water efficient landscape requirements into Chapter 14.18 of the Roseville Municipal Code.

10.6 SCENARIO

An extreme multi-year drought can impact the region with little warning. Combinations of low precipitation and unusually high temperatures could occur over several consecutive years. Intensified by such conditions, extreme wildfires could break out throughout Placer County, increasing the need for water. Surrounding communities, also in drought conditions, could increase their demand for water supplies relied upon in the City of Roseville, causing social and political conflicts. If such conditions persisted for several years, the economy of Placer County and Roseville could experience setbacks, especially in water dependent industries.

10.7 ISSUES

The planning team has identified the following drought-related issues:

- Identification and development of alternative water supplies
- Utilization of groundwater recharge techniques to stabilize the groundwater supply
- The probability of increased drought frequencies and durations due to climate change
- The promotion of active water conservation even during non-drought periods.

11. EARTHQUAKE

11.1 GENERAL BACKGROUND

An earthquake is the vibration of the earth's surface following a release of energy in the earth's crust. This energy can be generated by a sudden dislocation of the crust or by a volcanic eruption. Most destructive quakes are caused by dislocations of the crust. The crust may first bend and then, when the stress exceeds the strength of the rocks, break and snap to a new position. In the process of breaking, vibrations called "seismic waves" are generated. These waves travel outward from the source of the earthquake at varying speeds.

11.1.1 Earthquake Location

The location of an earthquake is commonly described by its focal depth and the geographic position of its epicenter. The focal depth of an earthquake is the depth from the Earth's surface to the region where an earthquake's energy originates (the focus or hypocenter). The epicenter of an earthquake is the point on the Earth's surface directly above the hypocenter.

11.1.2 Earthquake Geology

Tectonic Plates

The Earth's crust, which is the rigid outermost shell of the planet, is broken into seven or eight major tectonic plates (depending on how they are defined) and many minor plates. Where the plates meet, they move in one of three ways along their mutual boundary: convergent (two plates moving together), divergent (two plates moving apart), or transform (two plates moving parallel to one another). Earthquakes, volcanic activity, mountain-building, and oceanic trench formation occur along these plate boundaries. Subduction is a geological process that takes place at convergent boundaries of tectonic plate, in which one plate moves under another. Regions where this process occurs are known as subduction zones, and they have the potential to generate highly damaging earthquakes.

California is seismically active because of movement of the North American Plate, east of the San Andreas Fault, and the Pacific Plate to the west, which includes the state's coastal communities. The transform (parallel) movement of these tectonic plates against one another creates stresses that build as the rocks are gradually deformed. The rock deformation, or strain, is stored in the rocks as elastic strain energy. When the strength of the rock is exceeded, rupture occurs along a fault. The rocks on opposite sides of the fault slide past each other as they spring back into a relaxed position. The strain energy is released partly as heat and partly as elastic waves called seismic waves. The passage of these seismic waves produces the ground shaking in earthquakes.

Faults

Geologists have found that earthquakes reoccur along faults, which are zones of weakness in the earth's crust. When a fault experiences an earthquake, there is no guarantee that all the stress has been relieved. Another earthquake can still occur. In fact, relieving stress along one part of a fault may increase it in another part.

Faults are more likely to have future earthquakes on them if they have more rapid rates of movement, have had recent earthquakes along them, experience greater total displacements, and are aligned so that movement can relieve the accumulating tectonic stresses. Geologists classify faults by their relative hazards. "Active" faults, which represent the highest hazard, are those that have ruptured to the ground surface during the Holocene period (about the last 11,000 years). "Potentially active" faults are those that displaced layers of rock from the Quaternary period (the last 1,800,000 years) (California Department of Conservation 2022).

Determining if a fault is "active" or "potentially active" depends on geologic evidence, which may not be available for every fault. The majority of the seismic hazards are on well-known active faults. However, inactive faults, where no displacements have been recorded, also have the potential to reactivate or experience displacement along a branch sometime in the future. An example of a fault zone that has been reactivated is the Foothills Fault Zone. The zone was considered inactive until evidence of an earthquake (approximately 1.6 million years ago) was found near Spenceville, California. Then, in 1975, an earthquake occurred on another branch of the zone near Oroville, California (now known as the Cleveland Hills Fault). The State Division of Mines and Geology indicates that increased earthquake activity throughout California may cause tectonic movement along currently inactive fault systems.

11.1.3 Earthquake-Related Hazards

According to the U.S. Geological Survey (USGS) Earthquake Hazards Program, an earthquake hazard is anything associated with an earthquake that may affect people's normal activities. This includes the following:

- **Surface Faulting**—Displacement that reaches the earth's surface during slip along a fault. Commonly occurs with shallow earthquakes, those with an epicenter less than 20 kilometers.
- **Ground Motion (shaking)**—The movement of the earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves that are generated by sudden slip on a fault or sudden pressure at the explosive source and travel through the earth and along its surface.
- **Landslid**e—A movement of surface material down a slope.
- **Liquefaction**—A process by which water-saturated sediment temporarily loses strength and acts as a fluid. Earthquake shaking can cause this effect.
- **Tectonic Deformation**—A change in the original shape of a material due to strain.
- **Tsunami (in coastal areas)**—A sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major submarine slides, or violent underwater volcanic eruptions.

11.1.4 Earthquake Classifications

Earthquakes are typically classified in one of two ways: By the amount of energy released, measured as magnitude; or by the impact on people and structures, measured as intensity.

Magnitude

An earthquake's magnitude is a measure of the energy released at the source of the earthquake. Magnitude is commonly expressed by ratings on the moment magnitude scale (M_w), the most common scale used today. **The** moment magnitude scale is a more accurate measure of earthquake size than the better-known Richter scale (M_L) (U.S. Geological Survey 2021). This scale is based on the total moment release of the earthquake (the product of the distance a fault moved, and the force required to move it). The scale is as follows:

- Great—Mw > 8
- Major—Mw = 7.0 – 7.9
- Strong—Mw = 6.0 – 6.9
- Moderate—Mw = 5.0 – 5.9
- Light—Mw = 4.0 – 4.9
- Minor—Mw = 3.0 – 3.9
- Micro—Mw < 3

Intensity

The most commonly used intensity scale is the modified Mercalli intensity scale. Ratings of the scale as well as the perceived shaking and damage potential for structures are shown in Table 11-1. The modified Mercalli intensity scale is generally represented visually using a USGS product called a ShakeMap (see Section 11.1.6), which shows the expected ground shaking at any given location produced by an earthquake with a specified magnitude and epicenter. An earthquake has only one magnitude and one epicenter, but it produces a range of ground shaking at sites throughout the region, depending on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth's crust. A ShakeMap shows the variation of ground shaking in a region immediately following significant earthquakes (for technical information about ShakeMaps see (USGS 2021)).

Table 11-1. Mercalli Scale and Peak Ground Acceleration Comparison

Modified Mercalli Scale	Perceived Shaking	Potential Structure Damage		Estimated PGA[a] (%g)
		Resistant Buildings	Vulnerable Buildings	
I	Not Felt	None	None	<0.17%
II-III	Weak	None	None	0.17% - 1.4%
IV	Light	None	None	1.4% - 3.9%
V	Moderate	Very Light	Light	3.9% - 9.2%
VI	Strong	Light	Moderate	9.2% - 18%
VII	Very Strong	Moderate	Moderate/Heavy	18% - 34%
VIII	Severe	Moderate/Heavy	Heavy	34% - 65%
IX	Violent	Heavy	Very Heavy	65% - 124%
X – XII	Extreme	Very Heavy	Very Heavy	>124%

a. PGA = peak ground acceleration. Measured in percent of g, where g is the acceleration of gravity

Sources: (USGS 2021); (USGS 2011)

11.1.5 Ground Motion

Earthquake hazard assessment is based on expected ground motion. During an earthquake when the ground is shaking, it also experiences acceleration. The peak acceleration is the largest increase in velocity recorded by a particular station during an earthquake. Estimates are developed of the annual probability that certain ground motion accelerations will be exceeded; the annual probabilities can then be summed over a time period of interest.

The most commonly mapped ground motion parameters are horizontal and vertical peak ground accelerations (PGA) for a given soil type. PGA is a measure of how hard the earth shakes, or accelerates, in a given geographic area. Instruments called accelerographs record levels of ground motion due to earthquakes at stations throughout a region. PGA is measured in g (the acceleration due to gravity) or expressed as a percent acceleration force of gravity (%g). These readings are recorded by state and federal agencies that monitor and predict seismic activity.

Maps of PGA values form the basis of seismic zone maps that are included in building codes such as the International Building Code. Building codes that include seismic provisions specify the horizontal force due to lateral acceleration that a building should be able to withstand during an earthquake. PGA values are directly related to these lateral forces that could damage "short period structures" (e.g., single-family dwellings). Longer period response components determine the lateral forces that damage larger structures with longer natural periods (apartment buildings, factories, high-rises, bridges). Table 11-2 lists damage potential and perceived shaking by PGA factors, compared to the Mercalli scale.

Table 11-2. Mercalli Scale and Peak Ground Acceleration Comparison

Modified Mercalli Scale	Perceived Shaking	Potential Structure Damage		Estimated PGA[a] (%g)
		Resistant Buildings	Vulnerable Buildings	
I	Not Felt	None	None	<0.17%
II-III	Weak	None	None	0.17% - 1.4%
IV	Light	None	None	1.4% - 3.9%
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VI	Strong	Light	Moderate	9.2% - 18%
VII	Very Strong	Moderate	Moderate/Heavy	18% - 34%
VIII	Severe	Moderate/Heavy	Heavy	34% - 65%
IX	Violent	Heavy	Very Heavy	65% - 124%
X - XII	Extreme	Very Heavy	Very Heavy	>124%

a. PGA measured in percent of g, where g is the acceleration of gravity
Sources: (USGS 2008); (USGS 2010)

11.1.6 USGS Earthquake Mapping Programs

ShakeMaps

The USGS Earthquake Hazards Program produces maps called ShakeMaps that map ground motion and shaking intensity following significant earthquakes. ShakeMaps focus on the ground shaking caused by the earthquake, rather than on characteristics of the earthquake source, such as magnitude and epicenter. An earthquake has only one magnitude and one epicenter, but it produces a range of ground shaking at sites throughout the region, depending on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth's crust.

A ShakeMap shows the extent and variation of ground shaking immediately across the surrounding region following significant earthquakes. Such mapping is derived from peak ground motion amplitudes recorded on seismic sensors, with interpolation where data are lacking based on estimated amplitudes. Color-coded instrumental intensity maps are derived from empirical relations between peak ground motions and Modified Mercalli intensity. In addition to the maps of recorded events, the USGS creates the following:

- Scenario ShakeMaps of hypothetical earthquakes of an assumed magnitude on known faults.

- Probabilistic ShakeMaps, based on predicted shaking from all possible earthquakes over a 10,000-year period. In a probabilistic map, information from millions of scenario maps are combined to make a forecast for the future. The maps indicate the ground motion at any given point that has a given probability of being exceeded in a given timeframe, such as a 100-year (1-percent-annual chance) event.

National Seismic Hazard Map

National maps of earthquake shaking hazards provide information for creating and updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities and land use planning. After thorough review of the studies, professional organizations of engineers update the seismic-risk maps and seismic design requirements contained in building codes (Brown, et al. 2001). The USGS updated the National Seismic Hazard Maps in 2018. New seismic, geologic, and geodetic information on earthquake rates and associated ground shaking were incorporated into these revised maps. The 2018 map, shown in Figure 11-1, represents the best available data as determined by the USGS.

Source: (USGS 2018)

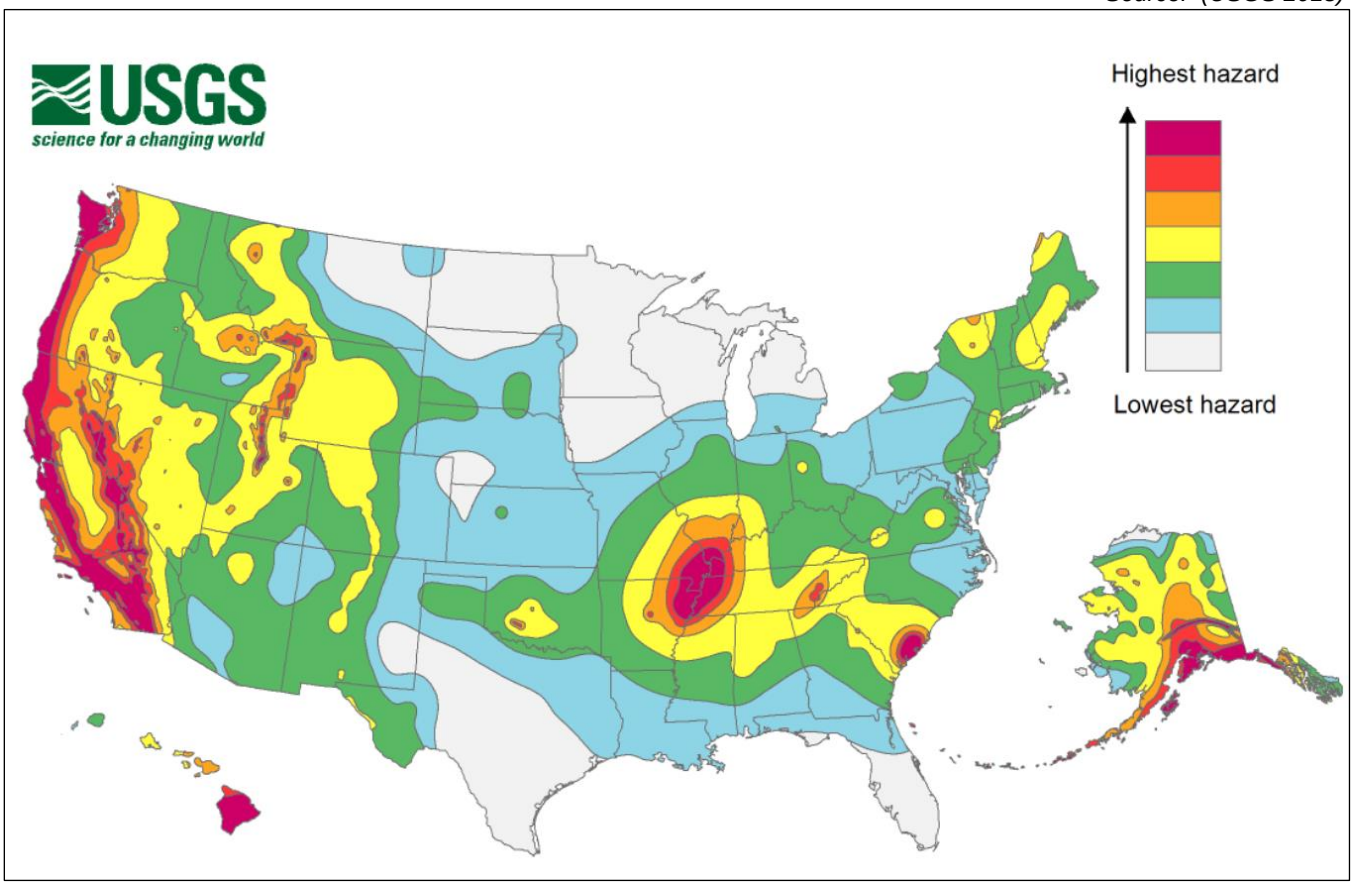


Figure 11-1. 2018 USGS National Seismic Hazard Map

11.1.7 Liquefaction and Soil Types

Soil liquefaction occurs when water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and float freely in the water, turning the ground into a pudding-like liquid. Building and road foundations lose load-bearing strength and may sink into the ground.

A program called the National Earthquake Hazard Reduction Program (NEHRP) creates maps based on soil characteristics to help identify locations subject to liquefaction. NEHRP soil types define the locations that will be significantly impacted by an earthquake. Table 11-3 summarizes NEHRP soil classifications. NEHRP Soils B and C typically can sustain ground shaking without much effect, dependent on the earthquake magnitude. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E and F. In general, these areas are also most susceptible to liquefaction.

Table 11-3. NEHRP Soil Classification System

NEHRP Soil Type	Description	Mean Shear Velocity to 30 m (m/s)
A	Hard Rock	1,500
B	Firm to Hard Rock	760-1,500
C	Dense Soil/Soft Rock	360-760
D	Stiff Soil	180-360
E	Soft Clays	< 180
F	Special Study Soils (liquefiable soils, sensitive clays, organic soils, soft clays >36 m thick)	

11.1.8 Secondary Hazards

Earthquakes can cause large and sometimes disastrous mudslides. Building and road foundations can lose load-bearing strength and may sink into what was previously solid ground. Earthen dams and levees are highly susceptible to seismic events, and the impacts of their failures can be considered secondary risks for earthquakes.

Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people. Hazardous materials releases can occur during an earthquake from fixed facilities or transportation-related incidents. During an earthquake, structures storing these materials could rupture and leak into the surrounding area or an adjacent waterway, having a disastrous effect on the environment. Transportation corridors can be disrupted during an earthquake, leading to the release of materials to the surrounding environment.

11.2 HAZARD PROFILE

11.2.1 Past Events

The last seismic event recorded in the Roseville vicinity measuring at least 4.0 on the Richter scale occurred between Placerville and Roseville in 1908 on a north-south fault line between Folsom and Auburn. No significant seismic events in the Roseville vicinity have been recorded since then. Significant recent earthquakes in California include the 1906 earthquake in San Francisco, the 1971 San Fernando Earthquake, the 1989 Loma Prieta Earthquake, and the 1994 Northridge earthquake. Figure 11-2 shows the location of the most recent events in relation to Roseville. Table 11-4 lists recent earthquakes with a magnitude of 5.0 or greater within a 100-mile radius of Roseville.

Source: USGS, 2022; Google Earth

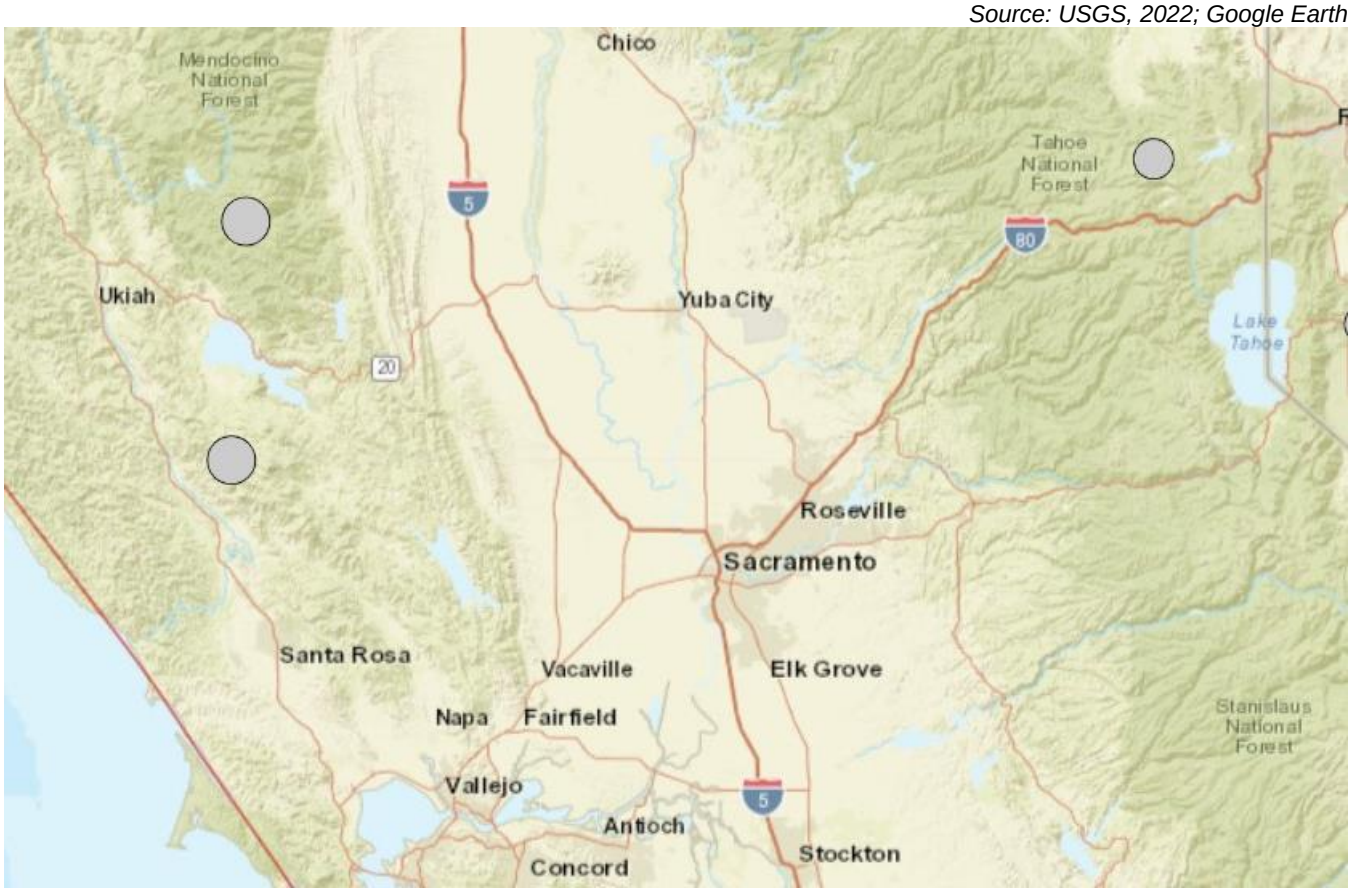


Figure 11-2. Location of Recent Earthquakes in Roseville Vicinity

Table 11-4. Recent Earthquakes Magnitude 5.0 or Larger Within 100-mile radius

Date	Magnitude	Epicenter Location
12/14/2016	5.0	6 miles west of Cobb, CA
8/10/2016	5.1	12 miles north northeast of Upper Lake, CA
8/24/2014	6.0	6 miles southwest of Napa, CA
5/24/2013	5.7	12 miles southeast of Chester, CA
4/26/2008	5.1	6 miles west of Reno, NV
10/31/2007	5.6	10 miles northeast of San Jose, CA
8/10/2001	5.5	9 miles west of Portola, CA
9/3/2000	5.17	8 miles northwest of Napa, CA
10/30/1998	5.35	4 miles south-southeast of Truckee, CA
12/28/1995	5.33	7 miles east-northeast of Markleeville, CA
12/23/1995	5.08	8 miles east of Markleeville, CA
9/12/1994	5.95	7 miles north-northeast of Markleeville, CA
9/12/1994	5.12	7 miles north-northeast of Markleeville, CA
3/31/1986	5.70	12 miles east-northeast of Milpitas, CA

Source: Earthquake Catalogs, Northern California Earthquake Data Center, USGS

11.2.2 Location

Faults

A direct relationship exists between a fault's length and location and its ability to generate damaging ground motion at a given site. Small, local faults produce lower magnitude quakes, but ground shaking can be strong and damage can be significant in areas close to the fault. Large regional faults can generate earthquakes of great magnitudes but, because of their distance and depth, they may result in only moderate shaking in an area. The City of Roseville is in a region of moderate seismicity between the seismically active Coast Ranges and the Foothills Fault Zone in the Sierra Nevada.

East of Roseville

The Great Valley Fault Zone is the geomorphic boundary of the Coast Ranges and the Central Valley. It is underlain by a 300-mile long seismically active fold-and-thrust belt that has been the source of recent earthquakes, such as the 1983 Magnitude-6.5 Coalinga and the 1985 Magnitude-6.1 Kettleman Hills earthquakes. Nearly the entire thrust system is concealed. The Great Valley fault system consists of 14 segments, named numerically based on location along the fault system from north (1) to south (14).

The Foothill Fault Zone, a complex series of northwest trending-faults that are related to the Sierra Nevada uplift, runs from about Oroville in the north to east of Fresno in the south. This was the source of Oroville's 1975 earthquake and an event in the 1940s. Subsequent research of these events led to the identification and naming of the zone. Earthquakes on fault segments in the zone could be a source of ground shaking in Placer County.

The closest potentially active faults in the near vicinity of Roseville are the Bear Mountain and Melones Faults. The closest recently active fault in the western Sierra Nevada foothills is the Cleveland Hills Fault, about 36 miles northwest of Auburn.

Eastern Placer County borders the Basin and Range geological province, which includes most of Nevada and western Utah. This area is riddled with active faults that form the boundary between each basin or valley and the neighboring mountain range.

The Lake Tahoe Basin is seismically active with earthquakes greater than 7.0 that have occurred beneath Lake Tahoe. According to the Placer County Multi-Hazard Mitigation Plan, a series of small earthquakes also occurred in late 2003 and early 2004 due to volcanic magma (molten rock) moving 20 miles below the Sierra Nevada Mountains. The earthquakes reflect the movement of the Sierra Nevada range to the northwest at a rate of about half an inch per year.

West of Roseville

Tectonic stresses associated with the North American-Pacific Plate boundary can generate damaging earthquakes along faults 30 to 100 miles west of Placer County. Both the San Andreas fault (source of the estimated 8.0-Richter magnitude San Francisco earthquake that caused damage in Sacramento in 1906) and the closer Hayward fault have the potential for experiencing major to great events. Another potential earthquake source is the Midland Fault Zone on the western side of the Sacramento Valley. This was the source of the 1892 Vacaville-Winters earthquake.

The Petrolia (coastal Humboldt County) earthquake increased concern about how amplified long-period motions from much closer major events, such as on the San Andreas Fault or the Hayward Fault, might reach damaging levels and affect Sacramento. Other potential earthquake sources are the faults associated with the western edge of the Central Valley, recently defined as the Coast Range Central Valley Boundary Thrust Fault System. Various documents define portions of this little known system as the Midland Fault Zone or the Dunnigan Hills fault, where the 1892 Vacaville-Winters earthquake occurred. A southern part of the system may have been the source of the 1983 Coalinga earthquake.

Inactive Faults

Active faults are those that have experienced displacement in historical time. However, inactive faults, for which no such displacements have been recorded, also have the potential to reactivate or experience displacement along a branch sometime in the future. An example of a fault zone that has been reactivated is the Foothills Fault Zone. The zone was considered inactive until evidence of an earthquake (approximately 1.6 million years ago) was found near Spenceville, California. Then, in 1975, an earthquake occurred on another branch of the zone near Oroville, California (now known as the Cleveland Hills Fault). The State Division of Mines and Geology indicates that increased earthquake activity throughout California may cause tectonic movement along currently inactive fault systems. No active faults are known to exist in Placer County. The following inactive faults have been identified within the city limits:

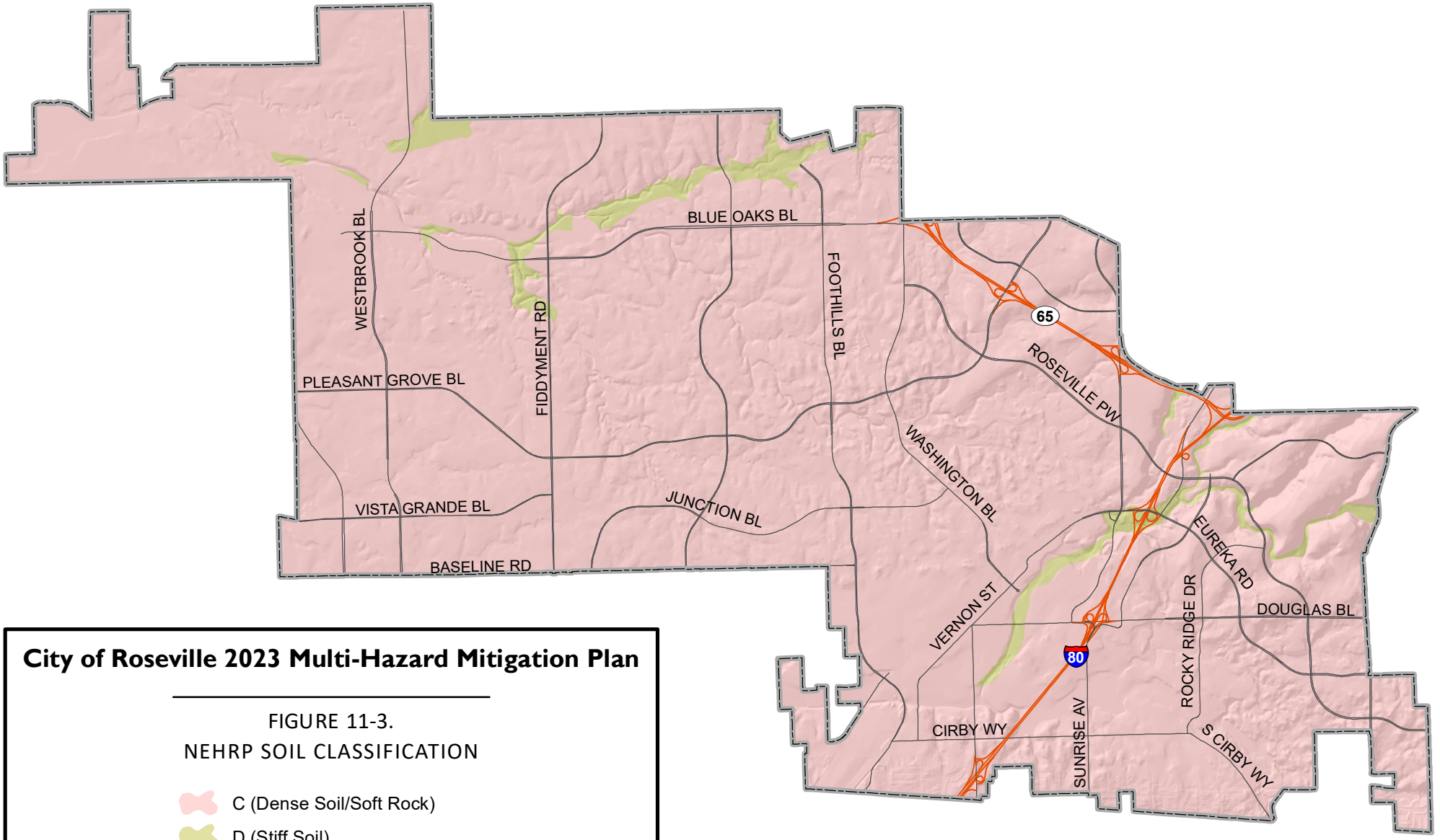
- The Volcano Hill fault extends northwest from Volcano Hill for a distance of 1 mile, terminating near Eureka Road. No activity has been recorded along this fault; therefore, it is considered inactive.
- Identified in 1973, the Linda Creek fault is located along Linda Creek in Roseville and Sacramento County. No activity has been recorded along this fault.
- The Willows Fault and Stockton Fault are in the Roseville vicinity and are considered inactive as displacement occurred greater than 1.8 million years ago.
- An unnamed fault extends east to west between Folsom Lake and the City of Rocklin. Segments of the fault are concealed and therefore unmapped. However, the east/west alignment suggests that the fault could connect to the Bear Mountain Fault, branches of which are located beneath Folsom Lake. The Bear Mountain Fault is a fault that could be undergoing reactivation as a result of continental tectonic activity. However, no evidence has been identified along the unnamed fault alignment of such reactivation.

NEHRP Soils

NEHRP soil types define locations that will be significantly impacted by an earthquake. NEHRP Soils B and C typically can sustain low-magnitude ground shaking without much effect. Areas with NEHRP Soils D, E and F are most commonly affected by ground shaking. Figure 11-3 shows NEHRP soil classifications in the county.

11.2.3 Frequency

California experiences hundreds of earthquakes each year, most with minimal damage and magnitudes below 3.0 on the Richter Scale. Earthquakes that cause moderate damage to structures occur several times a year. According to the USGS, a strong earthquake measuring greater than 5.0 on the Richter Scale occurs every two to three years and major earthquakes of more than 7.0 on the Richter Scale occur once a decade. Both the San Andreas Fault and the closer Hayward Fault have the potential for experiencing major to great events. The State Hazard Mitigation Plan indicates that in the next 30 years in California there is over a 99-percent probability of a magnitude 6.7 earthquake and a 94-percent probability of a magnitude 7.0 earthquake.



City of Roseville 2023 Multi-Hazard Mitigation Plan

FIGURE 11-3.
NEHRP SOIL CLASSIFICATION

- C (Dense Soil/Soft Rock)
- D (Stiff Soil)

Data Souces
CA Geologic Survey
CIty of Roseville

CITY OF ROSEVILLE CALIFORNIA

0 1 2 Miles

N W E S

11.2.4 Severity

Although Roseville is in California and has three faults documented in the City's General Plan, the seismic hazard is not considered to be a serious risk to life or property. Studies have not identified the Sierra Foothills, including Placer County, as a likely location for a significant seismic event. Roseville is fortunate in that more than three-quarters of the development in the City has occurred in the past two decades and all applicable seismic building codes have been enforced through the planning and development process.

Ground Shaking

Placer County and Roseville are identified as a low-severity zone. While there are several faults with the potential for large-magnitude earthquakes in the vicinity, the distance between those faults and the City of Roseville would result in very low, peak-ground accelerations in the City. The biggest contributor to potential intensity of shaking in Roseville is the Foothills Fault Zone.

Liquefaction

Liquefaction of loose sandy soil with a high water content during an earthquake undermines the ground's ability to solidly support building structures. Foundations supported on liquefiable soils can lose their ability to support load, and can experience settlement on the order of several inches or more. Differential settlement can cause significant damage to buildings, lifelines, and transportation structures, with partial or total collapse.

The City of Roseville is not specifically addressed in currently available State Division of Mines and Geology liquefaction risk data. No determination has been made as to whether liquefaction potential exists in Roseville. Based on project-specific analysis that has been done for many of Roseville's development projects, liquefaction has not been identified as a significant problem in Roseville.

The prevailing water table in the vicinity of Roseville is approximately 80 feet below grade. Without water to saturate the soil, liquefaction is not possible. The liquefaction potential in Roseville is, therefore, considered to be very low. The most likely location for liquefaction would be along the City's creek beds. The City's policy of protecting floodplain areas has avoided development in many of the most susceptible areas.

Ground Failure

Roseville's geographic location, soil conditions, and surface terrain combine to minimize risk of major damage from landslides, subsidence (gradual shrinking of the earth's surface due to underground resource extraction), or other geologic hazards resulting from seismic activity and related natural forces.

11.2.5 Warning Time

There is no current reliable way to predict the day or month that an earthquake will occur at any given location. In 2019, Governor Gavin Newsom announced the launch of the country's first statewide Earthquake Early Warning System. The California Earthquake Early Warning System uses ground motion sensors from across the state to detect earthquakes before humans can feel them. Notifications provide up to 19 seconds for Californians to take protective action and stay safe during the earthquake. As of October 2022, more than two million users have downloaded California's MyShake App.

11.3 EXPOSURE

The entire planning area is exposed to the earthquake hazard, so an earthquake has the potential to affect the entire population of 152,928, all 50,516 buildings in the planning area, with a total replacement value of $47.4 billion, all of the planning area's 539 identified critical facilities, and the entire environment of the planning area.

The City's Water Treatment Plant on Barton Road is the only critical facility located near an identified local inactive fault. All other City facilities are within Roseville and are not located near an inactive local fault. However, all are considered to be exposed to the same earthquake risk as the general building stock.

11.4 VULNERABILITY

Earthquake vulnerability data for the risk assessment was generated using a Hazus Level 2 (user-defined) analysis for the scenario events listed in Table 11-5. Summary findings of the risk assessment, showing vulnerability results for the entire planning area, are provided in the sections below.

Table 11-5. Earthquakes Modeled for Risk Assessment

Scenario Event	Focal Depth	Epicenter Location	Map Figure
100-Year Probabilistic Event	N/A	N/A	Figure 11-4
Concord-Green Valley Fault Scenario (M6.8)	5.6 miles	56 miles southwest of Roseville near Vallejo	Figure 11-5
Great Valley Fault Scenario (M7.1)	8.8 miles	58 miles west northwest of Roseville	Figure 11-6

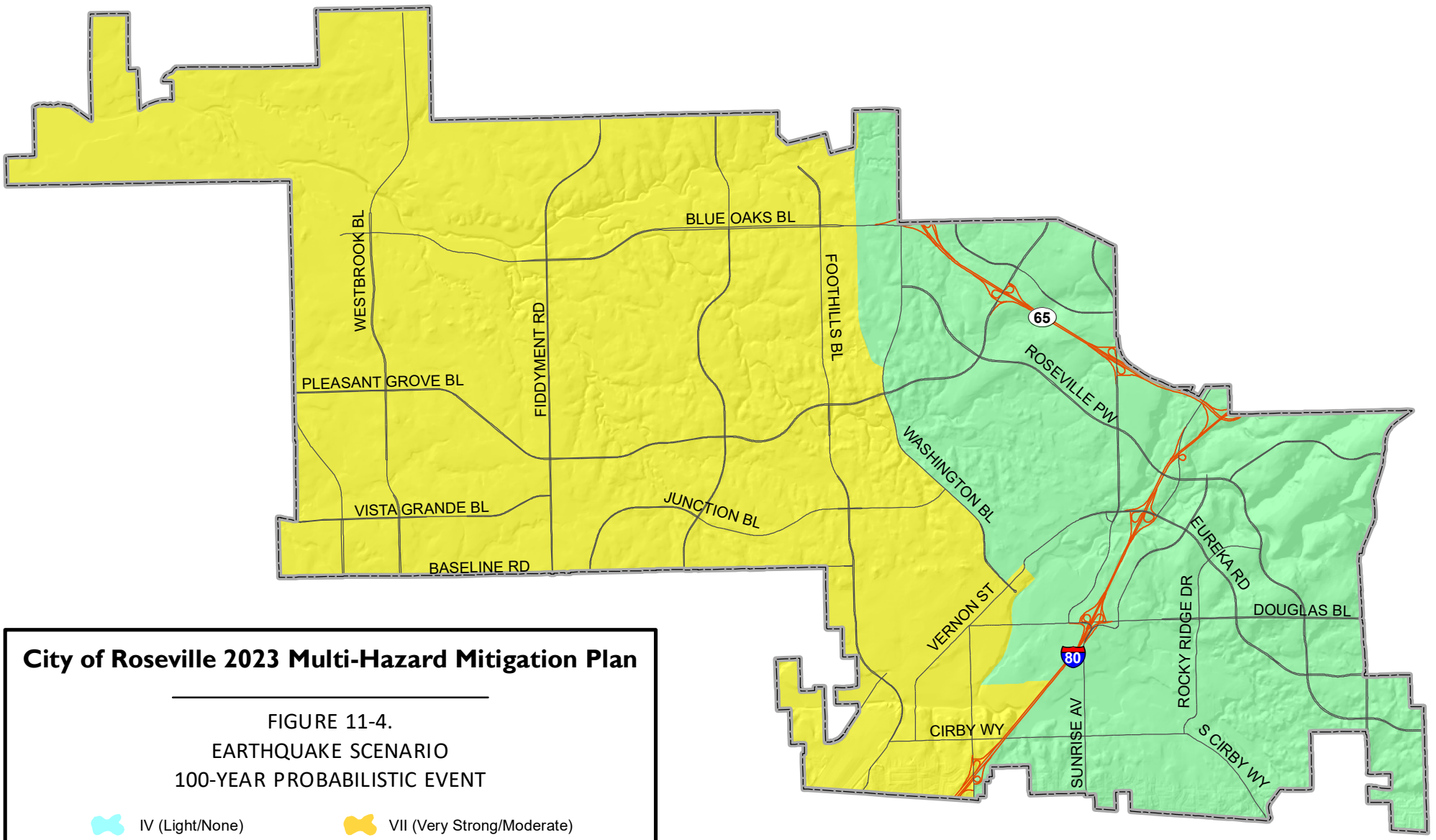
11.4.1 Population

Vulnerable Populations

While all people located in the NEHRP Class D and E Soils areas are considered exposed and potentially vulnerable, socially vulnerable populations include the very young, the elderly, and those experiencing poverty. These socially vulnerable populations are most susceptible based on many factors, including their physical and financial ability to react or respond during a hazard and the ability to be self-sustaining for prolonged periods of time after an incident because of limited ability to stockpile supplies. Socially vulnerable populations may live in structures that do not conform to seismic building codes; therefore, homes will sustain more damage during an event. Those experiencing homelessness are also especially vulnerable due to their lack of stable shelter and depending on their location, may be threatened by bridge or other structural collapse.

The measurable impact of earthquake on loss of life is minimal in Roseville and has not been estimated for this Plan. The life-safety exposure to earthquake in Roseville is low and would most likely occur in buildings as a result of damage to structures. To prevent damage to structures that could lead to loss of life, the City has a strict code enforcement policy to prevent improper alterations to original buildings. The City has funded façade grants to renovate older commercial structures, and has established an infill development team to work with property owners to upgrade and add value to older properties.

The City encourages residents to be prepared through public education and training via the Roseville Fire Department and local non-profits. Local employers such as Union Pacific, Sutter Roseville Medical Center, Kaiser Hospital, HP and NEC maintain emergency response plans that include earthquake preparedness and response training to protect life and property. Earthquake preparedness and response training prepares employees to continue service to the community in the event of a seismic event.



City of Roseville 2023 Multi-Hazard Mitigation Plan

FIGURE 11-4.
EARTHQUAKE SCENARIO
100-YEAR PROBABILISTIC EVENT

- IV (Light/None)
- V (Moderate/Very Light)
- VI (Strong/Light)
- VII (Very Strong/Moderate)
- VIII (Severe/Moderate-Heavy)
- IX (Violent/Heavy)

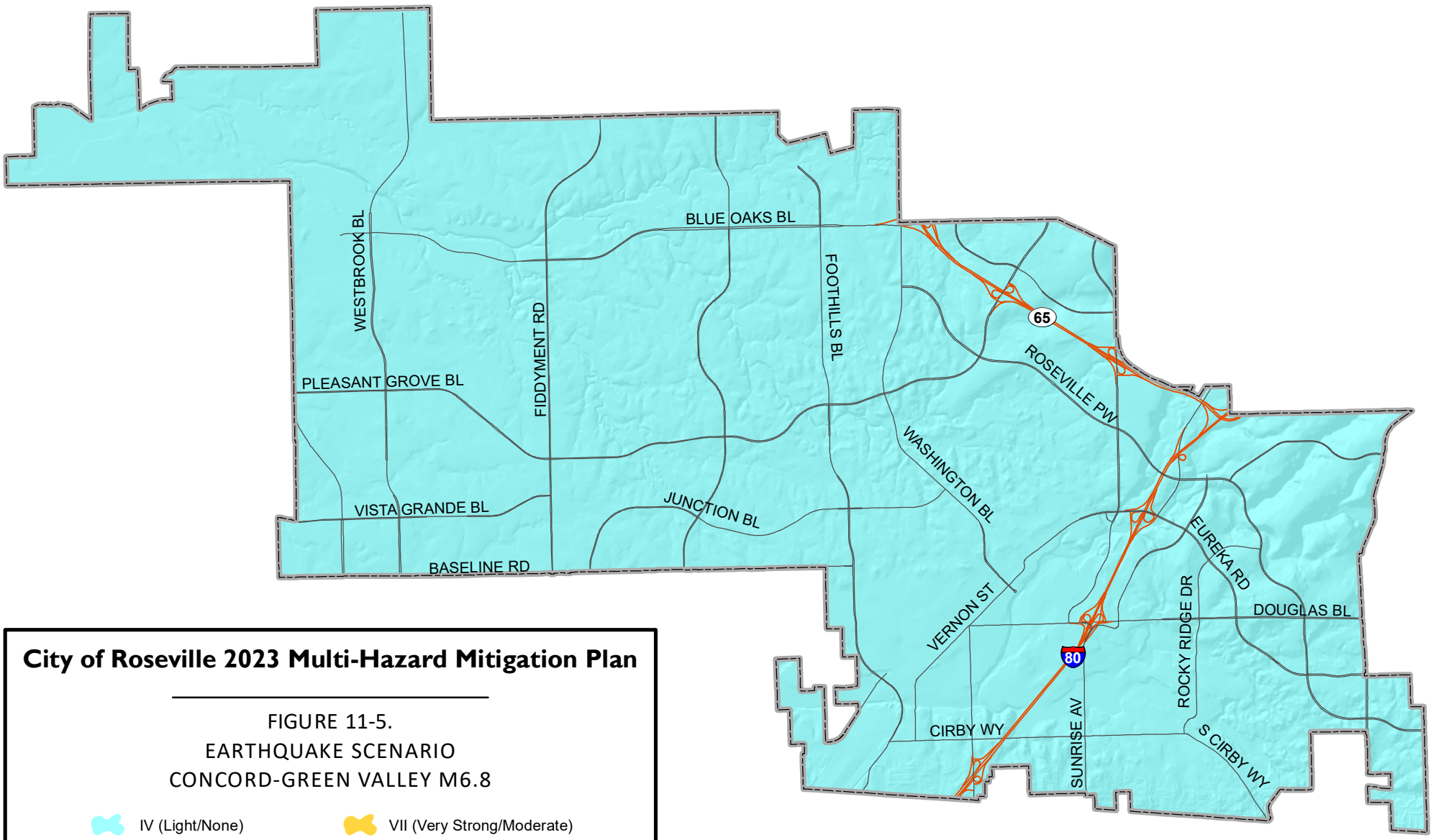
Mercalli Intensity Scale described as Perceived Shaking/Potential Damage

Data Souces
US Geologic Survey
CIty of Roseville

CITY OF ROSEVILLE CALIFORNIA

0 1 2 Miles

N W E S



City of Roseville 2023 Multi-Hazard Mitigation Plan

FIGURE 11-5.
EARTHQUAKE SCENARIO
CONCORD-GREEN VALLEY M6.8

- IV (Light/None)
- V (Moderate/Very Light)
- VI (Strong/Light)
- VII (Very Strong/Moderate)
- VIII (Severe/Moderate-Heavy)
- IX (Violent/Heavy)

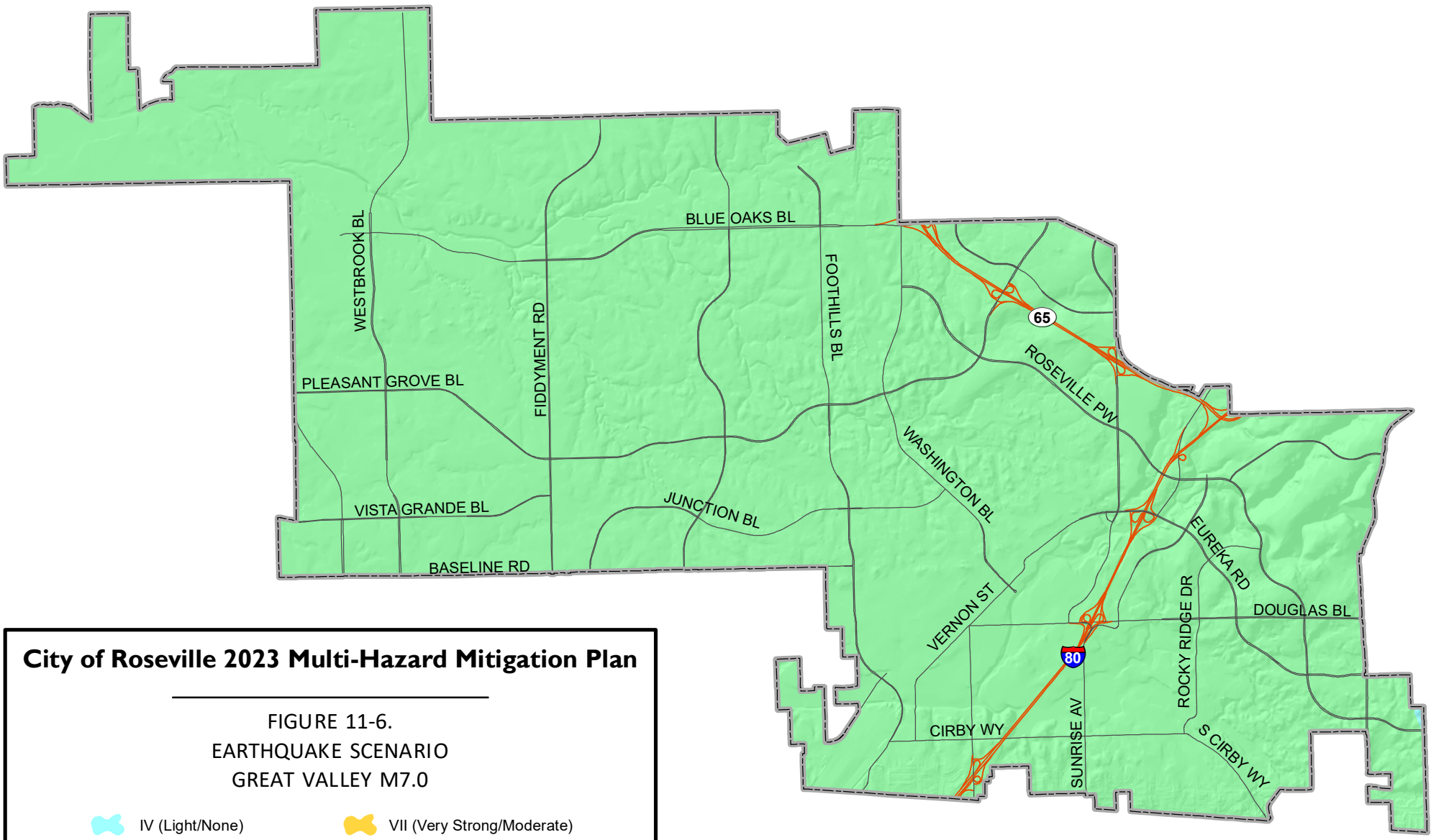
Mercalli Intensity Scale described as Perceived Shaking/Potential Damage

Data Souces
US Geologic Survey
CIty of Roseville

CITY OF ROSEVILLE CALIFORNIA

0 1 2 Miles

N W E S



City of Roseville 2023 Multi-Hazard Mitigation Plan

FIGURE 11-6.
EARTHQUAKE SCENARIO
GREAT VALLEY M7.0

- IV (Light/None)
- V (Moderate/Very Light)
- VI (Strong/Light)
- VII (Very Strong/Moderate)
- VIII (Severe/Moderate-Heavy)
- IX (Violent/Heavy)

Mercalli Intensity Scale described as Perceived Shaking/Potential Damage

Data Souces
US Geologic Survey
CIty of Roseville

CITY OF ROSEVILLE CALIFORNIA

0 1 2 Miles

N W E S

The City of Roseville faces potential social impacts in the wake of mass evacuations should a large seismic event occur in the San Francisco Bay area. As the first major metropolitan city along Interstate 80 east of Sacramento, the City's services and infrastructure could be strained as evacuating populations seek shelter close to home. Evacuees could need shelter for long periods, depending on the magnitude of the event. This could significantly tax hospitals, schools and services in the City, causing significant economic impacts.

Since the entire city is exposed to the earthquake hazard, the percent of earthquake-vulnerable households that are economically disadvantaged is equal to the citywide total: 19.4 percent. However, homes built on NEHRP Class D and E soils are especially vulnerable because those soils are more likely to experience heavy ground shaking during an earthquake. Table 11-6 shows the findings of a social vulnerability assessment of areas in the city with Class D and E soils, based on economically disadvantaged households.

Table 11-6. Economically Disadvantaged Households on NEHRP Class D and E Soils

	Number within the Mapped Hazard Area	% of Total in Mapped Hazard Area
All Households	3,158	100.0%
Households with Income Below $40,000	599	19.0%

Impacts on Persons and Households

Impacts on persons and households in the planning area were estimated for the four scenario events through the Hazus analysis. Figure 11-7 summarizes the results.

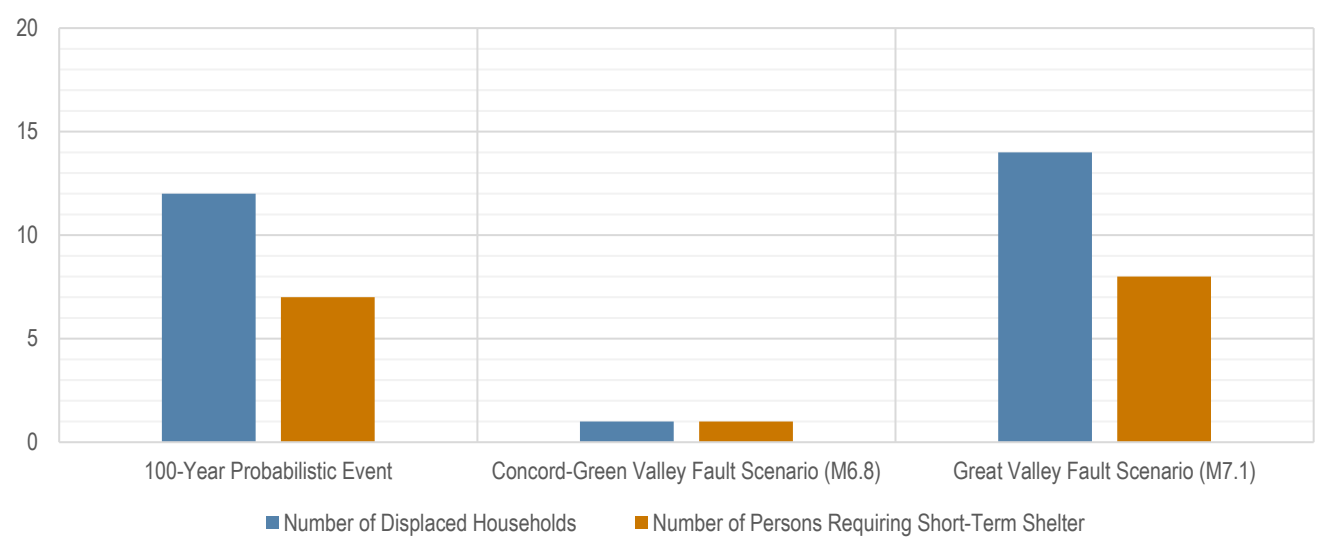


Figure 11-7. Estimated Earthquake Impact on Persons and Households

11.4.2 Property

Loss Potential

Property losses were estimated through Hazus for the three earthquake fault scenarios. The Hazus analysis also estimated the amount of earthquake-caused debris in the planning area for the scenario events. Table 11-7 summarizes the results. Figure 11-8 shows damage by occupancy class for the 100-year probabilistic event.

Table 11-7. Loss Estimates for Modeled Earthquake Scenarios

	100-Year Probabilistic Event	Concord-Green Valley Fault Scenario (M6.8)	Great Valley Fault Scenario (M7.1)
Number of Buildings Impacted	50,516	50,516	50,516
Estimated Loss			
Structures	$9,861,896	$567,761	$8,833,520
Contents	$10,414,937	$611,284	$9,401,710
Total	**$20,276,833**	**$1,179,044**	**$18,235,230**
% of Total Planning Area Replacement Value	*0.04%*	*0.00%*	*0.04%*
Debris to Be Removed (tons)	10	2	10

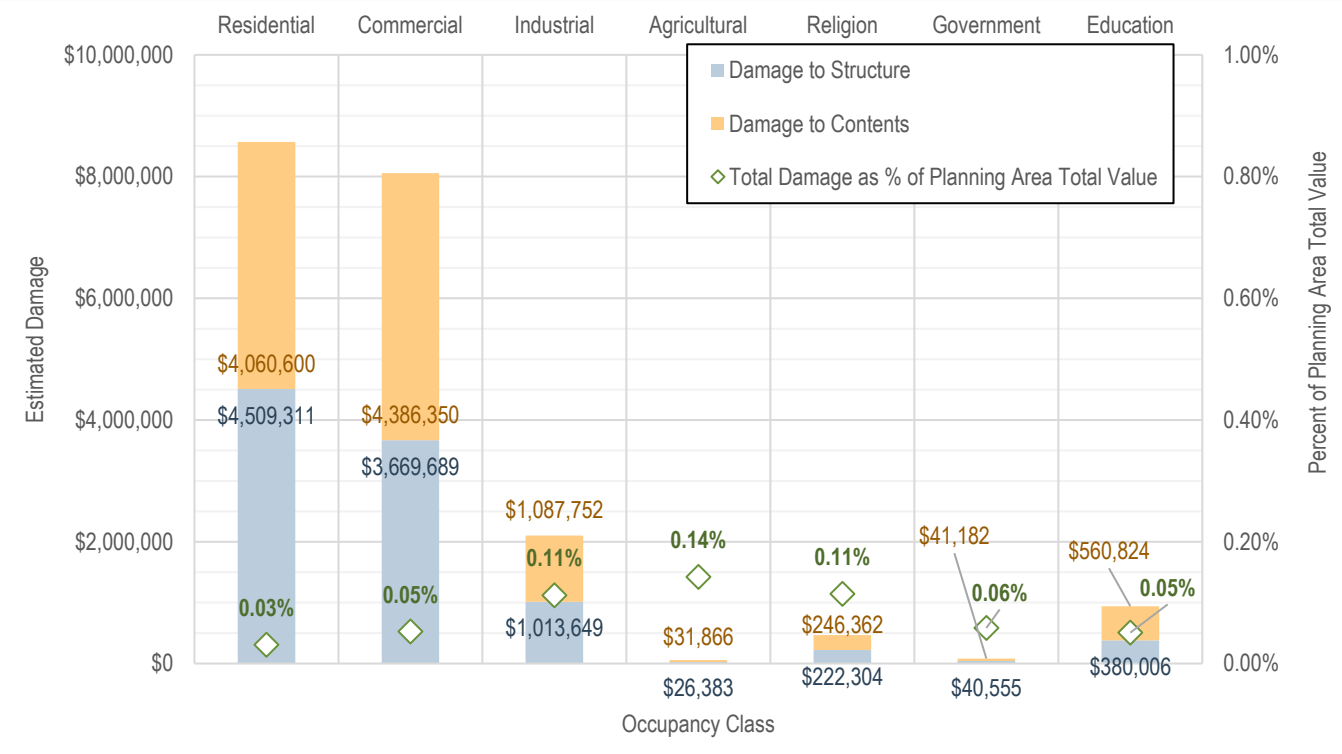


Figure 11-8. Damage to Structures from the 100-Year Probabilistic Earthquake Scenario, by Occupancy Class

Age of Structures

The City of Roseville is a relatively new community, with most of its development occurring since 1976. The California Multi-Hazard Mitigation Plan identifies significant milestones in building and seismic code requirements that affect the structural integrity of development in California. Table 11-8 lists the City's structures by the time period in which they were built, based on age-of-structure data from the City's land inventory database. The number of structures is approximate and is based on best available data currently entered into Roseville and Placer County databases. The number of structures does not reflect the number of total housing units, as many multi-family units and attached housing units are reported as one structure.

Table 11-8. Age of Structures in the City of Roseville

Time Period	Number of Structures	Significance of Time Period
Pre-1933	1,465	Before 1933, there were no explicit requirements for earthquakes in building codes. State law did not require local governments to have building officials or issue building permits.
1933-1940	307	In 1940, the first strong motion recording was made in El Centro.
1941-1960	2,135	In 1960, the Structural Engineers Association of California reached the first statewide consensus on recommended earthquake provisions and published the guidelines.
1961-1975	2,488	In 1975, significant improvements were made to lateral force requirements that were then enforced throughout the state.
1976-1994	11,586	In 1994, the Uniform Building Code was amended to include provisions for seismic safety.
1995 to present	32,535	Seismic code is currently enforced.
Total	50,516	

About 64 percent of the City's structures were constructed since the Uniform Building Code (UBC) was amended in 1994 to include seismic safety provisions. About 3 percent were built before 1933 when there were no building permits, inspections, or seismic standards.

11.4.3 Critical Facilities

Roseville's utilities all have funded rehabilitation programs that identify and replace worn infrastructure to ensure continuous service. The latest technologies, including computerized alarms, video inspections, and mapping of all of the City's water, wastewater, recycled water and electric systems, would identify damaged sections in the event of a seismic event. Private utilities in Roseville also use modern technology to monitor their infrastructure in Roseville and respond quickly to service interruptions.

Level of Damage

Hazus classifies the vulnerability of critical facilities to earthquake as no damage, slight damage, moderate damage, extensive damage, or complete damage. The model was used to assign a category to each critical facility in the planning area for the five earthquake fault scenarios. Figure 11-9 through Figure 11-11 summarize the results.

Time to Return to Functionality

Hazus estimates the time to restore critical facilities to fully functional use. Results are presented as probability of being functional at specified time increments: 1, 3, 7, 14, 30 and 90 days after the event. For example, Hazus may estimate that a facility has 5 percent chance of being fully functional at Day 3, and a 95-percent chance of being fully functional at Day 90. The analysis of critical facilities in the planning area was performed for the five scenario events assessed. The results are summarized in Figure 11-12 through Figure 11-14.

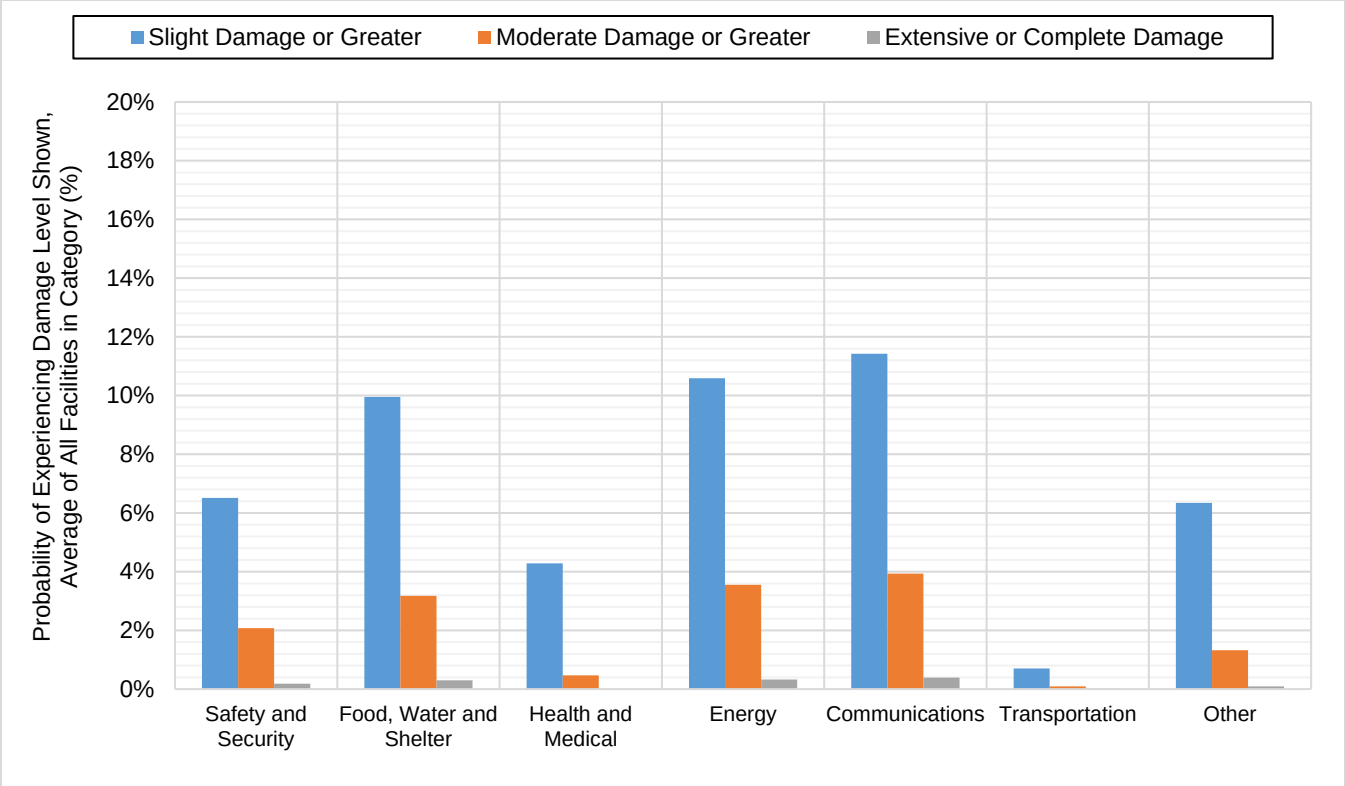


Figure 11-9. Critical Facility Damage Potential, 100-Year Probabilistic Event

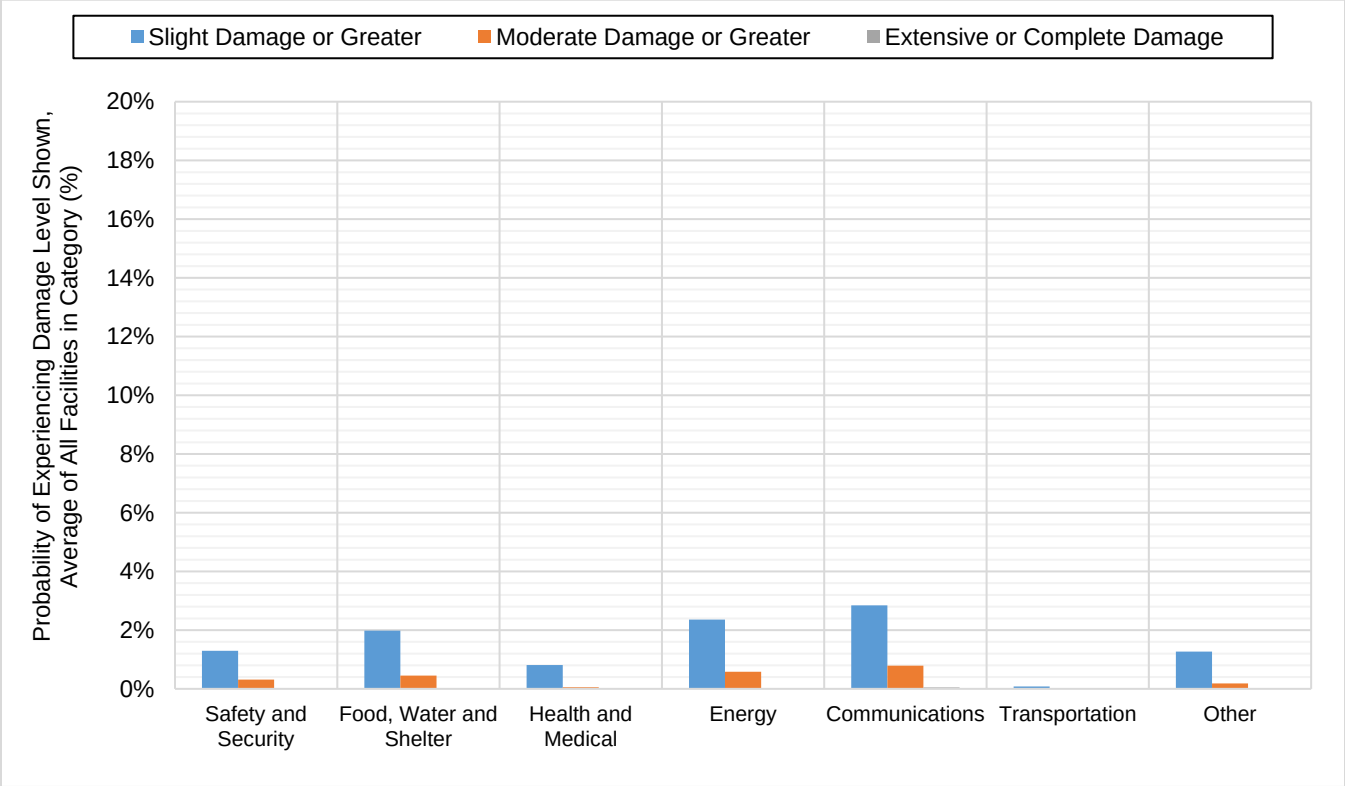


Figure 11-10. Critical Facility Damage Potential, Concord-Green Valley Fault Scenario (M6.8)

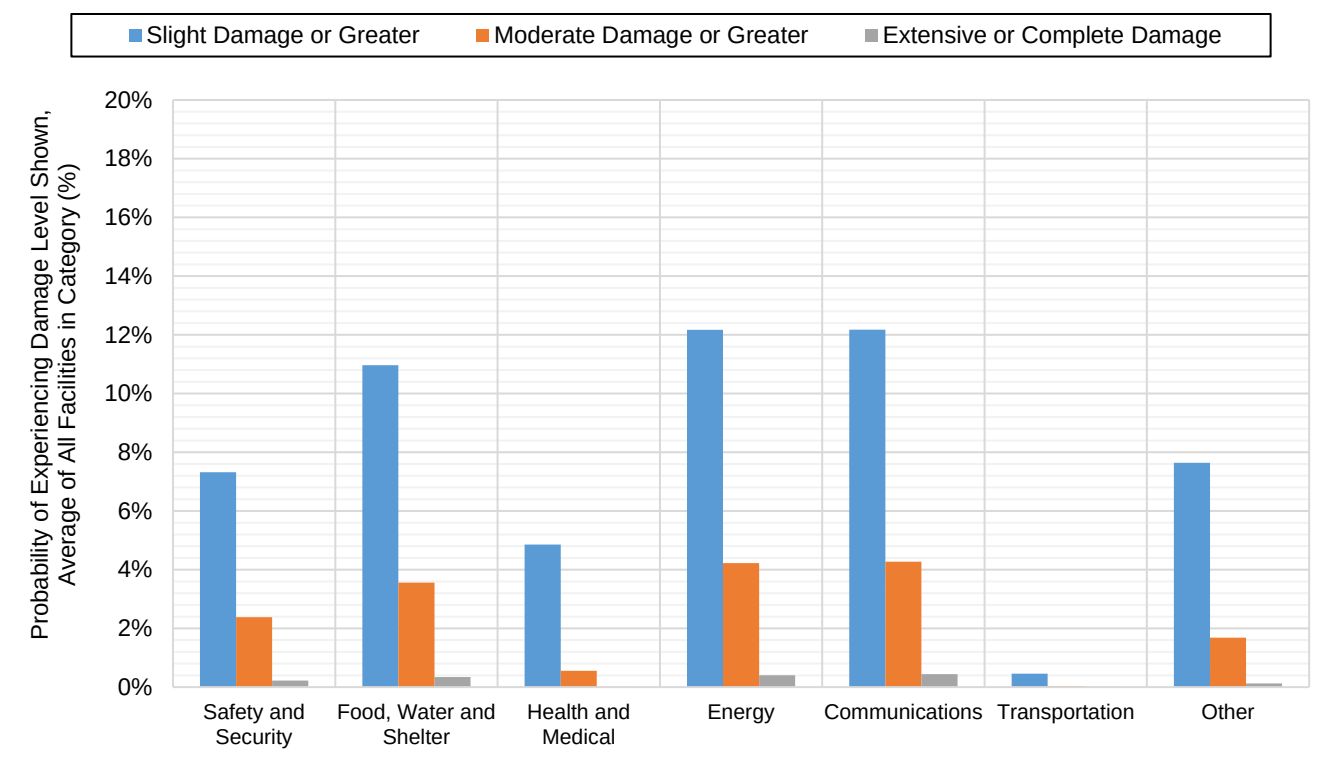


Figure 11-11. Critical Facility Damage Potential, Great Valley Fault Scenario (M7.1)

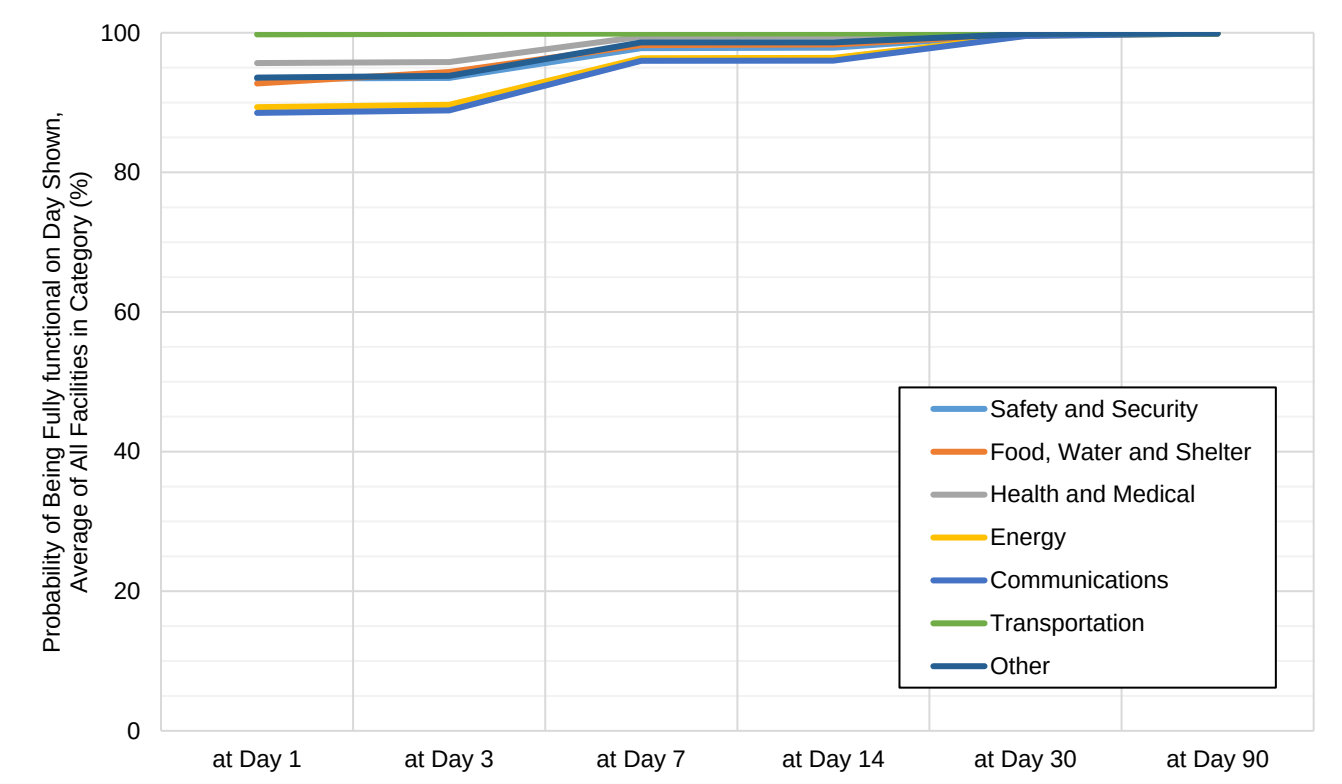


Figure 11-12. Critical Facility Functionality, 100-Year Probabilistic Event

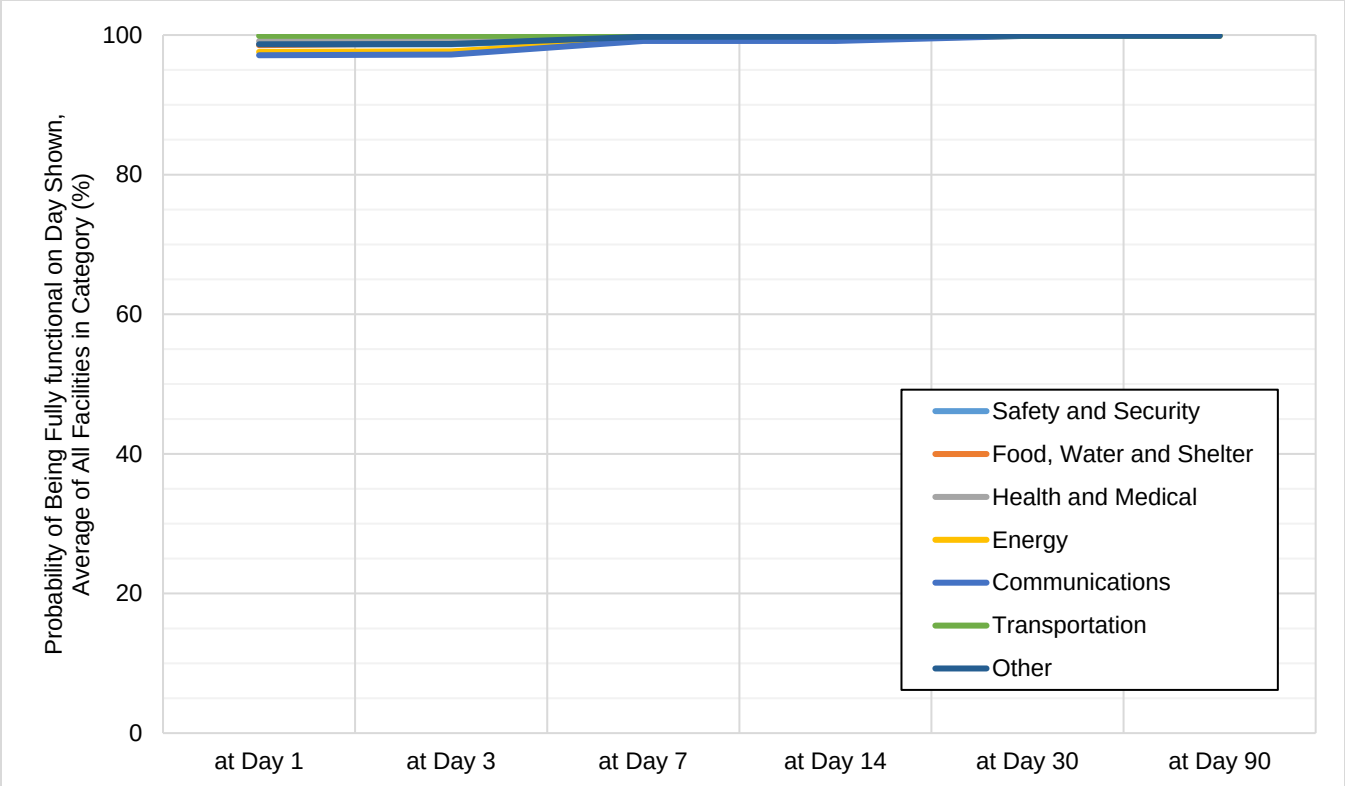


Figure 11-13. Critical Facility Functionality, Concord-Green Valley Fault Scenario (M6.8)

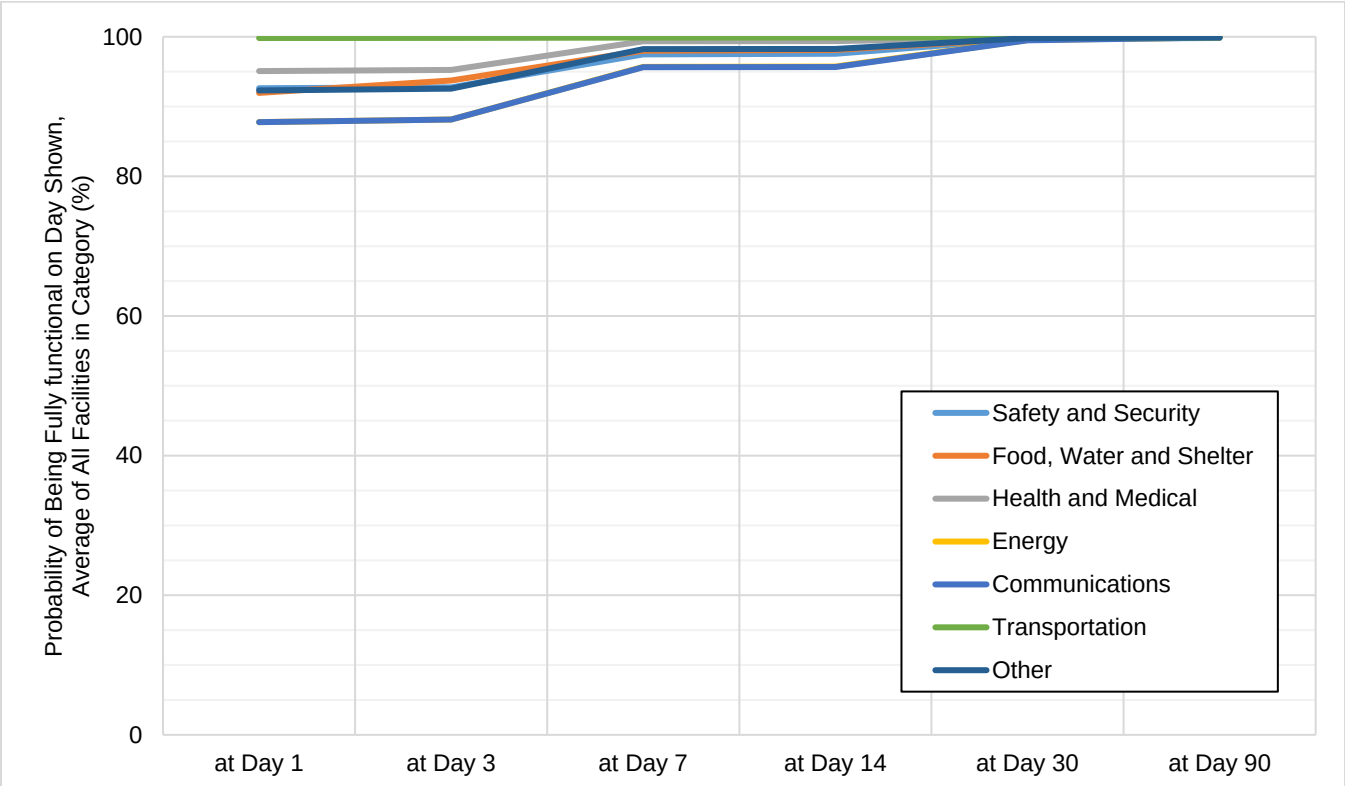


Figure 11-14. Critical Facility Functionality, Great Valley Fault Scenario (M7.1)

Highly Susceptible Facilities

Most of the City's critical facilities have been built since the Uniform Building Code (UBC) was amended to include provisions for seismic safety. For example, the two major hospitals—Sutter Roseville Medical Center and Kaiser Permanente—were both constructed in the 1990s, as were the Roseville Police Department and Roseville Civic Center. The movement of the California Building Code to the International Building Code standard in 2013 has upheld seismic standards previously established by the UBC. The following are particular vulnerabilities of critical facilities to the earthquake hazard:

- **Hazardous Materials—**Hazardous material releases from fixed facilities and transportation-related releases can occur during an earthquake event. Roseville's location at the junction of two major rail lines with two freeways increases the potential for a hazardous materials event should a major earthquake occur. Facilities holding hazardous materials are of particular concern because of possible isolation of surrounding populations. Many forms of hazardous materials are present in Roseville at private businesses, in permanent storage locations, along the Union Pacific Railroad, and on Interstate 80 and Highway 65. Critical industrial facilities are of concern because of potential hazardous materials spills or the potential for critical employment centers to continue operating.
- **Roads—**Roads have the potential to be significantly damaged during an earthquake. Access to major roads is crucial to life and safety after a disaster event as well as to response and recovery operations.
- **Bridges—**Earthquake events can significantly impact bridges, which often provide the only access to some neighborhoods. Since soft soil regions generally follow floodplain boundaries, bridges that cross water courses are considered vulnerable. Since most of the City's bridges provide access across water courses, most are at least somewhat vulnerable to earthquakes. Key factors in the degree of vulnerability are the facility's age and type of construction, which indicate the standards to which the facility was built.
- **Water and Sewer Infrastructure—**Water and sewer infrastructure can suffer considerable damage in the event of an earthquake. This is hard to analyze due to the amount of infrastructure and the fact that water and sewer infrastructure are usually linear easements. Without further analysis of individual system components, it should be assumed that these systems are exposed to breakage and failure.

11.4.4 Environment

Environmental problems as a result of an earthquake can be numerous. Secondary hazards will likely have some of the most damaging effects on the environment. Earthquake-induced landslides in landslide prone areas can significantly impact surrounding habitat. It is also possible for streams to be rerouted after an earthquake. This can change the water quality, possibly damaging habitat and feeding areas. There is a possibility of streams fed by groundwater wells drying up because of changes in underlying geology.

11.5 FUTURE TRENDS IN DEVELOPMENT

Roseville is expected to grow considerably in the next 10 years. The moderate potential for earthquake in Roseville is not likely to lessen or prohibit development in the City. The City's development departments will strictly enforce all seismic building codes and design standards to prevent loss of life and property due to earthquake. Public education, cooperation with the development community, and individual preparedness are essential as Roseville welcomes thousands of new residents and hundreds of new businesses to the City each year.

Recent development in the Stoneridge Specific Plan and Northeast Roseville Specific Plan is adjacent to ravine areas, and developed property there would be more susceptible in the event of seismic activity due to steep slopes.

11.6 REVIEW OF EXISTING ORDINANCES, PROGRAMS AND PLANS

11.6.1 International Building Codes

The State of California provides minimum standards for structural design and site development through the California Building Standards Code (California Code of Regulations (CCR), Title 24). The California Building Code (CBC) is based on the International Building Code (IBC), which is widely used throughout the United States and has been modified for California conditions with numerous more detailed and stringent regulations.

Chapter 18 of the IBC/CBC regulates the excavation of foundations and retaining walls and regulates grading activities, including drainage and erosion control, and construction on expansive soils (soils that expand when water is added, and shrink when they dry out). The IBC/CBC requires a site-specific geotechnical study to address seismic issues and identifies seismic factors that must be considered in structural design.

The following uniform codes have been adopted in the Roseville Zoning Ordinance to ensure that buildings are designed and sited properly to protect against seismic and unstable soil conditions: CBC (2013), California Plumbing Code (2013), California Green Building Standards (2013), and the California Mechanical Code (2013).

To reduce the risk of seismic-related safety hazards and structural damage to pipelines, roads, and residential homes to an acceptable level, the City of Roseville conditions of approval for development projects require that at the time of tentative map approval, construction be in accordance with the IBC and local building standards, as administered by the Roseville Building Division. Regular monitoring and enforcement through the building permit and plan check process ensures that new development and construction meet all seismic and geologic safety standards, reducing the risk of building damage.

11.6.2 Improvement Standards

The City of Roseville Improvement Standards require the development of a grading plan, an erosion and sedimentation control plan, and mitigation monitoring requirements to reduce the exposure of people and structures to seismic hazards.

11.6.3 Geotechnical Studies

The City of Roseville requires the preparation of site-specific geotechnical studies as part of the building permit process. The technical information that must be compiled for these studies, which address both seismic hazards and soil conditions, is specified in Chapters 16 and 18 of the CBC. The studies provide recommendations to address slope and foundation instability, stream bank protection, and slope evaluation, as well an evaluation of expansive soils and differential settlement. Implementation of recommendations minimizes impacts associated with the exposure of people and structures to seismic hazards, the development of structures on expansive soils, grading that increases slope instability, increased erosion along stream channels, and soil erosion from grading.

11.7 SCENARIO

Inactive faults in the region could significantly impact the City of Roseville should they reactivate, but modeling such impact is difficult due to the lack of data. The direct earthquake risk in Roseville is considered to be low to moderate, but indirect impacts from a significant event in the region could be significant. The City would most likely experience impacts from a large seismic event in the Bay Area. As a large metropolitan center with easy

access to transportation corridors, the City would likely become a major evacuation center in response to such an event. This could significantly tax City resources.

11.8 ISSUES

Important issues associated with an earthquake in Roseville include but are not limited to the following:

- Planning is required for mass evacuations into the City of Roseville.
- There is enough older building stock in the City featuring un-reinforced masonry construction to warrant structural and non-structural mitigation.
- There is a need for better comprehensive soils data to better identify the probable earthquake risks in the City.
- A large seismic event in the Sacramento Region could trigger a dam failure on Folsom Lake, causing significant impacts.
- The perceived lack of risk can lead to complacency. Earthquakes provide a significant risk to all populations in California, whether the impacts are direct or indirect.
- There is still much to learn about the impacts of climate change on seismic activity.

12. FLOOD

12.1 GENERAL BACKGROUND

Flooding is any overflowing of water onto land that is normally dry, due to rain, ocean waves, or the failure of a dam or levee. Floods are the most common of all weather-related natural disasters. They kill more people in the United States each year than tornados, hurricanes, or lightning (NOAA n.d.). Areas near rivers or streams are at risk from floods during heavy rain or periods of upstream snowmelt. In urban areas, where buildings, highways, driveways, and parking lots reduce the ground's ability to absorb rainfall, the resulting increase in runoff can overwhelm constructed storm drain systems, resulting in flooding on nearby roads and buildings.

12.1.1 FEMA Regulatory Flood Zones

FEMA defines flood hazard areas through statistical analyses of records of river flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. Flood hazard areas are delineated on Flood Insurance Rate Maps (FIRMs), which are official maps of a community on which the Federal Insurance and Mitigation Administration has delineated special flood hazard areas (SFHAs). Digital versions of FIRMs are called DFIRMs.

The SFHA is the land area on a DFIRM covered by floodwaters of the "base flood," which is the flood with a 1 percent chance of occurrence in any given year (also called the 1 percent annual chance flood). A structure within the SFHA (also called the 1 percent annual chance floodplain) has a 26 percent chance of undergoing flood damage during the term of a 30-year mortgage. The base flood is the regulatory standard adopted by federal agencies and most states to administer floodplain management programs. In SFHAs, National Flood Insurance Program (NFIP) floodplain management regulations must be enforced, and flood insurance is mandatory.

Common Flood Map Zones

DFIRMS show the boundaries of floodways and floodplains, as well as expected floodwater elevations at specific sites during the base flood. They define the following specific flood-related areas:

- River flood hazard zones:
  - **Zone A (also known as Unnumbered A-zones)**—SFHAs where no base flood elevations or depths are shown because detailed hydraulic analyses have not been performed.
  - **Zones A1-30 and AE**—SFHAs that are subject to inundation by the base flood, determined using detailed hydraulic analysis. Base flood elevations are shown within these zones.
  - **Zone AH and AO—**SFHAs subject to inundation by types of shallow flooding where average depths are between 1 and 3 feet. These are normally areas prone to ponding (Zone AH) or shallow sheet flow flooding on sloping terrain (Zone AO).

- **Zone B and X (shaded)—**Zones where the land elevation as been determined to be above the base flood elevation, but below the 500-year flood elevation. These zones are not SFHAs.
- **Zones C and X (unshaded)—**Zones where the land elevation has been determined to be above both the base flood elevation and the 500-year flood elevation. These zones are not SFHAs.

Mapping of Levee-Protected Areas

FEMA can accredit levee systems that meet federal certification requirements. Areas protected by these levees are considered to have reduced flood risk due the presence of the levee. FEMA's mapping shows these areas as Zone X. These are considered to be "awareness" zones that depict the "residual risk" associated with the levee systems. Residual risk is the risk that remains after controls are accounted for. The protection level for any flood control facility is based on its design level of protection. A facility with 100-year design effectiveness loses that effectiveness for events with greater than a 100-year probability. This is residual risk.

Federal flood insurance for properties in these areas is available through the NFIP's lower-cost Preferred Risk Policy. While not federally required, it is strongly recommended, as there is still a risk.

12.1.2 Floodplains

Ecosystems and Beneficial Functions

Floodplains can support ecosystems that are rich in plant and animal species. Wetting of the floodplain soil releases an immediate surge of nutrients: those left over from the last flood, and those that result from the rapid decomposition of organic matter that has accumulated since then. Microscopic organisms thrive and larger species enter a rapid breeding cycle. The production of nutrients peaks and falls away quickly, but the surge of new growth endures for some time. This makes floodplains valuable for agriculture. Species growing in floodplains are markedly different from those that grow outside floodplains. For instance, riparian trees (trees that grow in floodplains) tend to be very tolerant of root disturbance and very quick growing compared to non-riparian trees.

When floodwaters recede after a flood event, they leave behind layers of rock and mud. These gradually build up to create a new floor of the floodplain. Floodplains generally contain accumulations of sand, gravel, loam, silt, and/or clay, often extending below the bed of the stream. These sediments provide a natural filtering system, with water percolating back into the ground and replenishing groundwater. These are often important aquifers, the water drawn from them being filtered compared to the water in the stream. Fertile, flat reclaimed floodplain lands are commonly used for agriculture, commerce and residential development.

Effects of Human Activities

Human activities tend to concentrate in floodplains for a number of reasons: water is readily available; land is fertile and suitable for farming; transportation by water is easily accessible; and land is flatter and easier to develop. But human activity in floodplains frequently interferes with the natural function of floodplains. When a river is separated from its floodplain with levees and other flood control facilities, natural, built-in benefits can be lost, altered, or significantly reduced. Structures can affect the distribution and timing of drainage, thereby increasing flood problems. Human development can create local flooding problems by altering or confining drainage channels. This increases flood potential in two ways: it reduces the stream's capacity to contain flows, and it increases flow rates or velocities downstream during all stages of a flood event. Human activities can interface effectively with a floodplain as long as steps are taken to mitigate the activities' adverse impacts on floodplain functions.

12.1.3 Secondary Hazards

The most significant secondary hazard for flooding in Roseville is bank erosion. The dangers of bank erosion often are greater than those of flooding. Flooding is responsible for landslides when high flows over-saturate soils on steep slopes, causing them to fail. Hazardous material spills are also a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers or drainage sewers. Large gravity sewer conveyance pipelines often run along creeks, which makes this infrastructure susceptible to damage from erosion.

12.2 HAZARD PROFILE

12.2.1 Federal Flood Programs Participation

National Flood Insurance Program

History of Participation

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. For most communities participating in the NFIP, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance flood and the 0.2-percent annual chance flood (the 500-year flood). Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs).

Roseville entered the NFIP on December 15, 1983. The date of the City's current effective FIRM is November 2, 2018. As a participant in the NFIP, the City must, at a minimum, regulate development in its floodplain areas in accordance with NFIP criteria. Before a permit to build in a floodplain area is issued, the City must ensure that two basic criteria are met:

- All new buildings and developments undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.
- New floodplain development must not worsen existing flood problems or increase damage to other properties.

Properties constructed after a FIRM has been adopted are eligible for reduced flood insurance rates. Such structures are less vulnerable to flooding since they were constructed after regulations and codes were adopted to decrease vulnerability. Properties built before the FIRM was adopted may be more vulnerable to flooding and related damage because they do not meet code or are located in hazardous areas. The first FIRMs for Roseville were available at the end of 1983. The number of post-FIRM structures in the regulatory floodplain is extremely low because of the City's proactive floodplain management policy of not allowing new development in the floodplain.

Flood Insurance Analysis

Table 12-1 lists flood insurance statistics for the City of Roseville. A statistical analysis was performed in conformance with CRS Activity 370 requirements. The City will revisit this analysis with every subsequent revision to this hazard mitigation plan, based on the best available, most accessible data at the time of the update.

Table 12-1. Flood Insurance Statistics for the City of Roseville [a]

Community Identification Number (CID)	060243
Date of Entry Initial FIRM Effective Date	December 15, 1983
Current FIRM Effective Date	November 2, 2018
Number of flood insurance policies in force as of 12/02/2022	311
Total annual premium	$212,151
Average policy cost	$682 (national average = $859[b])
Total insurance in force	$101,453,200
Total claims filed (1978 to 12/02/2022)	300
Value of claims paid	$9,864,992
Average claim paid	$32,883
# of Substantial Damage Closed Paid Losses	67
Number of flood insurance policies in force within the SFHA	84
X Standard/AR/A99 policies	154
Preferred Risk Policies	73
# Pre-FIRM SFHA Policies	60
# Pre-FIRM Non-SFHA Policies	62
# Pre-FIRM Preferred Risk Policies	30
#Post-FIRM SFHA Policies	24
#Post-FIRM Non-SFHA Policies	92
# Post-FIRM Preferred Risk Policies	43
# Single Family Policies in Force	276
# 2-4 Family Policies in Force	7
All Other Residential Policies in Force	8
# of Non-Residential Policies	20

a. As of 12/02/2022
b. Per "Forbes Advisor," https://www.forbes.com/advisor/homeowners-insurance/flood-insurance-cost/, 03/2023

The following are key findings of the statistical analysis

- The use of flood insurance in the planning area is above the national average, with 65.3 percent of insurable planning area buildings in the SFHA having flood insurance. According to an NFIP study, only 49 percent of single-family homes in SFHAs nationwide are covered by flood insurance.
- The average cost of a flood insurance policy in Roseville is $682. The average cost of a flood insurance policy nationally is $859—21 percent lower than the national average.
- The average cost of a flood insurance policy in the SFHA is $1,008 per year.
- The average cost of a policy outside the SFHA is $562.
- 91 percent of the policies in force are for residential occupancies
- The average insurance in force for residential policies within the planning area is $306,67,5 which represents 49.9 percent of the average assessed value for residential properties ($614,947) within the planning area.
- 73 percent of the policies in force are for properties located outside of the SFHA
- 48.9 percent of the policies are for pre-FIRM construction.

- The amount of insurance in force represents 35.3 percent of the total value of the assets exposed within the SFHA.
- The high percentage of flood insurance policies in force outside the SFHA (roughly 73 percent of the policies) can be attributed to the City regulating a floodplain larger than the SFHA and the consideration of residual risk in areas protected by a flood wall.
- 86.7 percent of the total paid losses within the planning area have been for residential use properties
- The average claim paid in the planning area ($32,833) represents about 1 percent of the 2022 average replacement cost value of structures in the floodplain. This correlates to a flood depth damage function of less than 1 foot for a 1-story structure with no basement using the U.S. Army Corps of Engineers generic flood-depth/damage curves.
- There were 311 flood insurance policies in force within the SFHA as of December 2022. This represents 180 percent of the total structures in the SFHA, which is well above the national average of 49 percent. The breakdown of the 311 policies by flood zone is as follows:
  - AE, A1-99—82 policies, or 26.4 percent
  - AO Zones—2 policies, or 0.6 percent
  - B, C, & X Zone-Standard—154 policies, or 49.5 percent
  - B, C, & X Zone-Preferred Risk—73 policies or 23.5 percent

Based on these findings, the following recommendations are provided for the City to consider in the identification of mitigation actions for this plan:

- With over 49 percent of the structures within the SFHA covered by a flood insurance policy, the City's coverage is on par with national averages. The City should continue to promote flood insurance as part of its on-going outreach programs.
- It may be beneficial for the City to identify the percentage of properties within the City's regulated floodplain that are rental properties so that outreach efforts that target renters' options for flood insurance coverage can be promoted.
- With the high percentage of policies in force outside the SFHA, it is evident that properties within the city's regulated floodplain and floodwall-protected areas are seeking flood insurance to cover their residual risk. The City should continue to promote flood insurance to these properties under its campaigns for CRS Activity 610, 620 and 630.
- It is not known what percentage of the policies in force are on properties located within the Folsom Dike 5 Dam failure inundation area. The City should consider a future analysis to determine this percentage dependent upon the availability of accessible flood insurance information.

The Community Rating System

The Community Rating System (CRS) is a voluntary incentive program within the NFIP. The CRS encourages floodplain management activities that exceed the minimum NFIP requirements (FEMA 2022). Flood insurance premium rates are discounted to reflect the reduced flood risk resulting from community actions meeting the following three goals of the CRS:

- Reduce flood losses.
- Facilitate accurate insurance rating.
- Promote awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public Information
- Mapping and Regulations
- Flood Damage Reduction
- Flood Preparedness

Figure 12-1 shows the nationwide number of CRS communities by class as of April 1, 2022, when there were 1,520 communities receiving flood insurance premium discounts under the CRS program. Although insurance premium discounts are one benefit of participation in the CRS, more important benefits result from activities that save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk as evidenced by the fact that over 68 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks.

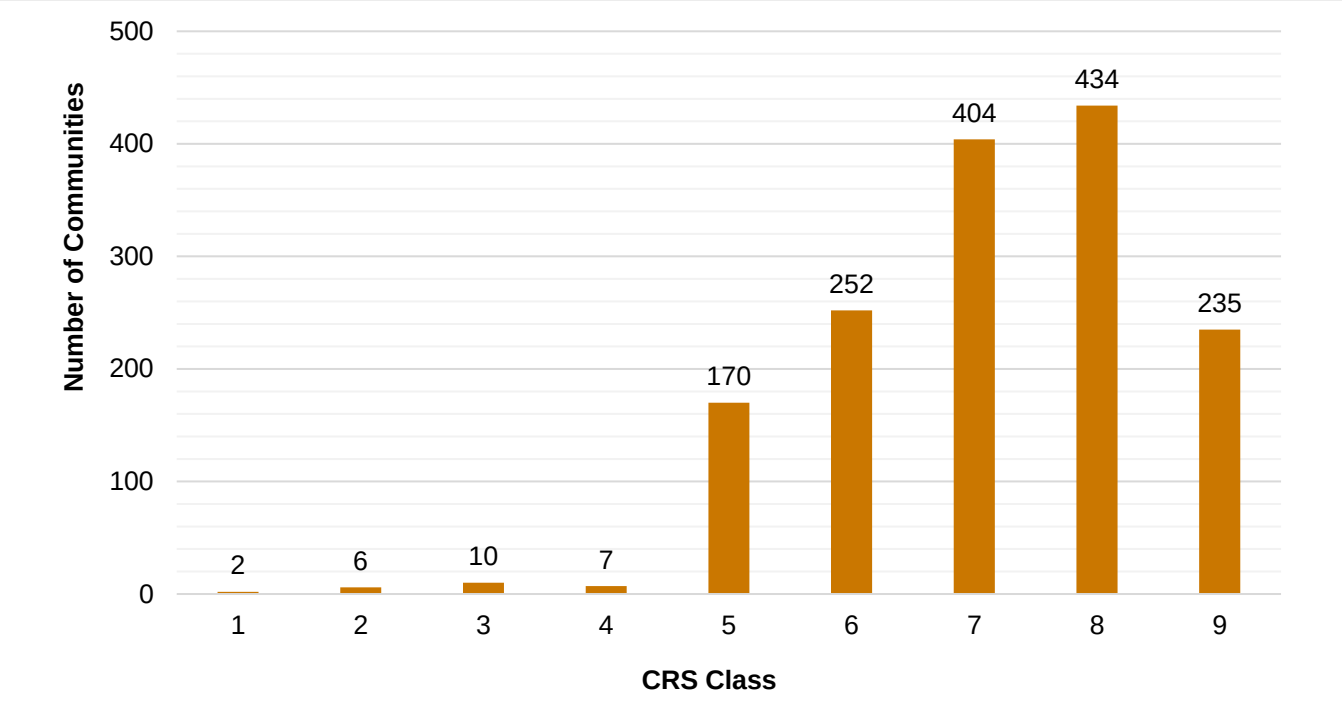


Figure 12-1. CRS Communities by Class as of April 1, 2022

The City of Roseville participated as a pilot-test community during CRS development in the late 1980s. The City began its official participation in the CRS program in 1991 and became the nation's first and only Class 1 community on October 1, 2006. This classification provides flood insurance policy holders in Roseville up to a 45-percent reduction in flood insurance premiums and represents an annual savings of $102,982 in flood insurance premiums; an average of $318 per year for each policy in force.

Repetitive Loss Area Analysis

Overview

A repetitive loss property is defined by FEMA as an NFIP-insured property that has experienced any of the following since 1978, regardless of any changes in ownership:

- Four or more paid losses in excess of $1,000
- Two paid losses in excess of $1,000 within any rolling 10-year period
- Three or more paid losses that equal or exceed the current value of the insured property.

A severe repetitive loss property is further defined as follows:

- Four or more paid losses in excess of $5,000 each, with the cumulative amount of such claim payments exceeding $20,000
- At least two separate claim payments made, with the cumulative amount of the building portion of such claims exceeding the market value of the building
- At least two of the above referenced claims occurring within any rolling 10-year period and more than 10 days apart.

Several federal government programs encourage communities to identify and mitigate "repetitive loss" properties. Nationwide, repetitive loss properties make up only 1 to 2 percent of the flood insurance policies currently in force, yet they account for 40 percent of the flood insurance claim payments. A report on repetitive loss structures by the National Wildlife Federation found that 20 percent of these structures are listed as outside the 100-year floodplain. In 1998, FEMA reported that the NFIP's 75,000 repetitive loss structures had already cost $2.8 billion in flood insurance payments.

FEMA identifies repetitive loss structures based on flood insurance payments. A repetitive loss area is the portion of the floodplain where numerous buildings have been subject to repetitive flooding. The purpose of identifying repetitive loss areas is to identify structures that are subject to the same risk but are not on FEMA's list because a flood insurance policy was not in force at the time of loss.

Repetitive Loss in Roseville

The list of repetitive loss properties maintained by FEMA identifies one commercial repetitive loss property within the City's regulatory floodplain. When Roseville first began its participation in the CRS program in 1991, the list of repetitive loss properties totaled 31 locations. Since then, flood protection and mitigation projects (including purchase and relocation of structures) have occurred at 29 repetitive loss locations and all 29 locations are no longer subject to repetitive flood losses. This represents a 93.5 percent reduction in exposure of insured properties to repetitive flood losses. This overall reduction in repetitive loss exposure is a prime example of how the City of Roseville's proactive flood mitigation practices have decreased the exposure of its citizens to the flood hazard, reduced the number of repetitive loss properties, and minimized reliance on post-disaster assistance provided by the federal government and the nation's taxpayers.

Of two remaining properties listed by FEMA, one is not located in Roseville, and the City has initiated the FEMA correction protocol to remove this property from its list. This leaves one property on the City's repetitive loss list that has not been mitigated.

Roseville's single repetitive loss area was determined by identifying other structures in the vicinity of the remaining repetitive loss property that could be inundated by the depth of flooding that caused the repetitive flood losses to that property. This depth of flooding was determined by applying depth/damage curves to the value of the claims paid compared to the value of the structure at the time of the losses. This approach is known as the "reverse damage function methodology." The City is required to address its repetitive loss area as a condition of its participation in the CRS program. This hazard mitigation plan meets this CRS requirement.

12.2.2 Flooding Types

Flooding in Roseville is typically caused by high-intensity storms of relatively short duration (1 to 3 hours) concentrated on a stream reach with already saturated soil. In Roseville, two types of flooding typically occur:

- Flash floods that occur suddenly after a brief but intense and concentrated downpour. They move rapidly, end suddenly, and can occur in areas not generally associated with flooding (such as subdivisions not adjacent to a water body and areas serviced by underground drainage systems). Although the duration of these events is usually brief, the damage they cause can be severe. Flash floods cannot be predicted accurately and happen whenever there are heavy storms.
- Riverine floods, which are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwater) and the related probability of occurrence (expressed as the percentage chance that a flood of a specific extent will occur in any given year).

Some localized flooding not associated with creek or stream overflow occurs in Roseville when rainfall runoff volumes exceed the design capacity of drainage facilities or when there are no drainage facilities to control flows. The City has attempted to address this type of flooding with regulations that require an "overland release" of stormwater generated at a site to a recognized stormwater facility. The City also requires mitigation of any increase in runoff generated from new development. However, some developments and facilities in the City were put in place before these policies were adopted.

12.2.3 Past Events

Correspondence from the 1930s between the U.S. Army Corps of Engineers and the City of Roseville indicated a need for establishing flood control measures along Dry, Cirby, and Linda Creeks. The flood of February 1986 was the largest flood on record at its time. This flood caused substantial property damage and was considered to be a 70- to 100-year event, depending on location. In January 1995, the City was subject to flooding that exceeded the 1986 flood event in most streams in Roseville, and that flood is now considered to be the flood of record.

Based on data from the National Climactic Data Center and the University of South Carolina's Spatial Hazard Events and Losses Database for the United States, 18 major flood events were reported in Placer County between January 1950 and August 2022, with an estimated $54,165,460 in property damage. According to the NOAA National Centers for Environmental Information Storm Events Database, there have been two flood events in Roseville since 2016, but there were no reported damages, deaths, or injuries for either event. Table 12-2 shows the estimated damage from flooding in Placer County that impacted Roseville from 1973 to 2022.

Significant flood events impacting the City of Roseville are discussed below with respect to damage, frequency, injuries and fatalities. Unreported injury or illness may be associated with each event. In addition to the events discussed below, flooding occurred during other storms in 1950, 1952 and 1963. However, little information is available to define the extent and impacts of these flooding events.

Table 12-2. Reported Damage from Major Flooding in Roseville (1973 to 2022)

Date	Reported Damage (not adjusted for inflation)
January 1973	$86,207
March 1983	Not Available
February 1986	$5,000,000 (Roseville only)
January 1995	$8,000,000 Total ($4.4 million structural)
January 26,1997	$43,600 (structural)
February 1998	$20,000 (structural)
December 17, 2005	$2,000,000 (county-wide)

December 1955

Flooding occurred primarily along Dry Creek. Homes in the Douglas Boulevard area were surrounded by floodwater, and one family was evacuated. Douglas Boulevard was impassable, and pavement was damaged. Royer Park was inundated, and floodwater extended across Park Drive. No injuries or fatalities were reported.

April 1958

This flood, which continued for at least 12 hours, was the second largest event on record at the time. Flooding was most severe on Sunrise Avenue in the southeast portion of the City, on Douglas Boulevard, in the Royer Park area, and on Riverside Avenue at Dry Creek. Agricultural damage occurred along Dry Creek immediately west of the City. Many homes and businesses were surrounded by floodwater. Several families were evacuated by boat from homes in the Columbia Street and Douglas Boulevard areas. At Royer Park, floodwater covered the ball field and extended across Park Drive. Part of the sewage treatment plant was flooded, but the plant remained operational. No injuries or fatalities were reported.

October 1962

This flood was considered the flood of record at the time. Over 9 inches of rain fell. Creeks overflowed their banks throughout the City, but the areas most affected were along Linda Creek in the Sierra Gardens Subdivision and along Dry Creek. A number of families were evacuated from their homes on Lee Way and Douglas Boulevard. Royer Park was completely inundated for a time, and one deer in the zoo was drowned before animals could be evacuated. Other flood losses in the park included bank erosion, destruction of fencing, damage to a footbridge, and damage to a recreation building and the park office. Restoration of the park required two weeks. Water mains were damaged in the Cresthaven and Atlantic Street areas. The Dry Creek Bridge on Riverside Avenue and the Antelope Creek Bridge on Atlantic Street were damaged. No injuries or fatalities were reported.

December 1964

During this flood event, the fire and police departments evacuated four families when floodwater from Linda Creek surrounded their homes on Champion Oaks Drive and Lee Way. Dry Creek overflowed its banks in several locations, and flood-borne debris was removed in an effort to keep the stream flowing at Booth Road and the Southern Pacific railroad tracks. Floodwater at this location was deep enough to submerge a car stalled in the underpass. Stream-bank erosion occurred along the east bank of Dry Creek behind the Campfire Girls lodge on Sutter Avenue. No injuries or fatalities were reported.

January 1969

A series of downpours beginning on January 16, 1969, caused flooding along Dry Creek, affecting Royer Park, the Champion Oaks area, and the intersection of Cirby Way and Old Auburn Road. Rising water from Linda Creek crested at the doorsteps of five homes along Champion Oaks Drive. A second storm during the week of January 25, caused rising water in Linda Creek that led to the evacuation of five homes on Champion Oaks Drive. Dry Creek Bridge on Douglas Boulevard at Royer Park was closed when Dry Creek washed out fill placed by City crews in response to an earlier washout. No injuries or fatalities were reported.

January 1970

Heavy rains and severe winds caused flooding in Roseville and throughout northern California. High water levels were reported on Champion Oaks Way, Subway Road, and Royer Park. No injuries or fatalities were reported.

January 1973

Heavy rain and high winds impacted northern California border during the week of January 16, 1973. City crews kept watch on Linda Creek at Champion Oaks Drive and closed Subway Road because of flooding. Royer Park flooded after Dry Creek overflowed its banks. No injuries or fatalities were reported.

March 1983

This flood damaged approximately 25 residences along Linda and Cirby Creeks. Portions of Royer Park and areas in the Sierra Lakes Mobile Home Park were inundated. Dry Creek overflowed the Darling Way and Riverside Avenue bridges and flooded six businesses along Riverside Avenue. No injuries or fatalities were reported.

February 1986

This flood caused widespread damage in most of the Dry Creek basin. Nearly all bridges and culverts were overtopped, with 30 sustaining embankment damage. The crossing at Rocky Ridge Drive washed out. Two bridges over Dry Creek were damaged, and street cave-ins occurred at a number of locations. Approximately 209 homes along Dry, Linda, and Cirby Creeks reported flood damage, with water levels up to 5 feet above finished floor levels. The Roseville City Library was closed due to flooding. Floodwaters reached the foundation of the Public Safety Building but did not cause any damage. One fatality associated with this flood event was reported.

January 1995

The January 1995 flood event (Figure 12-2) exceeded the flood event of 1986 on Cirby and Linda Creeks. This event is now considered the flood of record for Dry Creek based on flood heights. The flood was calculated to be a 100-year event. This flood resulted in 358 structures in the Dry Creek Basin being inundated by floodwaters. No injuries or fatalities were reported.

January 1997

Flood events in 1997 were some of the most severe on record for the region. An isolated storm event typical for the Roseville area occurred on soils saturated from repetitive storm events, causing a flash flood. This flooding resulted in 21 structures being inundated with floodwater. The impact of this event was significantly reduced by the partially completed Cirby, Linda, and Dry Creek flood control project. No injuries or fatalities were reported.



Figure 12-2. Dry Creek Flooding, January 1995

February 1998

A small flood occurred on February 3, 1998, resulting in eight structures being inundated by floodwater in the Dry Creek Basin (Figure 12-3). This event was caused by an isolated storm event centered over the basin. No injuries or fatalities were reported.



Figure 12-3. Business Flooding, February 1998

12.2.4 Location

Primary Flood Sources

Upstream flows generated in Placer County enter the City of Roseville's creeks and tributaries from the east and north. Picking up additional stormwater runoff, the creek systems flow west-southwest through Roseville. These flows continue to move west-southwest, passing through Placer, Sacramento, and Sutter Counties to their ultimate destination, the Sacramento and American Rivers.

Roseville is located in portions of two major drainage basins: the Pleasant Grove Creek Basin and the Dry Creek Basin. Pleasant Grove Creek and its tributaries drain most of the western and central areas of the City, and the Dry Creek Basin and its tributaries drain the rest of the City.

The Dry Creek system has year-round flow in its major water courses, and the Pleasant Grove system is intermittent, with only seasonal flow. Since 1950, there have been no reports of structural flood damage along Pleasant Grove Creek. Due to the City's floodplain management policies, no structures in the Pleasant Grove Creek Basin are presently subject to flooding. The focus of flood hazard management is the Dry Creek Basin.

Seven creeks and streams that drain the 80-square-mile Upper Dry Creek Basin pass through and join within the city limits of Roseville. Three of these creeks have primary flooding impacts on the City: Cirby, Dry, and Linda Creeks.

Mapped Floodplains

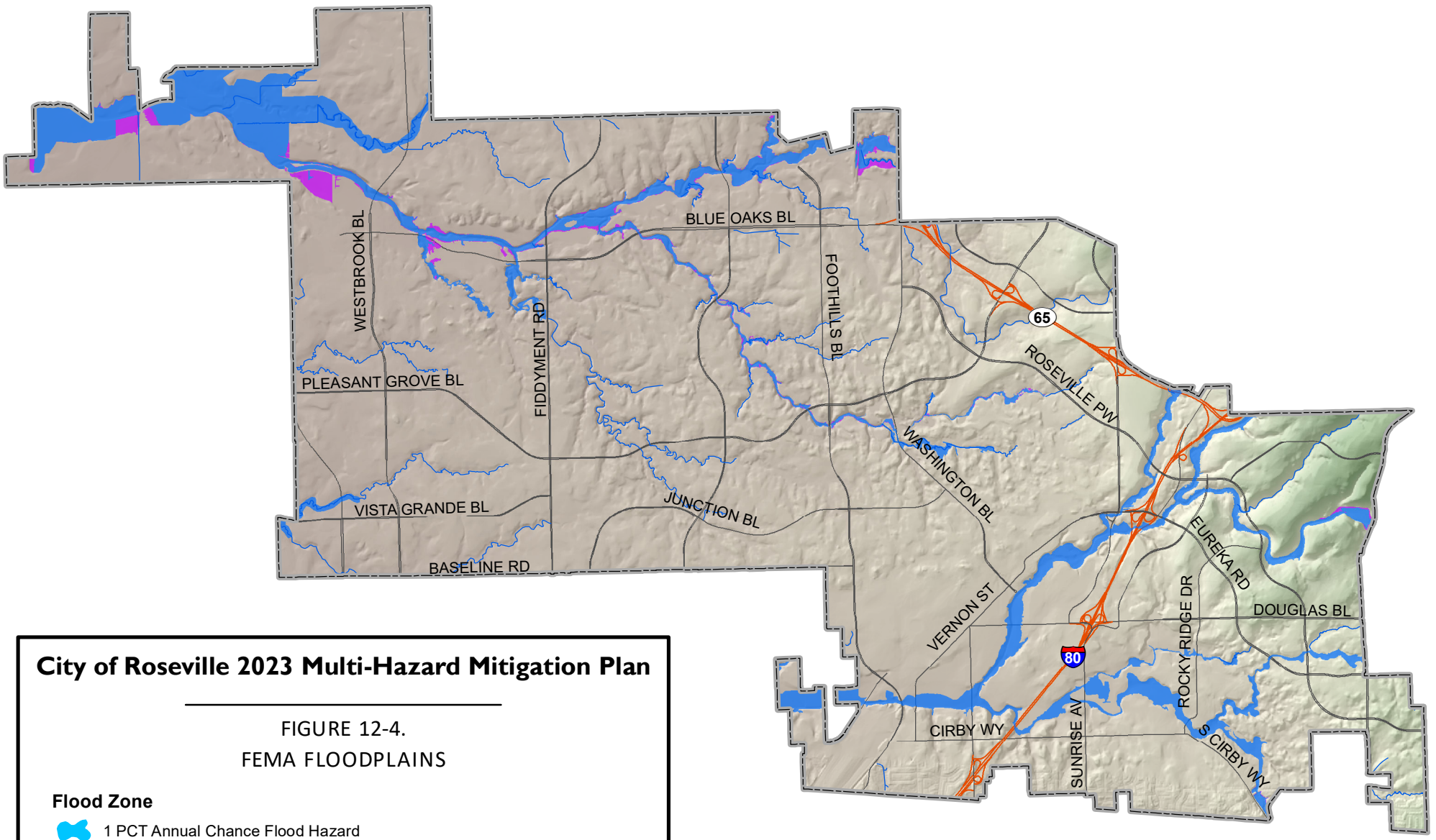
FEMA Mapping

Figure 12-4 shows FEMA's mapped floodplain for Roseville, including the 1 percent and 0.2 percent annual chance flood zones. FEMA also maps "areas with reduced risk due to levee," which indicate locations where the presence of a levee leads to lower flood risk due to the levee's flood-protection capabilities. Those areas are not shown on the figure included here, but the risk analysis for flood in this plan does take them into consideration. The map also does not show the 10 percent annual chance flood zone, but that area too is evaluated in the risk analysis.

City of Roseville Mapping

The science available at the time that most of the City of Roseville was developed did not accurately project flood heights that could occur from typical rainfall events in the region. Development therefore occurred in areas needed for stormwater conveyance, with insufficient levels of flood protection. Development now exists in low-lying areas adjacent to creek or stream systems needed to convey the over-bank flooding that can occur during storm events.

The City eventually modeled flooding using the best available hydrologic and hydraulic science to better reflect actual rainfall events that can impact the City. This modeling generated a projection of flood heights and areas of inundation that is well supported by conditions observed during the 1986 flood. The City has since used this information to create and enhance its floodplain management program to minimize flood risk to all new developments. Based on the detailed modeling, the City identified its own regulatory floodplain that exceeds the SFHA mapped by FEMA. Figure 12-5 shows the City's regulatory floodplain, as authorized by the Roseville City Code.



City of Roseville 2023 Multi-Hazard Mitigation Plan

FIGURE 12-4.
FEMA FLOODPLAINS

Flood Zone

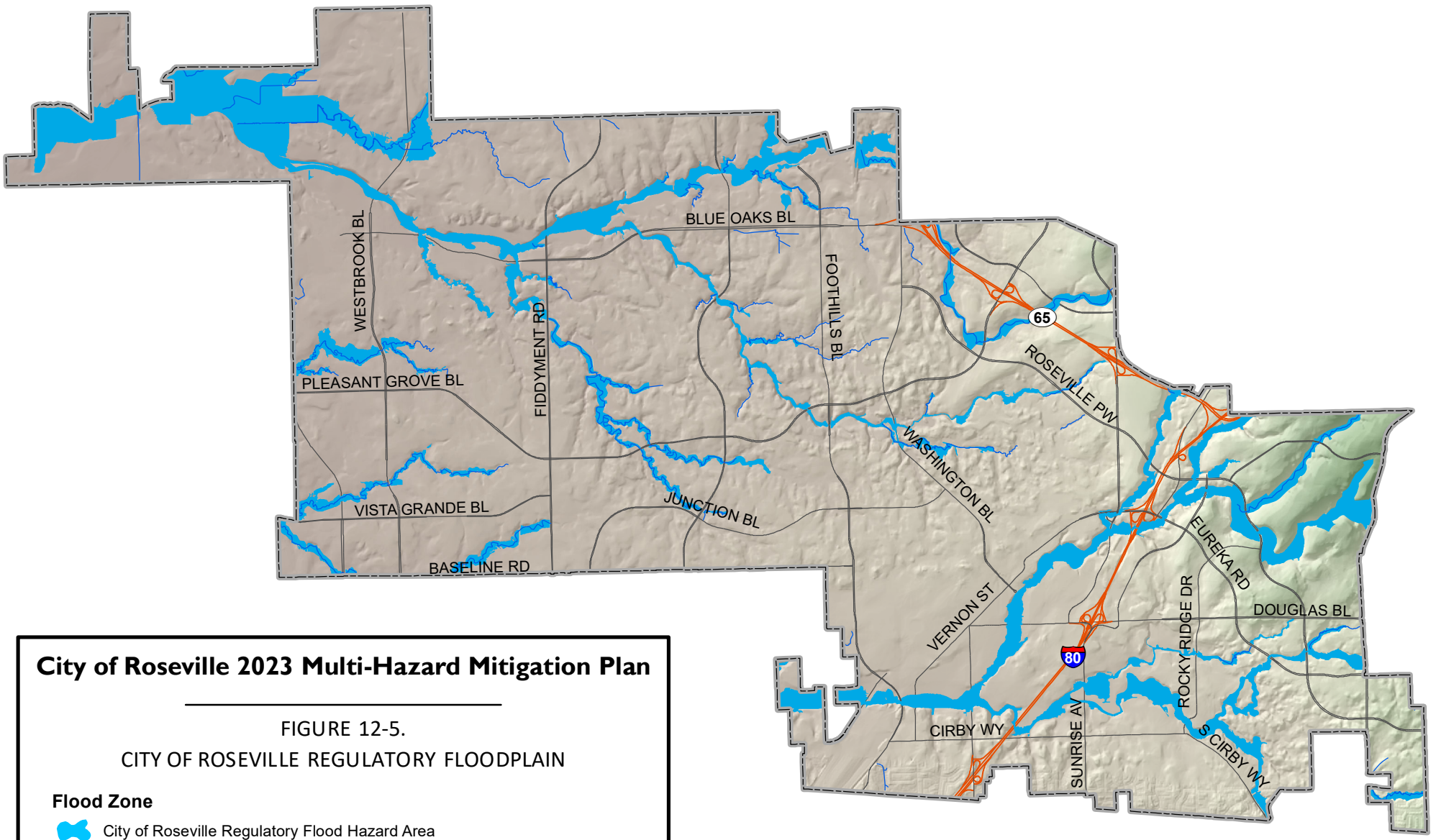
- 1 PCT Annual Chance Flood Hazard
- 0.2 PCT Annual Chance Flood Hazard

Data Souces
FEMA Digital Flood Insurance Rate Map
CIty of Roseville

CITY OF ROSEVILLE CALIFORNIA

0 1 2 Miles

N W E S



City of Roseville 2023 Multi-Hazard Mitigation Plan

FIGURE 12-5.
CITY OF ROSEVILLE REGULATORY FLOODPLAIN

Flood Zone

City of Roseville Regulatory Flood Hazard Area

Data Souces
CIty of Roseville

CITY OF ROSEVILLE CALIFORNIA

0 1 2 Miles

N W E S

The City regulatory floodplain is the area susceptible to risk from flooding based on City-approved studies. These areas are based on detailed hydrologic and hydraulic floodplain modeling that meets or exceeds FEMA criteria for mapping and modeling floodplains. The flood event used to delineate these boundaries is referred to as "the regulatory flood" to differentiate it from the "base flood" used by FEMA.

The flood risk assessment in this plan uses a City-generated flood inventory database of site-specific information for each property in the regulatory floodplain. This database includes information for the following basic categories:

- Buildings in the regulatory floodplain
- Building use
- Building area
- Building value
- Permit history
- Flood loss history
- Regulatory flood elevation
- Base flood elevation
- Pre- and post-FIRM structures
- Elevation of lowest adjacent grade
- Finished floor elevation

In many portions of the City, the Nolte Future Floodplain has been used to designate floodplain boundaries. The Nolte Future Floodplain defines floodway and floodway fringe boundaries within the floodplain. The floodway fringe is an area along the boundary of the floodplain that, if totally obstructed, would not result in more than a 1-foot rise in the water surface elevation. The floodway constitutes the remainder of the floodplain area and is typically where floodwaters have the most velocity.

12.2.5 Frequency

Flood magnitude measurements reflect statistical averages only; it is possible for two or more rare floods (with a 100-year or higher recurrence interval) to occur within a short time period. Assigning recurrence intervals to historical floods on different streams can help indicate the intensity of a storm over a large area. For example, the 1995 flood event was determined to be a 100-year flood on Dry Creek and a 50-year flood on Linda Creek.

Recent history has shown that Roseville can expect an average of one episode of minor river flooding each winter. Recent flooding resulting in property damage has occurred about every 3 to 5 years since 1950, except for the period from 1973 to 1981, when no significant flooding occurred. The frequency of flood events that cause significant damage has decreased significantly over the years due to City efforts to mitigate flood risk. Exposure to events that could cause significant flooding can be expected every 5 to 10 years. Additionally, the City can expect what is often referred to as "nuisance" flooding annually in the historic core due to urban drainage issues.

12.2.6 Severity

Table 12-3 shows observed flooding characteristics for the Pleasant Grove and Dry Creek basins, based on measurements made during past flood events.

The City implemented the "Cirby-Linda-Dry Creek Flood Control Project" to reduce stormwater backup at constrictions and increase the overall capacity of the floodplain during storm conditions. Project structures were designed to provide 1 foot of freeboard above the projected 500-year flood elevation. This project significantly reduced the flood risk exposure for this area, but did not eliminate it.

Table 12-3. Observed Characteristics of Flooding

	Pleasant Grove Creek Basin	Dry Creek Basin
Approximate Base Flood Velocity (feet/second)[a]	0.5 to 8.0	2.0 to 14.0
Flow Rate (cubic feet per second)[b]	1,100 to 5,000	900 to 15,000
Base Flood Elevation (feet, National Geodetic Vertical Datum)		
Downstream limit	89.7	79.7
Upstream limit	150.0	210.0
Approximate Depth of Overbank Flooding (feet above existing grade)	0 to 2	0 to 3
Approximate Warning Time (hours)	3	3

a. Higher velocities were observed in the channel; lower velocities were observed in the overbank area
b. 1 cubic foot is about 7.5 gallons

12.2.7 Warning Time

Due to the extended precipitation needed to cause serious flooding, it is unusual for a flood to occur without warning. Flash flooding can be less predictable, but hazard areas can be warned in advanced of potential flash flooding. Typical warning times for Roseville range from 1 to 3 hours. The City's flood warning system has four ways to warn the public of potential flooding:

- A comprehensive graphical display of stream levels, broadcast on Channel 14 or 73, with the status of the warning
- The "Stream Level" link on the City of Roseville home web page (www.roseville.ca.us)
- An automatic telephone dialing system to problem areas
- Flooding status broadcasted on radio station 530 AM.

Numerous stream flow and rain gauges form the City's stream monitoring system for the Upper Dry Creek Drainage Basin. These stations are placed at strategic locations throughout the drainage basin. For example, one is mounted on the floodwall just upstream from the pedestrian bridge that crosses between Tina Way and Marlin Drive and another is on Dry Creek at the Vernon Street Bridge. Each station transmits information via radio antenna to a central computer. Stream level information from five of the most critical stream level gauges is broadcasted on cable Channel 14/73 and on the City's web page during significant storm events. City staff uses this information in deciding whether to advise residents to evacuate. The goal is to provide up to 3 hours of advance warning. The continuously changing variables of precipitation, stream levels, and forecasts have a major effect on meeting this goal. The display shown on Channel 14/73 consists of a set of basic graphics shown in 15-second intervals:

- The first, which is shown only once for every complete cycle, is a City of Roseville map that includes major roadways (Vernon Street, Douglas Boulevard, Cirby Way, etc.), the three major streams (Dry Creek, Linda Creek, and Cirby Creek) and the five stream level gauge locations. Residents living in a designated floodplain can determine which of the five stream gauges best represents their neighborhood. Once this is established, it is important to focus on how the streams are reacting to the weather conditions.
- Following this display, a more specific map identifies a single stream gauge's location in relation to nearby roadways and streams.
- Transmitted information from the gauges is presented in visual formats that include the current stream depth and the stream depth over the past six hours.

The stream level graph is divided into four colored categories of flood depth stages (see Figure 12-6):

- Blue (Normal Stage)—Stream level conditions are normal and safe.
- Green (Advisory Stage)—City staff is continuously monitoring creek levels and weather conditions. Residents should be closely watching for further information about flooding in their area.
- Yellow (Warning Stage)—There is a possibility of flooding in this area. Necessary precautions need to be taken to secure personal property and safety.
- Red (Critical Stage)—Flooding appears imminent in this area. Residents should evacuate their homes.

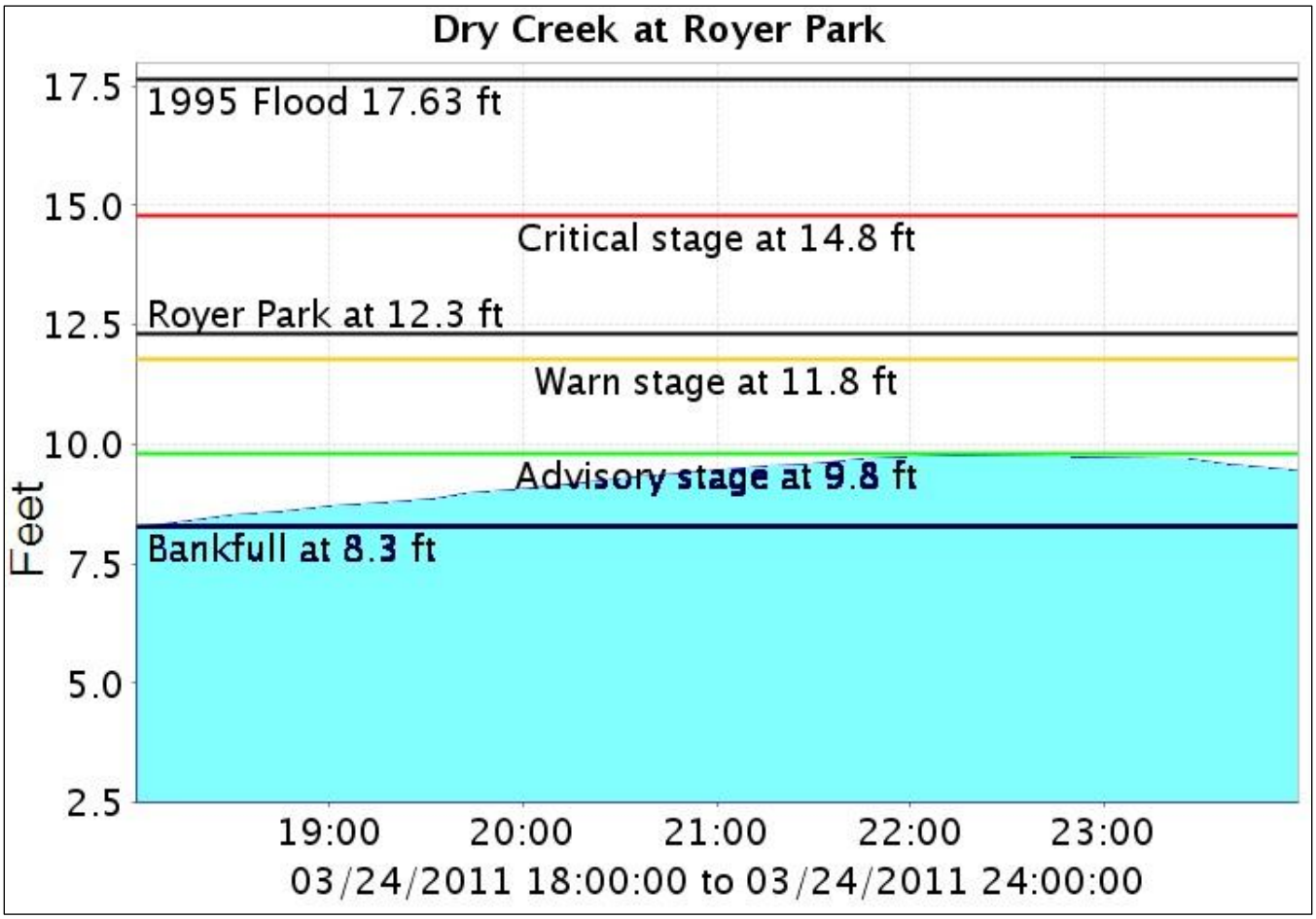


Figure 12-6. Example of Stream Gauge Graphic Display

The numeric values of the stream depths associated with the flood depth stages are shown on the vertical bar graph for all five of the stream level gauges, and reference stream levels are identified for each gauge. For example, the stream level during the 1995 flood is marked for each location. Also identified are other reference points such as roadway surface, bridge and/or top of berm levels. This enables viewers to identify and understand the present stage of the stream in relation to known benchmarks.

The City of Roseville also has an automated telephone dialing system. During significant storm events, this system is used to phone residents and businesses in the floodplain and provide recorded messages containing important information. The message to be played will depend on the flood threat in the area at that time.

12.3 EXPOSURE

The Level 2 Hazus protocol was used to assess the exposure to flooding in the planning area for the following mapped flood hazard areas:

- The FEMA-mapped 10 percent, 1 percent, and 0.2 percent annual chance flood zones
- The FEMA-mapped area of reduced risk due to levees
- The City of Roseville regulatory flood zone.

12.3.1 Population

Table 12-4 summarizes the estimated population living in all the evaluated flood hazard areas.

Table 12-4. Exposed Population in Evaluated Flood Hazard Zones

	10% Annual Chance Flood Zone	1% Annual Chance Flood Zone	0.2% Annual Chance Flood Zone	Area of Reduced Risk Due to Levees	City Regulatory Floodplain
Population Exposed	98	367	367	728	376
% of Total Planning Area Population	0.1%	0.2%	0.2%	0.5%	0.3%

12.3.2 Property

Table 12-5 summarizes the estimated property exposure in all the evaluated flood hazard areas. Figure 12-7 shows the number of exposed structures by occupancy class for evaluated flood zones. The value of exposed structures is shown by occupancy class in Figure 12-8 through Figure 12-12.

Table 12-5. Exposed Property in Evaluated Flood Hazard Zones

	10% Annual Chance Flood Zone	1% Annual Chance Flood Zone	0.2% Annual Chance Flood Zone	Area of Reduced Risk Due to Levees	City Regulatory Floodplain
Acres of Inundation Area	913	1,931	2,078	60	2,916
Number of Buildings Exposed	46	159	166	298	169
Value of Exposed Structures	$106,190,777	$172,216,733	$186,016,646	$105,346,493	$181,144,941
Value of Exposed Contents	$139,737,946	$193,979,712	$214,679,581	$84,971,478	$204,937,756
Total Exposed Property Value	**$245,928,723**	**$366,196,445**	**$400,696,228**	**$190,317,971**	**$386,082,697**
Total Exposed Value as % of Planning Area Total	***0.5%***	***0.8%***	***0.8%***	***0.4%***	***0.8%***



Figure 12-7. Number of Flood-Exposed Structures, by Occupancy Class

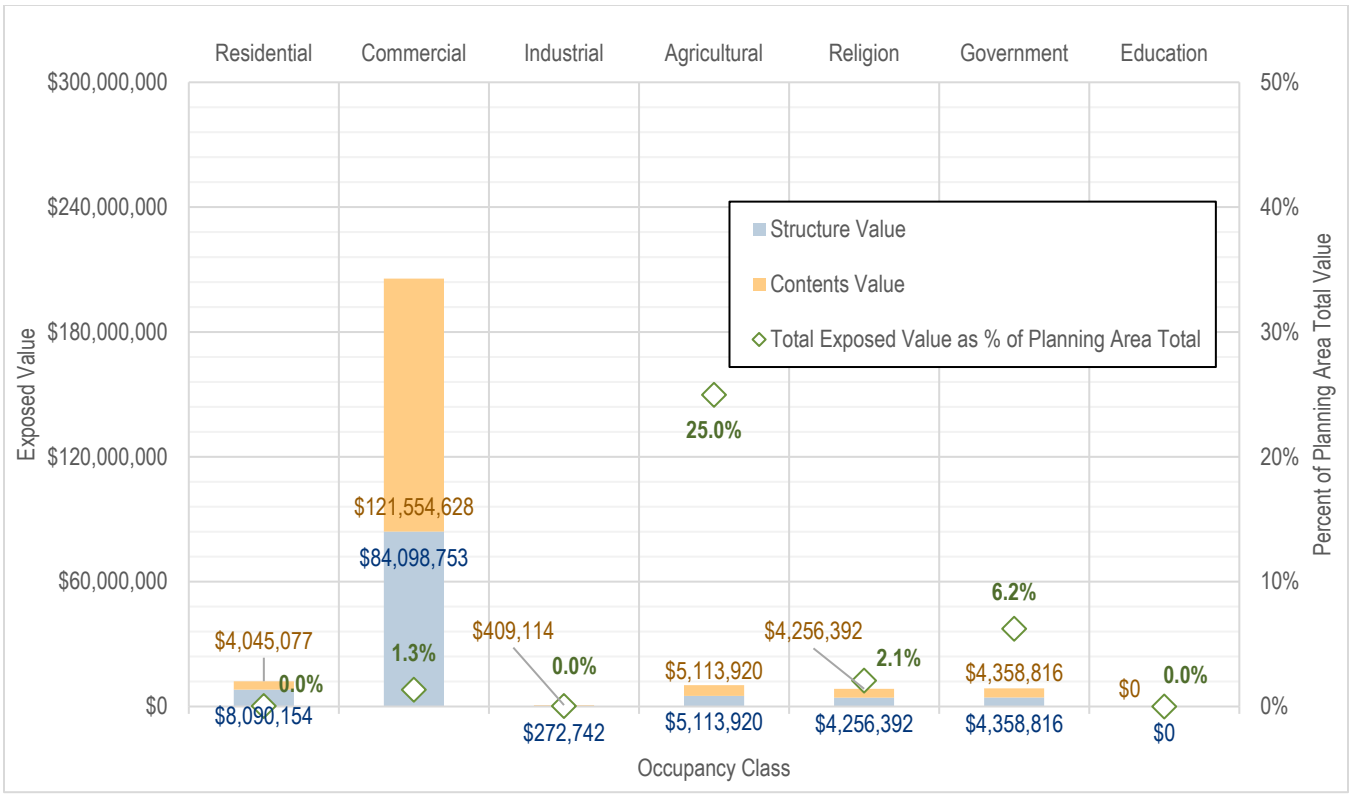


Figure 12-8. Value of Exposed Structures in the 10% Annual Chance Flood Zone, by Occupancy Class

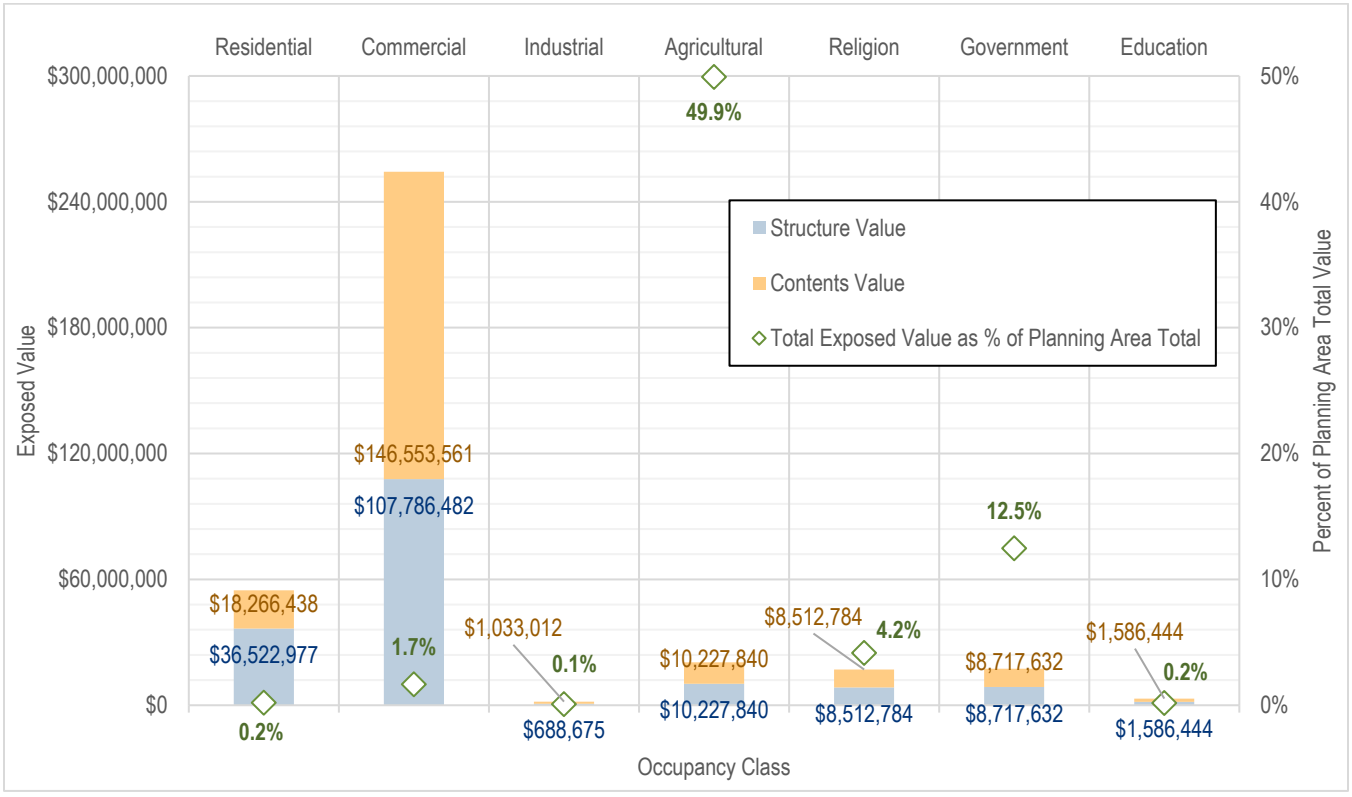


Figure 12-9. Value of Exposed Structures in the 1% Annual Chance Flood Zone, by Occupancy Class

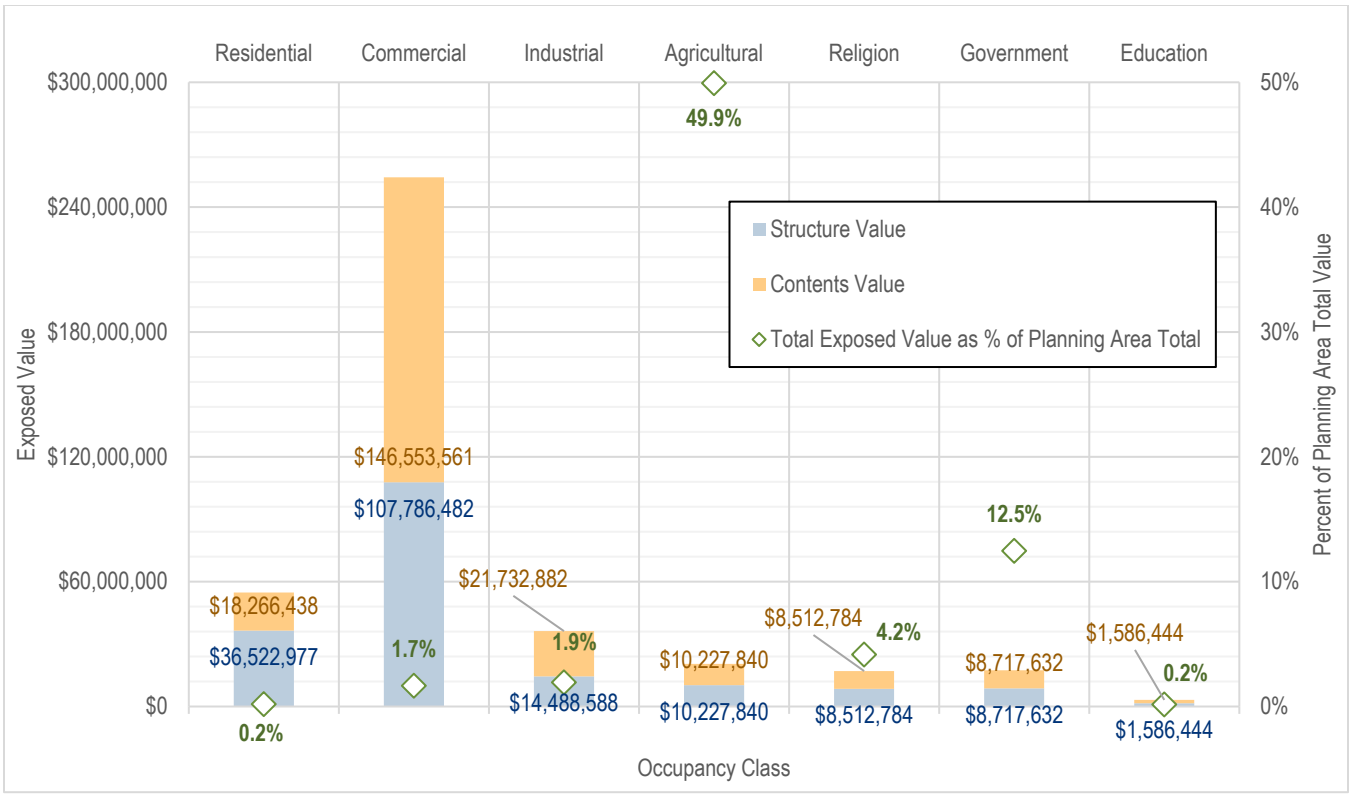


Figure 12-10. Value of Exposed Structures in the 0.2% Annual Chance Flood Zone, by Occupancy Class

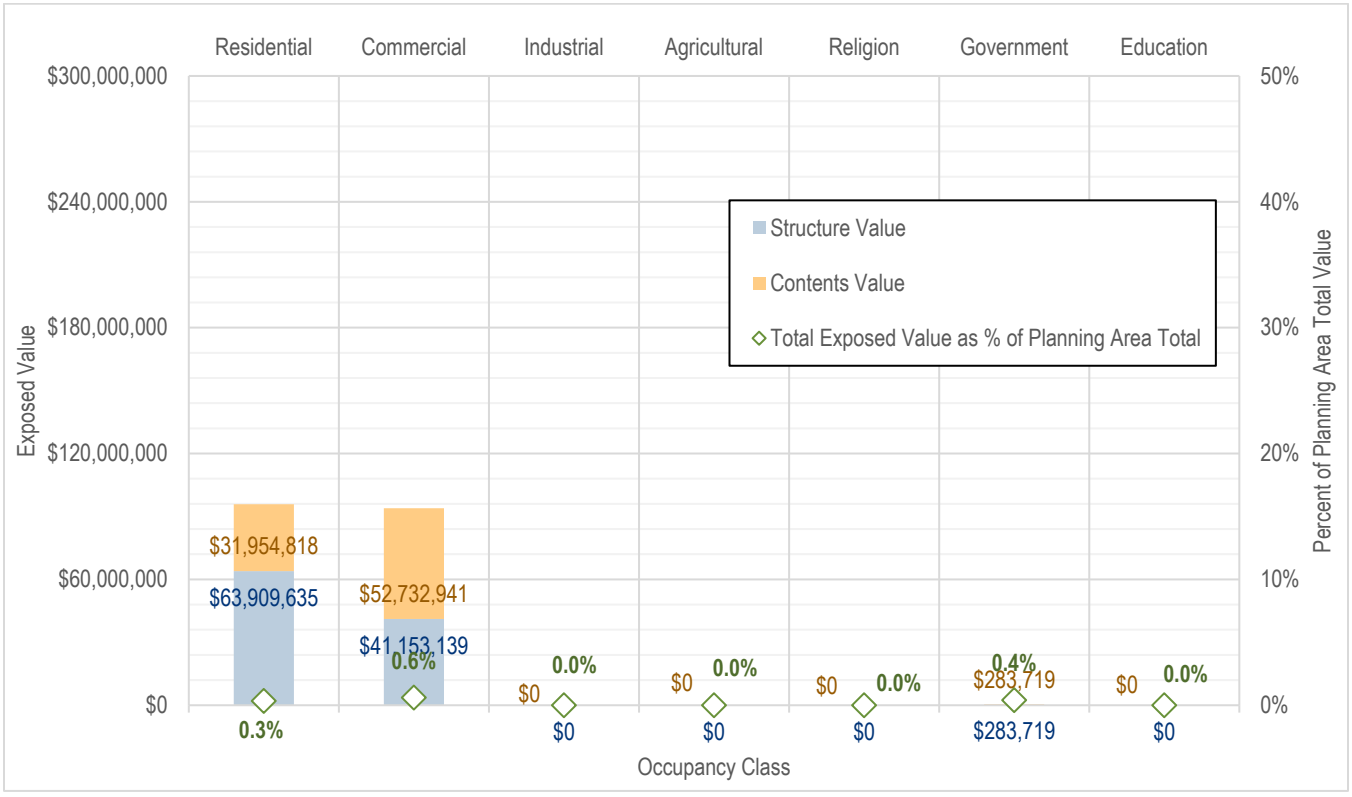


Figure 12-11. Value of Exposed Structures in Areas of Reduced Risk Due to Levees, by Occupancy Class

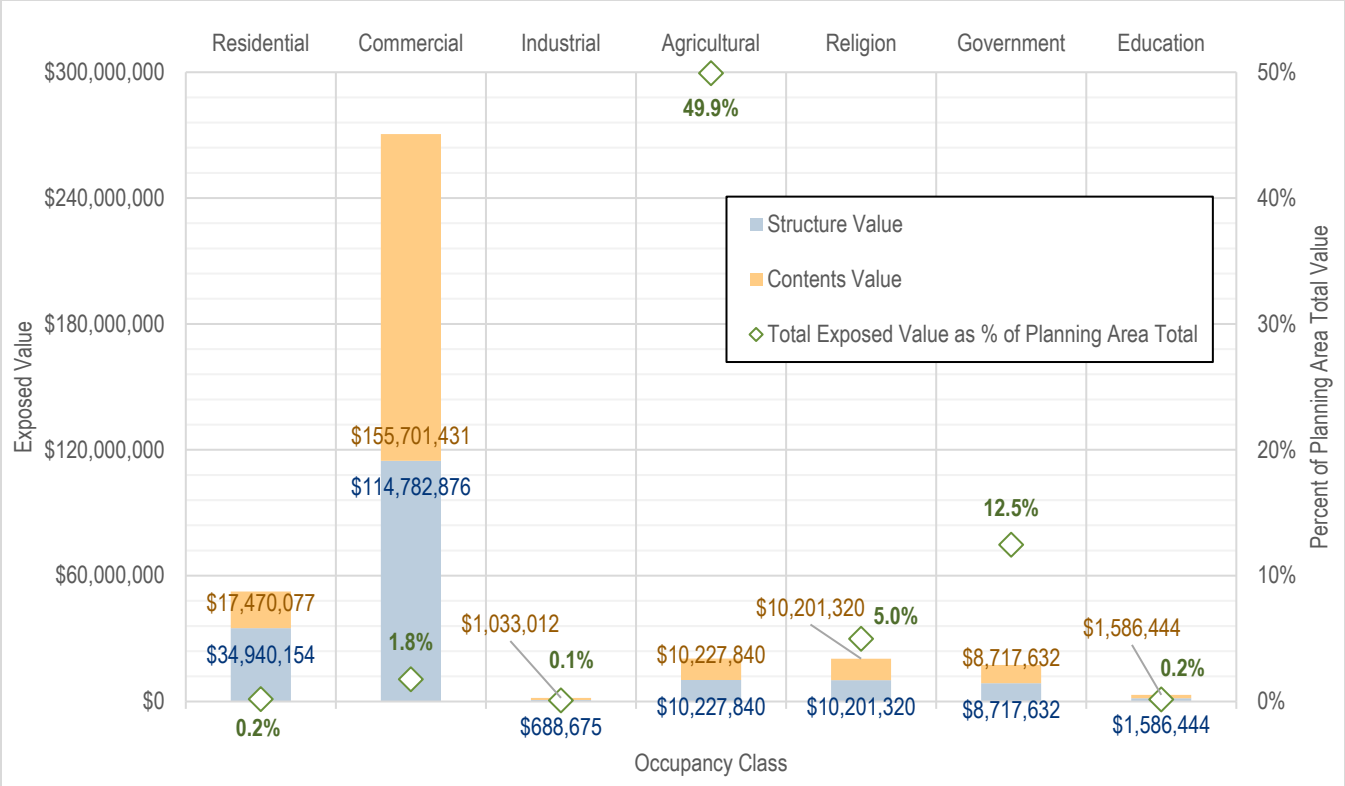


Figure 12-12. Value of Exposed Structures in the City Regulatory Floodplain, by Occupancy Class

12.3.3 Critical Facilities

GIS analysis was used to determine the number of critical facilities in all of the evaluated flood zones. Figure 12-13 shows the distribution of exposed critical facilities by occupancy class.

The following major roadways and stream crossings (bridges or culverts) would be impassable during a 100-year flood event:

- Dry Creek Road Crossings
  - Vernon Street
  - Riverside Avenue
  - Darling Way
  - Douglas Boulevard
  - Folsom Road
- Linda Creek Road Crossings
  - Rocky Ridge Drive
  - Champion Oaks Drive
  - Sierra College Boulevard
- Cirby Creek Road Crossings
  - Sunrise Avenue
  - Coloma Way
  - Oakridge Road
  - Sierra Gardens Drive
  - Huntington Drive
- Miners Ravine
  - Sierra College Boulevard

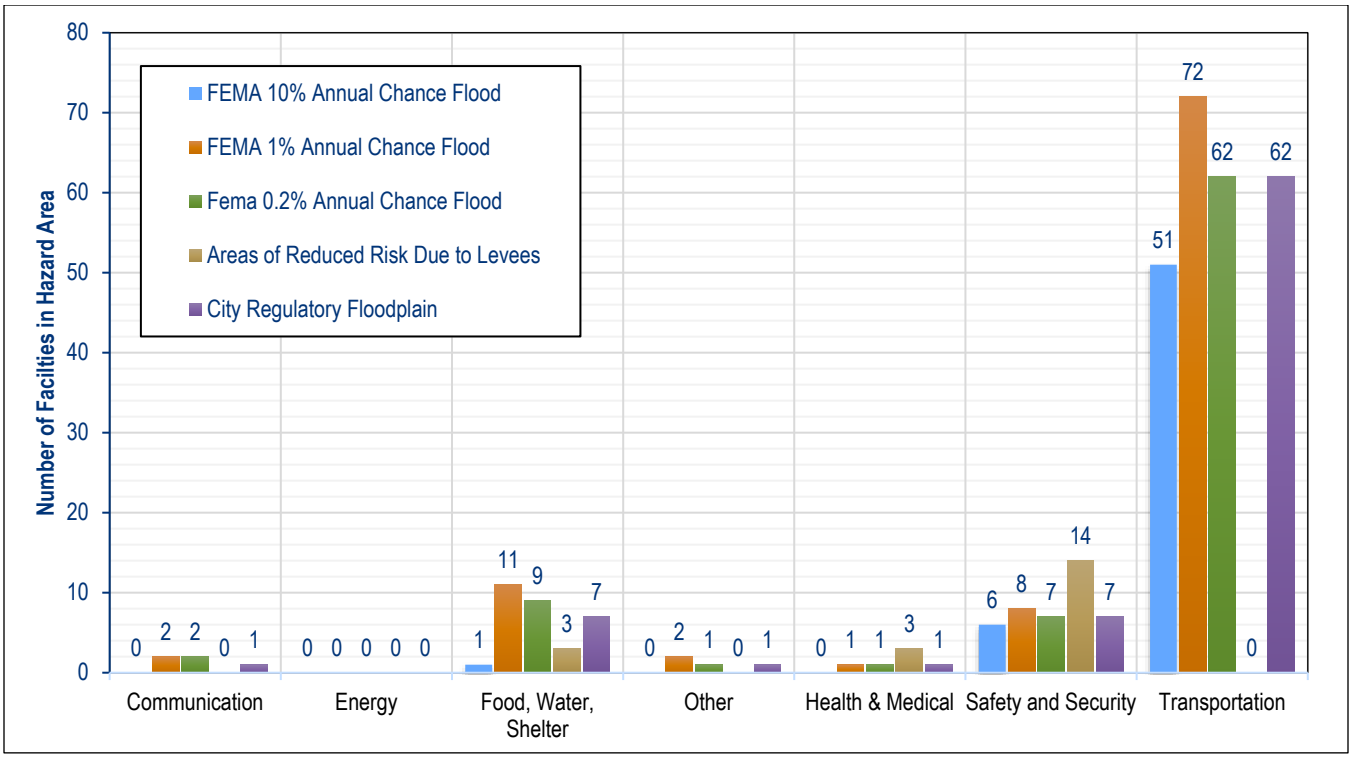


Figure 12-13. Number of Critical Facilities in Evaluated Flood Zones

12.3.4 Environment

With much of Roseville's regulatory floodplain zoned for open space use, the City has taken significant steps to preserve the natural and beneficial functions of the floodplain, while at the same time reducing the risk exposure to the built environment. Still, all vegetation and wildlife resources and corridors in the floodplain open space system—grasslands, oak woodlands, riparian areas, and seasonal wetlands—are exposed to the flood risk.

12.4 VULNERABILITY

12.4.1 Population

Impacts on Persons and Households

Table 12-6 summarizes the estimated flooding impacts on persons and households due to flooding in each evaluated flood zone.

Table 12-6. Exposed Population in Evaluated Flood Hazard Zones

	10% Annual Chance Flood Zone	1% Annual Chance Flood Zone	0.2% Annual Chance Flood Zone	Area of Reduced Risk Due to Levees	City Regulatory Floodplain
Displaced Population	8	71	85	5	92
Population Requiring Short-Term Shelter	1	3	5	0	6

Vulnerable Populations

The aftermath of flooding events present numerous threats to public health and safety, including unsafe food, contaminated drinking and washing water and poor sanitation, mosquitoes and animals, mold and mildew, carbon monoxide poisoning, and mental stress and fatigue. Current loss estimation models such as Hazus are not equipped to measure public health impacts. The best preparation for these effects includes awareness that they can occur, education of the public on prevention, and planning to deal with them during responses to flooding events.

Flooding can be a deadly hazard. Roads running through low-lying areas prone to sudden and frequent flooding are a serious threat. Motorists often attempt to drive through barricaded or flooded roadways. Because as little as 18 to 24 inches of water moving across a roadway can carry away most vehicles, floods can present significant potential safety risks. The second largest potential for injuries from flooding results from people walking or playing in or near flooded areas. Generally, floods kill people in one of two situations: when people ignore basic safety precautions (such as evacuations and warnings), and when a flash flood hits an area with no warning.

Although it is possible to analyze life and safety impacts resulting from the flood hazard, injuries and casualties were not estimated for this hazard. One flood-related fatality in Roseville has been recorded, but the flood hazard is not generally considered to pose a serious risk to life in this area, for the following reasons:

- Flooding in Roseville tends to be rapid in terms of the rise and fall of floodwaters. Because of the City's geographical location in the watershed, floods tend to come and go quickly as they move toward their drainage endpoints, thereby decreasing the threat that people become trapped by floodwaters.
- The City has made it a priority to warn and educate its citizens on the dangers and impacts of flooding. The City implements public outreach programs that provide information on flood warnings, property protection, flood safety, and flood insurance. The City also has developed a comprehensive flood warning program that can deliver real-time data to citizens and emergency management personnel through cable television and the Internet. The program can provide a warning up to 3 hours before a flood event occurs in the 100-year floodplain. The City's approach has resulted in an educated and well-informed constituency.

Table 12-7 shows the findings of the social vulnerability assessment for the 1 percent annual chance floodplain and the City's regulatory floodplain, based on economically disadvantaged households.

Table 12-7. Economically Disadvantaged Households in Mapped Flood Zones

	1 Percent Annual Chance Floodplain		Roseville Regulatory Floodplain	
	Number within the Mapped Hazard Area	% of Total in Mapped Hazard Area	Number within the Mapped Hazard Area	% of Total in Mapped Hazard Area
All Households	8,213	100.0%	10,824	100.0%
Households with Income Below $40,000	1,806	22.0%	2,249	20.8%

12.4.2 Property

Table 12-8 summarizes Hazus estimates of flood damage for all evaluated flood hazard zones. The debris estimate includes only structural debris and building finishes; it does not include additional debris that may result from a flood event, such as from trees, sediment, building contents, bridges, or utility lines. Estimated damage by occupancy class is shown in Figure 12-14 to Figure 12-18.

Table 12-8. Estimated Property Impacts of Flooding in the Planning Area

	10% Annual Chance Flood Zone	1% Annual Chance Flood Zone	0.2% Annual Chance Flood Zone	Area of Reduced Risk Due to Levees	City Regulatory Floodplain
Number of Structures Impacted	46	125	126	192	145
Estimated Loss					
Structures	$1,809,697	$8,715,967	$29,549,542	$1,657,956	$12,795,896
Contents	$8,667,211	$23,265,884	$46,177,524	$1,158,837	$31,020,247
Total	**$10,476,908**	**$31,981,852**	**$75,727,066**	**$2,816,793**	**$43,816,143**
% of Total Planning Area Replacement Value	*0.02%*	*0.1%*	*0.2%*	*0.0%*	*0.1%*
Debris to Be Removed	1,550	5,191	10,427	298	8,859

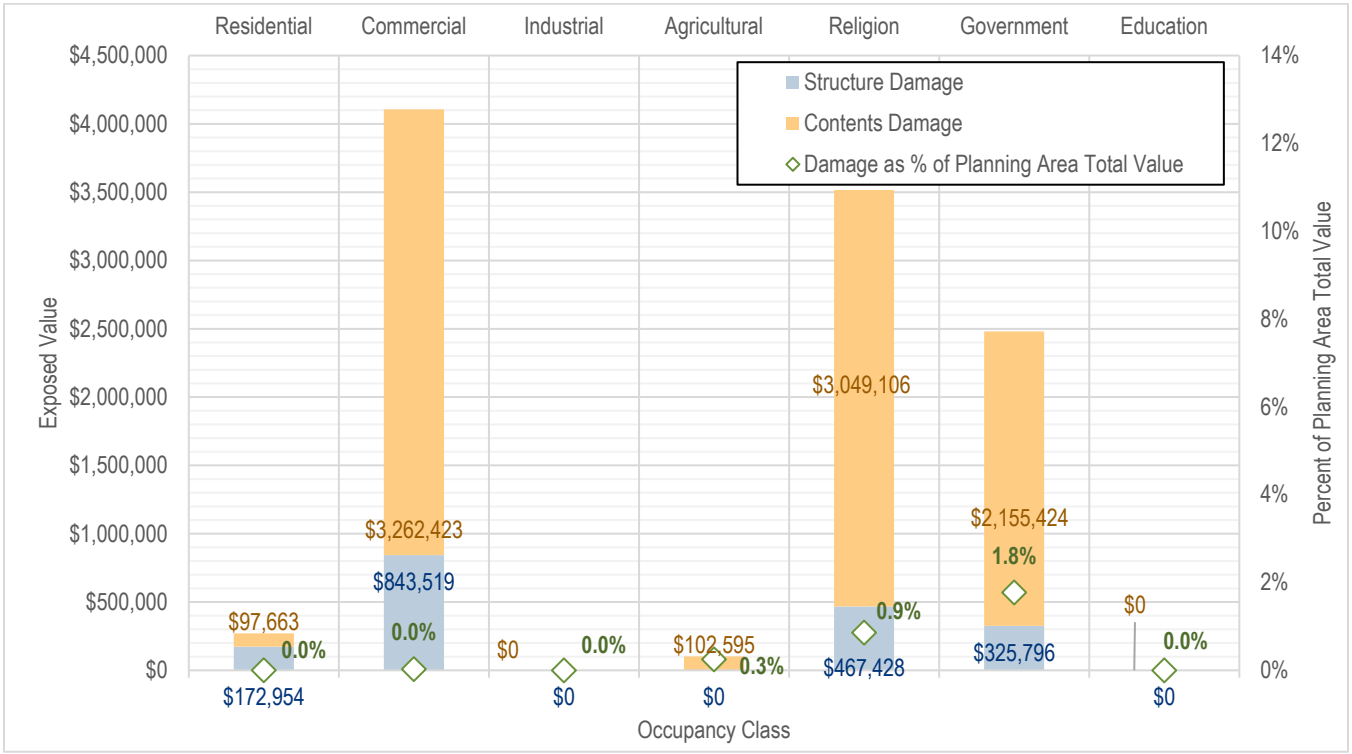


Figure 12-14. Flood Damage to Structures in the 10% Annual Chance Floodplain, by Occupancy Class

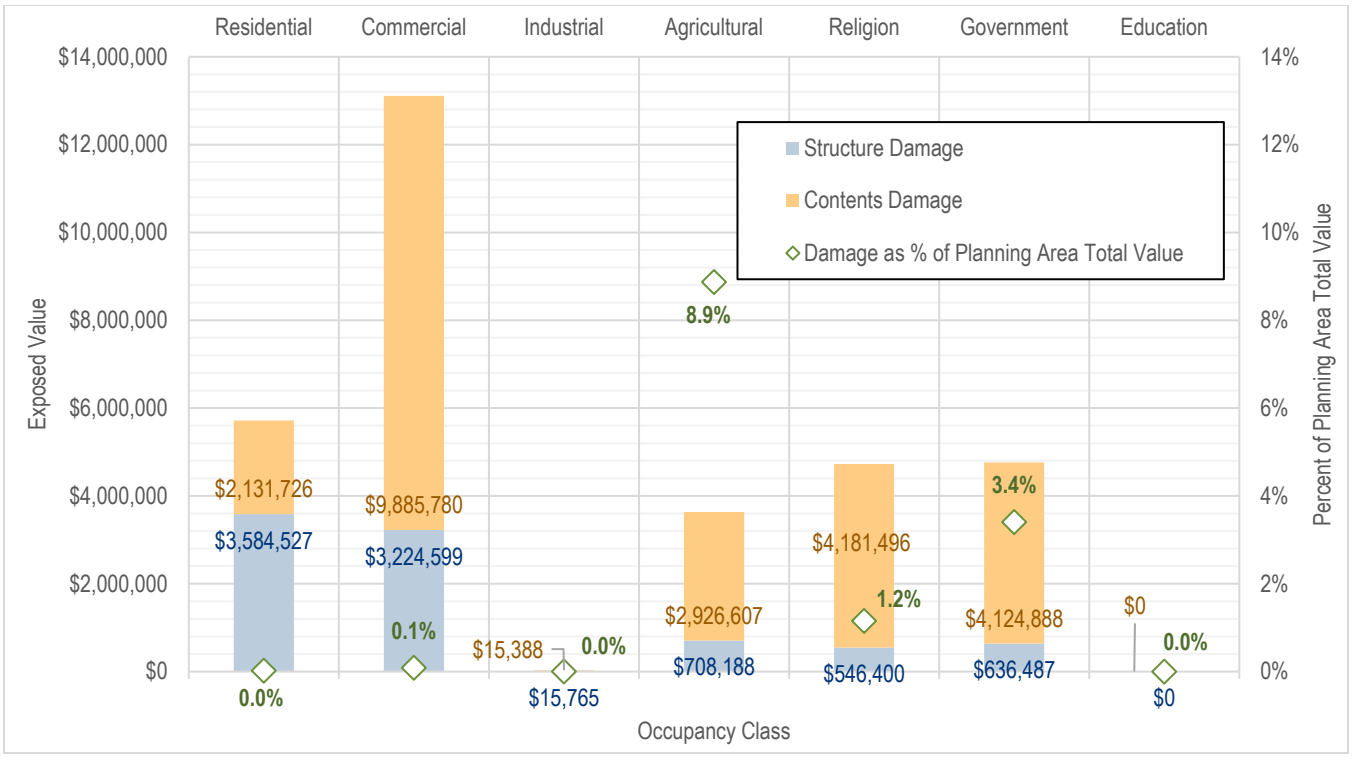


Figure 12-15. Flood Damage to Structures in the 1% Annual Chance Floodplain, by Occupancy Class

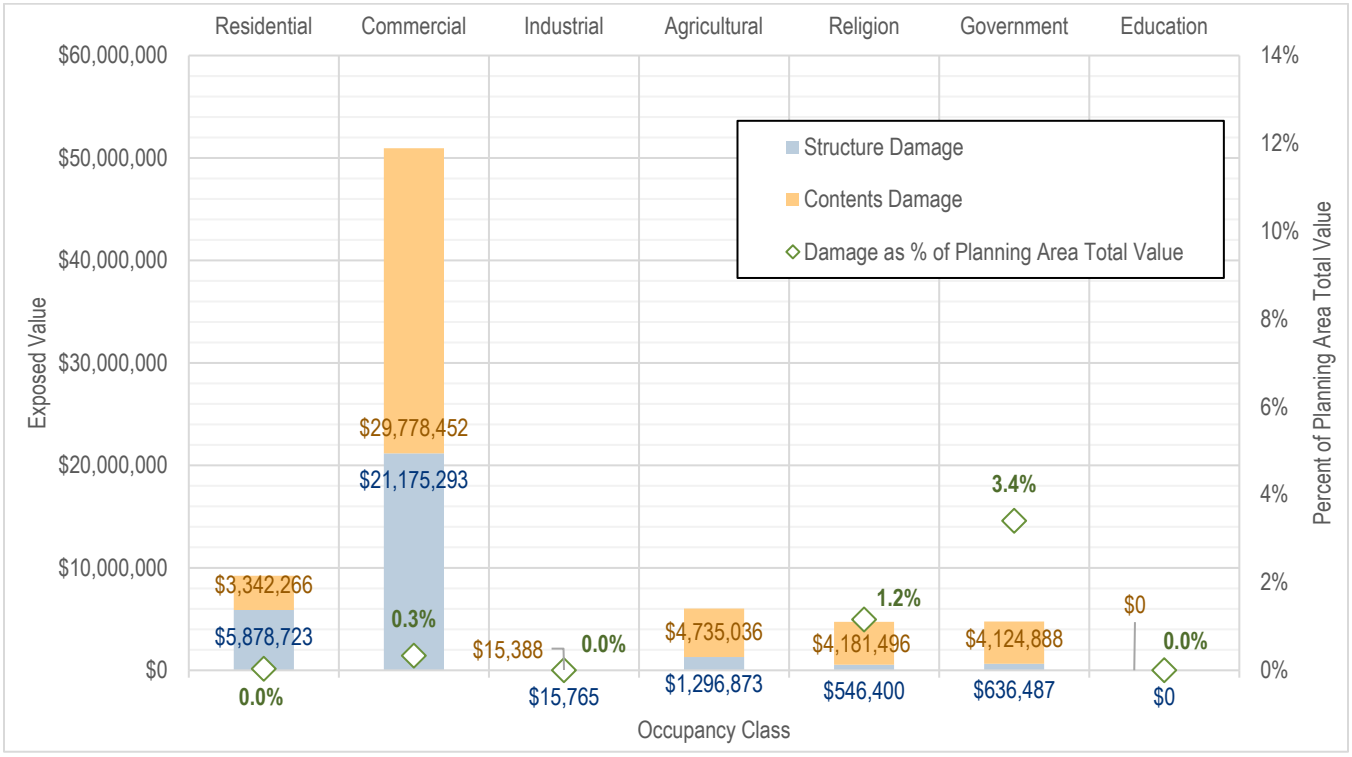


Figure 12-16. Flood Damage to Structures in the 0.2% Annual Chance Floodplain, by Occupancy Class

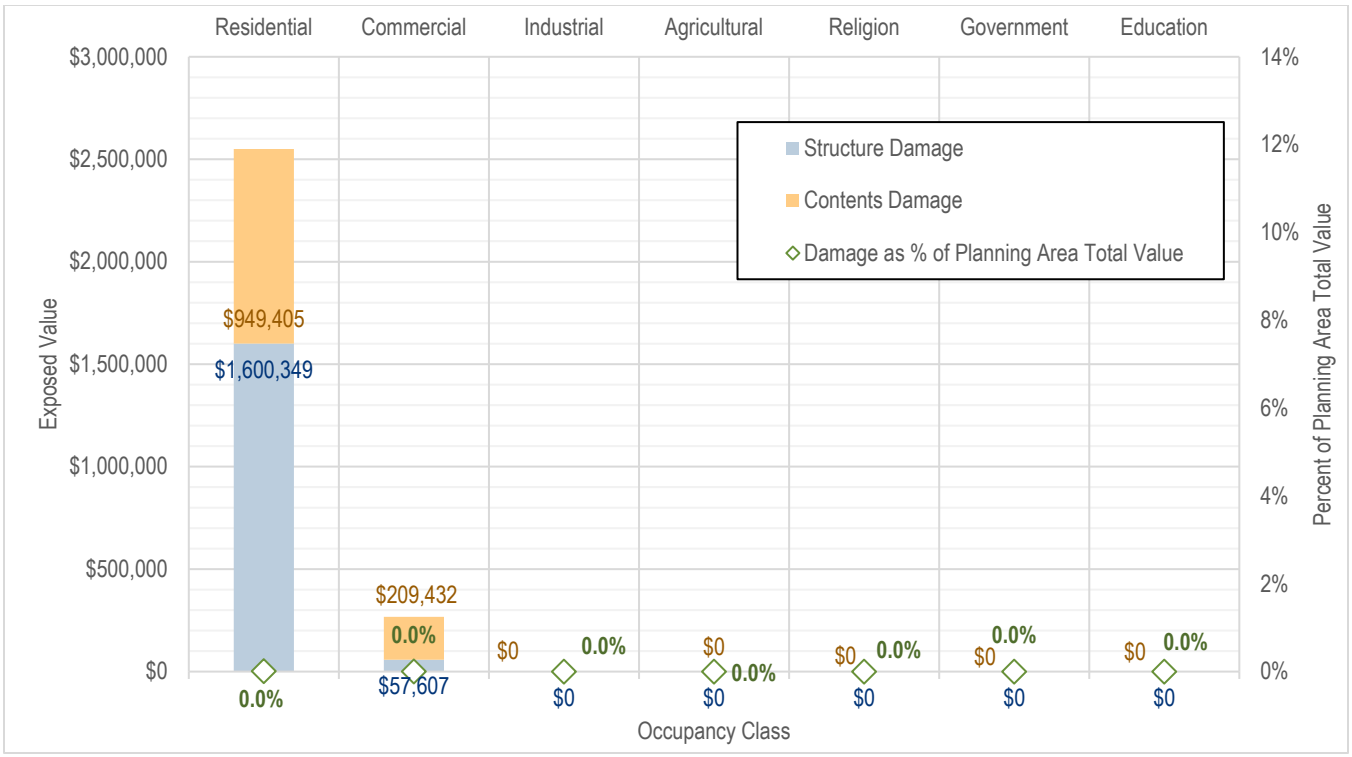


Figure 12-17. Flood Damage to Structures in the Area With Reduced Risk Due to Levees, by Occupancy Class

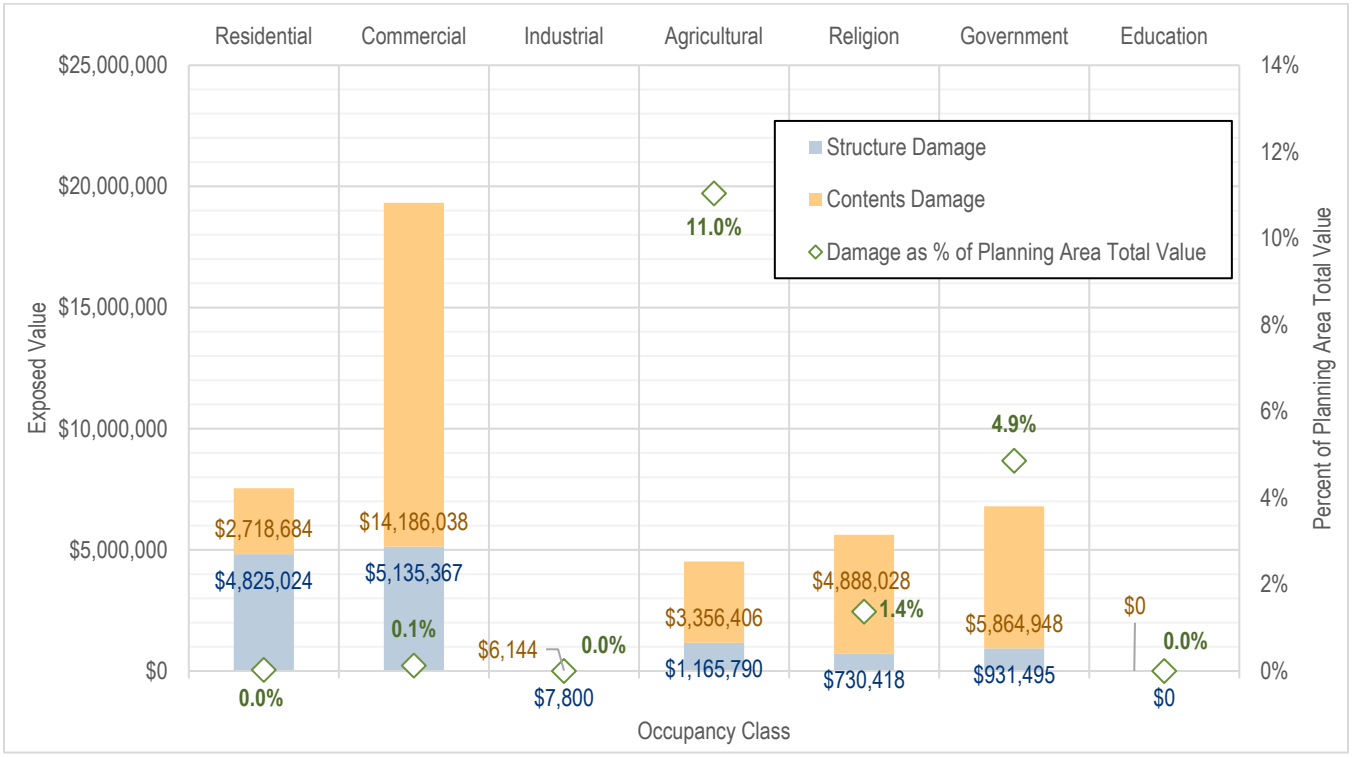


Figure 12-18. Flood Damage to Structures in the City Regulatory Floodplain, by Occupancy Class

To preserve the natural and beneficial functions of open space resource areas adjacent to the floodplain areas of Roseville, the City has adopted policies under the Open Space and Conservation Element of its General Plan that include the following:

- Preserve and rehabilitate continuous riparian corridors and adjacent habitat along City waterways.
- Require dedication of the 100-year floodplain or comparable mechanism to protect habitat and wildlife values in perpetuity.
- Restrict development within the 200-year floodplain subject to the State of California Urban Level of Flood Protection Criteria.
- Require preservation of contiguous areas outside the 100-year floodplain as merited by special resources or circumstances, which may include, but are not limited to, sensitive wildlife or vegetation, wetland habitat, oak woodland areas, grassland connections in association with other habitat areas, slope or topographical considerations, recreation opportunities, and maintenance access requirements.
- Limit recreation activities within the 100-year floodplain and require additional setback areas for trails and other recreation uses so that natural resource areas are not adversely impacted.
- Provide protection and enhancement of fishery resources, including continued coordination with the California Department of Fish and Wildlife to release water to Linda Creek.

Because of these policies, a large portion of the floodplains within Roseville is held for open space use, much of it in a natural or beneficial state. Currently, 1,873.6 acres (63 percent) of the regulatory floodplain within Roseville is designated for open space use, as defined in the Open Space and Conservation Element of the General Plan. Maps showing these areas are provided in Appendix C

12.4.3 Critical Facilities

Estimated Damage

The estimated number of critical facilities affected by flooding and the estimated damage are shown in Figure 12-19 through Figure 12-22 for the FEMA floodplains and the City's regulatory floodplain. Depending on community lifeline category, the average amount of damage to structures, measured as a percentage of total value, ranges from 12 to 38 percent of total value. Average damage to contents ranges from 15 to 45 percent.

Significant Facilities Affected

The risk assessment found that the following critical facilities would be affected by the FEMA 1 percent annual chance flood or the City's regulatory flood:

- FEMA 1 percent annual chance flood:
  - 4 wastewater system facilities
  - 2 potable water system facilities
  - 1 fraternal organization facility
  - 1 medical care facility
  - 1 communications transmitter
  - 56 bridges
- City regulatory flood:
  - 1 fire station
  - 7 wastewater system facilities
  - 4 potable water system facilities
  - 1 fraternal organization facility
  - 1 medical care facility
  - 1 church
  - 2 communications transmitters
  - 67 bridges

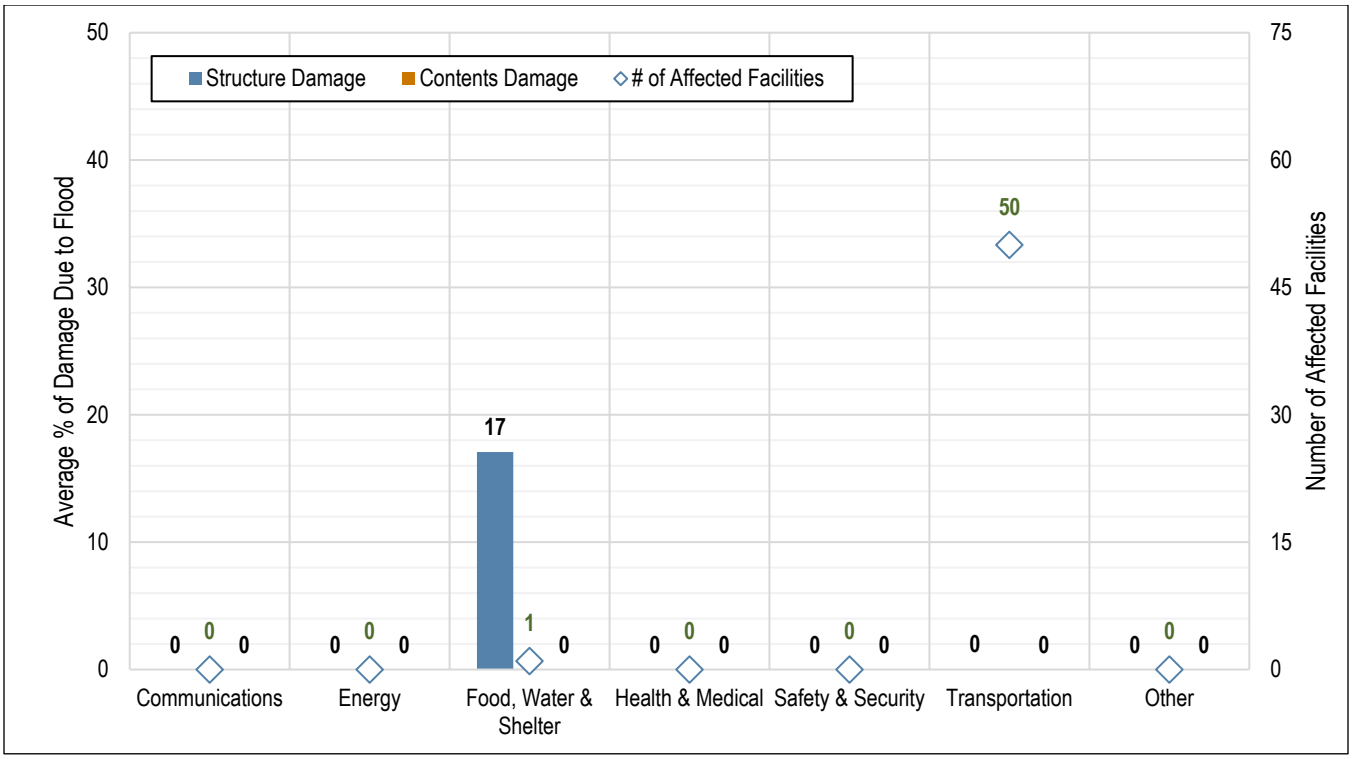


Figure 12-19. Average Damage to Critical Facilities in the 10% Annual Chance Floodplain

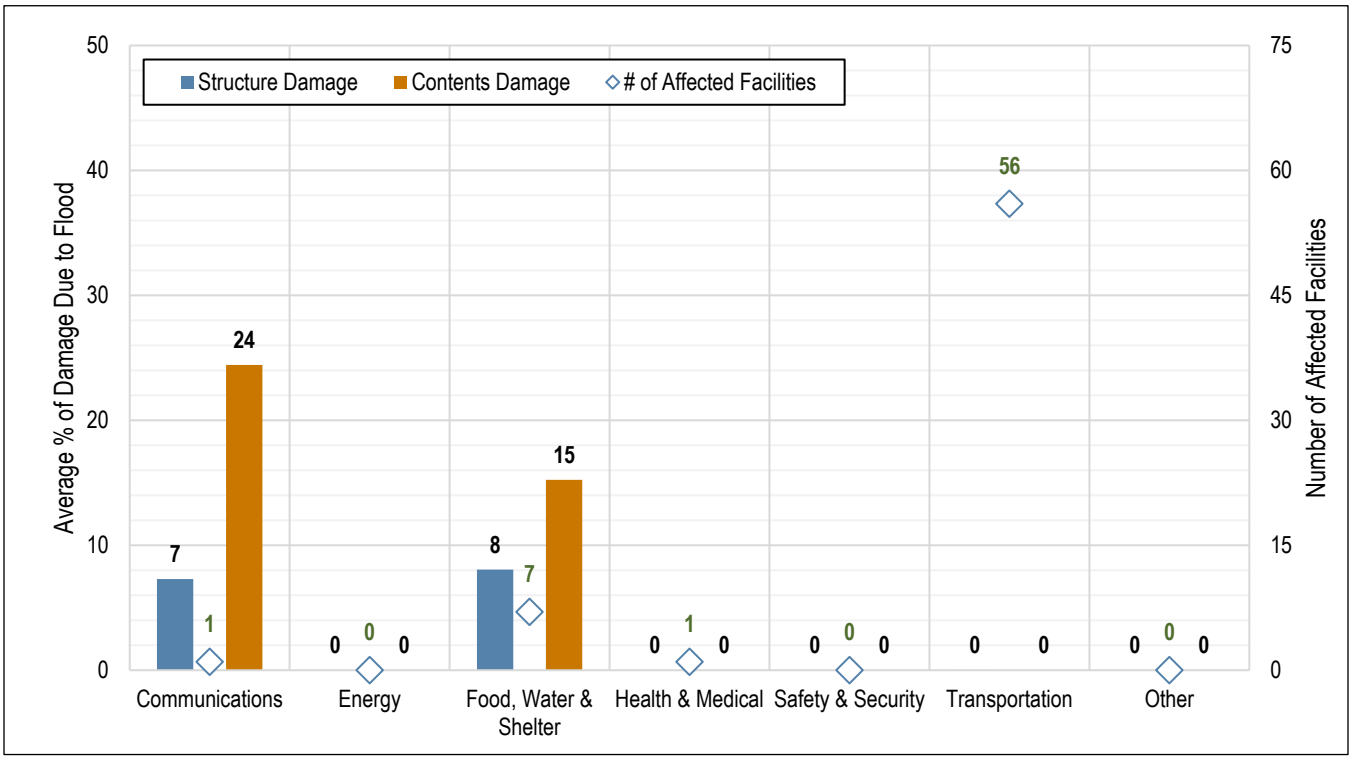


Figure 12-20. Average Damage to Critical Facilities in the 1% Annual Chance Floodplain

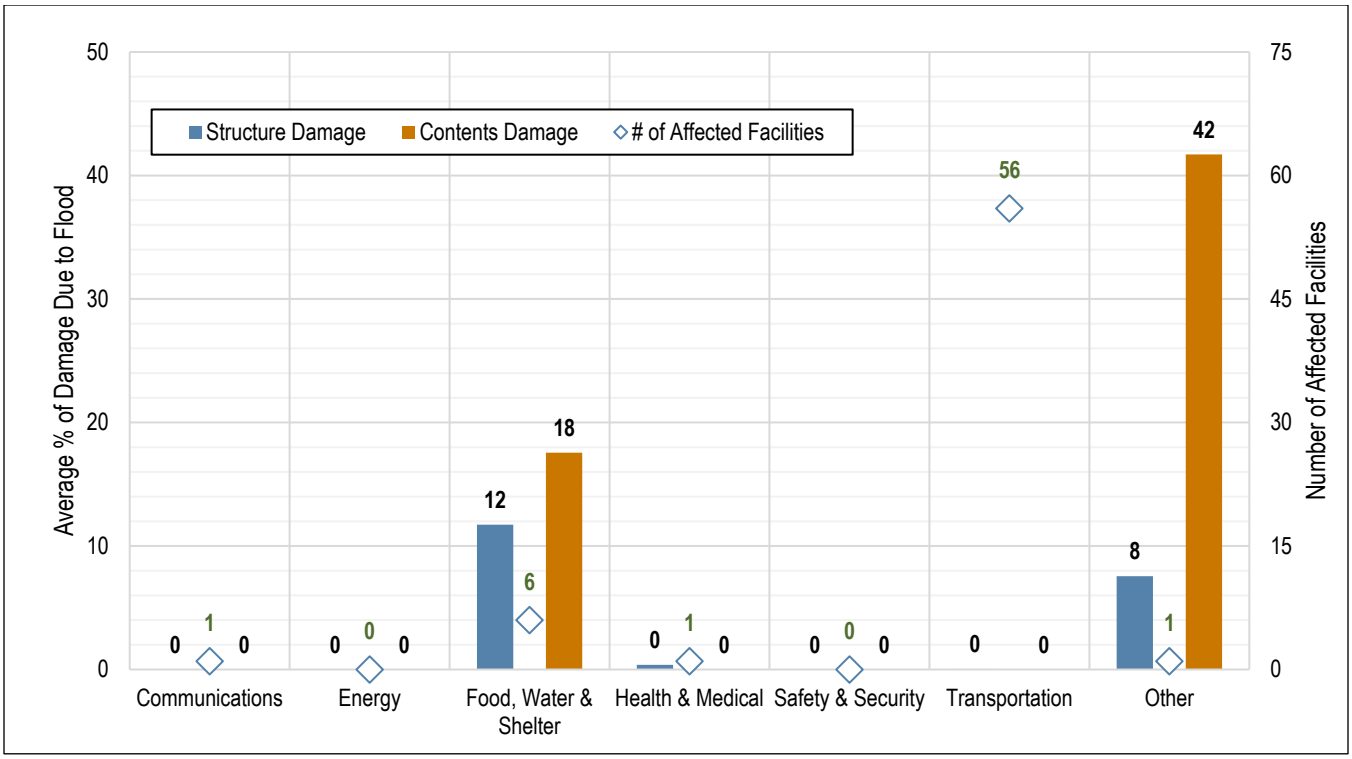


Figure 12-21. Average Damage to Critical Facilities in the 0.2% Annual Chance Floodplain

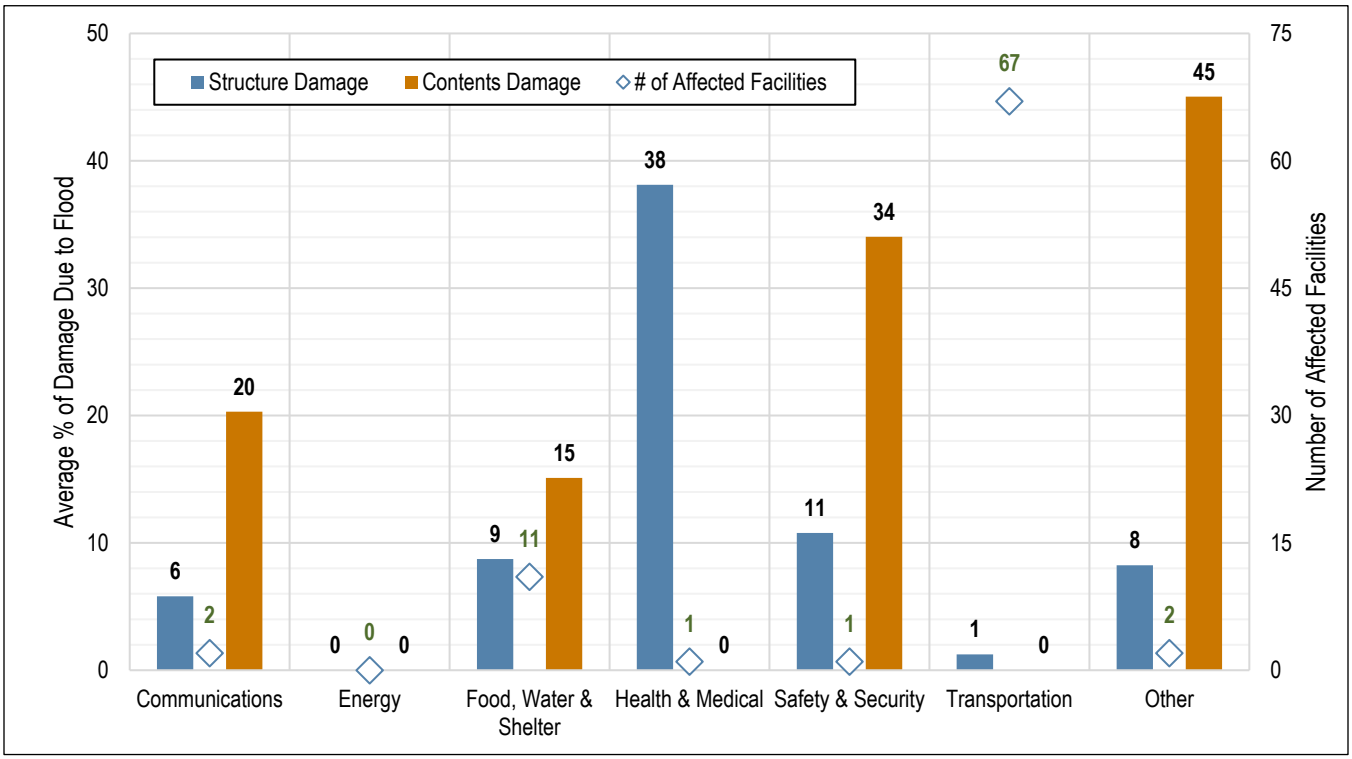


Figure 12-22. Average Damage to Critical Facilities in the City Regulatory Floodplain

Flooding poses numerous risks to critical facilities:

- Roads or railroads that are blocked or damaged can prevent access throughout the area and can isolate residents and emergency service providers needing to get to vulnerable populations or to make repairs.
- Bridges washed out or blocked by floods or debris from floods also can cause isolation.
- Creek or river floodwaters can back up drainage systems, causing localized flooding.
- Culverts can be blocked by debris from flood events, also causing localized urban flooding.
- Floodwaters can get into drinking water supplies, causing contamination.
- Sewer systems can be backed up, causing waste to spill into homes, neighborhoods, rivers and streams.
- Underground utilities can also be damaged.

Of Roseville's two wastewater treatment plants, only the Dry Creek Plant is partially located in the floodplain. The storm sewer system is separate from the sanitary sewer system, so the sanitary sewers are not significantly affected by storm events. The Dry Creek Plant is located above the 100-year floodplain but has overflow ponds within the floodplain. When plant influent loads exceed the plant capacity, untreated sewage is discharged to the overflow ponds. If this scenario occurred simultaneously with a 100-year flood, floodwaters could be contaminated. This situation has not occurred during past flood events, and its probability of occurrence is low. Therefore, its potential impacts on health were not estimated as part of this assessment.

12.4.4 Environment

Flooding can impact the environment in negative ways:

- Migrating fish can wash into roads or over dikes into flooded fields, with no possibility of escape.
- Pollution from roads, such as oil, and hazardous materials can wash into rivers and streams.
- Pollutants carried by floodwaters can settle onto normally dry soils, polluting them for agricultural uses.
- Human development, such as bridge abutments and levees, and logjams from timber harvesting can increase streambank erosion, causing rivers and streams to migrate into non-natural courses.

The environment vulnerable to the flood hazard is the same as the environment exposed to the hazard. While flood events have historically caused significant damage to the environment, estimating damage can be difficult. Loss estimation platforms such as Hazus are not currently equipped to measure environmental impacts of flood hazards. The best gauge of vulnerability of the environment would be a review of damage from past flood events. Loss data that segregates damage to the environment were not available at the time of this Plan. Capturing this data from future events could be beneficial in measuring the vulnerability of the environment for future updates to this Plan.

12.5 FUTURE TRENDS IN DEVELOPMENT

Increased urbanization of western Placer County within the Pleasant Grove and Dry Creek Basins has resulted in the potential for increased flooding problems in Roseville. Land development typically results in increased hard surfaces and decreased vegetation, conditions that limit infiltration opportunities and, without adequate mitigation, can increase stormwater runoff rates and volumes and decrease the time required to reach peak discharge.

Recognizing that typical growth patterns in California would impact and exacerbate the flood hazard problem, the City of Roseville took an aggressive, proactive approach to managing its floodplains through the development of its General Plan in 1992. Land-use categories are defined in the General Plan, with information on general uses, development, intensity, siting, and compatibility standards in relation to the flood hazard. City actions, such as land-use allocation, annexations, zoning, subdivision and design review, redevelopment and capital improvements, must be consistent with the General Plan.

Only three parcels in Roseville's regulatory floodplain are in the current buildable lands inventory. These parcels were all created before the City's flood-protection policies were enacted. Any new development on these parcels would be subject to strict regulations.

Because of policies, activities and mitigation measures in place in Roseville, it can be concluded that future land development trends will not impact or be impacted by flooding in Roseville as long as existing policies remain in force.

12.6 REVIEW OF EXISTING ORDINANCES, PROGRAMS, AND PLANS

The City of Roseville has a long-standing policy to proactively manage its floodplains. Under the guidance of the General Plan and its Safety Element, Roseville has been able to decrease the exposure of its citizens to flooding with a comprehensive approach that includes the following measures:

- Structural mitigation (flood control)
- Non-structural mitigation (elevation or acquisition)
- Regulations
- Stormwater management
- Flood warning
- Outreach and public education.

This section discusses each element except flood warning, which is discussed in Section 12.2.7).

12.6.1 Structural Mitigation

The following major flood control improvements have been accomplished by the City of Roseville since the January 1995 flood event:

- **Tina Way/Elisa Way Area—**Completed in 1996 at the cost of $3 million (100 percent City-funded), this project included channel excavation and construction of berms and floodwalls. The project removed 40 structures from the floodplain. Based on the pre-project location and construction of these structures, the entire area would have flooded during the 1997 flood if the improvements had not been implemented.
- **Riverside Avenue/Vernon Street Area—**Completed in 1996 at the cost of $2 million (90 percent funded by the Union Pacific Railroad and 10 percent funded by the City), the construction project included replacing culverts with a new bridge over Dry Creek. The net effect of this project lowered flood elevations for the reach by 5 to 7 feet and removed 150 structures from the floodplain.
- **Sunrise Avenue/Oakridge Drive and Champion Oaks Areas—**Completed in 2001 at the cost of $16.1 million ($8.7 million from FEMA and $7.4 million from the City), this project replaced culverts

with a new bridge over Linda Creek at Sunrise Avenue. Twin 9-foot-diameter bypass pipes were installed in the Oakridge Drive area. The project included channel excavation and berm and floodwall construction. The project removed 233 structures from the floodplain; 44 structures remained in the floodplain, but these structures were less likely to be flooded. Features included maintaining a channel in as natural a state as possible; planting over 500 oak trees; assigning biologists, ornithologists, and arborists to minimize environmental impacts; and monitoring fish passage and plantings for 5 years.

- **Home Elevation Program**—FEMA funded 75% of this $1 million program to elevate flood-prone homes. These are homes that would not be brought completely out of the floodplain by construction of the City's flood control project. 27 of 44 homeowners on the list elevated their homes via the program. Most of these homes are located in the Folsom/Maciel neighborhood along Dry Creek. Homeowner participation was voluntary.

The City has spent more than $33 million on flood mitigation since the January 1995 flood event and has eliminated 445 flood-prone structures from the floodplain.

12.6.2 Non-Structural Mitigation

Structural mitigation projects reduced the flood exposure of property by 91 percent. Roseville offered mitigation through acquisition or home elevation to the remaining 9 percent of properties exposed to flooding. Completed in 2001 at the cost of $1 million (50 percent funded by FEMA, 40 percent funded by the property owners, and 10 percent funded by the City), the project included elevating 27 homes and acquiring (buying out) 4 homes. This effort resulted in 22 flood-prone homes with post-project floor levels higher than the floodplain level.

12.6.3 Regulations

The City of Roseville regulates its floodplain areas through land use, zoning, and other development restrictions, including a policy that prohibits most development within the 100-year floodplain area. Development in floodplain areas in Roseville is restricted by the following:

- 2035 General Plan, Safety Element, Flood Protection Component
- Improvement Standards
- Flood Damage Prevention Ordinance (Roseville Municipal Code [RMC] Chapter 9.80)
- Zoning Ordinance (RMC Chapter 19.18)
- State of California Urban Level of Flood Protection Legislation.

2035 General Plan, Safety Element, Flood Protection Component

The Safety Element of Roseville's General Plan sets forth goals and policies to address community safety concerns. The flood protection component identifies nine policies and 12 measures to achieve the following goals:

- Minimize the potential for loss of life and property due to flooding.
- Pursue flood control solutions that are cost-effective and minimize environmental impacts.

The policies and implementation measures are incorporated into the City's area-specific plans and are legally enforceable. Key to the City's flood-protection effort is the clear definition and application of floodplain boundaries. The flood protection component of the Safety Element establishes policies prohibiting new

development in an identified floodplain or requiring an appropriate level of flood protection in design and construction for any development that does occur in the floodplain:

- **Infill Areas**—No development is permitted in the future floodway. Development may be permitted within the future floodway fringe. In accordance with the Nolte Future Floodplain definition, such development is limited to areas within the assumed cumulative 1-foot rise in water surface elevation if it can be demonstrated that the development will not impact flood levels (see Figure 12-23).
- **Remainder of the City (specific plans and north industrial area)**—No development is permitted within the future floodplain (floodway and floodway fringe). Exceptions may be considered by the City on a case-by-case basis if encroachment is limited to only the future floodway fringe and would not result in any off-site increase in the water surface elevation (see Figure 12-24).

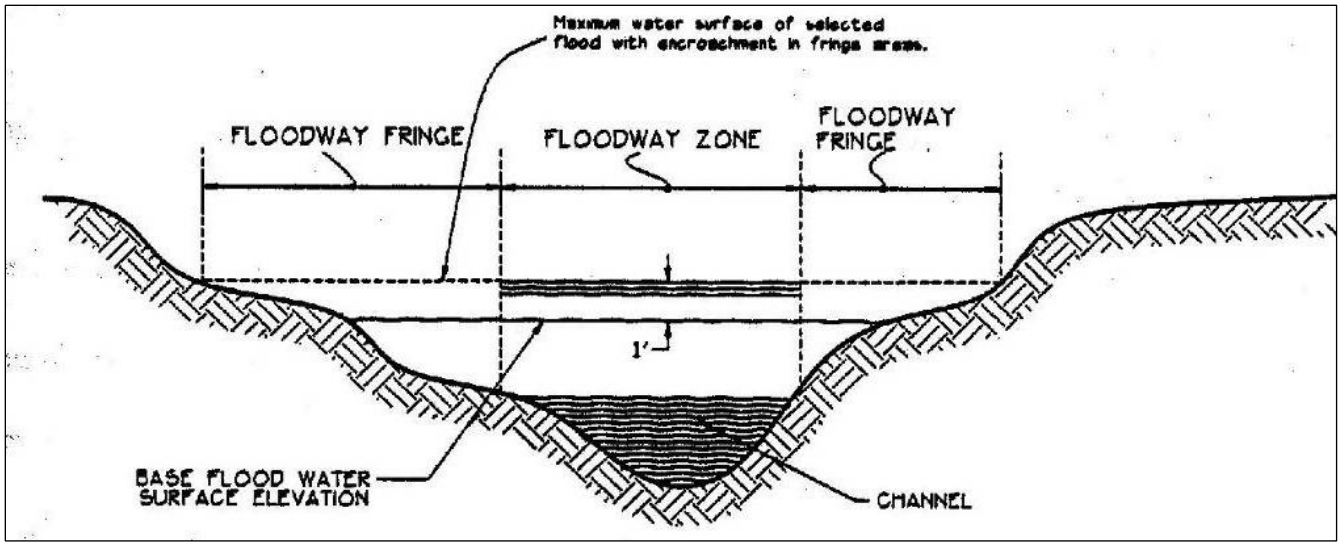


Figure 12-23. Floodplain Designation Cross-Sections for Infill Areas

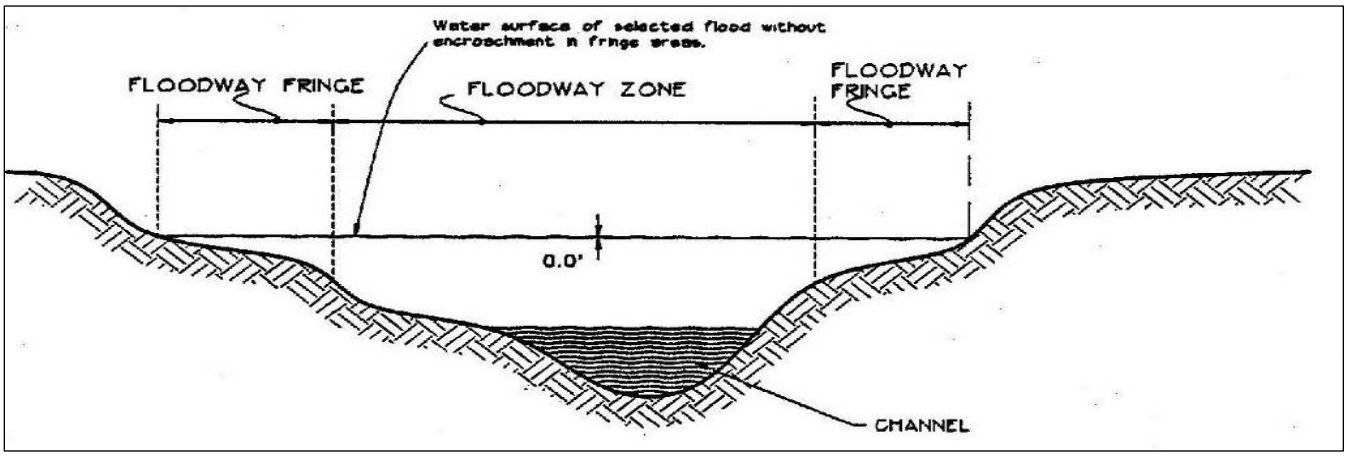


Figure 12-24. Floodplain Designation Cross-Sections for Areas Other Than Infill Areas

The City is committed to exploring environmentally sensitive flood control solutions, so this component is intended to be used in combination with the goals, policies, and implementation measures contained in the Open

Space and Conservation Element of the General Plan. Emphasis is placed on protecting floodplain areas and on pursuing regional cooperation on flooding issues.

Improvement Standards

Roseville's improvement standards provide minimum standards for the following:

- Improvements dedicated to the public and accepted by the City for maintenance or operation
- Certain private works
- Improvements to be installed within existing rights-of-way and easements.

Improvement standards provide coordinated development of required facilities used by and for the protection of the public. They apply to, regulate, and guide preparation of traffic impact studies and the design and preparation of plans for construction of streets, highways, alleys, drainage systems, sewage systems, traffic signals, site access structures, water supply facilities and related public improvements. The standards also set guidelines for private works that involve drainage, grading, tree removal, and related improvements. Section 10 of the improvement standards deals with drainage as follows:

- Requires residential lots developed in and adjacent to a designated floodplain to have a pad elevation a minimum of 2 feet above the regulatory flood elevation.
- Establishes stormwater management provisions that require mitigation of the increase in runoff generated by new development.
- Establishes provisions that require the building pads of structures built outside the regulatory floodplain to be a minimum of 1 foot above the 100-year water surface elevation for the site, assuming total blockage of drainage facilities.

Flood Damage Prevention Ordinance (RMC Chapter 9.80)

The flood damage prevention ordinance provides regulatory provisions for the floodplains of Roseville and is a requirement for participation in the NFIP. Chapter 9.80 of the RMC meets the NFIP requirements (44 CFR, Section 60.3) and includes the following standards that exceed those requirements:

- Adoption of a regulatory floodplain that includes areas not mapped by FEMA for application
- Requirement for elevation to 2 feet above the regulatory flood elevation for all structures within the flood hazard area
- Provisions to track substantial improvements to structures over a period of 10 years.

Zoning Ordinance (RMC Chapter 19.18)

Updated in September 2010, the zoning ordinance implements the City's general and specific plans and establishes regulations governing the use, placement, spacing and size of land and buildings. The zoning ordinance describes permits available through the Planning Division, when permits are needed, and the process for obtaining permits. This ordinance includes policy that prohibits most development within the 100-year floodplain. Exceptions to this policy exist primarily within the infill area and for the maintenance of essential services. Where encroachments may be permitted, improvements are required to minimize cumulative upstream and downstream effects.

The zoning ordinance identifies floodway and floodway fringe zoning districts. The floodway zoning district is not synonymous with FEMA's defined floodway. Development is generally prohibited in the floodway zone, with some level of development allowed in the floodway fringe zones with restrictions. The floodway fringe and floodway zone boundaries are based on previous hydraulic modeling conducted by the U.S. Army Corps of Engineers. The floodplain boundaries have changed over time since this modeling, but the zone district boundaries have not changed. The zone boundaries are updated on a parcel-by-parcel basis at a landowner's request using best available data.

State of California Urban Level of Flood Protection Legislation

The Central Valley Flood Protection Act of 2008 (SB 5) and its subsequent amendments (SB 1278, AB 1965 and AB 1259) include requirements and standards for flood protection that relate to land use planning. The legislation defines the Urban Level of Flood Protection (ULOP) as the level of protection necessary to withstand flooding that has a 1-in-200 (0.5-percent) chance of occurring in any given year (also referred to as the 200-year flood). This legislation directed local agencies to revise their general plans no later than July 2, 2015, to address flood risk for affected land use decisions based on an ULOP. It also required local agencies to revise their zoning codes to reflect the new standard within one year after the adoption of their revised general plans. In areas not subject to the ULOP standards, the 100-year floodplain standards will continue to apply.

The legislation defines five locational criteria that determine whether the ULOP applies. All areas of the City of Roseville meet two of the criteria (the City is an urban area of more than 10,000 people and the City is within the Sacramento-San Joaquin Valley), but only certain areas of the City meet the remaining three criteria:

- Areas mapped as either a special hazard area or an area of moderate hazard on FEMA's official (i.e., effective) Flood Insurance Rate Map
- Areas with a potential flood depth above 3 feet from sources other than localized conditions
- Areas within a watershed with a contributing area of more than 10 square miles.

As required by SB 5 as amended, the City of Roseville will implement the following:

- Updating the General Plan to define the City's regulatory floodplain as the combination of the City's mapped 100-year floodplain, the ULOP floodplain, and the FEMA floodplain.
- Amendment of the Land Use Element to include a reference to the Safety Element map identifying existing and planned development areas within the regulated floodplain as defined above.
- Amendment of the Open Space and Conservation Element setting and background to reflect the current regulatory environment.
- Amendment of the Safety Element to identify and revise flood hazard information and policies which protect communities from flooding risks as follows:
  - Revise the setting, outlook, and floodplain designations portions of the flood protection section to reflect the updated regulatory environment and to identify sources of floodplain mapping and hazard data.
  - Revise the floodplain designation policy and the implementation measures sections to include definitions and floodplain development regulations and implementation for the ULOP floodplain.
  - Provide new floodplain maps showing the extent of the FEMA 100-year, City's regulatory 100-year, and ULOP floodplains.

As required by adopted State law, the various City regulations requiring preservation of the floodplain and elevation of structures above the floodplain will include the ULOP floodplain. After the modeling analysis was completed by the City, staff examined the data to determine the effect on land uses. Both the ULOP and the 100-year floodplains along Pleasant Grove Creek are almost entirely contained within existing or planned open space and recreation areas. This is generally because these areas of Roseville were planned or developed relatively recently in the City's history, and in compliance with the City's current General Plan goals and objectives restricting development in the floodplain.

The areas where the ULOP floodplain extends into residential or commercial areas are older areas of the City along Dry Creek, where development was planned and implemented prior to Roseville's initial participation in the NFIP in 1983 and prior to adoption of the City's current General Plan. These infill areas are already affected by the FEMA 100-year floodplain, and a few areas will now also be affected by the ULOP.

According to the City's GIS database, 4 of 11 vacant parcels affected by the ULOP are privately owned. The remaining 7 parcels are City-owned. In the future, any new habitable structure along streams affected by the ULOP floodplain will need to be elevated slightly higher (less than 1 foot) than would have been required prior to the legislation. For existing structures, additional elevation would only be required if the owner undertook a "substantial improvement" to the structure (defined within the City's Flood Damage Prevention Ordinance as any work in a 10-year period that is worth 50 percent or more of the value of the structure).

12.6.4 Stormwater Management

Stormwater management in the City of Roseville is accomplished through a multi-tiered approach. The City uses a combination of regional development impact studies, sub-regional impact studies, the City of Roseville improvement standards, the City of Roseville grading ordinance, and the Placer County stormwater management manual. All of these tools manage the City's stormwater system at different levels. The Roseville General Plan is the principal planning document that lays out goals for managing the flooding hazard. Each update to the General Plan reviews these goals to determine their effectiveness in managing watershed characteristics. Regional master planning, sub-regional master planning, and project drainage design are discussed below.

Regional Master Planning

City ordinances establish developer fees to pay for mitigation projects that will reduce development impacts on flooding on major streams in the Dry Creek and Pleasant Grove Creek basins. Regional master planning for each basin has been conducted through the Placer County Flood Control District (PCFCD). Seven communities, including the City of Roseville, are members of this district.

The Dry Creek and Pleasant Grove Creek basins each have a detailed hydrology report that calculates the 5-, 10-, 50-, and 100-year storm frequencies based on total buildout of the basin:

- **Dry Creek Basin Report—**The *Final Report for the Dry Creek Flood Control Plan,* adopted by the Roseville City Council in April 1992, was co-sponsored, supported, and approved by the PCFCD and the Sacramento County flood control agency that oversees floodplains downstream of Placer County.
- **Pleasant Grove Creek Basin Report—**Pleasant Grove Creek Basin hydrology is included in the *Cross Canal Study*. Pleasant Grove Creek is one of several major streams that flow to a reclamation district canal; overflow is stored behind levees during Sacramento River flooding. Except for the PCFCD, this

report was supported, sponsored, and approved by all agencies within the basin, in particular Sutter County and State Reclamation Board Districts 1001 and 1000.

Each report defines development impacts on the basin and specifies mitigation procedures and improvements to developers' mitigation. Both reports indicate a strategy for mitigation of floods resulting from new development on a regional scale. The reports indicate that most of Roseville is in the part of the watershed where detention is not recommended. These studies have been submitted to FEMA for approval, and FEMA is currently using the hydrology and hydraulics information provided in the reports to update FIRMs for the region.

Sub-Regional Master Planning

The City requires each sub-region to develop a master plan and mitigation strategy in a specific plan. Specific plans currently exist for Amoruso Ranch, Creekview, Del Webb, Downtown, Highland Reserve North, North Central Roseville, Northeast Roseville, North Industrial, North Roseville, Northwest Roseville, Riverside Gateway, Sierra Vista, Southeast Roseville, Stoneridge, West Roseville, and the Infill Area. Before zoning and development rights are issued for these newly developing areas, a detailed hydrology and hydraulic study dealing with that sub-region's concerns is required, in order to examine local drainage problems, define flood levels based on total buildout of the watershed, and set aside floodplain areas as open space. Floodplains are defined on swales with drainage areas greater than 300 acres. The City of Roseville and PCFCD review and approve each specific plan.

Major drainage infrastructure in the specific plans is designed as part of the infrastructure of the sub-regions and is constructed prior to development in the area; this eliminates the need for on-site detention requirements because regional detention, if required, is built into the infrastructure for the entire specific plan and not on a project-by-project basis. This approach allows for more control of the design and easier maintenance of the facility. In addition, in newly developing areas, hydraulic requirements used to define floodplains assume well-vegetated swales and creeks, which reduces the need to provide constant cleaning of these streams by maintenance crews.

Project Drainage Design

As each project in the specific plan is developed, the City requires the project to meet drainage improvement standards. The standards require storm drain systems that support more than one parcel to be dedicated to the City for maintenance or that project owners maintain the system. In both cases, the storm drain system is reviewed by the City's Public Works Department to meet the same hydraulic standards. Project owners must demonstrate that in the case of total system failure, surface water would be able to exit the project area without causing damage. For example, if drain inlets are not maintained on a commercial site and water ponds, surface water should be able to discharge into the public drainage system without entering any on- or off-site buildings. This requirement eliminates the need for the City to monitor private storm drain systems to verify that they are adequately maintained.

12.6.5 Outreach and Public Education

The City of Roseville makes a concerted effort to educate and inform its citizens on the impacts of flooding and how to prepare for flooding impacts. The ongoing outreach and public education program uses multiple media:

- Floodplain information is published in "Roseville Reflections," a City-sponsored newsletter sent to all citizens.

- Flood information is published on the City's website and includes real-time flood warning and flood threat recognition information. The website is www.roseville.ca.us/flood/alert/floodalert.html.
- On-line surveying is used to identify public perception of flood risk and support of mitigation.
- An informational brochure, "Weathering the Storm," is available to the public.
- Literature on flood warning, property protection, and flood safety is mailed annually to Roseville residents.

12.6.6 Emergency Operations Plan

The City of Roseville Emergency Operations Plan follows California's Standardized Emergency Management System (SEMS) format (see Section 4.9.2). Its key functions are as follows:

- Directs the City of Roseville Emergency Management Organization
- Coordinates the actions of emergency operations center staff
- Establishes operational priorities
- Ensures development and implementation of strategies to meet the needs of the emergency
- Works with local elected officials on issues related to emergency response and recovery
- Identifies procedures for evacuation, communicates with the media
- Coordinates response with outside agencies,
- Ensures the safety of responders.

12.7 SCENARIO

The City of Roseville has made great strides to reduce the risk from flooding. Events like those that caused past flooding will continue to occur, but impacts will be significantly less than in the past. Intense isolated rainstorms over the region will cause creeks and streams to overflow their banks, causing road closures and power outages. However, structure damage to personal property will be limited to the few properties that have exposure to significant depths of flooding. Flash flooding caused by rainfall runoff exceeding the capacity of stormwater systems will also continue to occur. However, potential personal property damage will be limited to structures constructed prior to building and stormwater standards adopted by the City to remediate these impacts.

12.8 ISSUES

Important issues associated with flood hazard in Roseville include but are not limited to the following:

- The boundaries of the 100-year floodplain could be as specified in the floodplain designations section of the flood-protection component of the City's General Plan. Floodplain areas shall be preserved as specified in the Open Space and Conservation Element. Preservation may include required dedication to the City. If needed, the City's ordinances can be modified to include floodplain use regulations consistent with the goals, policies, and implementation measures of the Safety Element, Land Use Element, Open Space and Conservation Element, and Parks and Recreation Element of the City's General Plan. This effort would be overseen by the Planning Division and would require no special funding.

- The development, implementation, and expansion of the Flood Alert and Early Warning Program systems should be continued, and the systems should be integrated with other local jurisdictions to form a regional warning program. This effort is overseen by the Public Works Department. Annual funding is provided through the City's general fund and is about $100,000 per year.
- By remaining actively involved in the PCFCD, the City of Roseville should continue to pursue a regional approach to flood issues. Involvement includes cooperation in the development of a comprehensive regional database. Regional drainage planning and design for all individual developments in the Placer County Flood Control District should be encouraged to address cumulative flooding impacts. The City should also continue to participate in regional flooding studies, including the Auburn Creek/Coon Creek/Pleasant Grove Creek flood mitigation plan and the Dry Creek Basin flood control plan. Efforts would be overseen by the Public Works Department. Annual funding for membership to the PCFCD is currently provided by the City's General Fund and is about $90,000 per year.
- The City should continue coordination with other agencies on issues of flood control. Coordination between the City and adjacent jurisdictions occurs through several mechanisms, including the distribution of development proposals for review and comment. The City should also continue its cooperation with federal, state, and local agencies, including the U.S. Army Corps of Engineers, California Reclamation Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and PCFCD. This effort would be overseen by the Community Development Department, Planning Division, and Public Works Department as appropriate and should not require special funding.
- The final two phases of the Cirby-Linda-Dry Creek Flood Control Project should be completed. Five of the seven phases of this project have been completed at a cost of about $18,000,000. This project is overseen by the Public Works Department. The cost for the last two phases would be about $3,000,000. Funding could be from City, state, federal, or private developer sources.
- Alternative improvements to the Cirby-Linda-Dry Creek Flood Control Project could be analyzed. These improvements may be cost-effective in the following flood-prone areas of Roseville:
  - Dry Creek from Darling Way to Riverside Avenue
  - The area on Dry Creek upstream of Folsom Road in the Columbia Avenue, Marilyn Avenue, Bonita Street area
  - The Linda Creek area near Champion Oaks Drive, Samoa Way, and Hurst Way
  - Cirby Creek in the Trimble Way and Zien Court area.
- The existing wood flood wall along Dry Creek that is protecting the City's Main Library and Public Safety Building could be replaced. The wood wall allows floodwater to leak through, and constant pumping is required. This effort would be overseen by the Public Works Department and cost about $300,000. Funding could be from City, state, federal, private developer, property owner sources.
- How will the potential impacts of climate change impact flood conditions in the City of Roseville?

13. SEVERE WEATHER

13.1 GENERAL BACKGROUND

Severe weather refers to any dangerous meteorological phenomenon with the potential to cause damage, serious social disruption, or loss of human life. The most common severe weather events that impact the planning area are extreme heat, fog, tornadoes, windstorm, heavy rains/thunderstorms, and ice or freezing rain. These types of severe weather are described in the following sections.

13.1.1 Extreme Heat

In most of the United States, extreme heat is defined as a period (two to three days) of high heat and humidity with temperatures above 90 ºF. In extreme heat, evaporation is slowed, and the body must work extra hard to maintain a normal temperature, which can lead to death by overworking the human body. Extreme heat can cause heat exhaustion, in which the body becomes dehydrated, resulting in an imbalance of electrolytes. Without intervention, heat exhaustion can lead to collapse and heatstroke. Heatstroke occurs when perspiration cannot occur, and the body overheats. Without intervention, heatstroke can lead to confusion, coma, and death.

Extreme heat often results in the highest number of annual deaths among all weather-related hazards. Older adults, children, and sick or overweight individuals are at greater risk from extreme heat. According to the California Climate Adaptation Strategy, heat waves have claimed more lives in California than all other declared disaster events combined. It can take several days of oppressive heat for a heat wave to have a significant or quantifiable impact. Heat waves do not strike victims immediately, but their cumulative effects slowly cause harm to vulnerable populations.

Excessive heat is the primary weather-related cause of death in the United States, claiming over 100 lives each year. In a 30-year record of weather fatalities across the nation (1990-2019), excessive heat claimed more lives each year than floods, lightning, tornados, and hurricanes (Erdman 2021). Extreme heat events do not typically impact buildings; however, losses may be associated with the urban heat island effect and overheating of heating, ventilation, and air conditioning systems. These extreme heat events can lead to drought, impact water supplies, and lead to an increase in heat-related illnesses and deaths.

Legislation has been introduced in California to rate and name heat waves. The categorization would help communities take measures to reduce the number of heat-related fatalities (Washington Post 2021).

13.1.2 Fog

Fog is a cloud near the ground. Fog forms when air close to the ground can no longer hold all the moisture it contains. This occurs either when air is cooled to its dew point or the amount of moisture in the air increases.

Although fog seems like a minor hazard, it can have significant impacts. Heavy fog can impair the vision of drivers, resulting in vehicle accidents that can cause injury and death.

Severe fog incidents can close roads, cause vehicle accidents and airport delays, and impair the effectiveness of emergency response. Financial losses associated with transportation delays caused by fog have not been calculated in the United States, but it is known to be substantial. Fog can occur almost anywhere during any season and is classified based on how it forms, which is related to where it forms. Certain seasons are more likely to have foggy days or nights based on a number of factors, including topography.

13.1.3 Tornadoes

A tornado is a violently rotating column of air extending between, and in contact with, a cloud and the surface of the earth. Tornadoes are often (but not always) visible as a funnel cloud. On a local-scale, tornadoes are the most intense of all atmospheric circulations and wind can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long. As shown in Figure 13-1, California has a relatively low risk compared to states in the Midwestern and Southern U.S. Figure 13-2, adapted from FEMA, illustrates the potential impacts and damage from tornadoes of different magnitude. Tornadoes can occur throughout the year at any time of day but are most frequent in the spring during the late afternoon.

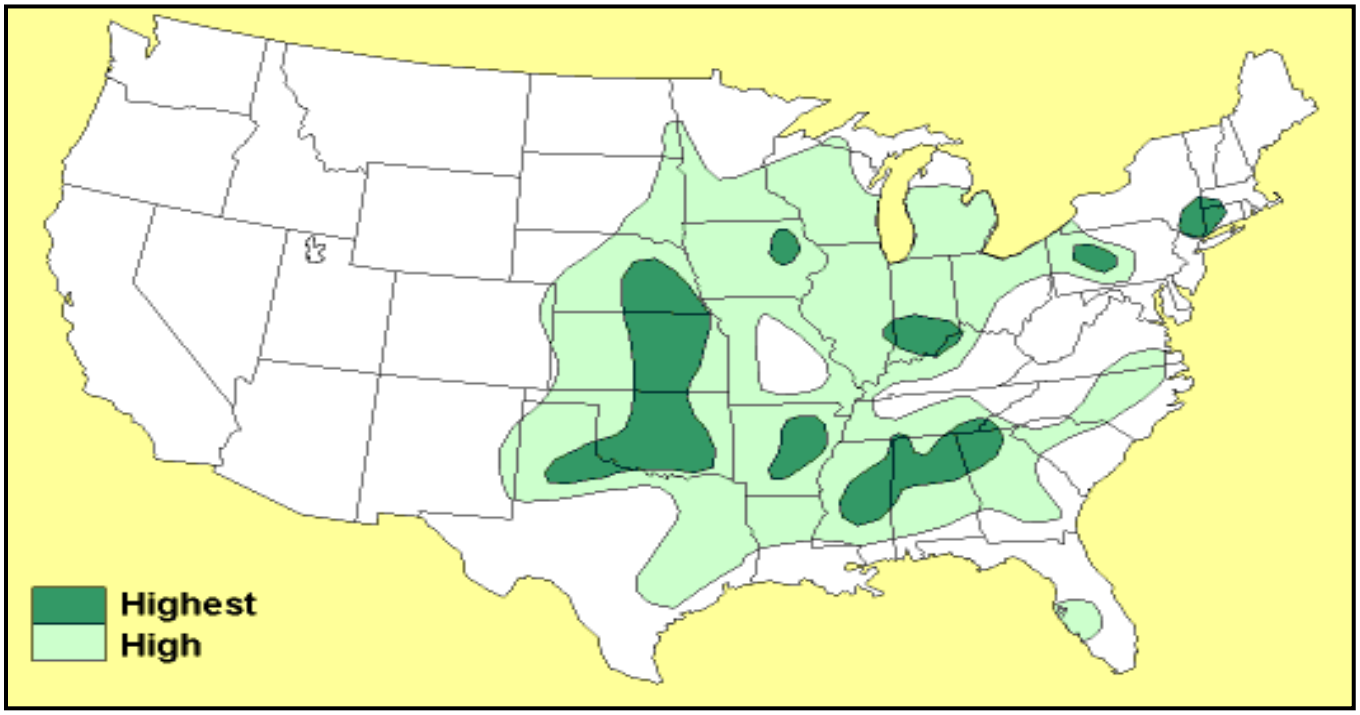


Figure 13-1. Tornado Risk Areas in the Coterminous United States

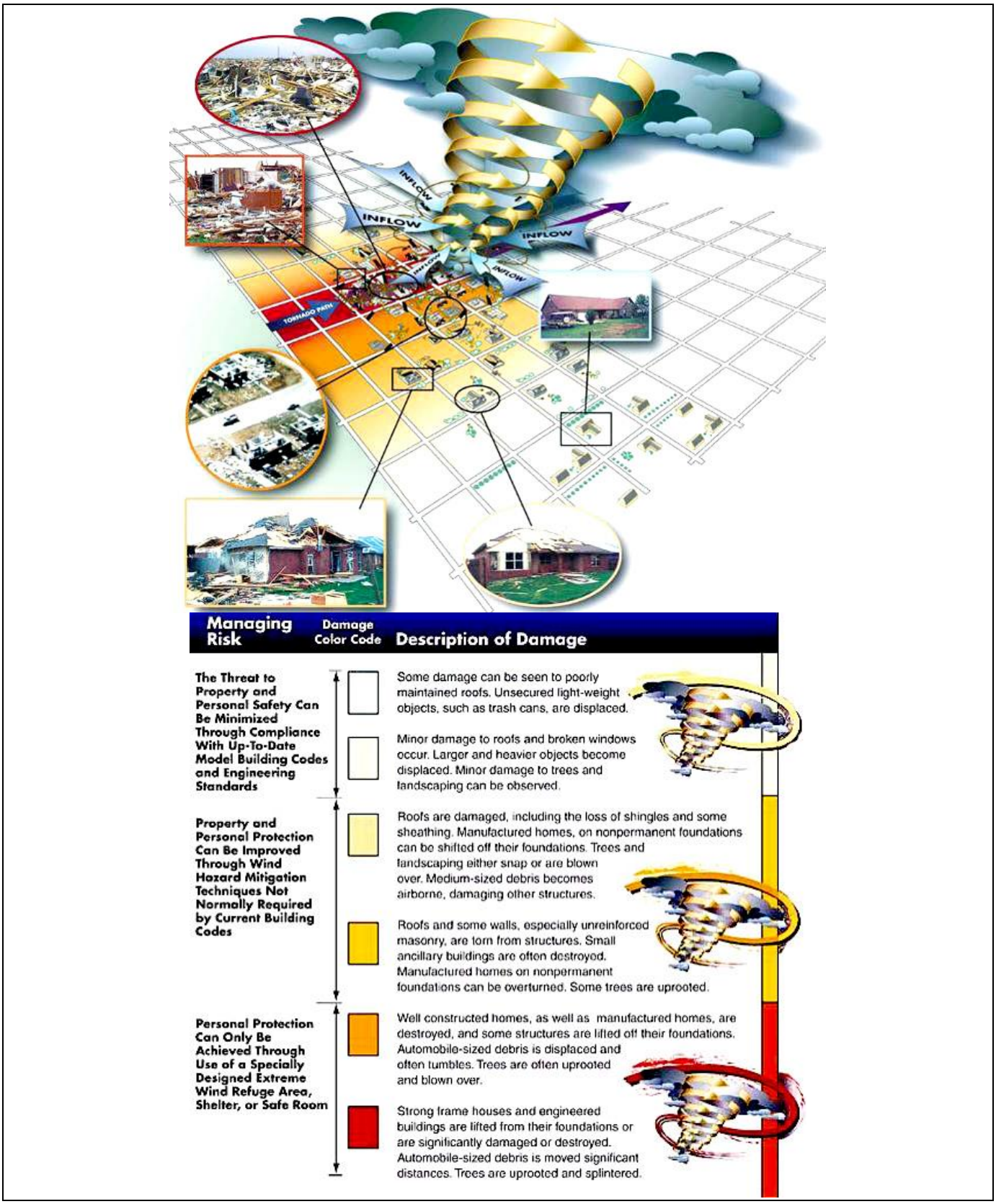


Figure 13-2. Potential Impact and Damage from a Tornado

13.1.4 Windstorms

Windstorms are generally short-duration events involving straight-line winds or gusts of over 50 mph, strong enough to cause property damage. Windstorms are especially dangerous in areas with significant tree stands and areas with exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and above-ground utility lines. A windstorm can topple trees and power lines, cause damage to residential, commercial and critical facilities, and leave tons of debris in its wake. There are seven types of damaging winds:

- **Straight-line winds—**Any thunderstorm wind that is not associated with rotation; this term is used mainly to differentiate from tornado winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.
- **Downdrafts—**A small-scale column of air that rapidly sinks toward the ground.
- **Downbursts—**A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst or damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- **Microbursts—**A small, concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph. There are two kinds of microbursts: wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.
- **Gust front—**A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- **Derecho—**A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary (the boundary formed by horizontal spreading of thunderstorm-cooled air). The word “derecho” is of Spanish origin and means “straight ahead.” Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.
- **Bow Echo—**A bow echo is a linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive wind damage at the ground.

Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, streetlights and parks, and other damage. Wind speeds as low as 32 mph can cause structural damage, and winds of 100 mph can actually destroy wood-frame structures (Seattle Office of Emergency Management 2014). High winds can also cause direct losses to buildings, people, and vital equipment. There are direct consequences to the local economy resulting from windstorms related to both physical damage and interrupted services.

Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing winds can create lift and suction forces that act to pull building components and surfaces outward. As positive and negative forces impact a building’s doors, windows and walls, the result can be roof or building component failures and considerable structural damage. The effects of winds are magnified in the upper levels of multi-story structures.

Debris carried along by extreme winds can contribute directly to loss of life and indirectly to the failure of protective building envelopes. Falling trees and branches can damage buildings, power lines, and other property and infrastructure. Tree limbs breaking in winds of only 45 mph can be thrown over 75 feet, so overhead power lines can be damaged even in relatively minor windstorm events. During wet winters, saturated soils cause trees to become less stable and more vulnerable to uprooting from high winds. Utility lines brought down by summer thunderstorms have also been known to cause fires, which start in dry roadside vegetation. Electric power lines falling down to the pavement create the possibility of lethal electric shock.

Downed trees and power lines, and damaged property also can be major hindrances to emergency response and disaster recovery. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Industry and commerce can suffer losses from interruptions in electric service and from extended road closures.

Windstorms in Placer County are more probable during the fall through early spring. Because of the shape and orientation of the Sacramento Valley, prevailing winds are southerly. When atmospheric conditions are favorable, usually in conjunction with a significant storm tracking along the coast, these winds may combine and become strong enough to cause property damage and personal injury. The most significant windstorm in Northern California was the Columbus Day storm of 1962. Significant damage occurred along the coast and in the far northern part of the Sacramento Valley. Because Roseville lies far enough south in the valley, windstorms such as those during the 1962 Columbus Day Storm, typically do not intensify to damaging levels. It is rare for southwesterly winds flowing parallel to the Sierra Nevada Mountains to reach sustained gusts above 60 mph in the valley floor. The predicted wind speed given in wind warnings issued by the National Weather Service is for a one-minute average; gusts may be 25 to 30 percent higher.

Site-specific data on windstorms in Roseville are incomplete. Regionally, a few windstorm events have resulted in significant damage. The impacts of these events were felt to the north and east of Roseville. There have been a couple of instances of unusual wind bursts that resulted in some property damage. December 1993 saw a downburst of wind that did significant damage to a sound wall that was under construction. Another event occurred on January 1, 1995, when a wind gust through northwest Roseville snapped several power poles.

13.1.5 Heavy Rains, Thunderstorms

Severe weather in the City of Roseville generally includes heavy rains and is periodically accompanied by strong winds, lightning, or hail. Heavy rains coupled with low temperatures or other severe weather conditions can result in increases in traffic accidents, disruptions in transportation, commerce, government, and education. Severe weather incidents can also cause utility outages due to falling trees or other debris, as well as injuries.

Roseville’s Mediterranean type of climate is typified by nearly 90 percent of the annual precipitation occurring during a window of about 16 weeks. The most severe storms occur during the late fall to early spring. The climate pattern, coupled with the onshore flow of warm, moist Pacific air during the winter, can generate severe and prolonged periods of heavy rain.

Roseville experiences heavy rains every year. Some of these events may include thunderstorms. Thunderstorms are typically few in number and are more likely to appear in spring or late fall.

NOAA classifies a thunderstorm as a storm with lightning and thunder produced by cumulonimbus clouds, usually producing gusty winds, heavy rain, and sometimes hail. Thunderstorms are usually short in duration

(seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry season.

According to the American Meteorological Society *Glossary of Meteorology*, thunderstorms are reported as light, medium, or heavy according to the following characteristics:

- Nature of the lightning and thunder
- Type and intensity of the precipitation, if any
- Speed and gustiness of the wind
- Appearance of the clouds
- Effect on surface temperature.

Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt." This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches temperatures approaching 50,000ºF instantaneously. The rapid heating and cooling of air near the lightning causes thunder. Lightning is a major threat during a thunderstorm. In the United States, between 75 and 100 Americans are killed by lightning each year.

13.1.6 Ice and Freezing Rain

Ice and freezing rain are not part of the climate pattern in southern Sacramento valley. Periods have occurred where the daily minimum temperature has been at or below 32°F for several days. Yet the low temperatures reflect diurnal variations with clear skies, not part of a synoptic feature generating any precipitation. The bitterest cold snap on record, occurring December 9 to 15, 1935, was ended by the onset of a Pacific storm bringing warmer air. Although ice storms and freezing rains are a significant natural hazard, the extremely remote possibility of their occurrence in Roseville precludes any further discussion in this analysis.

13.1.7 Secondary Hazards

The most significant secondary hazards associated with severe weather are floods, falling and downed trees, landslides and downed power lines. Rapidly melting mountain snow combined with heavy rain can overwhelm natural and man-made drainage systems, causing overflow and property destruction. Landslides occur when the soil on slopes becomes oversaturated and fails.

13.2 HAZARD PROFILE

Most of the federal and state disaster declarations for the Roseville area and Placer County are related to severe weather conditions. Severe weather conditions vary greatly from the western portion of Placer County to the eastern portion, primarily due to variation in topography and elevation across the county. Heavy rainfall and snowfall result when humid air masses blow in from the ocean and move up the mountain ranges. Moist air, traveling inland on prevailing westerly winds, pushes up against the Sierra Nevada mountains, which wrings moisture out of the air as it rises, cools and condenses.

Roseville's location in the western, low-lying portion of the county helps explain why, at well below the 4,000-foot snowfall region, the City avoids the harshest of winter conditions that occur in eastern Placer County.

Figure 13-3 shows Roseville's elevation of approximately 165 feet above sea level. Although the climate of Roseville is relatively mild, with an average of 257 sunny days each year, the City is near the foothills of the Sierra Nevada range and can experience severe weather resulting from rapid changes in topography.

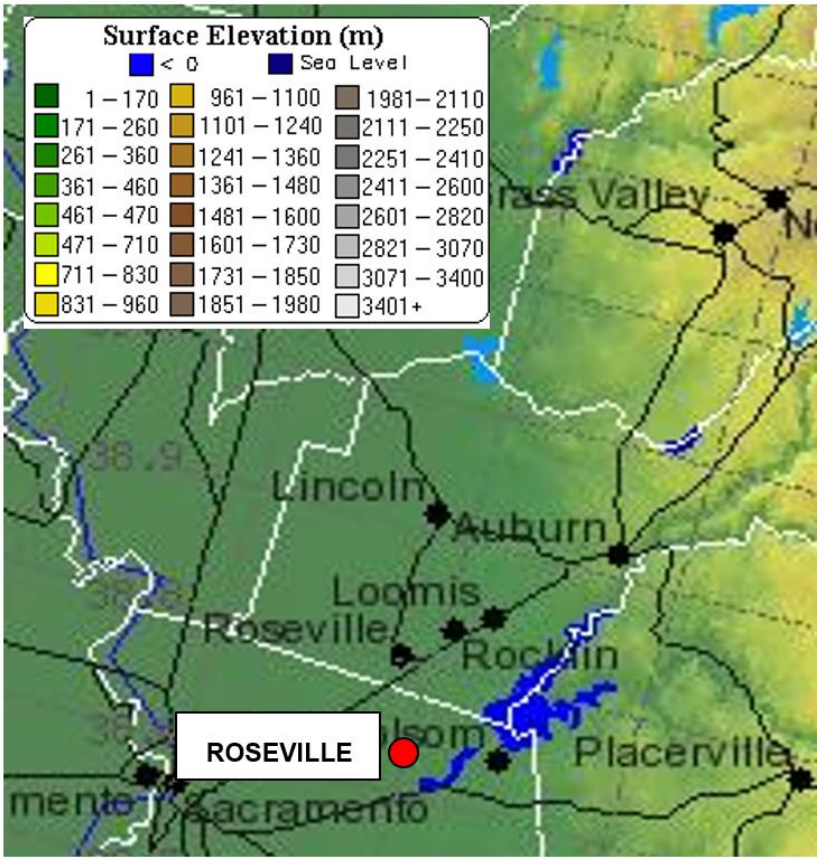


Figure 13-3. Roseville Regional Surface Elevation

13.2.1 Past Events

Table 13-1 summarizes past severe weather events in Roseville and Placer County as recorded by the National Oceanic and Atmospheric Administration since 1958.

Table 13-1. Severe Weather Events in Placer County since 1958

Location	Date	Type	Magnitude	Deaths or Injuries	Property Damage
Placer County	01/13/1957	Tornado	F0	0	0
Placer County	04/22/1967	Hail	0.00 Inches	0	0
Placer County	10/15/1972	Tornado	F0	0	0
Placer County	03/03/1983	Tornado	F0	0	0
Placer County	03/22/1983	Tornado	F1	0	$250,000
Placer County	04/23/1990	Tornado	F0	0	$2,500
Placer County	12/30/1992	Hail	0.50 inches	0	0
Description: *Severe thunderstorms produced golf ball-sized hail. Damage occurred at several auto dealers in Roseville.*					
Roseville	12/22/1996	Thunderstorm/Wind	0	0	0
Description: *Downburst winds snapped five 75-foot-high power poles into several pieces.*					

Location	Date	Type	Magnitude	Deaths or Injuries	Property Damage
Roseville	01/22/1997	Flash Flood	0	0	0
Description: *Heavy rains on saturated soil caused flooding on Dry Creek and Linda Creek, damaging 21 homes.*					
Roseville	01/26/1997	Flash Flood	0	0	0
Description: *Heavy rain caused flooding on Dry Creek and Linda Creek, damaging 21 buildings.*					
Placer County	01/12/1998	Heavy Rain	N/A	0	0
Description: *Heavy rains caused widespread but minor flooding across the Sacramento Valley and nearby foothills.*					
Placer County	01/18/1998	Heavy Rain	N/A	2	0
Description: *A Pacific storm brought brief but heavy rain to the Sacramento Valley and surrounding foothills. 27,000 customers lost power at some time during the storm. Two teens were drowned when their car flipped into a flooded ditch near Loomis.*					
Roseville	01/22/2000	Heavy Rain	N/A	0	0
Description: *Rainfall totaling 5.43 inches fell in just over 48 hours.*					
Roseville	02/11/2000	Heavy Rain	N/A	0	$10,000
Description: *Heavy rain that persisted for nearly 72 hours was responsible for the closure of Granite Bay High School. The school lost power and phone service. Local businesses were affected by the flooding and closed as well.*					
Placer County	12/17/2005	Heavy Rain	N/A	0	0
Description: A series of storms brought heavy rainfall to Northern California. Five-day rainfall for Roseville was 2.99 inches.					
Placer County	01/01/2006	Severe Storm/Flood	N/A	0	$2,000,000
Description: *Storms brought heavy rain, mudslides, flooding, and high winds to Northern California. Levee overtopping, breaching, and river flooding occurred along numerous rivers, creeks, and streams. Several urban areas had significant street flooding. The Sacramento weir was opened for the first time since 1997. Airports were closed due to high winds and major road closures resulted from flooding and mudslides. Interstate 80 between Sacramento and Reno, NV, was closed for more than a day due to a mudslide, as were both directions of U.S. Highway 50 between Sacramento and South Lake Tahoe. Place County was among the counties declared in need of federal disaster assistance.*					
Placer County	07/25/2013	Hail	N/A	0	0
Description: *Strong to severe thunderstorms affected the Sierra and northeast California.*					
Roseville	03/36/2014	Tornado	EF0	0	0
Description: *EF0 tornado began in a field southwest of Roseville, but did not cause damage until it reached the Pleasant Grove Blvd housing developments in West Roseville. The winds were estimated to be 75 to 85 mph. Several windows were blown out from houses, 25 to 30 feet of fence was blown down, projectile damage to stucco occurred. The tornado lasted 5 to 10 minutes.*					
Roseville	05/14/2015	Heavy Rain	N/A	0	0
Description: *Thunderstorms brought local heavy rain and minor flooding. Unusually late winter snow fell in the Sierra, causing travel delays and chain controls over passes. Funnel clouds were reported with thunderstorms, but no touchdowns were confirmed. Street flooding was reported at Martin Road and East Roseville Parkway from a thunderstorm.*					
Roseville	10/02/2016	Hail	N/A	0	0
Description: *Hail up to 1.25 inches in diameter was reported at the Fountains shopping complex in Roseville. Tree leaves and branches were reported down.*					
Roseville	04/07/2017	Hail	N/A	0	0
Description: *A storm system brought wind damage to trees, thunderstorms with hail, and snow accumulating down into the foothills of the Sierra and Coastal Range.*					
Southern Sacramento Valley	08/14/2020	Excessive Heat	N/A	1	0
Description: *A prolonged and significant heat wave occurred in mid-August due to high pressure parked over California. High temperatures soared between 100 to 115 degrees for much of the Valley and lower elevation foothills, while higher elevation areas in the mountains range from the mid-80s to low 100s. Overnight lows were oppressive during this time frame as well, with Valley and foothill locations holding in the 70s to low 80s. Many emergency room visits were recorded in the Sacramento area in addition to 3 confirmed heat related deaths. One out of these deaths also involved drug use.*					

Location	Date	Type	Magnitude	Deaths or Injuries	Property Damage
Southern Sacramento Valley	12/20/2020	Dense Fog	N/A	0	0
Description: *On the morning of December 21, dense fog developed over the southern Sacramento Valley and northern San Joaquin Valleys. Observation sites within in the area generally reported dense fog with visibility at or less than a quarter of a mile.*					
Southern Sacramento Valley	09/09/2021	Excessive Heat	N/A	0	0
Description: *High pressure over California resulted in very hot daytime temperatures and warm overnight low temperatures across interior Northern California. High to very high heat risk impacted the region. The Sacramento region saw high temperatures reach in excess of 105 degrees.*					
Southern Sacramento Valley	12/02/2021	Dense Fog	N/A	0	0
Description: *On the morning of December 2nd dense fog developed over the southern Sacramento Valley and northern San Joaquin Valleys. Observation sites within in the area generally reported dense fog with visibility at or less than a quarter of a mile.*					
Roseville	09/6/2022	Excessive Heat	N/A	0	0
Description: *Temperatures in Roseville reached 115 degrees. The California Independent System Operator requested the activation of temporary emergency power generators deployed by the Department of Water Resources in Roseville and Yuba* **(CA DWR 2022)**.					

The City of Roseville has experienced excessive heat events over the last several years. In September 2022, excessive heat prompted the California Independent System Operator (ISO) to request the activation of temporary emergency power generators in Roseville and Yuba City (CA DWR 2022). The four generators activated provided up to 120 megawatts of electricity to support the power grid during the extreme heat event.

13.2.2 Location

Severe weather events have the potential to happen anywhere in the planning area. Extreme heat events may be exacerbated in the City where reduced air flow, reduced vegetation, and increased generation of waste heat can contribute to temperatures that are several degrees higher than in surrounding less urbanized areas.

13.2.3 Frequency

Table 13-2 summarizes search results from the National Center for Environmental Information Storm Events Database for storm events in Placer County over the 20-year period from 2003 through 2023. Based on these results, extreme heat, ice or freezing rain, high winds, and heavy rain or thunderstorm occur on average at least once per year in Placer County. Severe fog events occur on average about once every two years and tornados about once every five years.

13.2.4 Severity

Severe weather disaster declarations for Placer County are often related to heavy rains, thunderstorms, and freezing temperatures. The most common problems associated with severe storms are immobility and loss of utilities. Fatalities are uncommon, but can occur. Roads may become impassable due to flooding, downed trees, or a landslide. Power lines may be downed due to high winds, and services such as water or phone may not be able to operate without power. Lightning can cause severe damage and injury. Windstorms have been known to cause damage to utilities.

Table 13-2. Severe Weather Events in Concord and the Surrounding Area, January 2002 – September 2022

Event Types Included[a]	Total Number of Events	Number of Days with:			Average Years Between Days with Event
		Event	Event and Death or Injury	Event and Property Damage	
Extreme Heat					
Excessive Heat, Heat	50	36	6	0	0.4
Fog					
Dense Fog, Freezing Fog	9	9	0	1	2.2
Tornado					
Funnel Cloud, Tornado, Waterspout	4	4	0	0	5
Ice and Freezing Rain					
Ice Storm, Sleet, Winter Storm	234	139	3	4	0.1
High Wind					
High Wind, Strong Wind, Thunderstorm Wind	209	125	5	43	0.1
Heavy Rain, Thunderstorm					
Hail, Heavy Rain, Lightning,	58	40	0	0	0.3

a. Event types are the categories available for search in the National Center for Environmental Information Storm Events Database
Source: National Center for Environmental Information Storm Events Database

Tornadoes are potentially the most dangerous of local storms, but they are not common in the Roseville vicinity. If a major tornado were to strike a populated area such as Roseville, damage could be widespread. Businesses could be forced to close for an extended period or permanently, fatalities could be high, many people could be homeless for an extended period, and routine services such as telephone or power could be disrupted. Buildings may be damaged or destroyed. Compared with other states, California ranks 32nd for frequency of tornadoes, last for number of deaths, 36th for injuries, and 31st for cost of damage. California ranks 44th for the frequency of tornados per square mile.

13.2.5 Warning Time

Meteorologists can often predict the likelihood of a severe storm. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or the severity of the storm. Some storms come on more quickly and have only a few hours of warning time.

13.3 EXPOSURE AND VULNERABILITY

A lack of data separating severe weather damage from flooding and landslide damage prevented a quantitative analysis for exposure and vulnerability. However, it can be assumed that the entire Roseville planning area is exposed to severe weather events. Certain areas are more exposed due to geographic location and localized weather patterns.

13.3.1 Population

Particularly vulnerable populations are the elderly, low income or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. These populations face isolation and exposure

during severe weather events and could suffer more secondary effects of the hazard. Those experiencing homelessness who lack adequate shelter may be directly exposed to severe weather, leading to the destruction of temporary shelter, heat stroke, hypothermia or illness from this exposure.

13.3.2 Property

There are currently no loss estimation tools with uniform damage functions for severe weather events. This can be attributed to the variety of impacts that severe weather events generate. Also, the severity of severe weather events varies by location. Since secondary effects of severe weather events include flooding, landslides or even wildfires in drier climates, the vulnerability assessments under those hazards can provide emergency managers a gage of the economic impact of severe weather events.

All property is vulnerable during severe weather events, but structures in poor condition or constructed to low building code standards risk the most damage. The frequency and degree of damage will depend on specific locations. Those in higher elevations and on ridges may be more prone to wind damage. Those that are located under or near overhead lines or near large trees may be damaged in the event of a collapse.

Estimates of potential loss for the severe weather hazard are not based on damage functions, because no such damage functions have been generated. Instead, estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of potential economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 13-3 lists the potential loss estimates to the general building stock.

Table 13-3. Loss Potential for Roseville Buildings Vulnerable to Severe Weather Hazard

	Building Count	Assessed Value	10% Damage	30% Damage	50% Damage
Residential	48,288	$27,733,494,567	$2,773,349,456.70	$8,320,048,370.10	$138,667,472,835
Commercial	1,736	$15,320,115,726	$1,532,011,572.59	$4,596,034,717.77	$76,600,578,630
Industrial	334	$1,873,405,841	$187,340,584.06	$562,021,752.19	$9,367,029,203
Agricultural	7	$40,971,589	$4,097,158.95	$12,291,476.84	$204,857,947
Religion	53	$409,382,787	$40,938,278.71	$122,814,836.12	$2,046,913,935
Government	17	$139,887,051	$13,988,705.05	$41,966,115.16	$699,435,253
Education	81	$1,854,390,958	$185,439,095.77	$556,317,287.32	$9,271,954,789
Total	**50,516**	**$47,371,648,518**	**$4,737,164,851.83**	**$14,211,494,555.49**	**$236,858,242,592**

13.3.3 Critical Facilities

Incapacity and loss of roads are the primary transportation failures associated with severe weather. High winds can cause significant damage to trees and power lines, with obstructing debris blocking roads, incapacitating transportation, isolating population, and disrupting ingress and egress. High temperatures can cause railroad tracks and wires, and pavement and joints on roads and bridges to crack, buckle, or sag, resulting in service disruptions, potentially hazardous travel conditions, and the need for costly repairs. Landslides that block roads are caused by heavy prolonged rains.

Of particular concern are roads providing access to isolated areas and to the elderly. Prolonged obstruction of major routes due to landslides, debris, or floodwaters can disrupt the shipment of goods and other commerce. Large and prolonged storms can have negative economic impacts for an entire region.

Another common problem associated with severe weather is the loss of utilities. Downed power lines can cause blackouts, leaving large areas isolated. Phone, water and sewer systems may not function. Severe windstorms and downed trees or power lines can create serious impacts on power and above-ground communication lines. Broken power and communication lines would result in isolation because some residents would be unable to call for assistance. Power outages or roaming blackouts may occur as a result of extreme heat events that strain and overheat circuits. During a blackout, all critical facilities that are reliant upon electricity for power will be severely impacted unless they are connected to a backup power source.

13.3.4 Environment

Severe storm events can drastically affect the physical environment, changing natural landscapes. Natural habitats such as streams and trees risk major damage and destruction during a severe storm. Prolonged rains can saturate soils and lead to slope failure. Flooding caused by severe weather can cause stream channel migration.

13.4 FUTURE TRENDS IN DEVELOPMENT

Since the entire planning area is susceptible to severe weather, any increase in building stock valuation represents an increase in property value exposed to the severe weather hazard. However, the vulnerability of new building stock is low, due to the application of strong building code standards that are contained within the International Building Code.

Many of the impacts associated with severe weather hazards can be addressed through proactive planning and the use of best available information in making land use decisions. Roseville has and will achieve this goal through the implementation of its General Plan. The General Plan serves as a long-term policy guide for the physical, economic, and environmental growth of the City. It includes a statement of the community's vision of its ultimate physical growth. Implementation of the General Plan, along with other programs such as Building Code enforcement, public information and early warning, will help Roseville to manage the probable impacts of severe weather hazards as the City grows in the future.

13.5 REVIEW OF EXISTING ORDINANCES, PROGRAMS, AND POLICIES

Roseville implements numerous programs and policies that can impact severe whether hazards. Like most programs and policies sited in this Plan, these are tied to the City's general plan. Maintenance of these existing programs is included in the action plan for this hazard mitigation plan.

13.6 SCENARIO

A worst-case event would involve prolonged high winds during an extreme rainstorm. Such an event would have both short-term and long-term effects. Initially, schools and roads would be closed due to flooding, downed tree obstructions, and downed power lines. Power outages would be common throughout the City. Some subdivisions in the City could experience limitations on ingress and egress. Continuing rains could produce flooding,

overtopped culverts with ponded water on roads, and landslides on steep slopes. Flooding and landslides could further obstruct roads and bridges, further isolating residents.

13.7 ISSUES

In general, every household and resident in the City is likely to be exposed to severe weather, but some are more likely than others to experience isolation as a result. Those residing in higher elevations with limited transportation routes may have the greatest vulnerability to isolation from storms. Another group at risk is the portion of the population that is over the age of 65.

14. WILDFIRE

14.1 GENERAL BACKGROUND

A wildfire is any uncontrolled fire occurring on undeveloped land that requires fire suppression. wildfires can be ignited by lightning or by human activity such as smoking, campfires, equipment use, and arson.

14.1.1 Contributing Factors

How a fire behaves primarily depends on the following:

- Fuel—Fuels for wildfire may include living and dead vegetation on the ground, along the surface as brush and small trees, and above the ground in tree canopies Lighter fuels such as grasses, leaves and needles quickly expel moisture and burn rapidly, while heavier fuels such as tree branches, logs and trunks take longer to warm and ignite. Trees killed or defoliated by forest insects and diseases are more susceptible to wildfire.
- Weather—Temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount and duration, and the stability of the atmosphere all influence wildfire behavior. Strong, dry winds produce extreme fire conditions. Such winds generally reach peak velocities during the night and early morning hours.
- Thunderstorm activity—The thunderstorm season typically begins in June with wet storms, and turns dry with little or no precipitation reaching the ground as the season progresses into July and August.
- Terrain—The topography (slope and elevation) of a region influences the amount and moisture of fuel; the impact of weather conditions such as temperature and wind; potential barriers to fire spread, such as highways and lakes; and elevation and slope of landforms (fire spreads more easily uphill than downhill).
- Time of Day—A fire's peak burning period generally is between 1 p.m. and 6 p.m.

14.1.2 State Codes and Policies for Mitigating the Fire Hazard

Urbanization tends to alter the natural fire regime and can lead to expansion of urbanized areas into wildland areas. State and local policies and regulations require landowners to carry out activities such as maintaining defensible space and reducing vulnerability to damage or loss from wildfire. The most important policies and regulations related to residential wildfire safety in California are as follows:

- **General Plan Safety Element Review: Government Code 65302.5**—The Board of Forestry and Fire Protection (BOF) must provide recommendations to a local jurisdiction's general plan safety element at the time that the general plan is being amended. BOF recommendations include goals and policies that provide for contemporary fire-prevention standards for the jurisdiction. This is not a direct and binding fire-prevention requirement for individuals.

- **Sprinkler Systems: California Residential Code, Chapter 3, Section R313—**All new dwellings, dwelling units, and one- and two-family townhomes must be equipped with an automatic fire-sprinkler system that can protect the entirety of the dwelling. Dwellings and homes constructed prior to January 1, 2011, that do not have a sprinkler system may be retrofitted, but it is not required.
- **Fire Safety Standards: California Public Resources Code 4290 and 14 California Code of Regulations (CCR) 1270—**These regulations govern roads, driveway width, clearance, turnarounds, signing, and water related to fire safety throughout California. Public Resources Code 4290 is typically enacted through regulation at the county level, as described below.
- **Wildland-Urban Interface Building Standards: California Government Code 51189**—The Office of the State Fire Marshal is required to create building standards for wildfire resistance. Construction of buildings in the wildland-urban interface must use fire-resistant materials to save life and property. As of 2011, the standards relevant to fire-safe construction for all new structures in the SRA are the California Building Code, Chapter 7A (for commercial construction) and the California Residential Code, Chapter 3, Section R327 (for residential construction).
- **State Responsibility Area: Public Resources Code 4102, 4125-4229 and 14 CCR 1220**—These statutes and regulations establish the locations where CAL FIRE has the financial responsibility for preventing and suppressing fires. These designations define financial arrangements for fire protection services and establish the locations where fire safe and defensible space laws or regulations apply.
- **Hazardous Fire Areas: Public Resources Code 4251-4255 and 14 CCR 1200—**These laws and regulations allow petitioners to the BOF or CAL FIRE to establish hazardous fire areas, providing for area closures and other restrictions for fire prevention.
- **Defensible Vegetation Clearing Around Structures: Public Resources Code 4291/14 CCR 1299**—Public Resources Code 4291 regulates fuel management around a property. It states that a person who owns or controls a building or structure in or adjoining to forest, brush, or grass covered lands shall follow certain guidelines outlined in the code. At least 100 feet of defensible space is required. The owner of the property is liable for making these changes to protect habitable structures. The 100 feet is separated into two zones, with the closer zone, 30 feet out from the structure, being managed more intensively.

14.1.3 Secondary Hazards

Wildfires can generate a range of secondary impacts, which in some cases may cause more widespread and prolonged damage than the fire itself. A major fire can lead to ancillary impacts such as landslides in steep ravine areas and flooding due to the impacts of silt in local watersheds. Wildfires cause the contamination of reservoirs, destroy transmission lines and contribute to flooding. They strip slopes of vegetation, exposing them to greater amounts of runoff. This in turn can weaken soils and cause failures on slopes, sometimes several years after a wildfire.

Wildfires can have a significant impact on air quality, especially with prolonged periods of burning combined with climatic conditions. Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxics (formaldehyde, benzene). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency (or temperature) of combustion, and the weather.

14.2 HAZARD PROFILE

14.2.1 Local Conditions Related to Wildfire Hazard

Vegetation

The vegetation in Roseville can be broadly classified in three categories:

- There are large tracts of self-sustaining grasslands in the northern and western undeveloped edges of Roseville. Less extensive areas of grassland can be found in smaller, undeveloped areas scattered throughout the City. Most of the grasslands are non-native, following the effects of grazing and clearing for agricultural uses.
- Oak woodland, riparian and creek areas are found in proximity to Roseville's major stream channels where microclimates and alluvial soils provide ideal conditions for the deeper rooting shrubs and trees found in these habitats. Most woodland areas are relatively open, with little shrub growth.
- Seasonal wetlands in Roseville include intermittent drainages and vernal pools. Intermittent drainages are wet only in winter and dry during the summer, with scattered ponds; they may contain water from adjacent urban runoff. Vernal pools represent a significant seasonal wetland resource in Roseville.

Undeveloped Areas

The U.S. Army Corps of Engineers has required developers in Roseville to preserve areas of vernal pools that are dedicated to the City and maintained in perpetuity. These areas are to be left undisturbed and are typically open grassy areas during the hot summer months when the vernal pools are dry.

Preservation of open space, wetlands, natural parkways, riparian corridors along the City's watersheds, vernal pools and endangered species habitat have added to the inventory of vegetation susceptible to wildfire. The City of Roseville has 2,600 acres of dedicated open space within the city limits. Nearly 740 acres will be added on dedication of properties in the West Roseville Specific Plan. The City recently acquired the Reason Farms property in unincorporated Placer County, which will be the site for a retention basin projected to have water only eight days per year. The property will be preserved in perpetuity as open space with passive recreational uses planned, including biking, hiking, camping, and boating on a man-made lake. The Roseville Fire Department will assume fire protection duties for this significant piece of open space at a future date.

Fire-Fighting and Fire Prevention

Federal, state, county, city, and private agencies provide fire protection and firefighting services in California. Wildfires usually are extinguished while smaller than 1 acre, but they can spread to more than 100,000 acres and may require thousands of firefighters and several months to extinguish.

Roseville Fire Protection Services

The Roseville Fire Department is a fully functional agency that primarily provides fire suppression and emergency medical services for the urban environment of the City. The department operates eight stations. The department has eight paramedic engine companies, with a minimum staffing of three, two paramedic truck companies with a minimum staffing of four, and one battalion chief. The department also operates a hazardous materials response unit (cross-staffed the truck company); five grass/wildland units, and one technical rescue unit (cross-staffed by engine companies). The department maintains four reserve engines and one reserve truck.

Regional Services

Regional fire protection is provided by municipal fire departments and those assigned to specially designated lands outside city boundaries. The Placer County Fire Department provides fire protection to much of Placer County including west of the Roseville city limits. The South Placer Fire District serves unincorporated Placer County east of Roseville. The City of Rocklin Fire Department provides services within the City of Rocklin to the north and east of Roseville. The Sacramento Metropolitan Fire District provides fire protection to the City of Citrus Heights and the unincorporated Sacramento County areas to the south of Roseville.

State of California

The California Department of Forestry and Fire Protection (CAL FIRE) is charged with both assessing the threat of fire in California and suppressing fires on state and federal lands, while providing mutual aid if needed to communities that do not include public lands. The California Fire Plan formalizes much of the work that has been done to assess the threat of wildfire statewide. CAL FIRE's Fire and Resource Assessment Program assesses the amount and extent of California's forests and rangelands, analyzes their conditions and identifies alternative management and policy guidelines.

Firewise Communities

The national Firewise Communities program is a multi-agency effort involving homeowners, community leaders, planners, developers, and others to protect people, property and natural resources from the risk of wildfire before a fire starts. The program emphasizes community responsibility for planning a safe community and effective emergency response, and individual responsibility for safer home construction and design, landscaping and maintenance. Firewise Communities is directed and sponsored by the National Wildfire Coordinating Group, a consortium of organizations and federal agencies responsible for wildfire management in the U.S.

14.2.2 Past Events

CAL FIRE maintains a website (http://www.calfire.ca.gov/general/firemaps/) with interactive maps that detail the fire history in California since 2011. Fire history shows multiple wildfires in or near Roseville since the 1950s:

- In the 1950s, one fire occurred just east of the current location of Interstate 80 on the Roseville/Rocklin border, including parts of the Stoneridge area. A second fire occurred south of Douglas Boulevard where Roseville Parkway is now located.
- In the 1970s, a significant fire occurred in undeveloped grasslands along what is now Galleria Boulevard and Harding Boulevard in north central Roseville. Another fire occurred just outside the city limits on both sides of Cavitt-Stallman in the Loomis area.
- In the 1980s, five wildfires were mapped, including one in grasslands of the North Central Roseville Specific Plan north of Highway 65. Three grassland fires occurred west of Roseville. A major fire occurred in 1983 where Baseline Road and Country Club Drive now intersect. The fire scorched 1,500 acres north of the current Blue Oaks Boulevard, stopping at Pleasant Grove Creek. The area is now developed with urban uses.
- The 2002 Sierra Fire in Loomis and Granite Bay was the largest in recent history near Roseville. The fire charred 900 acres in the area between Interstate 80 and Cavitt-Stallman Road. It destroyed six structures and threatened two schools. More than 1,000 homes in both communities were threatened.

- On May 17, 2016, a grass fire broke out near Highway 65 north of Roseville. The fire, located at Athens Avenue and Industrial Boulevard, south of Lincoln in Placer County stretched to 169 acres.
- On August 4, 2021, a fire erupted on Milk Ranch Road and Bear River Campground Road, north of Applegate. The fire burned 2,619 acres in Nevada and Placer counties.
- On September 6, 2022, a fire broke out near Mosquito Road and OxBow Reservoir east of Foresthill, Placer County. It burned 76,788 acres in Placer and El Dorado counties.

Statewide, California experiences frequent significant wildfires. Most recently, the following two fires occurred:

- The 2017 Tubbs Fire in Napa County & Sonoma County is considered the fourth deadliest California wildfire in history. The fire consumed 36,807 acres, destroyed 5,636 structures and killed 22 people.
- The 2018 Camp Fire in Butte County is considered the deadliest fire in California history. The fire burned a total of 153,336 acres, destroying 18,804 structures and killing 85 people.

14.2.3 Location

CAL FIRE has developed an estimate of fire risk in designated wildland-urban interface areas, based on a variety of factors affecting fire frequency and fire behavior. The City of Roseville does not include any designated wildland-urban interface areas. A significant portion of the area around the City is developed. State maps show that the City has a moderate fire threat. While the City rarely has critical fire weather conditions, a combination of dry grasslands, the topography in northeast Roseville, and hot temperatures with limited rainfall could result in a risk of wildfire on occasion. The following sections describe the most likely wildfire hazards in Roseville.

Grassland Fires

Prior to August 2004, Roseville's northwestern boundary was Fiddyment Road. Since the annexation of 3,200 acres in West Roseville, the City now includes a significant amount of undeveloped non-native annual grassland with some riparian and oak woodland along Pleasant Grove Creek and Kaseberg Creek. The property to the west of Roseville along this border is also non-native annual grassland. The 2004 West Roseville Specific Plan Open Space Preserve Operations and Management Plan has provisions for reducing fire hazard if the preserve becomes a fire hazard. The preserve manager will work with the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service and the Roseville Fire Department to decide the best way to reduce the hazard. Fire breaks are allowed within the 50-foot buffer around the preserve. Fire breaks in other locations would require U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service approval.

The Sierra Vista Specific Plan Area, annexed in January 2012, consists of largely nonnative, annual grasslands. The Sierra Vista Specific Plan Area will develop as urban uses, but will also contain 267 acres of preserve areas. A 50-foot wide open space buffer area is maintained at the perimeter of all open space preserves for fuel modification and fire management, among other uses. The Roseville Fire Department's Fire Station #5 serves as the primary responding area for this area.

Ravine Fires

The Stoneridge Specific Plan includes 1,089 acres of land that will include 2,882 dwelling units, along with office and commercial uses, schools, parks, and open space. Approximately 252 acres will be set aside as open space with an extensive network of bike trails. The main ingress and egress to the area is Secret Ravine Parkway, which

will link Sierra College Boulevard with East Roseville Parkway. The ravines also border the Northeast Roseville Specific Plan Area, which is largely developed, with some construction continuing along the ravine edges.

The key topographic features in Stoneridge are the three ravines: Secret Ravine, False Ravine, and Miners Ravine. The creek at the base of Miner's Ravine flows year-round. The elevation of the property is among the highest in the City, ranging from 225 feet to 375 feet above sea level. Slopes in Miner's Ravine range from a 5-percent grade to a 26-percent grade.

Vegetation in the Stoneridge Specific Plan Area is primarily annual grasslands, oak woodlands, and oak riparian landscapes (see Figure 14-1). Annual grasses with scattered downed trees and limbs cover the ground. The overstory includes scattered oaks and a few other broad leaf trees. The riparian vegetation includes Blue Oak, Valley Oak and Interior Live Oak, along with willows, cottonwood, and ash trees. The vegetation on the plateaus between the three main ravines is primarily annual grasses. The ravines do not have a continuous fuel ladder from the ground vegetation to the overstory trees.



Figure 14-1. View of Ravine, Tree Canopy and Stoneridge Development

The 1999 Stoneridge Specific Plan Wildfire Safety Plan outlined the following risks resulting from development of the Plan Area (see Figure 14-2):

- Fire in the grass of the open space area was identified as the most serious wildfire threat for the Stoneridge Specific Plan. Extensive grass fuels in the open space areas will quickly ignite and fire will spread rapidly, especially in summer. The plan cites a fire history that has demonstrated that grass and other light fuels are a threat to fire risk for other vegetation types as well as people.
- Wildfire rate of spread can increase with steep slopes. The three ravines in the project area have moderate slopes that can cause a fast rate of wildfire spread.
- Risk of fire starts will increase with development. The greatest risk from fire ignitions will be in the open space areas as use of these areas by future residents and other members of the public increases. Bike trails, for example, will make open space areas more accessible than when the Plan Area was undeveloped.
- Initial work by the developer to reduce the amount of fuel in the area must be maintained over the long-term to keep fire risk in check.
- Home design and siting often do not adequately mitigate wildfire risk. Measures specific to development within the Plan Area have been adopted by the City and are being enforced at the building permit stage. Owners will be required to maintain a clearing of flammable vegetation around the structures, use only fire resistant materials for roofs and fences, and ensure adequate water for fire suppression.

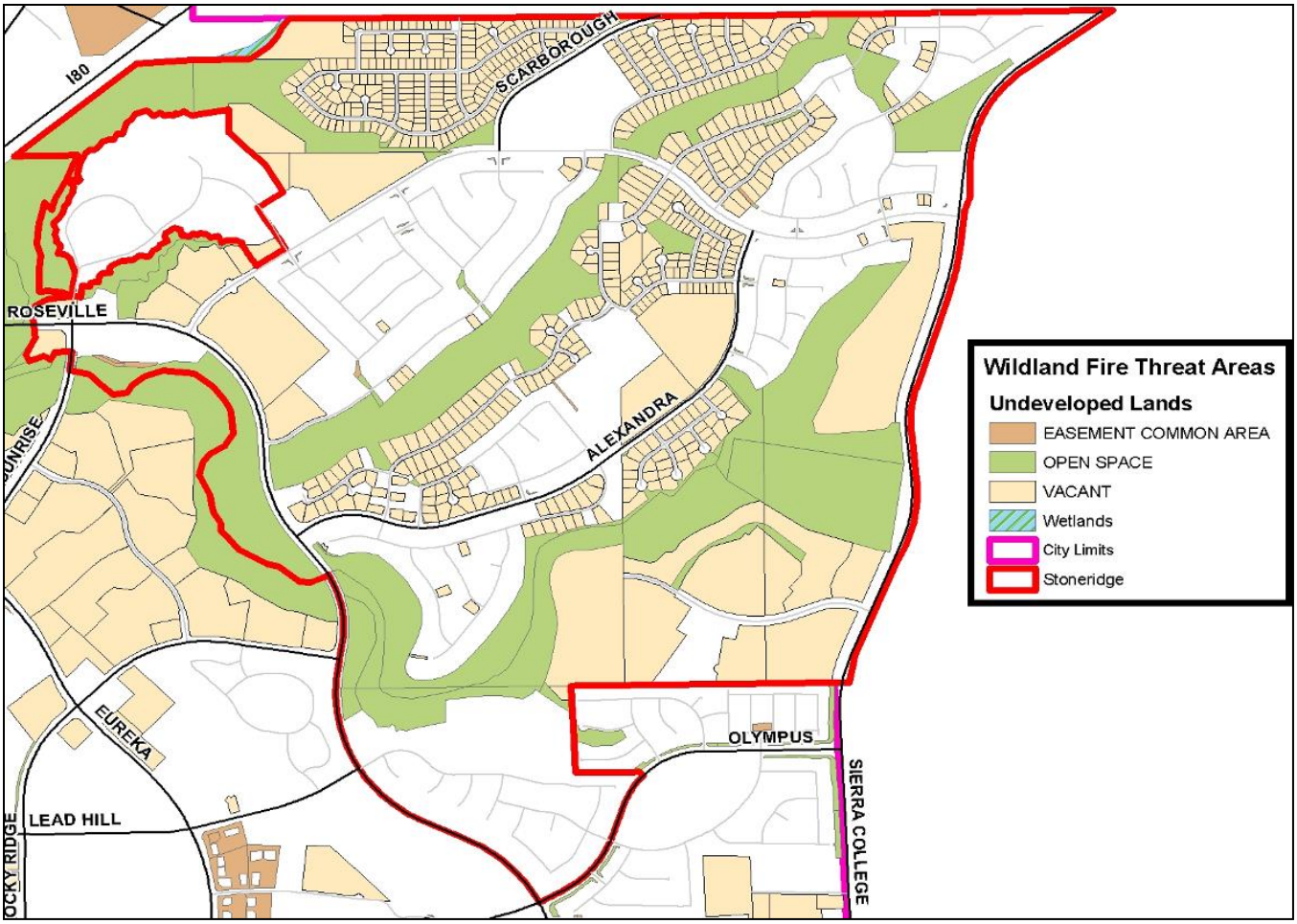


Figure 14-2. Stoneridge Specific Plan Wildfire Threat Areas

The Stoneridge Wildfire Safety Plan outlines short and long-term mitigation measures to prevent or minimize the impact of wildfire in this area of Roseville. These are included in the mitigation section of this 2021 Plan.

Open Space Fires

The City is adding new open space areas through dedication as part of the specific plan process. This will result in construction of new developments immediately adjacent to open space areas, which poses moderate risk to such developments. The Fire Department reviews these during the planning process, and fire safety provisions are accounted for in Specific Plan design guidelines and development agreements.

14.2.4 Frequency

The Roseville Fire Department maintains a database of every incident type responded to by Roseville fire personnel. Wildfires are tracked in four categories: natural or vegetation fire; forest, woods, or wildfire; brush or brush and grass fire; and grass fire. Table 14-1 provides the number of wildfire incidents recorded from 2018 to 2022. Most are controlled and contained early, with limited damage. These represent an average of about 90 responses per year in that time period.

Table 14-1. Wildfire Incident Counts—2016 to 2022

Incident Type	2018	2019	2020	2021	2022
Natural vegetation fire	12	11	8	6	9
Forest, woods, or wildland fire	0	1	1	2	2
Brush, or brush and grass mixture fire	65	54	65	84	71
Grass fire	24	19	13	12	6
Total	**101**	**85**	**87**	**104**	**88**

Source: City of Roseville Fire Department Incident Type Count Reports 2018 – 2022

14.2.5 Severity

Wildfires have never resulted in loss of life in Roseville, though some property damage has resulted from wildfire incidents, including some fences on occasion. The Roseville Fire Department assessment in the General Plan indicates that wildfires in open space areas represent a moderate hazard. Most fires of this type are small and localized. The open space areas are typically easily accessible for fire suppression apparatus, and the response time is such that fires are suppressed rapidly.

Short-term loss caused by a wildfire can include the destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural and economic resources and community infrastructure. Vulnerability to flooding increases due to the destruction of watersheds.

14.2.6 Warning Time

Wildfires are typically caused by humans. There is no way to predict when one might break out. Dry seasons and droughts greatly increase fire likelihood. If a fire breaks out and spreads rapidly, residents may need to evacuate within days or even hours. Once a fire has started, fire alerting is reasonably rapid in most cases. The spread of cellular and two-way radio communications has contributed to a significant improvement in warning time.

Since fireworks often cause brush fires, extra diligence can be taken around the Fourth of July when the use of fireworks is highest. Dry lightning may also trigger wildfires, so special attention can be paid during weather events that may trigger wildfires. Reliable National Weather Service lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm. National Weather Service fire weather forecasts for the country (http://www.spc.noaa.gov/products/fire_wx) are monitored by local fire departments, including the City of Roseville Fire Department, to assess the risk for wildfire at any given time and enhance preparedness.

14.3 EXPOSURE AND VULNERABILITY

With no wildfire mapping for Roseville, the risk assessment for this hazard is qualitative. Structures, above-ground infrastructure, critical facilities and natural environments are all vulnerable to the wildfire hazard. There is currently no validated damage function available to support wildfire mitigation planning.

14.3.1 Population

Many communities and populations are especially vulnerable to wildfires, including low-income communities, migrant populations, populations whose primary language is not English, indigenous populations, communities of older adults, and those with respiratory and other health concerns. Members of immigrant communities may be concerned about impacts to their immigration status and do not seek help. When a wildfire impacts an area with high rents where multiple families live in one structure, it may be difficult for those not listed on the lease to prove that they were affected by the fire; this could result in a lack of access to services. Additionally, fires quickly increase housing prices and rent prices, further displacing people already affected by the fire. Homelessness may increase as a result of wildfire events.

Air pollution from wildfires can be a severe health hazard, especially for sensitive populations, including children, the elderly and those with respiratory and cardiovascular diseases. Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxics (formaldehyde, benzene). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency of combustion, and the weather. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility.

There are no recorded incidents of loss of life from wildfires in Roseville, and the risk from wildfire has been deemed moderate by the state and the Roseville Fire Department. Given the immediate response times to reported fires, the likelihood of injuries and casualties is minimal.

14.3.2 Property

Loss estimations for the wildfire hazard are not based on modeling utilizing damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of the City's structures. This allows emergency managers to select a range of economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 14-2 lists the loss potential for Roseville's building stock.

Table 14-2. Potential Loss Estimates for the Wildfire Hazard

	Building Count	Assessed Value	10% Damage	30% Damage	50% Damage
Residential	48,288	$27,733,494,567	$2,773,349,456.70	$8,320,048,370.10	$138,667,472,835
Commercial	1,736	$15,320,115,726	$1,532,011,572.59	$4,596,034,717.77	$76,600,578,630
Industrial	334	$1,873,405,841	$187,340,584.06	$562,021,752.19	$9,367,029,203
Agricultural	7	$40,971,589	$4,097,158.95	$12,291,476.84	$204,857,947
Religion	53	$409,382,787	$40,938,278.71	$122,814,836.12	$2,046,913,935
Government	17	$139,887,051	$13,988,705.05	$41,966,115.16	$699,435,253
Education	81	$1,854,390,958	$185,439,095.77	$556,317,287.32	$9,271,954,789
Total	**50,516**	**$47,371,648,518**	**$4,737,164,851.83**	**$14,211,494,555.49**	**$236,858,242,592**

14.3.3 Critical Facilities

If a critical facility is damaged or destroyed by wildfire, there could be severe consequences to public health and safety. The Roseville Fire Department, all first responders and mutual aid agencies would work to protect those facilities in areas where wildfire is a potential.

Critical facilities of wood frame construction are especially vulnerable during wildfire events. A detailed vulnerability analysis for all critical facilities is on file with City staff and will not be published for review due to security reasons.

In the event of wildfire, there would likely be little damage to most infrastructure. Most roads and railroads would be without damage except in the worst scenarios. Power lines are the most at risk from wildfire because most poles are made of wood and susceptible to burning. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers. Wildfire typically does not have a major direct impact on bridges, but it can create conditions in which bridges are obstructed. Many bridges in areas of high to moderate fire risk are important because they provide the only ingress and egress to large areas and in some cases to isolated neighborhoods.

14.3.4 Environment

It can take decades or even centuries for ecosystems to recover from a wildfire, which can cause severe environmental impacts:

- **Damaged Fisheries**—Critical trout, salmon and steelhead fisheries can suffer from increased water temperatures, sedimentation, and changes in water quality.
- **Soil Erosion**—The protective covering provided by foliage and dead organic matter is removed, leaving the soil fully exposed to wind and water erosion. Accelerated soil erosion occurs, causing landslides and threatening aquatic habitats.
- **Spread of Invasive Plant Species**—Non-native woody plant species frequently invade burned areas. When weeds become established, they can dominate the plant cover over broad landscapes and become difficult and costly to control.
- **Disease and Insect Infestations**—Unless diseased or insect-infested trees are swiftly removed, infestations and disease can spread to healthy forests and private lands. Timely active management actions are needed to remove diseased or infested trees.
- **Destroyed Endangered Species Habitat**—Catastrophic fires can have devastating consequences for endangered species. For instance, the Biscuit Fire in Oregon destroyed 125,000 to 150,000 acres of spotted owl habitat.
- **Soil Sterilization**—Topsoil exposed to extreme heat can become water repellant, and soil nutrients may be lost. Some fires burn so hot that they can sterilize the soil.

14.4 FUTURE TRENDS IN DEVELOPMENT

Roseville is expected to grow considerably in the next 10 years. The moderate potential for wildfire in Roseville is not likely to lessen or prohibit development in Roseville. Any increase in asset value increases risk exposure when risk is measured by assets exposed, as it is in this Plan. However, the vulnerability of this new exposure is low, due to the application of strong building code standards contained within the California Fire Code.

14.5 REVIEW OF EXISTING PROGRAMS, PLANS AND ORDINANCES

The City of Roseville and Roseville Fire Department have adopted a number of policies, programs, plans and ordinances to meet the following fire protection goals detailed in the Roseville General Plan:

- Protect against the loss of life, property, and the environment by appropriate prevention and suppression measures.
- Provide emergency services in a well-planned, cost-effective, and professional manner through the best use of equipment, facilities and training available.

14.5.1 Fire Prevention Programs and Standards

Roseville Fire Prevention

Roseville fire prevention includes the fire marshal, hazardous materials officer, two senior fire inspectors, four fire inspectors and one public safety community relations coordinator (shared with the Police Department). The key role of these staff members is improving the safety and quality of life of the citizens of Roseville.

The Roseville Fire Department has an extensive work program to promote and implement fire prevention in developed and undeveloped areas of the City. These programs promote or provide the following services:

- Regular inspection and code enforcement
- Fire-safe roofing requirements
- Adequate access to and fire breaks adjoining open space areas
- Early warning devices such as automatic detection and reporting devices and smoke detectors
- Automatic fire suppression systems such as fire sprinkler systems
- Public education and information
- Code and ordinance development and updates
- Training and planning
- Fire investigation and data analysis
- Hazardous materials process and inspection.

Development Review Process

Section 16.16.050 of the Roseville Municipal Code specifies that all development plans be reviewed and approved by the Roseville Fire Department prior to construction. The code section states the following:

> "…complete plans, specifications, and information for new construction, remodeling, tenant improvements, or additions to buildings shall be submitted for review and approval prior to construction to the Chief or his/her designated representative having jurisdiction. Plan approval shall be required prior to the issuance of a Fire Department Inspection Record Card for those instances where such card may be required. In addition to the submittal of hard copy plan sets, a digitized copy of the approved drawings for new buildings shall be submitted to the Fire Department for pre-fire documentation purposes. Said copy shall be submitted in an approved format."

The Roseville Fire Department is an integral part of the development planning and review process, with specific emphasis on the provision of access to lands for firefighting purposes, street access to all structures, fire prevention programs, and the enforcement of building and fire codes and City ordinances. The Fire Department also evaluates water supply for firefighting and fire suppression systems.

California Building Code

Roseville Municipal Code Title 16 has been adopted to enforce the 2013 California Building Code for all construction in the City. Roofing and building materials, construction techniques, wiring standards, and fire detection/warning devices are defined and enforced to minimize the risk of structural fire damage.

California Fire Code

Chapter 16.16 of the Roseville Municipal Code includes adoption of, reference to and amendments to the Uniform Fire Code. Last amended in 2013, the code provides specifications and standards for fire safety. Early warning devices such as automatic sprinkler systems, automatic detection and reporting devices, and smoke detectors are required as preventative measures to reduce the risk of fire. The code also states the amount of water needed for fire protection.

Weed Abatement Ordinance

Chapter 9.20 of the Roseville Municipal Code includes provisions for the abatement of weeds, dirt, rubbish, and rank growths. The ordinance specifies that weeds be eradicated by property owners to prevent the presence of fire fuels. Properly implemented, the ordinance ensures accessibility of firefighters to open space areas and creation of firebreaks that slow the spread of fire.

14.5.2 Adopted Service Levels for Response Time

Specific Plans

Roseville's specific plan process is used by the Fire Department to plan future fire station locations and response times based on the circulation systems, and to ensure that revenues from the Fire Service Construction Tax and General Fund are sufficient to provide fire protection services to the area and cumulatively city-wide. The Fire Department is involved in every specific plan process from the initial planning process to adoption, construction, and ongoing inspections.

Should there be significant fire-related concerns, the Fire Department may require supplemental analysis as a condition of the specific plan. For example, a mitigation measure for adoption of the Stoneridge Specific Plan required the preparation of the Stoneridge Plan Wildfire Safety Plan. The Safety Plan analyzes the factors contributing to the risk of wildfire in Stoneridge and mitigation measures to enhance fire prevention.

Capital Improvement Program

The Capital Improvement Program is a five-year plan updated annually with the City's fiscal year budget that includes all public projects under construction and planned within the five-year time frame. The Capital Improvement Program allocates funds from each of the revenue sources collected to pay for City facilities, services, and programs. Fire Department stations and apparatus are included in the Capital Improvement Program

along with the status of the Fire Service Construction Tax current and projected revenues to ensure that fire stations are built and apparatus is procured to keep pace with development.

Fire Service Construction Tax

The Fire Service Construction Tax, approved by Roseville voters in 1984, requires that 1/2 percent of the value of any new construction be collected as part of the building permit fee and designated for fire suppression and protection. The funds must be spent on capital improvements such as fire stations, fire apparatus, and other Fire Department equipment. The funds may not be allocated to expenses such as salaries or training. The City's newer Specific Plan Areas include provisions that extend this tax collection to the buildout of each Plan Area.

Dedications, Fees, and Exactions

The City of Roseville, through the specific plan process, and if necessary as part of individual project approvals, requires the dedication of property and payment of fees or exactions. The Fire Department reviews the project proposals and may require dedication of land or payment of appropriate fees and exactions to help offset municipal costs for fire-related facilities and services. The City of Roseville requires the dedication of fire station sites through the specific plan process. Should revenues be deemed insufficient to fully support fire services, additional assessments may be required to ensure adequate protection in the future. For example, recent specific plans through development agreements require owners to pay a special assessment for public safety, including fire protection, as part of their annual property tax bills.

Water System Master Plan

The City of Roseville Environmental Utilities Department maintains and updates a distribution system model to ensure adequate water sources, quantities and water pressure, along with emergency backup systems to ensure maximum firefighting capacity.

Interagency Agreements

The City of Roseville Fire Department participates in the statewide mutual aid agreement, whereby the Fire Department will respond to any other department or district should the need arise. In addition, the Department maintains mutual aid agreements with other agencies, including agreements through Cal OES Mutual Aid Region IV and the Placer County Operational Area.

14.5.3 Annual Monitoring of Fire Department Service Levels

Program Performance Measures

The Roseville Fire Department compiles program performance measures as part of the City's annual budget to monitor service levels and address deficiencies before they become serious. The annual evaluation includes establishment of goals and objectives, formulation of key indicators relating to activities, and efficiencies that can be monitored throughout the year, along with a line item cost for the programs and objectives. The Fire Department budget and program performance measures include a review of fire service levels and department goals.

National Fire Incident Reporting System

The National Fire Incident Reporting System requires local fire departments to report fire service data. Performance indicators are routinely reviewed to evaluate capability and coverage, demand for service and trends. Key components of the system include GIS and mapping, fire incident reporting, emergency medical management, personnel and training management, inspection management, and equipment and supplies inventory management. Fire Department incident data are input into a computer database and submitted to the State Fire Marshal's Office per state standards. The data are also used by the City of Roseville to evaluate operations and track trends in fire service within the City.

14.5.4 Personnel Training

The Roseville Fire Department Training program includes dedicated staff and facilities to ensure that personnel are properly trained and updated as new techniques and equipment become available. The Fire Training staff provides training for all firefighters within the department at the City's state of the art training center (Figure 14-3). This training is the most important ingredient to the readiness of Roseville firefighters and emergency responders to fulfill their assigned mission. The Training Center is also used by other fire departments and local agencies on a fee-for-use basis. The training staff consists of one fire training officer.



Figure 14-3. City of Roseville Fire Training Center

14.5.5 Fire Investigation

Fires in the City of Roseville are investigated by Roseville Fire Department investigators. The program ensures proper investigation of the cause, origin, and circumstances of each fire; collects and preserves evidence; coordinates with authorities in detection, apprehension and prosecution of arsonists; and pursues each investigation to conclusion. Information is reported to the State Fire Marshal for inclusion in annual state reports.

14.5.6 Comprehensive Emergency Medical Services

The state requires a Multi-Hazard Function Plan that details response strategies for all types of emergencies. The plan addresses interagency cooperation, emergency functions, continuity of government, and public awareness. In addition, the plan provides for the operation of police, fire and health services, as well as transportation alternatives in the event of a multi-hazard emergency. The City's Emergency Plan conforms with the Standardized Emergency Management System and is approved by the City Council and Cal OES.

14.5.7 Accreditation Recommendation

The Commission on Fire Accreditation International provides a comprehensive system of fire and emergency service evaluation that helps local governments determine their risks and fire safety needs, evaluate the performance of the organizations involved and provide a method for continuous improvement. The self-assessment process covers 10 categories: governance and administration; assessment and planning; goals and objectives; financial resources; programs; physical resources; human resources; training and competency; essential resources; and external systems relations. Within these categories are several related performance indicators and core competencies that the agency must address. In completing the self-assessment process, agencies must develop a strategic or master plan as well as a standard of response coverage document.

The Roseville Fire Department staff spent more than four years on the self-assessment and preparing the materials for the accreditation. In June 2005, the Commission on Fire Accreditation International recommended accreditation for the Roseville Fire Department. Reaccreditation was obtained in 2010. Only 220 departments in the world are accredited, and only 16 in California.

14.6 SCENARIO

As the future growth of Roseville expands into wildland-urban interface areas, a wildfire in Roseville has the potential to cause significant damage to exposed areas. A major wildfire might begin with a wet spring, adding to fuels already present on the forest floor. Flashy fuels would build throughout the spring. The summer could see the onset of insect infestation. A dry summer could follow the wet spring, exacerbated by dry hot winds. Carelessness with combustible materials or a tossed lit cigarette, or a lightning storm could trigger a multitude of small, isolated fires.

The embers from these smaller fires could be carried miles by hot, dry winds. The deposition zone for these embers would be deep in the forests and wildland-urban interface zones. Fires that start in flat areas move more slowly, but wind still pushes them. It is not unusual for a wildfire pushed by wind to burn the ground fuel and later climb into the crown and reverse its track. This is one of many ways that fires can escape containment, typically during periods when response capabilities are overwhelmed. These new small fires would likely merge. Suppression resources would be redirected from protecting the natural resources to saving remote subdivisions.

The worst-case scenario would include an active fire season throughout the American west, spreading resources thin. Firefighting teams would be exhausted or unavailable. Many federal assets would be responding to other fires that started earlier in the season. While local fire districts would be useful in the wildland-urban interface areas, they have limited wildfire capabilities or experience, and they would have a difficult time responding to the ignition zones. Even though the existence and spread of the fire is known, it may not be possible to respond to it adequately, so an initially manageable fire can become out of control before resources are dispatched.

To further complicate the problem, heavy rains could follow, causing flooding and landslides and releasing tons of sediment into rivers, permanently changing floodplains and damaging sensitive habitat and riparian areas. Such a fire followed by rain could release millions of cubic yards of sediment into streams for years, creating new floodplains and changing existing ones. With forests removed from the watershed, stream flows could double. Floods that had been expected every 50 years may occur every couple of years. With streambeds unable to carry the increased discharge because of increased sediment, floodplain elevations would increase.

14.7 ISSUES

The major issues for wildfire are as follows:

- Public education and outreach to people living in or near the fire hazard zones should include information about and assistance with mitigation activities such as defensible space, and advance identification of evacuation routes and safe zones.
- Wildfires could cause landslides as a secondary natural hazard.
- Climate change could affect the wildfire hazard.
- Future growth into wildland-urban interface areas should continue to be managed.
- The Fire Department needs to continue to train on wildland-urban interface type events.
- Expand the City's vegetation management activities. This would include enhancement through expansion of the target areas as well as additional resources.
- Expand certifications and qualifications for Fire Department personnel. Ensure that all firefighters are trained in basic wildfire behavior, basic fire weather, and that all company officer and chief level officers are trained in the wildland command and strike team leader level.

15. HUMAN HEALTH HAZARDS

15.1 GENERAL BACKGROUND

Human health hazards include transmittable diseases and environmental hazards such as extreme weather. The following sections describe commonly recognized human health hazards.

15.1.1 Coronavirus Disease 2019 (COVID-19)

Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. The majority of individuals infected with the virus experience mild to moderate respiratory illness and recover without requiring special treatment. However, some individuals become seriously ill and require medical attention. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer are more likely to develop serious illness. Anyone can get sick with COVID-19 and become seriously ill or die at any age (World Health Organization 2022).

15.1.2 Influenza

Influenza, commonly called flu, is a viral infection that attacks the respiratory system. Epidemics of the flu typically occur in the fall and winter.

H1N1

In April 2009, the World Health Organization (WHO) issued a health advisory on an outbreak of influenza-like illness caused by a new subtype of influenza A (A/H1N1) in Mexico and the United States.

The disease spread rapidly, with the number of confirmed cases rising to 2,099 by May 7, despite aggressive measures taken against the disease by the Mexican government. On June 11, the WHO declared an H1N1 pandemic, marking the first global pandemic since the 1968 Hong Kong flu. On October 25, the U.S. declared H1N1 a national emergency. On August 10, 2010, the WHO International Health Regulations Emergency Committee declared an end to the 2009 H1N1 pandemic globally.

H1N1 viruses and seasonal influenza viruses are co-circulating in many parts of the world. It is likely that the 2009 H1N1 virus will continue to spread for years to come, like a regular seasonal influenza virus.

H5N1/H7N9

The highly pathogenic H5N1 avian influenza virus is an influenza A subtype that occurs mainly in birds, causing high mortality among birds and domestic poultry. Outbreaks of highly pathogenic H5N1 among poultry and wild birds are ongoing in a number of countries.

H5N1 virus infections of humans are rare and most cases have been associated with direct poultry contact during poultry outbreaks. Rare cases of limited human-to-human spread of H5N1 virus may have occurred, but there is no evidence of sustained human-to-human transmission. Nonetheless, because all influenza viruses have the ability to change and mutate, scientists are concerned that H5N1 viruses one day could be able to infect humans more easily and spread more easily from one person to another, potentially causing another pandemic.

While the H5N1 virus does not now infect people easily, infection in humans is much more serious when it occurs than is infection with H1N1. More than half of people reported infected with H5N1 have died.

15.1.3 Smallpox

Smallpox is a sometimes fatal infectious disease. There is no specific treatment, and the only prevention is vaccination. Symptoms include raised bumps on the face and body of an infected person. The oldest evidence of smallpox was found on the body of Pharaoh Ramses V of Egypt who died in 1157 BC.

Outbreaks have occurred from time to time for thousands of years, but the disease is now eradicated after a successful worldwide vaccination program. The last case of smallpox in the United States was in 1949. The last naturally occurring case in the world was in Somalia in 1977. As of the publication of this document, there are no cases of smallpox in the world. Currently only two locations in the world have samples of smallpox: the CDC in Atlanta and the Ivanovsky Institute of Virology in Russia.

After the disease was eliminated, routine vaccination among the general public was stopped. Therefore, any cases of smallpox in the world would be considered an immediate international emergency. In 2003, the Wisconsin Division of Public Health conducted an investigation of state residents who became ill after having contact with prairie dogs. The cases appeared in May and June of 2003, and symptoms in the human cases included fever, cough, pox-like rash and swollen lymph nodes. CDC laboratory test results indicated that the cause of the human illness was Monkeypox, an orthopox virus that could be transmitted by prairie dogs. This outbreak, and the potential use of smallpox as a weapon of bioterrorism, brought the fear of smallpox back to the forefront of the population. A detailed nationwide smallpox response plan created at the end of 2002 is designed to quickly contain a potential outbreak and vaccinate the population.

15.1.4 Viral Hemorrhagic Fevers

Viral hemorrhagic fevers (VHFs) are a group of illnesses caused by several distinct families of viruses. VHF describes a multisystem syndrome (multiple systems in the body are affected). Characteristically, the overall vascular system is damaged and the body's ability to regulate itself is impaired. These symptoms are often accompanied by hemorrhage (bleeding); however, the bleeding itself is rarely life-threatening. While some types of hemorrhagic fever viruses can cause relatively mild illnesses, many cause severe, life-threatening disease.

The viruses that cause VHFs are distributed over much of the globe. However, because each virus is associated with one or more particular host species, the virus and the disease it causes are usually seen only where the host species live. Some hosts, such as the rodent species carrying several of the New World arenaviruses, live in

geographically restricted areas. Therefore, the risk of getting VHFs caused by these viruses is restricted to those areas. Other hosts range over continents, such as the rodents that carry viruses that cause the hantavirus pulmonary syndrome in North and South America, or the rodents that carry viruses that cause hemorrhagic fever with renal syndrome in Europe and Asia.

Ebola

The 2014 Ebola virus outbreak was unprecedented in geographical reach and impact on health care systems across the globe. This was the largest and deadliest Ebola virus outbreak ever recorded. It was the first time the West African countries of Guinea, Liberia, Sierra Leone, Nigeria, Mali, and Senegal saw the virus. Ebola is more common in Central African countries, such as the Democratic Republic of Congo and Sudan, where it was first discovered in 1976. It was also the first time that Ebola made it to the United States and Europe, prompting world-wide preparedness and response efforts.

In August 2014 two U.S. healthcare workers returned to the United States for treatment for Ebola. The case that most impacted the health care system in the United States was a patient diagnosed with Ebola in Dallas, Texas who died due to Ebola in October 2014. The nurse who provided care for him later tested positive for Ebola. This caused responses across the country from hospitals, emergency medical teams, fire departments and public health agencies to enhance isolation precautions, develop emergency policies, train with personal protective equipment and conduct multi-agency emergency exercises in case the spread of Ebola became a pandemic.

Before the 2014 outbreak, only 2,200 cases of Ebola had been recorded and 68 percent were fatal. Twenty percent of new Ebola infections were linked to burial traditions in which family and community members wash and touch dead bodies before burial. In Guinea, 60 percent of Ebola infections were linked to traditional burial practices. From 2014 to the publishing of this document, there have been no confirmed cases of Ebola in California.

Hantavirus

Hantavirus is a rodent-borne disease and one of the most important in California. It was discovered in 1993 in the southwestern U.S., and it has determined that the disease had been present, but unrecognized, at least as early as 1959. It has now been identified in over half of the states of the U.S. In 2013, seven cases of Hantavirus occurred in Yosemite National Park. Hantavirus has also been detected in the local Sierra Nevada region.

The hantavirus spreads when individuals touch or eat something contaminated with infected rodent urine, droppings or saliva. It can also be transmitted through aerosolization, which occurs when dried materials contaminated by infected rodent droppings or saliva are disturbed and brought up into the air and inhaled. Infected persons first develop symptoms one to two weeks, and up to five weeks, after exposure. Early symptoms include fever, headache, and muscle aches, especially in the thighs, hips, back, and shoulders. Other early symptoms include dizziness, chills, nausea, vomiting, diarrhea, and abdominal pain. After two to seven days of these symptoms, patients develop breathing difficulties that range from cough and shortness of breath to severe respiratory failure. Approximately 40 percent of hantavirus patients die from the disease.

15.1.5 Plague

Plague is a potentially fatal infectious disease of animals and humans caused by the *Yersinia pestis* bacterium. People usually get plague from being bitten by a flea that is carrying the plague bacterium or by handling an

infected animal. Today, modern antibiotics are effective against plague, but if an infected person is not treated promptly, the disease is likely to cause illness or death.

Plague is an ancient disease but outbreaks throughout the world continue. Major plague epidemics occurred in the middle of the sixth century in Egypt, Europe and Asia; during the 14th century in Europe, following caravan routes; in the 18th century in Austria and the Balkans; and in the late 19th century worldwide (but mostly in China and India). Manchuria in 1910–1911 witnessed about 60,000 deaths due to pneumonic plague with a repeat in 1920–1921. A minor outbreak occurred as recently as the summer of 1994 in Surat, India, closely following an earthquake in September 1993. Globally, the WHO reports 1,000 to 3,000 cases of plague every year. Monitoring of mammals routinely occurs in California to mitigate potential plague (see Figure 15-1).

Source: California Department of Public Health

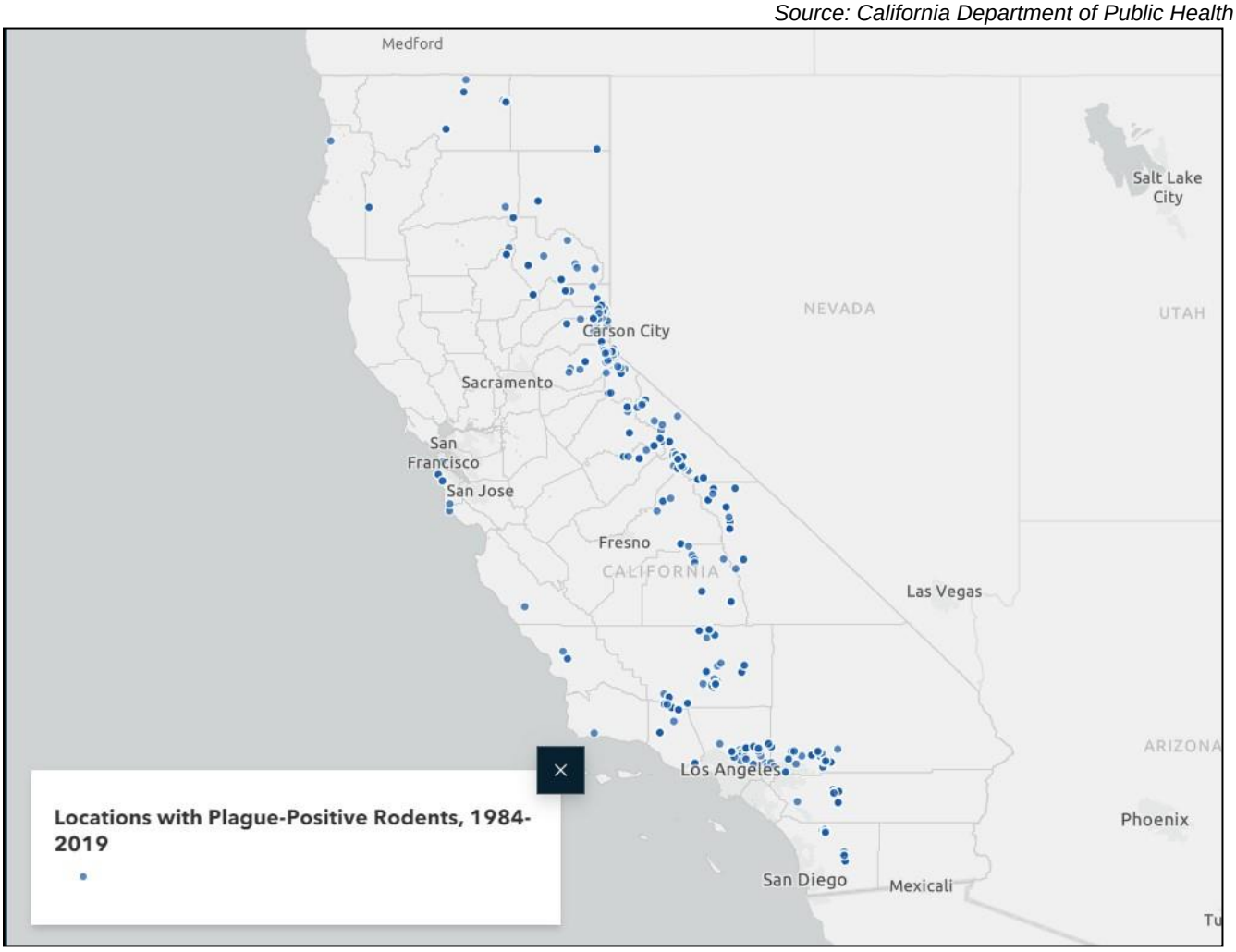


Figure 15-1. California Locations with *Yersinia Pestis*-Positive Rodents by County (1984 – 2019)

In North America, plague is found in certain animals and their fleas from the Pacific Coast to the Great Plains, and from southwestern Canada to Mexico. The last urban plague epidemic in the United States occurred in Los Angeles in 1924-25. Since then, human plague in the U.S. has occurred as mostly scattered cases in rural areas (an average of 10 to 15 persons each year per the CDC). Most human cases in the United States occur in northern New Mexico, northern Arizona, southern Colorado, California, southern Oregon, and far western Nevada.

15.1.6 Tick-Borne Disease

Ticks are small, insect-like creatures most often found in naturally vegetated areas. They feed by attaching to animals and humans, sticking their mouthparts into the skin, and sucking blood for up to several days. Ticks do not fall from trees, jump or fly. Most species are found on wild grasses and low plants. Adult ticks wait at the ends of grass or other foliage for a host to brush by so they may attach. Sometimes ticks carry bacteria or viruses that can be transmitted to a person while the tick is attached and feeding.

There are 47 species of ticks in California, but only eight are known to commonly bite humans:

- Western blacklegged tick (*Ixodes pacificus*)
- American dog tick (*Dermacentor variabilis*)
- Pacific Coast tick (*Dermacentor occidentalis*)
- Wood tick (*Dermacentor andersoni*)
- Brown dog tick (*Rhipicephalus sanguineus*)
- *Ornithodoros hermsi*
- *Ornithodoros parkeri*
- *Ornithodoros coriaceus.*

Tularemia

Tularemia, named after Tulare County in California where it was first described in 1911, is a tick-borne disease of animals and humans caused by the bacterium *Francisella tularensis*. Tularemia is similar to plague, but is typically spread differently. While plague is usually spread to humans by fleas, humans usually become infected with Tularemia by tick and deer fly bites, skin contact with infected animals, ingestion of contaminated water or meat, or inhalation of contaminated dusts or aerosols. Symptoms vary depending upon the route of infection.

Rabbits, hares, and rodents are especially susceptible and often die in large numbers during outbreaks. Although Tularemia can be life-threatening, most infections can be treated successfully with antibiotics. Steps to prevent Tularemia include use of insect repellent, wearing gloves when handling sick or dead animals, and not mowing over dead animals. In the United States, naturally occurring infections have been reported from all states except Hawaii.

Lyme Disease

Lyme disease, named after the city in Connecticut where it was first identified in 1975, is a tick-borne disease caused by the bacterium *Borrelia burgdorferi,* which normally lives in mice, squirrels and other small animals. It is transmitted among these animals and to humans through the bites of certain species of ticks. In the northeastern and north-central United States, the black-legged tick (or deer tick, *Ixodes scapularis*) transmits Lyme disease. In the Pacific coastal United States, the disease is spread by the western black-legged tick (*Ixodes pacificus*). Other major tick species found in the United States have not been shown to transmit the disease.

Typical symptoms include fever, headache, fatigue, and a skin rash. If left untreated, infection can spread to joints, the heart, and the nervous system. Lyme disease is diagnosed based on symptoms, physical findings (e.g., rash), and the possibility of exposure to infected ticks. Laboratory testing is helpful in later stages of the disease. Most cases of Lyme disease can be treated successfully with a few weeks of antibiotics. Steps to prevent Lyme disease include using insect repellent, removing ticks promptly, landscaping, and integrated pest management. The ticks that transmit Lyme disease can occasionally transmit other tick-borne diseases as well.

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever is a potentially fatal tick-borne disease caused by the bacterium *Rickettsia rickettsii*. It is transmitted to humans by the bite of an infected American dog tick (*Dermacentor variabilis*), Rocky Mountain wood tick (*Dermacentor andersoni*), or brown dog tick (*Rhipicephalus sanguineus)*.

Typical symptoms include fever, headache, abdominal pain, vomiting, and muscle pain. A rash may also develop, but is often absent in the first few days, and in some patients, never develops. Rocky Mountain spotted fever can be a severe or even fatal illness if not treated in the first few days of symptoms. It can be treated successfully with a few weeks of antibiotics. Steps to prevent the disease include using insect repellent, removing ticks promptly, landscaping, and integrated pest management. The ticks that transmit Rocky Mountain spotted fever can occasionally transmit other tick-borne diseases as well.

15.1.7 Mosquito-Borne Disease

Many of the 48 species of mosquitoes in California can carry disease. The City of Roseville actively supports the Placer County public outreach campaign and task force about the potential for mosquito-borne disease.

Malaria

Malaria is a sometimes fatal mosquito-borne disease caused by a parasite that commonly infects the *Anopheles* mosquito, which feeds on humans. People who contract malaria are typically very sick with high fevers, chills, and flu-like illness. Although malaria can be fatal, illness and death can usually be prevented.

On average 1,500 cases of malaria are diagnosed in the United States each year. The vast majority are in travelers and immigrants returning from countries where malaria transmission occurs, many from sub-Saharan Africa and South Asia. Although rare, cases of malaria have been reported in California. In many temperate areas, such as western Europe and the United States, economic development and public health measures have succeeded in eliminating malaria. However, most of these areas have *Anopheles* mosquitoes that can transmit malaria, and reintroduction of the disease is a constant risk.

Individuals in areas with malaria need to reduce their likelihood of being bitten by mosquitoes. Screens on windows and doors should be examined to confirm that they are in good repair. Repellents containing 20 to 30 percent DEET should be applied to exposed skin and clothing to keep mosquitoes from biting.

West Nile Virus

West Nile virus (WNV) is a potentially serious mosquito-borne that may affect residents in the planning area. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall. WNV is a recent disease to affect California. Mosquitoes transmit the virus to birds, livestock and humans. As of January 2016, human-infection cases of the virus had been reported in all states of the continental U.S. except West Virginia, New Hampshire and Vermont, and those states had reported non-human infections. The Placer County West Nile Virus Task Force has had a strong and active role in the community since WNV arrived in 2004.

According to the CDC, approximately 80 percent of people who are infected with WNV will show no symptoms. Up to 20 percent have symptoms such as fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms can last for as short as a few days,

though even healthy people have become sick for several weeks. About 1 percent of people infected with WNV will develop severe illness, with symptoms that can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may become permanent. There is no specific treatment for WNV infection. In more severe cases, people may need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care.

Individuals in areas with WNV need to reduce their likelihood of being bitten by mosquitoes. Screens on windows and doors should be examined to confirm that they are in good repair. Repellents containing 20 to 30 percent DEET should be applied to exposed skin and clothing to keep mosquitoes from biting.

Dengue Fever

Dengue is a mosquito-borne disease caused by any of four closely related dengue viruses (DENV-1, DENV-2, DENV-3 and DENV-4). People get dengue from the bite of an infected mosquito. The mosquito becomes infected when it bites a person who has dengue virus in their blood. It takes a week or more for the dengue virus to replicate in the mosquito; then the mosquito can transmit the virus to another person when it bites. Dengue is transmitted by yellow fever mosquito (*Aedes aegypti)* and the Asian tiger mosquito *(Aedes albopictus)*. These mosquitoes are not native to California, but infestations have been reported in multiple counties in California. Dengue virus cannot be transmitted from person to person.

The main symptoms of dengue are high fever, severe headache, severe pain behind the eyes, joint pain, muscle and bone pain, rash, bruising, and sometimes mild bleeding from the nose or mouth. Generally, younger children and those with their first dengue infection have a milder illness than older children and adults. Severe dengue typically begins with signs and symptoms similar to dengue. Rather than recover, severe dengue patients proceed to experience more bleeding, severe pain in the abdomen, respiratory distress, and fluid accumulation in the abdomen and around the lungs as the smallest blood vessels (capillaries) begin to leak. If not treated, severe dengue can result in death. There is no specific treatment for dengue infection. Rest and fluids are generally sufficient for persons with dengue. Severe dengue may require hospitalization and intensive medical care.

Individuals in areas with dengue need to reduce their likelihood of being bitten by mosquitoes. Screens on windows and doors should be examined to confirm that they are in good repair. Repellents containing 20 to 30 percent DEET should be applied to exposed skin and clothing to keep mosquitoes from biting.

Zika Virus

Zika is a mosquito-borne disease. The most common symptoms of Zika are fever, rash, joint pain, and conjunctivitis (red eyes). The illness is usually mild, with symptoms lasting for several days to a week after being bitten by an infected mosquito. People usually do not get sick enough to go to the hospital, and they rarely die of Zika. For this reason, many people might not realize they have been infected. However, Zika virus infection during pregnancy can cause a serious birth defect called microcephaly, as well as other severe fetal brain defects. Once a person has been infected, he or she is likely to be protected from future infections.

Zika virus is transmitted by yellow fever mosquito (*Aedes aegypti)* and the Asian tiger mosquito *(Aedes albopictus)*. These mosquitoes are not native to California, but infestations have been reported in multiple counties in California. An *Aedes* mosquito can only transmit Zika virus after it bites a person who has this virus in their blood. Thus far in California, Zika virus infections have been documented only in people who were infected

while traveling outside the United States or through sexual contact with an infected traveler. Zika virus is not spread through casual contact, but can be spread by infected men to their sexual partners. There is a growing association between Zika and microcephaly (abnormally small head and brain) in newborns, as well as Zika and Guillain-Barré Syndrome, a disease affecting the nervous system. Studies are ongoing to further evaluate these associations. From 2015 to the publishing of this document there has been no local mosquito-borne transmission of Zika virus in California (CDPH 2022).

Chikungunya

Chikungunya (pronounced chik-en-gun-ye) is an infectious mosquito-borne disease with symptoms that typically include fever and severe joint pain. It is caused by the chikungunya virus, which is transmitted by yellow fever mosquito (*Aedes aegypti)* and the Asian tiger mosquito *(Aedes albopictus)*. These mosquitoes are not native to California, but infestations have been reported in multiple counties in California. An *Aedes* mosquito can only transmit chikungunya virus after it bites a person who has this virus in their blood. A person with chikungunya is not contagious. As of the publication of this document, chikungunya infections have been documented only in persons who were infected while traveling outside the United States.

15.1.8 Anthrax

Anthrax is a disease caused by *Bacillus anthracis*, a bacterium that forms spores (a spore is a cell that is dormant but may come to life with the right conditions). There are three forms of anthrax:

- **Cutaneous**—The first symptom is a small sore that develops into a blister. The blister then develops into a skin ulcer with a black area in the center. The sore, blister and ulcer do not hurt.
- **Gastrointestinal**—The first symptoms are nausea, loss of appetite, bloody diarrhea, and fever, followed by bad stomach pain.
- **Inhalation**—The first symptoms of inhalation anthrax are like cold or flu symptoms and can include a sore throat, mild fever and muscle aches. Later symptoms include cough, chest discomfort, shortness of breath, tiredness and muscle aches.

Anthrax is a naturally occurring illness and isolated cases occur all over the world yearly. Humans can become infected with anthrax by handling products from infected animals or by breathing in anthrax spores from infected animal products (such as wool). People can become infected with gastrointestinal anthrax by eating undercooked meat from infected animals. Anthrax does occur in California, and animals have tested positive; however, there have been no positive human cases of anthrax in California in the last 10 years. Anthrax can be treated successfully with antibiotics.

Anthrax can be used as a weapon, as happened in the United States in 2001, when anthrax was spread through the postal system by sending letters with powder containing anthrax spores. This caused 22 cases of anthrax infection and brought anthrax back into the public eye. From 2016 to the publishing of this document there have no cases of anthrax in California.

15.1.9 Severe Acute Respiratory Syndrome

Severe Acute Respiratory Syndrome (SARS) is a viral respiratory illness caused by a coronavirus (SARS-CoV). SARS was first reported in Asia in February 2003. Over the next few months, the illness spread to more than two dozen countries in North America, South America, Europe, and Asia before the global outbreak was contained.

According to the WHO, 8,098 people worldwide became sick with SARS during the 2003 outbreak and 774 died. In the United States, only eight people had laboratory evidence of SARS-CoV infection. All of these people had traveled to parts of the world where SARS was present. SARS did not spread more widely in the United States.

In general, SARS begins with a high fever, headache, an overall feeling of discomfort and body aches. Some people also have mild respiratory symptoms at the outset. About 10 percent to 20 percent of patients have diarrhea. After two to seven days, SARS patients may develop a dry cough. Most patients develop pneumonia.

The main way that SARS seems to spread is by close person-to-person contact. The virus that causes SARS is thought to be transmitted most readily by respiratory droplets produced when an infected person coughs or sneezes. Droplet spread can happen when droplets from the cough or sneeze of an infected person are propelled a short distance (generally up to 3 feet) through the air and deposited on the mucous membranes of the mouth, nose, or eyes of persons nearby. The virus also can spread when a person touches a surface or object contaminated with infectious droplets and then touches his or her mouth, nose, or eyes. It is also possible that the SARS virus might spread more broadly through the air or by other ways that are not now known.

As of May 2005, according to the CDC, there was no remaining sustained SARS transmission anywhere in the world. However, CDC has developed recommendations and guidelines to help public health and healthcare officials plan for and respond quickly to the reappearance of SARS if it occurs again. Lessons learned from the SARS outbreak helped healthcare facilities and communities successfully plan and respond to the 2009 H1N1 pandemic. The California Health and Safety Code lists SARS among the communicable diseases that must be reported to health authorities. Placer County is authorized to collect records and data, initiate disease control measures, control property and manage persons (including isolation and quarantine) for containment of communicable disease. From 2016 to the publishing of this document there have no cases of SARS in California.

15.1.10 Extreme Weather

From 2015 to 2020, more people in the U.S. died from extreme heat or extreme cold than from hurricanes, tornadoes, floods and earthquakes combined. The western United States is subject to many weather extremes. Severe spring storms can lead to risk of traumatic injuries, mudslides, flooding and property damage. Extreme heat can lead to dehydration and heat-related illness. Severe winter weather can lead to risk of traumatic injuries, hypothermia and icy conditions.

Severe Spring Storms

Thunderstorms cause most of the severe spring weather. Tornados are rare in California but can occur. Since 2016, a total of 43 tornadoes have occurred in California, one of them in Placer County. When these events occur unexpectedly, the risk of injury and death increases. Advance planning can decrease the risks. Citizens should pay close attention to changing weather conditions when there is a severe thunderstorm watch or warning.

Lightning strikes are a danger during thunderstorms. A lightning bolt is 6 to 8 centimeters in diameter, carrying between 10 and 100 million volts in 20 to 50 thousand amps of direct current. The duration is approximately one millisecond. Volts of 2 billion and 500 thousand amps have been measured. A lightning strike can cause death or injury to one or several persons. Long-term injuries from lightning strike can include memory and attention loss, chronic numbness, muscle spasm, stiffness, depression, hearing loss and sleep disturbance. Seventy percent of all lightning injuries and fatalities occur in the afternoon; 85 percent of victims are children and young men (age 10

to 35) engaged in outdoor recreation and work activities. Hikers, campers, backpackers, skiers, fishermen, and hunters are especially vulnerable.

Extreme Heat

California, Nevada and Arizona experience very high temperatures during the summer. Those susceptible to extreme heat may suffer heat-related illnesses:

- **Heat Exhaustion—**Heat exhaustion is a mild form of heat-related illness that can develop after several days of exposure to high temperatures and inadequate or unbalanced replacement of fluids. It is the body's response to an excessive loss of the water and salt contained in sweat. Those most prone to heat exhaustion are elderly people, people with high blood pressure, and people working or exercising in a hot environment.
- **Heat Cramps—**Heat cramps usually affect people who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture. The low salt level in the muscles may be the cause of heat cramps. Heat cramps may also be a symptom of heat exhaustion.
- **Heat Stroke—**Heat stroke is a severe, dangerous form of heat-related illness. It occurs when the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Body temperature may rise to 106°F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not provided. This is a medical emergency.

From 2004 – 2018, an average of 702 heat-related deaths occurred in the United States annually. Air-conditioning is the number one protective factor against heat-related illness and death. If a home is not air-conditioned, people can reduce their risk for heat-related illness by spending time in public facilities that are air-conditioned.

The California Office of Emergency Services has a comprehensive contingency plan for excessive heat emergencies. The plan describes state operations during heat-related emergencies and provides guidance for state agencies, local government, and non-governmental organizations in the preparation of heat emergency response plans and related activities. Placer County has an emergency contingency plan and participates in the opening of local cooling centers if extreme heat continues for an extended period of time.

Severe Winter Weather

When winter temperatures drop significantly below normal, staying warm and safe can become a challenge. Extremely cold temperatures often accompany a winter storm, which may also cause power failures and icy roads. Staying indoors as much as possible can help reduce the risk of car crashes and falls on the ice, but cold weather also can present hazards indoors. Many homes will be too cold, either due to a power failure or because the heating system is not adequate for the weather. When people must use space heaters and fireplaces to stay warm, the risk of residential fires increases, as well as the risk of carbon monoxide poisoning.

Extreme cold can bring on health emergencies in susceptible people, such as those without shelter or who are stranded, or who live in a home that is poorly insulated or without heat:

- **Hypothermia**—When exposed to cold temperatures, the body begins to lose heat faster than it can be produced. Prolonged exposure to cold will eventually use up the body's stored energy. The result is hypothermia, or abnormally low body temperature. Body temperature that is too low affects the brain, making the victim unable to think clearly or move well. This makes hypothermia particularly dangerous because a person may not know it is happening and will not be able to do anything about it. Warning

signs of hypothermia include shivering, exhaustion, confusion, fumbling hands, memory loss, slurred speech, drowsiness, bright red cold skin, and very low energy.

- **Frostbite**—Frostbite is an injury to the body caused by freezing of the tissues. Frostbite causes a loss of feeling and color in affected areas. It most often affects the nose, ears, cheeks, chin, fingers, or toes. Frostbite can permanently damage the body, and severe cases can lead to amputation. The risk of frostbite is increased in people with reduced blood circulation and among people who are not dressed properly for extremely cold temperatures. A victim is often unaware of frostbite until someone else points it out because the frozen tissues are numb. Signs of frostbite may be a white or grayish-yellow skin area, skin that feels unusually firm or waxy and numbness.

Infants and the elderly are particularly at risk to cold temperatures, but anyone can be affected. If extreme winter weather conditions are expected for an extended period, Placer County has an emergency contingency plan to provide shelter and care areas to provide heating centers for those in need. Preventive action is the best defense against having to deal with extreme cold-weather conditions. Preparing homes and cars in advance for winter emergencies, and observing safety precautions during times of extremely cold weather can reduce the risk of weather-related health problems.

15.1.11 Secondary Hazards

Human health hazards are not like natural hazards that have measurable secondary impacts, such as earthquakes, floods or wildfires. The largest secondary impact caused by human health hazards would be economic. Large outbreaks of any human health hazard could reduce the work force significantly, causing businesses and agencies to close or be greatly impacted.

Another secondary impact could be stigmatization. The fear of the human health hazard and fear of the unknown could lead to isolation, violence and self-inflicted injury. Hospitals and health care providers could be overwhelmed with the “worried well” seeking care and comfort. Providing key and critical information can reduce and mitigate this secondary risk.

15.2 HAZARD PROFILE

The severity of human health hazards is dependent upon the hazard and the population exposed to it. As the population increases, so does the risk of exposure to hazards. The key to reducing the disease hazard is isolation so that the exposed population does not continue to spread the hazard to the uninfected population. For disease and weather-related human health hazards, promoting education and personal preparedness will help to mitigate and reduce the severity of the hazard.

15.2.1 Past Events

Communicable Diseases

The COVID-19 pandemic began in December 2019 after first appearing in Wuhan, China. The first case in the United States was reported in January 2020 after the CDC conducted a laboratory test with samples taken in Washington state (CDC 2022). On March 13, 2020, the Trump Administration declared a nationwide emergency and issued a travel ban on non-U.S. citizens traveling from 26 European countries due to COVID-19 (CDC 2022). Within the next few days, states began to implement shutdowns. As of November 2022, there were over 97 million cases of COVID-19 reported in the United States, with over 1 million deaths occurring from the

disease (CDC 2022). Placer County's first case of COVID-19 was announced on March 2, 2020, after a health care worker was exposed to a confirmed case in another county (Placer County 2020). As of November 2022, 85,941 cumulative total cases had been reported in Placer County, as well as 662 confirmed deaths (Placer County 2022).

The following is a summary of other recent disease outbreak events:

- In the United States during the 2009 H1N1 influenza pandemic, there were 59,979,608 confirmed cases of the disease, 270,435 people hospitalized due to the illness and 12,271 deaths. In California, there were 4,134 people hospitalized due to the illness and 596 deaths. In Placer County, there were 45 confirmed cases, with 5 deaths due to the illness.
- West Nile Virus arrived in Placer County in July 2004. The first case was diagnosed in September 2004. The 56-year old patient was recovering from meningitis in the hospital when the test came back positive for WNV. From 2016 to the publishing of this document there have been 2,162 cases of WNV in California, 25 of them in Placer County (CADPH 2022).
- There were two confirmed cases of SARS in California during the worldwide outbreak in 2002-2003, none of them in Placer County.
- From 2016 to 2020 there have been 678 cases of Lyme disease in California (CDC 2022), 5 of them in Placer County (Tick Check 2022).
- From 2016 to the publishing of this document there have been 17 cases of hantavirus in California (CDC 2022), including one in Placer County (Placer County 2018).
- As of the publishing of this document, no cases of tularemia or plague have been reported in Placer County, but cases of these diseases have been reported in California and nearby counties. Even though these hazards may not be endemic to the area, they can be brought into the planning region and are still considered to be a risk. From 1927 through 2020, 64 human plague cases have been reported from California (California Department of Public Health n.d.) Between 2013 and 2019, there were a total of 19 new tularemia cases in California (CDPH 2020).
- From 2016 to November 2022 there were 878 cases of dengue fever in California, with eight of the cases in Placer County (CDPH 2022).
- The U.S. Centers for Disease Control and Prevention (CDC) estimates that the 2019-2020 flu season for California was moderately severe, with high levels of outpatient illness and influenza-associated hospitalizations, particularly among adults 65 and older. The California Department of Public Health confirmed 238 respiratory outbreaks associated with influenza.

Extreme Weather

The following is a summary of recent extreme weather events that threatened human health:

- From 2018 to 2021, excessive heat exposure caused 4,656 deaths in the United States (Davis 2022).
- In September 2022, California experienced a heat wave impacting the entire state. Temperatures reached well into the triple digits (Fahrenheit), with some areas exhibiting record-high nighttime lows and relatively high dew points (NASA 2022).
- From 2015 to 2020, hypothermia caused approximately 9,000 deaths in the United States (Brown, et al. 2012).
- From 2006 to 2021, lightning strikes caused 444 deaths in the United States (CDC 2022).

15.2.2 Location

It is difficult to map the extent of human-health hazards compared to others, such as floods, wildfires and dam failures. All of the City of Roseville Planning Area is susceptible to the human health hazards discussed in this chapter. While some hazards, such as the West Nile Virus and Lyme disease, can have a geographic presence within the planning area, other diseases can cause exposure to the planning area from outside the local region. Roseville residents who travel can become exposed to diseases while abroad and bring the diseases back with them, potentially placing the region at risk for exposure. Extreme weather poses an equal human health hazard across the City.

15.2.3 Frequency

Communicable Disease

Due to increased air travel, the growing population and the country's aging population, the probability of a communicable disease epidemic or pandemic is a growing threat. Certain human health hazards, such as influenza, can be expected seasonably, with variations on specific strains year to year. Additionally, tick-borne diseases are likely to increase during spring and fall, when people participate in outdoor activities such as hiking. The frequency of other health hazards is difficult to establish and depends largely on the unique circumstances surrounding a localized outbreak and its subsequent expansion into epidemics and eventually pandemics.

Extreme Weather

Trauma due to injuries directly due to storms (such as motor vehicle collisions and falls), heat related illness and hypothermia are a factor of the weather and in some cases a technological hazard.

15.2.4 Severity

The severity of the human health hazard varies from individual to individual. Typically, young children and older adults are more susceptible to acquiring communicable diseases due to developing or diminishing immune systems or experiencing adverse effects to extreme weather conditions. These populations often experience the most severe of symptoms, as their immune systems are not capable of fighting off infection or efficiently regulating temperature. In general, severity varies depending on the pathology of the disease, the health of the infected, and the availability of treatments for alleviating symptoms or curing the disease.

15.3 EXPOSURE AND VULNERABILITY

15.3.1 Population

While all of the population in the planning area is considered at risk to the human health hazards discussed in this chapter, the young and the elderly, pregnant women, those with compromised immune systems, and those with special needs are considered the most vulnerable. The City has a large elderly community with a concentration of older residents in areas such as Sun City Roseville. The introduction of a disease such as the plague or influenza could rapidly impact those at risk. Food insecurity can impact those who lose employment during a pandemic, who are not eligible for Supplemental Nutrition Assistance Program benefits due to immigration status, or who may not be able to access food at stores because of supply chain issues or lack of stock. Food banks may be the only option for these families.

The entire population, residents, and visitors of the City of Roseville are exposed and potentially vulnerable to any of the health risks discussed above. Health risks can cover a wide geographic area and can affect large populations. The size and extent of an infected population depends on how easily the illness is spread, mode of transmission, and amount of contact between infected and uninfected individuals. Locations with higher-density populations are more susceptible to outbreaks, as the disease can be transmitted more easily. A large outbreak or epidemic, a pandemic or a use of biological agents as a weapon of mass destruction could have devastating effects on the population of Roseville

West Nile Virus and other mosquito-borne illnesses are a significant concern in the local wetlands and west of Roseville in the flooded rice fields. A concentrated at-risk population is on the western border of the city limits near the rice fields where the mosquitoes breed.

15.3.2 Property

None of the health hazards discussed in this chapter would have significant measurable impact on the structural environment or property of the planning area.

15.3.3 Critical Facilities

None of the health hazards discussed in this chapter would have significant measurable impact on the critical facilities or infrastructure of the planning area. However, health care facilities (including long-term care and clinics and even veterinary offices) have adopted the recommended “all-hazards” approach to preparedness and have prepared for the health hazards addressed in this chapter.

The acute care hospitals in Roseville have collaborated, trained and planned on a local, regional, state and national level to provide immediate and comprehensive medical care to the citizens of Roseville and the greater western Placer County population. Emergency management and preparedness planning incorporates all response disciplines (fire, law, first responder ground and air ambulance agencies, public health, mental and spiritual health). Planning includes identifying shelters, alternate treatment facilities, isolation capacity and methods to immediately expand physical and human resources.

15.3.4 Environment

None of the health hazards discussed in this chapter would have significant measurable impact on the environment of the planning area. While many of the vectors of the health hazards discussed in this chapter (mosquitoes, rodents, fleas, ticks and deer flies) rely on local or regional environments for their survival, the human health hazard that they carry or potentially transmit would have no significant measurable impact on the environment.

15.3.5 Economy

The economic impact of a human health hazard could be localized to a single region or population, or could be widespread. The impact could be significant, depending on the hazard, number of cases and the availability of resources to care for those affected by the hazard. Other financial impacts could be absorbed or managed by the organization affected.

15.4 FUTURE TRENDS IN DEVELOPMENT

The potential for communicable diseases, vector-borne diseases or extreme weather in Roseville and the planning area is not likely to lessen or prohibit growth or development in Roseville.

15.5 REVIEW OF EXISTING ORDINANCES, PROGRAMS AND PLANS

15.5.1 Hospital Expansions to Care for Growing Populations

Kaiser Permanente operates medical facilities in Roseville as follows:

- In October 1998, Kaiser Permanente opened a 116-bed hospital on Eureka Road adjacent to its medical offices. Since then, the hospital increased the number of beds to 166 (not including the Women's and Children's Center). In addition to the hospital, comprehensive outpatient, primary, and specialty care services are offered, as well as education, pharmacy, laboratory, radiology, optical, EKG, and physical therapy services at three sites in Roseville.
- Kaiser opened a 75,000 square-foot medical office building in Lincoln in October 2006.
- In December 2008, a $52 million expansion project was completed that quadrupled the size of the Kaiser Roseville emergency room and doubled the number of beds. The radiology department was tripled in size and provided with high tech rooms with advanced diagnostic tools.
- Kaiser Roseville's Women's and Children's Center opened in January 2009 and includes 174 beds, neonatal and pediatric intensive care units, and a second medical office building.
- Kaiser Roseville is a certified Stroke and STEMI (heart attack) Receiving Center.
- Kaiser's Roseville Medical Center was named as a "Top Hospital" on the 2015 Leapfrog Top Hospitals listing—a voluntary program recognizing hospitals that demonstrate success in minimizing mortality rates for high-risk procedures and preventing medical errors.

Sutter Roseville Medical Center operates medical facilities in Roseville as follows:

- The current Sutter Roseville Medical Center campus opened in 1997 and provides comprehensive community health and trauma care for more than seven counties.
- Sutter Roseville Medical Center provides critical care, cardiology, neurology, pulmonary and orthopedic services, a dedicated cancer center, a Family Birth Center, a Neo Natal Intensive Care Unit, wound care, a 24-hour emergency department and the Sutter Rehabilitation Institute, a 55-bed acute rehabilitation center with accreditation from the Commission on Accreditation of Rehabilitation Facilities
- Sutter Roseville Medical Center is an accredited regional Level II trauma center and designated disaster/medical control facility, as well as a certified Stroke Receiving Center, STEMI (heart attack) Receiving Center and National Disaster Medical Systems hospital.
- Sutter Roseville is in the process of expanding its emergency department, intensive care and trauma neuro intensive care units and inpatient and outpatient surgery programs.
- In 2015, Truven Health Analytics named Sutter Health and Sutter Health's Valley Area, which includes Sutter Roseville Medical Center, as two of the nation's top five performers among large health care systems in its 15 Top Health Systems study.

Past and future expansion of these medical centers will enhance the capacity and services offered to treat illness and injury in Roseville and the surrounding region.

15.5.2 Memorandums of Agreement

The following memorandums of agreement enhance Roseville's ability to respond to the human health hazard:

- Sutter Roseville Medical Center has a memorandum of agreement with the Department of Quarantine, a division of the CDC, to provide isolation treatment in the event of a highly contagious and virulent disease.
- Sutter Roseville Medical Center has cooperative memorandums of agreement with Beale Air Force Base and the Placer County Department of Health and Human Services to provide assistance and care in disaster and mass casualty incidents.
- Since 2013 Sutter Roseville Medical Center has been a designated one of the nation's 1,500 National Disaster Medical Systems Hospital by the Department of Defense, Department of Health and Human Services and the Department of Veteran's affairs. This designation can provide the facility and the region more rapid care and assistance if a catastrophe strikes.
- Kaiser Roseville and Sutter Roseville Medical Center are coalition members with Placer County Public Health in the Healthcare Emergency Coalition to prepare, train and exercise to provide services in mass casualty situations.

15.5.3 Integrated Emergency Response

FEMA and the Joint Commission for Accreditation of Healthcare Organizations (JCAHO) expect acute care facilities to provide planning for an "all hazard" disaster response and care for mass casualties, whether the incidents and events are naturally occurring, human caused, or a combination of both. JCAHO requires the integration of emergency response planning with local response agencies, ensuring that the community will receive the highest level of integrated response and protection available. These planning efforts are supported by local, regional, state and federal grant funding.

15.6 SCENARIO

A human health worst-case scenario for the planning area would be an epidemic or large-scale incident of any of the human health hazards discussed in this chapter. Medical treatment facilities in the planning area would be overwhelmed and taxed beyond their capabilities as the numbers of patients escalates. The impacts on the workforce within the planning area could have acute and long-term economic impacts on the primary employers in the planning area. First responders would be exposed to the human health hazards, which could deplete the medical workforce and could have profound impact on the potential escalation of the scenario.

15.7 ISSUES

Important issues associated with the human health hazards include but are not limited to the following:

- Prevention through vaccination and personal emergency and disaster preparation will help to reduce the impacts of human health hazards.

- Medical and response personnel need to be integrated in a unified command to provide care when needed in response to human health hazards.
- Medical and response personnel must be adequately trained and supplied.
- Up-to-date and functional all-hazard contingency planning should be carried out.
- A system needs to be in place for informing the public with a unified message about the human health hazard.
- Health agencies and facilities require surge capacity management and adaptation to the rising number and needs of the region.

16. HUMAN-CAUSED HAZARDS

16.1 GENERAL BACKGROUND

Although the DMA does not require an assessment of human-caused hazards, The City of Roseville is including human-caused hazards in this hazard mitigation plan for the following reasons:

- The City takes a proactive approach to disaster preparedness, especially in an effort to protect the public safety of all citizens.
- Preparation for and response to a human-caused disaster will involve many of the same staff training, critical decisions, and commitment of resources as for a natural hazard.
- The multi-hazard mitigation planning effort is an opportunity to inform the public about all hazards, including human-caused hazards.
- The likelihood of a human-caused hazard in Roseville is greater than several of the identified natural hazards in this Plan.
- The City has a Terrorism Contingency Plan and a Hazardous Materials Contingency Plan already in place with instructions for a response by City of Roseville first responders and staff of the emergency operations center.

Human-caused hazards fall into the following categories:

- Man-made hazards include acts of terrorism and cyber threats. These hazards are intentional, criminal, malicious acts.
- Technological hazards are incidents that arise from human activities such as the manufacture, transportation, storage and use of hazardous materials. These are accidental incidents with unintended consequences.

This report does not address human-caused hazards to the Roseville water treatment facilities, because the City evaluated those facilities in a separate report per EPA requirements. Information on that evaluation is available from the Roseville City Manager's office.

16.1.1 Intentional Hazards

Terrorism and Weapons of Mass Destruction

The Federal Bureau of Investigation (FBI) categorizes terrorism in the United States as one of two types:

- Domestic terrorism involves groups or individuals whose terrorist activities are directed at elements of our government or population without foreign direction. The 1995 bombing of the Alfred P. Murrah

federal building in Oklahoma City is an example of domestic terrorism. The FBI is the primary response agency for domestic terrorism. The FBI coordinates domestic preparedness programs and activities of the United States to limit acts posed by terrorists including the use of weapons of mass destruction (WMDs).

- International terrorism involves groups or individuals whose terrorist activities are foreign-based and/or directed by countries or groups outside the United States, or whose activities transcend national boundaries. Examples include the 1997 bombing of Mobil Oil's headquarters, the 1983 bombing of the U.S. Capitol, the 1993 bombing of the World Trade Center, and the September 11, 2001, attacks at the World Trade Center and the Pentagon.

The three key elements to defining a terrorist event are as follows:

- Activities involve the use of illegal force.
- Actions are intended to intimidate or coerce.
- Actions are committed in support of political or social objectives.

As detailed in the City's Terrorism Contingency Plan, at least three important considerations distinguish terrorism hazards from other types of hazards:

- In the case of chemical, biological and radioactive agents, their presence may not be immediately obvious, making it difficult to determine when and where they may have been released, who has been exposed, and what danger is present for first responders and emergency medical technicians.
- There is limited scientific understanding of how these agents affect the population at large.
- Terrorism evokes strong emotional reactions, ranging from anxiety to fear to anger to depression.

Those involved with terrorism response, including public health and public information staff, are trained to deal with the public's emotional reaction swiftly as response to the event occurs. The area of the event must be clearly identified in all emergency alert messages to prevent those not affected by the incident from overwhelming local emergency rooms and response resources, thereby reducing service to those actually affected. The public will be informed clearly and frequently about what government agencies are doing to mitigate the impacts of the event. The public will also be given clear directions on how to protect the health of individuals and families.

FEMA defines terrorism as the use of weapons of mass destruction, including biological, chemical, nuclear and radiological weapons; arson, incendiary, explosive and armed attacks; industrial sabotage and intentional hazardous materials releases; agro-terrorism; and cyber-terrorism (FEMA n.d.). The following are potential methods used by terrorists that could affect the City of Roseville as a direct target or collaterally:

- Conventional bomb
- Biological agent
- Chemical agent
- Nuclear bomb
- Radiological agent
- Arson/incendiary attack
- Armed attack
- Cyber-terrorism (see the cyber threats section of this profile)
- Agro-terrorism
- Intentional hazardous material release.

Table 16-1 provides a hazard profile summary for terrorism-related hazards. Most terrorist events in the United States have been bombing attacks, involving detonated or undetonated explosive devices, tear gas, pipe bombs, and firebombs.

Table 16-1. Event Profiles for Terrorism

Hazard	Application Mode[a]	Hazard Duration[b]	Static/Dynamic Characteristics[c]	Mitigating and Exacerbating Conditions[d]
Conventional Bomb	Detonation of explosive device on or near target; delivery via person, vehicle, or projectile.	Instantaneous; additional secondary devices, or diversionary activities may be used, lengthening the duration of the hazard until the attack site is determined to be clear.	Extent of damage is determined by type and quantity of explosive. Effects generally static other than cascading consequences, incremental structural failure, etc.	Overpressure at a given standoff is inversely proportional to the cube of the distance from the blast; thus, each additional increment of standoff provides progressively more protection. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers and shielding; poor construction; and ease of concealment of device.
Chemical Agent	Liquid/aerosol contaminants dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/ containers; or munitions.	Hours to weeks, depending on the agent and the conditions in which it exists.	Contamination can be carried out of the initial target area by persons, vehicles, water, and wind. Chemicals may be corrosive or otherwise damaging over time if not remediated.	Air temperature can affect evaporation of aerosols. Ground temperature affects evaporation of liquids. Humidity can enlarge aerosol particles, reducing inhalation hazard. Precipitation can dilute and disperse agents but can spread contamination. Wind can disperse vapors but also cause target area to be dynamic. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects.
Arson/ Incendiary Attack	Initiation of fire or explosion on or near target via direct contact or remotely via projectile.	Generally minutes to hours.	Extent of damage is determined by type and quantity of device, accelerant, and materials present at or near target. Effects generally static other than cascading consequences, incremental structural failure, etc.	Mitigation factors include built-in fire detection and protection systems and fire-resistive construction techniques. Inadequate security can allow easy access to target, easy concealment of an incendiary device, and undetected initiation of a fire. Non-compliance with fire and building codes, as well as failure to maintain existing fire protection systems, can substantially increase the effectiveness of a fire weapon.
Armed Attack	Tactical assault or sniping from remote location, or random attack based on fear, emotion, or mental instability.	Generally minutes to days.	Varies based on the perpetrators' intent and capabilities.	Inadequate security can allow easy access to target, easy concealment of weapons, and undetected initiation of an attack. Confined spaces with few exits can make escape more difficult and may prolong law enforcement response time. The presence of armed security, law enforcement, and/or concealed weapons permit holders equipped with adequate training may help to mitigate the effects of an attack once initiated.
Biological Agent	Liquid or solid contaminants dispersed using sprayers/ aerosol generators or by point or line sources such as munitions, covert deposits, and moving sprayers.	Hours to years, depending on the agent and the conditions in which it exists.	Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infection can spread via humans or animals.	Altitude of release above ground can affect dispersion; sunlight is destructive to many bacteria and viruses; light to moderate wind will disperse agents but higher winds can break up aerosol clouds; the micro-meteorological effects of buildings and terrain can influence aerosolization and travel of agents.

Hazard	Application Mode[a]	Hazard Duration[b]	Static/Dynamic Characteristics[c]	Mitigating and Exacerbating Conditions[d]
Agro-terrorism	Direct, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock.	Days to months.	Varies by type of incident. Food contamination events may be limited to specific distribution sites, whereas pests and diseases may spread widely. Generally no effects on built environment.	Inadequate security can facilitate adulteration of food and introduction of pests and disease agents to crops and livestock.
Radiological Agent	Radioactive contaminants dispersed using sprayers/ aerosol generators, or by point or line sources such as munitions.	Seconds to years, depending on material used.	Initial effects will be localized to site of attack; depending on meteorological conditions, subsequent behavior of radioactive contaminants may be dynamic.	Duration of exposure, distance from source of radiation, and the amount of shielding between source and target determine exposure to radiation.
Nuclear Bomb	Detonation of nuclear device underground, at the surface, in the air, or at high altitude.	Light/heat flash and blast/shock wave last for seconds; nuclear radiation and fallout hazards can persist for years. Electromagnetic pulse from a high-altitude detonation lasts for seconds and affects only unprotected electronic systems.	Initial light, heat, and blast effects of a subsurface, ground or air burst are static and determined by the device's characteristics and employment; fallout of radioactive contaminants may be dynamic, depending on meteorological conditions.	Harmful effects of radiation can be reduced by minimizing the time of exposure. Light, heat, and blast energy decrease logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting radiation and radioactive contaminants.
Intentional Hazardous Material Release (fixed facility or transportation)	Solid, liquid, and/or gaseous contaminants released from fixed or mobile containers	Hours to days.	Chemicals may be corrosive or otherwise damaging over time. Explosion and/or fire may be subsequent. Contamination may be carried out of the incident area by persons, vehicles, water and wind.	Weather conditions directly affect how the hazard develops. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects. Non-compliance with fire and building codes, as well as failure to maintain existing fire protection and containment features, can substantially increase the damage from a hazardous materials release.

a. **Application Mode**—Application mode describes the human acts or unintended events necessary to cause the hazard to occur.
b. **Duration**—Duration is the length of time the hazard is present. For example, a chemical warfare agent such as mustard gas, if un-remediated, can persist for hours or weeks under the right conditions.
c. **Dynamic or Static Characteristics**—These characteristics of a hazard describe its tendency to expand, contract, or remain confined in time, magnitude, and space. For example, the physical destruction caused by an earthquake is generally confined to the place in which it occurs, and it does not usually get worse unless aftershocks or other cascading failures occur; in contrast, a cloud of chlorine gas leaking from a storage tank can change location by drifting with the wind and can diminish in danger by dissipating over time.
d. **Mitigation and Exacerbating Conditions**—Mitigating conditions are characteristics of the target and its physical environment that can reduce the effects of a hazard. For example, earthen berms can provide protection from bombs; and perimeter lighting and surveillance can minimize the likelihood of someone approaching a target unseen. Exacerbating conditions are characteristics that can magnify the effects of a hazard. For example, depressions or low areas in terrain can trap heavy vapors, and a proliferation of street furniture (trash receptacles, newspaper vending machines, mailboxes, etc.) can provide hiding places for explosive devices.

Source: FEMA 386-7

The effects of terrorism can vary from loss of life and injuries to property damage and disruptions in services such as electricity, water supplies, transportation, or communications. Terrorist acts may have an immediate effect or a delayed effect. Terrorists often choose targets that offer limited danger to themselves and areas with relatively easy public access. Foreign terrorists look for visible targets where they can avoid detection before and after an attack such as international airports, large cities, major special events, and high-profile landmarks.

In dealing with intentional human-caused hazards, the unpredictability of human beings must be considered. People with a desire to perform criminal acts may seek out targets of opportunity that may not fall into established lists of critical areas or facilities. The City of Roseville first responders train not only to respond to organized terrorism events, but also to respond to random acts by individuals who, for a variety of reasons ranging from fear to emotional trauma to mental instability, may choose to harm others and destroy property.

While education, heightened awareness, and early warning of unusual circumstances may deter crime and terrorism, intentional acts that harm people and property are possible at any time. Public safety entities must react to the incident, locate, isolate and neutralize further damage, and conduct investigate to bring criminals to justice.

Cyber Threats

A cyber threat is an intentional and malicious crime that compromises the digital infrastructure of a person or organization, often for financial or terror-related reasons. Such attacks vary in nature and are perpetrated using digital mediums or sometimes social engineering to target human operators. Generally, attacks last minutes to days, but large-scale events and their impacts can last much longer. As information technology continues to grow in capability and interconnectivity, cyber threats become increasingly frequent and destructive. In 2014, internet security teams at Symantec and Verizon indicated that nearly 1 million new pieces of malware—malicious code designed to steal or destroy information—were created every day (Harrison 2015).

Cyber threats differ by motive, attack type and perpetrator profile. Motives range from the pursuit of financial gain to political or social aims. Cyber threats are difficult to identify and comprehend. Types of threats include using viruses to erase entire systems, breaking into systems and altering files, using someone's personal computer to attack others, or stealing confidential information. The spectrum of cyber risks is limitless, with threats having a wide-range of effects on the individual, community, organizational, and national threat.

This risk assessment includes cyber attacks and cyberterrorism under the inclusive hazard of cyber threats. The terms often are used interchangeably, though they are not the same. While all cyberterrorism is a form of cyber attack, not all cyber attacks are cyberterrorism.

Cyber Attacks

Public and private computer systems are likely to experience a variety of cyber attacks, from blanket malware infection to targeted attacks on system capabilities. Cyber attacks specifically seek to breach IT security measures designed to protect an individual or organization. The initial attack is followed by more severe attacks for the purpose of causing harm, stealing data, or financial gain. Organizations are prone to different types of attacks that can be either automated or targeted in nature. Table 16-2 describes the most common cyber attack mechanisms faced by organizations today.

A common cyber attack against individuals and organizations is called cyber ransom. Cyber ransom occurs when an individual downloads ransom malware, or ransomware, often through phishing or drive-by download, and the subsequent execution of code results in encryption of all data and personal files stored on the system. The victim then receives a message that demands a fee for the decryption code.

Table 16-2. Common Mechanisms for Cyber Attacks

Type	Description
Socially Engineered Trojans	Programs designed to mimic legitimate processes (e.g., updating software, running fake antivirus software) with the end goal of human-interaction caused infection. When the victim runs the fake process, the Trojan is installed on the system.
Unpatched Software	Nearly all software has weak points that may be exploited by malware. Most common software exploitations occur with Java, Adobe Reader, and Adobe Flash. These vulnerabilities are often exploited as small amounts of malicious code are often downloaded via drive-by download.
Phishing	Malicious email messages that ask users to click a link or download a program. Phishing attacks may appear as legitimate emails from trusted third parties.
Password Attacks	Third party attempts to crack a user's password and subsequently gain access to a system. Password attacks do not typically require malware, but rather stem from software applications on the attacker's system. These applications may use a variety of methods to gain access, including generating large numbers of generated guesses, or dictionary attacks, in which passwords are systematically tested against all of the words in a dictionary.
Drive-by Downloads	Malware is downloaded unknowingly by the victims when they visit an infected site.
Denial of Service Attacks	Attacks that focus on disrupting service to a network in which attackers send high volumes of data until the network becomes overloaded and can no longer function.
Man in the Middle	Man-in-the-Middle attacks mirror victims and endpoints for online information exchange. In this type of attack, the attacker communicates with the victims, who believe they are interacting with a legitimate endpoint website. The attacker is also communicating with the actual endpoint website by impersonating the victim. As the process goes through, the attacker obtains entered and received information from both the victim and endpoint.
Malvertising	Malware downloaded to a system when the victim clicks on an affected ad.
Advanced Persistent Threat (APT)	An attack in which the attacker gains access to a network and remains undetected. APT attacks are designed to steal data instead of cause damage.

With millions of threats created each day, the importance of protection against cyber attacks becomes a necessary function of everyday operations for individuals, government facilities, and businesses. The increasing dependency on technology for vital information storage and the often automated method of infection means higher stakes for the success of measurable protection and education.

Cyberterrorism

Cyberterrorism is the use of computers and information, particularly over the Internet, to recruit others to an organization's cause, cause physical or financial harm, or cause a severe disruption of infrastructure service. Such disruptions can be driven by religious, political, or other motives. Like traditional terrorism tactics, cyberterrorism seeks to evoke very strong emotional reactions, but it does so through information technology rather than a physically violent or disruptive action.

Cyberterrorism has three main types of objectives (Kostadinov 2012):

- **Organizational**—Cyberterrorism with an organizational objective includes specific functions outside of or in addition to a typical cyber attack. Terrorist groups today use the internet on a daily basis. This daily use may include recruitment, training, fundraising, communication, or planning. Organizational cyberterrorism can use platforms such as social media as a tool to spread a message beyond country borders and instigate physical forms of terrorism. Additionally, organizational goals may use systematic attacks as a tool for training new members of a faction in cyber warfare.
- **Undermining**—Cyberterrorism with undermining as an objective seeks to hinder the normal functioning of computer systems, services, or websites. Such methods include defacing, denying, and exposing

information. While undermining tactics are typically used due to high dependence on online structures to support vital operational functions, they typically do not result in grave consequences unless undertaken as part of a larger attack. Undermining attacks on computers include the following:

- Directing conventional kinetic weapons against computer equipment, a computer facility, or transmission lines to create a physical attack that disrupts the reliability of equipment.
- Using electromagnetic energy, most commonly in the form of an electromagnetic pulse, to create an electronic attack against computer equipment or data transmissions. By overheating circuitry or jamming communications, an electronic attack disrupts the reliability of equipment and the integrity of data.
- Using malicious code directed against computer processing code, instruction logic, or data. The code can generate a stream of malicious network packets that disrupt data or logic by exploiting vulnerability in computer software, or a weakness in computer security practices. This type of cyber attack can disrupt the reliability of equipment, the integrity of data, and the confidentiality of communications (Wilson 2008).

- **Destructive**—The destructive objective for cyberterrorism is what organizations fear most. Through the use of computer technology and the Internet, the terrorists seek to inflict destruction or damage on tangible property or assets, and even death or injury to individuals. There are no cases of pure cyberterrorism as of the date of this Plan.

16.1.2 Technological Hazards

Technological hazards are associated with human activities such as the manufacture, transportation, storage and the use of hazardous materials. Incidents related to these hazards are assumed to be accidental, with unintended consequences. Technological hazards in Roseville can be categorized as follows:

- Hazardous materials incidents
- Power utility losses
- Data and telecommunications disruptions
- Water and wastewater disruption
- Air and transportation accidents
- Infrastructure threats.

Hazardous Materials Incidents

Hazardous materials are present in nearly every city and county in the United States in facilities that produce, store, or use them. For example, water treatment plants use chlorine on-site to eliminate bacterial contaminants. Hazardous materials are transported along interstate highways and railways daily. Even the natural gas used in every home and business is a dangerous substance when a leak occurs. Except for severe weather and flooding, hazardous materials incidents are the hazards most likely to affect the City of Roseville.

Title 49 of the CFR lists thousands of hazardous materials, including gasoline, insecticides, household cleaning products, and radioactive materials. State regulated substances that have the greatest probability of adversely impacting the community are listed in the CCR, Title 19. The following are the most common type of hazardous material incidents:

- **Fixed-Facility Hazardous Materials Incident**—This is the uncontrolled release of materials from a fixed site capable of posing a risk to health, safety and property. It is possible to identify and prepare for a fixed-site incident because federal and state laws require those facilities to notify state and local authorities about what is being used or produced at the site.
- **Hazardous Materials Transportation Incident**—A hazardous materials transportation incident is any event resulting in uncontrolled release of materials during transport that can pose a risk to health, safety, and property. Transportation incidents are difficult to prepare for because there is little if any notice about what materials could be involved should an accident happen. Hazardous materials transportation incidents can occur anywhere, although most occur on major federal or state highways or major rail lines. In addition to materials such as chlorine that are shipped throughout the country by rail, thousands of shipments of radiological materials, mostly medical materials and low-level radioactive waste, travel by ground transportation across the United States. Many incidents occur in sparsely populated areas and affect very few people. There are occasions, however, of accidents in areas with much higher population densities, such as the January 6, 2005, train accident in Graniteville, South Carolina, that released chlorine gas killing nine, injuring 500, and causing the evacuation of 5,400 residents.
- **Interstate Pipeline Hazardous Materials Incident**—There are a significant number of interstate natural gas, heating oil, and petroleum pipelines running through California. These are used to provide natural gas to utilities in California and to transport these materials from production facilities to end users.

Power Utility Losses

A power failure is any interruption or loss of electrical service due to disruption of power generation or transmission caused by an accident, sabotage, natural hazards, equipment failure, or fuel shortage. These interruptions can last anywhere from a few seconds to several days. Power failures are considered significant only if the local emergency management organization is required to coordinate basic services such as the provision of food, water, and heating as a result. Power failures are common with severe weather and winter storm activity. However, for medically dependent residents, a power failure can present a life-threatening situation.

The City of Roseville Electric Utility is responsible for operating and maintaining the electrical transmission and distribution system in Roseville. The City supplies electricity to residential and business customers within the service area. Roseville Electric has the highest reliability in the country for municipal utilities of its size, due in large part to a redundant system with sophisticated interconnection between the facilities and immediate notification should failure occur along the distribution system. Through its load management program and load shedding agreements with large, local electric users, the City of Roseville avoided any outages during electric crises and brownouts that affected some parts of California in 2000 and 2001.

Roseville has taken a proactive approach to maintaining its reliability standards by building a local generation source—the Roseville Energy Park. The Roseville Energy Park is a natural-gas-fired, combined-cycle electrical generating facility located on an 8.9-acre site adjacent to the Pleasant Grove Wastewater Treatment Plant. The state-of-the-art, 160-megawatt power generation facility generates enough energy to meet a large portion of the community's electricity needs.

Data and Telecommunications Disruptions

The loss of data and/or telecommunications is often a secondary hazard to natural and other human-caused hazards. Data and telecommunications provide a primary method for service to the community by the government and the private sector. A loss of data and telecommunications could result in loss of emergency dispatch capabilities, emergency planning services, infrastructure monitoring capabilities, access to statistical data, and

loss of financial and personnel records. Losing the primary method of communication for emergency responders (radio) would severely disable their ability to respond in a timely and effective manner.

Water and Wastewater Disruption

Water or wastewater disruption is a secondary impact from a natural disaster or intentional act. The City of Roseville receives surface water from the Folsom Reservoir, a 1 million-acre-foot multi-purpose facility east of the City. A breach in the dam or the pipelines that carry water to the City's Water Treatment Plant on Barton Road in Granite Bay would have significant temporary impacts on the City until alternative water sources, including water from other regional purveyors and groundwater, are pumped and treated. Long-term disruption of the water source from Folsom Lake would have significant impacts on residences and businesses in Roseville should demand exceed secondary supplies and water conservation measures not provide enough relief to reduce demand to equal the secondary supplies.

Disruption of the City's wastewater collection and regional wastewater treatment plants at Dry Creek and Pleasant Grove Creek would also have significant citywide and regional impacts. Such disruption could result if the system were to be overwhelmed by a significant storm or discharge of materials in such quantities that the treatment plant could not adequately treat the waste. Natural hazards such as earthquake or flood, major power outages, or terrorism directed at the facilities and systems could disrupt the process of collecting and treating millions of gallons of waste. Wastewater treatment plants may also have emergencies internal to the plant such as oxygen deficiencies that render them incapable of treating waste. The disruption of service may also have significant environmental impacts on the waterways adjacent to the treatment plants.

Air and Transportation Accidents

Air and transportation accidents are incidents involving air or rail passengers resulting in death or serious injury. The region has a number of airports, including the Sacramento International Airport, as well as several smaller county or municipal airports and private air strips that enhance the potential for an air disaster.

Roseville features several major transportation routes, including Interstate 80 and Highway 65, both of which run through portions of the City. The potential for transportation accidents that block ingress, egress, and movement through the City is significant, as is the likelihood of hazardous material incidents resulting from a traffic accident.

16.1.3 Civil Disorder

Civil disorder refers to incidents that disrupt a community to the degree that law enforcement intervention is required to maintain public safety. These incidents are generally associated with controversial political, judicial, or economic issues and may occur at any time of the year, although statistics indicate that they are more frequent during summer. While Roseville has no history of civil disorder, large public gatherings associated with concerts or sports events have overburdened local law enforcement and fire protection resources in the past.

The effects of civil disorder vary with the type, severity, scope, and duration of event. Essential services (e.g., electricity, water, public transportation, communications) may be disrupted or property damage, injury and loss of life may occur. Facilities most at risk are government buildings, schools, utilities and correctional facilities.

16.1.4 Secondary Hazards

The largest secondary impact caused by human-caused hazards would be economic. Economic impacts from human-caused hazards are described in Section 16.4.5.

16.2 HAZARD PROFILE

16.2.1 Past Events

State of California

Terrorism Events

According to the Governor's Office of Emergency Services Terrorism Response Plan, California has had a long history of defending the public against domestic and foreign terrorists. Domestic terrorist groups in California have been focused on political or social issues, while the limited internationally based incidents have targeted the state's immigrant communities due to foreign disputes. Advanced technologies and communication have allowed these groups to become more sophisticated and better organized, with remote members linked electronically.

Technological Hazard Incidents

No comprehensive source exists for technological hazard incidents in California. Given the complex system of transportation networks, the large population, and the number of businesses in California, incidents occur on a regular basis throughout the state, as reported by the news media.

Region

Terrorism Events

In 2005, development projects in Placer County were the subject of arson activity by an individual who claimed to be from the Earth Liberation Front or ELF, a splinter group of Earth First, a radical environmental activist movement. ELF is a somewhat active domestic terrorism group that says it uses eco-sabotage to protect the Earth and to seek revenge on "those who are destroying the Earth and its inhabitants."

On December 3, 1999, the FBI arrested two anti-government militia members who planned a bomb attack at the Suburban Propane facility in Elk Grove, CA. The alleged plot involved a plan to blow up the Suburban Propane site, which stores about 24 million gallons of liquefied propane and is located one mile from residential homes. According to the Sacramento Bee, the plot resulted in heightened on-site security and a year-long investigation resulting in the two arrests.

Technological Hazard Incidents

Placer County and its incorporated cities have experienced many accidental hazardous materials incidents. Accidents involving high pressure gas lines in the County have caused injury and property damage. An underground Kinder Morgan pipeline failed in 2002, causing a significant spill of diesel fuel within a Rocklin neighborhood adjacent to where the breach occurred.

Air and Transportation Accidents

The Sacramento region was once the location of three large military installations: the Sacramento Army Depot, Mather Air Force Base and McClellan Air Force Base. All three have been decommissioned and transferred to civilian uses. The only active military installation is Beale Air Force Base, located to the north near Yuba City, California. A review of McClellan Fire Department history prior to the base closure identifies several responses to accidents near Roseville (see Table 16-3).

Table 16-3. Accidents Responded to by McClellan Fire Department, 1950-1980s

Timeframe	Incident
Early 1950s	Apparatus responded to Code 3 alarm at Travis Air Force Base for B-29 crash that involved a nuclear weapon
October 29, 1951	B-29 making an emergency landing crashed and caught fire on Runway 16 injuring 11 crewmen. One firefighter died.
Mid-1950s	EC-121 crashed near Watt Avenue and U Street in Sacramento
Mid-1960s	F-104 crashed next to Haggin Oaks Golf Course.
April 28, 1973	McClellan Fire Department responded to mutual aid at Roseville Rail Yard fire
1982	Multiple alarm fire including a chemical warehouse. Toxic smoke column closed Interstate 80 for several hours
Early 1980s	HH-53 helicopter crashed near PFE Road during an air show at McClellan Air Force Base. The helicopter was attempting a refueling operation with a C-130 refueler when the hose became entangled in the rotor.
Early 1980s	F-111 crashed near Woodland

Source: McClellan Fire Department History

While the risk of military aircraft accidents in the area has been reduced with the closure of McClellan Air Force Base, which was the closest military base to the City of Roseville, the region is not immune to air transportation accidents. On February 16, 2000, an aircraft crashed after take-off from the Sacramento Mather Airport in Rancho Cordova, California. The cargo flight was bound for Dayton, Ohio and all three crewmembers were killed. The cause of the accident was a mechanical failure. The aircraft crashed into an automobile salvage yard.

Local

Air and Transportation Accidents

On February 12, 2006, a Glasair II-S FT kit plane crashed into a home at 1302 Longfellow Drive in Roseville (see Figure 16-1). The pilot was reported to be performing aerial acrobatics when he lost control of the plane and it crashed. The pilot, his passenger, and a resident in the house were killed, and the home was determined to be a total loss. The fire spread to an adjacent home and caused significant damage, however the residents escaped injury.

Arson Events

On October 21, 2010, an arsonist set fire to the Roseville Galleria Mall that caused an estimated $55 million in property damage (see Figure 16-2). Police responded to the mall after a call from the tenant at GameSpot. They said a young male had entered, said he had a gun, and told them to get out. When police arrived, the male, who did not have a gun, had locked himself in the store. Once barricaded, he started a fire. The blaze destroyed an entire section of the mall, which is a core of the Sacramento economy. With over 240 stores operated by Westfield, the mall—built in 2000 and renovated in 2008 for $270 million—has generated $3.2 million in annual sales tax for the region. Reasons for the arson are unknown. The suspect suffered from mental illness.



Figure 16-1. February 12, 2006, Aircraft Crash into Residence



Figure 16-2. October 21, 2010, Arson Fire at Galleria Mall

Terrorism Events

Terrorism incidents in Roseville have been limited to individuals seeking to cause damage at Roseville schools. Pipe bombs have been left at a school facility in one past occurrence. No WMDs have been used in a terrorist attack in Roseville.

Technological Hazard Incidents

The City of Roseville has had a number of accidental incidents at the Roseville Rail Yard, private businesses and City facilities. The Fire Department has been called to both the Oakmont High School pool and the Roseville Aquatics Center for chlorine leaks. Sewage spills have occurred on occasion and overflowed into the City's creeks. Roseville Rail Yard accidents have included derailments and leaks of toxic chemicals from transporting hazardous materials in the wrong type of railcars.

The worst human-caused disaster in Roseville's history occurred on April 28, 1973, when a train loaded with munitions bound for Vietnam caught fire in the Roseville Yard (see Figure 16-3). No lives were lost, but significant damage to property in Roseville and jurisdictions in Sacramento County occurred during the 18 hours of explosions. In 1997, a number of unexploded bombs were discovered at the yard during construction of a modernization project (see Figure 16-4).

With growth in the region and in trips through the region to tourist destinations such as the ski resorts at Lake Tahoe, the number of traffic accidents has been steadily increasing. Truck with trailer accidents account for a small percentage of the City's reported traffic accidents, but they represent the highest potential for hazardous materials incidents on roadways in the City of Roseville.

Roseville's history parallels that of the transcontinental railroad. The federal government passed the act to build the transcontinental railroad in 1862 and shortly thereafter the Central Pacific Railroad was started in Sacramento in 1863. A northern route for the first transcontinental rail line was selected when the South seceded from the Union during the Civil War, and Trustees Charles Crocker, Mark Hopkins, Collis P. Huntington and Leland Stanford started construction on this northern line. The line extended from Sacramento to Rocklin by May 1864 and then construction across the Sierra Nevada Mountains began.

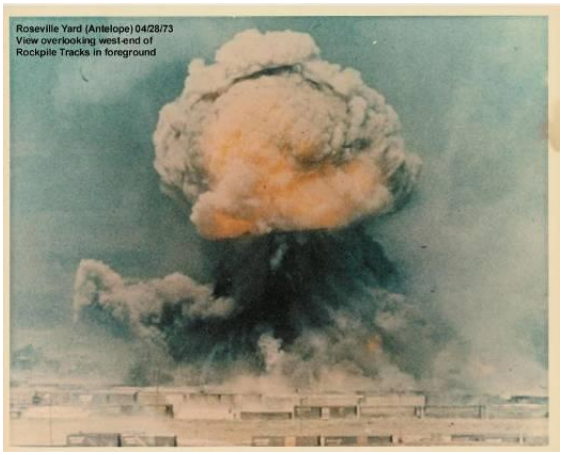
The first structure in Roseville was built in 1864 to serve as a freight and passenger depot for the fledgling railroad. In December 1905, a decision by the Central Pacific Railroad to move the division headquarters from Rocklin to Roseville meant a development boom for Roseville. The junction of the Central Pacific Railroad and the California Central, a north-south line became Roseville, where the largest artificial ice plant in the world operated to keep California's fruit and vegetables fresh as they were transported by rail car to the East. The Pacific Fruit Exchange Ice Plant operated from 1908 to 1974 when all of Southern Pacific's 21,000 rail cars were self-refrigerating.

During wartime, Roseville was a hub of activity as troops and war materials moved through the Roseville rail yards. Thousands of munitions shipments moved through Roseville during World Wars I and II, the Korean and Vietnam conflicts, and Desert Storm.

The largest human-caused disaster in the local area occurred on April 28, 1973, when a wooden floor in a munitions boxcar caught fire from brake shoe sparks. A train engine pulling 103 cars, including 21 Department of Defense freight cars with 7,056 Mark 81 bombs, was loaded at the Navy's ammunition depot in Hawthorne, Nevada on their way to western ports and the Vietnam War.

As the train pulled into the Roseville yard just west of the Roseville city limits, one of the cars caught fire and the flames spread, igniting other freight cars on the tracks, which were 21 rails wide. Nearly every car was loaded with cargo including paint, lumber, and fertilizer. The most dramatic explosions occurred when cars carrying liquid propane caught fire resulting in explosions that blew out windows five miles away and could be heard 100 miles away. Metal and wood was thrown 3,000 feet into the air.

The result was a series of explosions that caused damages of more than $5.6 million in Roseville and the neighboring communities of Citrus Heights, Antelope, and North Highlands. No lives were lost, but over 100 people were treated for assorted cuts and bruises caused by broken glass and flying debris.







After 18 hours of explosions, Army munitions teams recovered 1,200 unexploded bombs scattered around the area and collected another 300 from rail cars. Aerial photographs from that time show a railroad smoldering and piled with twisted track, shattered cars, and scraps of metal from bomb casings. Much of the debris was buried in the 10-foot-deep craters left by the blast.

Milestones & Memories: the Story of Roseville, California, 1850-2000 by Leonard "Duke" Davis

Figure 16-3. 1973 Roseville Rail Yard Disaster

In 1997, Union Pacific Railroad began work on a $130 million project to modernize the Roseville train yard, including significant automation improvements and the replacement of 86 miles of track with 136 miles of new track.

During project grading, backhoe operators uncovered a Mark 81 bomb intact. Bomb disposal experts from Moffett Field in Mountain View, California were flown in by the Sacramento Sheriff's Department to dispose of the bomb, which they do by digging a pit and exploding the ordnance. When another eight bombs were discovered at the western end of the yard in Antelope, California unexploded ordnance experts from Moffett Field were called back and made the decision to place the bombs in pits and build berms around them. The Sacramento County Sheriff evacuated 300 to 400 homes near the rail yard, and at 2 a.m. blew up the bombs. The explosions shattered windows, cracked walls, and rained shrapnel through the roofs of nearby homes

In all, recovered materials included 16 unexploded MK 81 bombs; 11 partial fragments containing explosive residue; 8,625 pounds (4.31 tons) of bomb fragments; and 131,560 pounds (65.78 tons) of ferrous material. Experts found the bombs were not fused (armed), making them less likely to accidentally detonate. The bombs not destroyed on-site were packaged and transported to a facility in Colfax, Louisiana for detonation.



Figure 16-4. 1997 Bomb Discovery

Large population centers, high visibility tourist attractions, and critical infrastructure accessible to the public present security challenges of an ongoing nature in California. The network of highways, railways, ports and airports used to transport significant amounts of hazardous materials poses a significant technological hazards threat. Hazardous materials incidents may occur anywhere in Placer County. Multiple incidents may happen simultaneously, and all typically require a multi-agency, multi-jurisdictional response. The following sections describe the local areas with the greatest likelihood of hazardous materials incidents, as identified in the *Roseville Hazardous Materials Contingency Plan*.

Transportation Routes

The following transportation facilities have the potential to be affected by human-caused hazards:

- Interstate 80 and State Route 65 bisect the City.
- The J.R. Davis Yard in Roseville, the largest train yard west of the Mississippi, is a major Union Pacific switching center built in 1907 (see Figure 16-5). The 850-acre yard includes 136 miles of track. The site includes a former railcar rebuilding facility, the Antelope Yard, fueling areas, and diesel servicing facilities. The site has been designated as contaminated by the federal government, with substances including volatile organics, chlorinated solvents, polynuclear aromatic hydrocarbons, and heavy metals present due to decades of continuous use as a railroad repair and switching facility. Remediation is ongoing at the site.



Figure 16-5. The J.R. Davis Yard in Roseville, the Largest Train Yard West of the Mississippi

- Sacramento International Airport in northwestern Sacramento County operates continuously with two major runways and thousands of passengers traveling via commercial and private airlines. Several major airlines operate out of Sacramento International Airport, with most flying light- to medium-weight passenger jets. Approach and takeoff patterns are usually over rural farmland; however, occasionally

patterns are adjusted over more populated locations including Roseville. The City is more than 20 miles from Sacramento International Airport and is not in the direct flight path for the airport, although planes do cross Roseville continuously at high altitudes.

- Additional airports within a 20-mile radius of Roseville include the Lincoln and Auburn Airports in Placer County, Beale Air Force Base (34 miles to the north and the closest active military installation), McClellan Airfield, and the Yuba County airport. The instrument-landing approach to Runway 16 at McClellan crosses a portion of the western edge of the Sierra Vista Specific Plan Area. Aircraft on approach fly as low as 1,600 feet at Baseline Road (approximately 4 miles from the runway threshold). Aircraft using McClellan Airpark include aircraft as large as Boeing 747 and 707 aircraft, in addition to Coast Guard C-130s. Additionally, the National Guard flies T-38 aircraft and Blackhawk helicopters out of Mather Air Force Base.
- Sutter Roseville Medical Center maintains a helistop for critically injured patients flown to the hospital. At one time, the facility was limited to accepting one helicopter. If another patient was being transported to the medical center, the Roseville Fire Department had to respond to the helipad and emergency medical personnel were on standby should anything occur with more than one helicopter using the helipad. The landing area has been expanded and now the helistop has the capacity to accept more than one helicopter at any one time.
- Emergency and public safety helicopter traffic as well as media aircraft and small commercial aircraft frequently fly over the interstates to respond to emergencies and provide public information via local news media.
- Roseville has a number of established truck routes with a higher potential for hazardous material incidents to occur as a result of traffic incidents, as shown in Figure 16-6.

Pipelines

The Kinder Morgan company owns 3 miles of pipelines generally parallel to the Union Pacific railroad tracks in Roseville that transport high volumes of natural gas through the City. Other natural gas pipelines run along Interstate 80 with connections between Roseville and Chico. The route to Chico travels through residential areas from the tank farm in Rocklin. The trans-Sierra route from the tank farm in Rocklin to Reno roughly follows the same track as Interstate 80. Pacific Gas and Electric maintains natural gas pipelines in and through Roseville as well.

Business and Industrial Areas

Retail, manufacturing and light industrial firms near State Route 65 (northeastern Roseville and the Sunset Industrial Area of Rocklin) are areas of concern. These facilities have the highest concentration of hazardous materials at fixed facilities in Roseville due to their manufacturing operations. Each business is required to file a detailed, confidential plan with the Roseville Fire Department regarding materials on-site and safety measures taken to protect the public.

Agricultural

Accidental releases of pesticides, fertilizers, and other agricultural chemicals may be harmful to both humans and the environment. Agricultural pesticides are transported daily in and around Roseville en route to their destination in rural areas of Placer County.

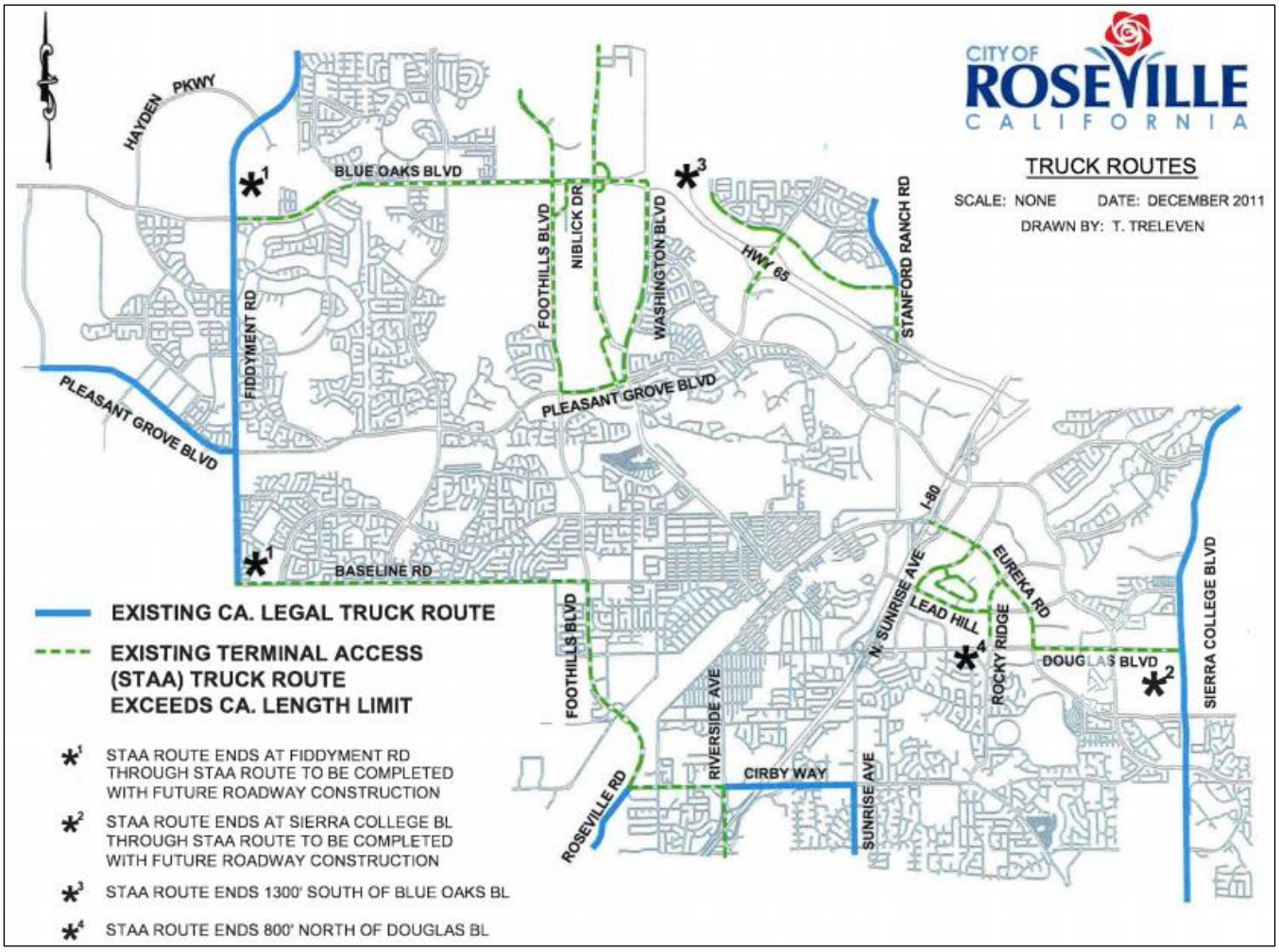


Figure 16-6. Roseville Truck Routes with High Potential for Hazardous Materials Incidents

Illegal Drug Operations

Illegal operations such as laboratories for methamphetamine pose a significant hazard. Laboratory residues are often dumped along roadways or left in rented hotel rooms, creating a serious health hazard to unsuspecting individuals and to the environment.

Illegal Dumping Sites

Hazardous wastes such as used motor oil, solvents, or paint are occasionally dumped in remote areas of Placer County and Roseville or along roadways, creating a potential health hazard to unsuspecting individuals and to the environment.

Radioactive Materials

Licensed carriers transport radioactive materials along several transportation routes (Interstate 80 and the railroads) through the City of Roseville. The City is notified in advance of these shipments and commits resources as a standby measure should an accident occur.

16.2.2 Frequency

Terrorism

As of 2014, California's economy was the largest of any state in the U.S. Placer County's proximity to the state capitol presents unique conditions for terrorist attacks. The transportation, energy, and communications systems that cross the county have impacts on the local, regional, and even national economy. In general, the risks of a terrorist event involving a WMD are as follows:

- **Chemical**—The risk of a chemical event is present in the City of Roseville. The agricultural community in Placer County uses and stores significant amounts of chemicals for peaceful and productive means that could be used in destructive ways.
- **Explosives**—Pipe bomb and suspicious package events have occurred in Placer County and Roseville in the past. While none of the events has been identified as a WMD, the elements necessary to construct a WMD are readily available. Additionally, the agricultural communities maintain sufficient products and quantities for use in explosive events.
- **Radiological/Nuclear**—The major transportation arteries for vehicles or rail that cross through or near the City of Roseville contribute to the risk of a radiological event. Such products can pass unknown through any one of the regional transportation corridors.
- **Biological**—Anthrax incidents that occurred in the U.S. in October 2001 demonstrate the potential for spreading terror through biological WMDs. The introduction of Newcastle disease in the United States demonstrates how an agent can be introduced to livestock, causing harm to public health and the economy.
- **Combined Hazards**—WMD agents can be combined to have a greater total effect. When combined, the impacts of the event can be immediate and longer-term. Casualties will likely suffer from both immediate and long-term burns and contamination. Given the risks associated with chemical agents in Placer County and the City of Roseville, the possibility exists for such a combined event to occur.

Technological

Hazardous material incidents may occur at any time in the City of Roseville, given the presence of transportation routes bisecting the City, the location of businesses and industry that use hazardous materials, the presence of scattered illegitimate businesses such as clandestine drug laboratories at any given time, and the improper disposal of hazardous waste.

16.2.3 Severity

The severity of human-caused hazards could range from a minor transportation accident or power outage to a full-scale terrorist attack.

The term mass casualty incident (MCI) is often applied to transportation accidents involving air and rail travel, as well as multi-vehicle highway accidents. However, MCIs may also result from hazardous materials incidents or acts of violence, such as shootings or hostage situations. Effects may include serious injuries, loss of life, and associated property damage.

Because large numbers of patients may be involved, significant MCIs may tax local emergency medical and hospital resources, and therefore require a regional response. MCIs may occur throughout the City, day or night,

at any time of the year: Interstate 80, State Route 65, and State Route 49 offer the potential for MCIs because of the heavy volume of traffic, although no highway or surface street in the City is exempt from this hazard.

The railroad tracks traversing Placer County, carrying Amtrak passengers as well as freight, also face the risk of an MCI, as do the air corridors above the county. Adverse weather may play a role in roadway, air, or rail accidents. MCIs may also result from acts of violence or terrorism, which could include a chemical, biological or radiological incident, contaminating persons and requiring mass decontamination.

In Placer County, an MCI is defined as any incident with three or more fatalities or critically injured. The first responders, including Roseville Fire, Roseville Police, and emergency room staffs at the local hospitals, follow the same protocol for an MCI whether the number of dead and injured is three, 30 or 300. Mutual aid is requested should Roseville be unable to respond appropriately with available personnel and equipment.

16.2.4 Warning Time

According to the Roseville Terrorism Contingency Plan, only 5 percent of all terrorism incidents are preceded by a warning. In the case of a technological hazard, accidents occur without predictability under circumstances that give responders little time to prepare.

16.3 EXPOSURE

The risk assessment for this hazard is based on a facility's criticality and physical vulnerability:

- Criticality is a measure of the potential consequence of an accidental or terrorist event as well as the attractiveness of the facility to a potential adversary or threat. The criticality for each critical facility is based on the factors shown in Table 16-4.
- Vulnerability is a measure of the physical opportunity for an accident or an adversarial attack. This assessment takes into consideration physical design, existing countermeasures, and site layout. The vulnerability for each critical facility is based on the criteria shown in Table 16-5.

Table 16-4. Criticality Factors

Criterion	Low Criticality	Medium Criticality	High Criticality
Awareness[a]	Not known/Neighborhood	City/Region/County	State/National
Hazardous Materials[b]	None / limited and secure	Moderate to large and secure	Large, minimum or no security
Collateral Damage Potential[c]	None or low	Moderate/immediate area or within 1 mile radius	High/immediate area or within 1 mile radius
Site Population[d]	0 – 300	301 – 1,000	1,001 or greater
Public/ Emergency Function[e]	No emergency function, or could be used for emergency function in the future	Support emergency function—redundant site	Emergency function—critical service with or without redundancy

a. Awareness—How aware is the public of the existence of the facility, site, system, or location?
b. Hazardous Materials—Are flammable, explosive, biological, chemical and/or radiological materials present on site?
c. Collateral Damage Potential—What are the potential consequences for the surrounding area if the asset is attacked or damaged?
d. Site Population—What is the potential for mass causalities, based on the capacity of the facility.
e. Public or Emergency Functions—Does the facility perform a function during an emergency? Is this facility or function capable of being replicated elsewhere?

Table 16-5. Vulnerability Criteria

Criterion	Low Vulnerability	Medium Vulnerability	High Vulnerability
Accessibility[a]	Remote location, secure perimeter, tightly controlled access	Controlled access, protected or unprotected entry	Open access, unrestricted, patrolling security, sign restrictions
Automobile Proximity[b]	Not within 75' – 100'	Not within 25' – 50'	Adjacent or not within 10'
Asset Mobility[c]	Moves or is relocated frequently	Moves or is relocated occasionally	Permanent/Fixed
Proximity to other Critical Facilities[d]	Greater than 1.5 – 2 miles	Greater than 3/4 - 1 mile	Within 1/2 – 3/4 mile
Secure Design[e]	No areas for concealment of packages, air intakes are on roof, access ways are not under the structure.	Area of concealment present, greater than 25' from the structure; Air intakes located at least 10' above ground, may have under structure access drives.	Areas of concealment within 25', air intakes at ground level, under structure access drives.

a. Accessibility—How accessible is the facility or site to the public?
b. Automobile Proximity—How close can an automobile get to the facility? How vulnerable is the facility to a car bomb attack?
c. Asset Mobility—Is the facility or asset's location fixed or mobile? If mobile, how often is it moved, relocated, or repositioned?
d. Proximity to other critical facilities—If the facility is close to other critical facilities, then there could be an increased probability of the facility receiving collateral damage.
e. Secure design—General evaluation of areas of obstruction, air intake locations, parking lot and road design and locations and other site design aspects.

16.3.1 Population

A human-caused hazard event could range from an isolated accident to a coordinated attack by multiple agents upon multiple targets. Large-scale incidents have the potential to kill or injure many citizens in the immediate vicinity, and may also affect people a relative distance from the initial event. Variables affecting exposure for a WMD attack and a hazardous material accident include the physical and chemical properties of the WMD, the ambient temperature, wind speed, wind direction, barometric pressure, and humidity.

Computer models are used by Roseville's Hazardous Materials teams to provide general data to first responders to advise evacuations or sheltering in place. With so many variables to determine "toxic endpoints" as defined by the California Environmental Protection Agency, distances are difficult to forecast. In general, those close to the City's transportation corridors or businesses with acutely hazardous materials are more at risk for some sort of effect. Each chemical incident will be different and the scenarios are too numerous to describe in this Plan.

Hazardous materials pose a significant risk to emergency response personnel. All potential first responders and follow-on emergency personnel in the City of Roseville currently are and will be properly trained to the level of emergency response actions required of their individual position at the response scene. Hazardous materials also pose a serious long-term threat to public health and safety, property and the environment.

16.3.2 Property

Roseville and Placer County are among the fastest growing communities in California, making them a higher profile target for terrorism. New development has been the target of arson fires and eco-terrorism in the County.

The City of Roseville has a total building count of 50,516 structures, of which 48,288 are residential. Roseville has over 27 million square feet of developed non-residential land uses covering over 3,000 acres city-wide. A

majority of this development has occurred since the mid-1980s when the specific plan process was established and large tracts of land were entitled for development.

16.3.3 Critical Facilities

There are no high profile federal or state buildings in Roseville. Critical facilities are limited to City facilities, Placer County facilities, and other government facilities such as the U.S. Post Office, private utility infrastructure and administrative offices, and medical facilities. Roseville's civic facilities are designed to welcome the public, with convenient parking and customer service areas. Except for the Roseville Police Facility, there are limited secure areas that are restricted to the public. Based on the criticality factors and vulnerability criteria described above, these facilities are all at risk because of their accessibility, automobile accessibility, and lack of a secure or hardened design.

Several of Roseville's critical emergency response facilities are located adjacent to the Roseville Rail Yard and pressurized underground pipelines, including the Roseville Civic Center, a primary location for City staff and services (see Figure 16-7), the Roseville Fire Department, which houses administration functions in Fire Station No. 1, and the City's emergency operations center. Significant regional critical facilities such as the Placer County courts and the main office for the U.S. Post Office are also close to the rail yard.



Figure 16-7. Roseville Civic Center

Several factors make gathering places such as the Roseville Civic Center vulnerable to human-caused hazards:

- All are accessible to the general public, to benefit aesthetically pleasing design and customer service.
- Design features, including types of building materials, and screened enclosures for mechanical equipment and solid waste, limit visibility and may contribute to the damage incurred should an intentional or accidental event occur.
- Automobile access is required in the design of most buildings in Roseville, with disabled access parking and easily accessible parking a valued feature.
- Most high population centers do not feature any limitations to access by the public or vehicles, although restricted access to large employment center sites with acutely hazardous materials is built into the design at these facilities.

16.3.4 Environment

The risk of human-caused hazards to the environment is considerable. Hazardous materials spilled along roads or railways could easily pollute rivers, streams, wetlands, riparian areas and adjoining fields. Other hazardous materials released into the air could severely impact plant and animal species. The City of Roseville recognizes this risk and has taken steps to reduce the risk exposure to the natural environment. By reducing the risk exposure to the built environment, the City will also mitigate potential losses to the natural environment.

16.4 VULNERABILITY

16.4.1 Population

A survey found that persons with disabilities were more anxious about their personal risk from terrorism than were persons without disabilities, even when equally prepared. Another study reported that persons who increased their disaster preparations in response to the possibility of terrorist attacks included African Americans, Latinos, persons with disabilities or household dependents, and non–US-born populations (NIH National Library of Medicine 2009).

Although human-caused hazards have not resulted in a large number of deaths in this area, this type of hazard can be deadly and widespread. Injuries and casualties were not estimated for this hazard. Any individuals exposed to human-caused hazards are considered to be at risk, particularly those working as first responder professionals.

16.4.2 Property

All structures in Roseville are physically vulnerable to a human-caused hazard. The emphasis on accessibility, the opportunity for roof access, driveways underneath some structures, unmonitored areas, the proximity of many structures to transportation corridors and underground pipelines, and the potential for a terrorist to strike any structure randomly all have an impact on the vulnerability of structures. Specific vulnerabilities are on file with the Roseville Fire Department as part of a State Homeland Security Assessment Survey and surveys conducted to complete this mitigation plan.

16.4.3 Critical Facilities

Most critical facilities in Roseville would be vulnerable to human-caused hazards, including utilities, data and telecommunications systems, and transportation facilities.

16.4.4 Environment

The environment vulnerable to a human-caused hazard is the same as the environment exposed to the hazard. While human-caused disasters have caused significant damage to the environment, estimating damage can be difficult. Loss estimation platforms such as Hazus are not equipped to measure environmental impacts of these types of hazards. The best gauge of vulnerability of the environment would be a review of damage from past human-caused hazard events. Loss data for damage to the environment were not available at the time of this Plan update. Capturing this data from future events could be beneficial in measuring the vulnerability of the environment for future updates.

16.4.5 Economic impacts

Economic impacts from human-caused hazards could be significant. The cost of a terrorist act would be felt in terms of loss of life and property, disruption of business activity and long-term emotional impacts. Recovery would take significant resources at the local level.

Utility losses could cause a reduction in employment, wholesale and retail sales, utility repairs, and increased medical risks. The City may lose sales tax and property taxes, and the finances of private utility companies and the businesses that rely on them would be disrupted.

The economic impact of data and telecommunications losses can be great, as computer security breaches, crime conducted via the world wide web such as identify theft, and many more forms of human-caused economic losses occur daily. Millions of dollars are lost each year as criminals and cyberterrorists steal sensitive information and funds from individuals and organizations.

The economic impacts would be significant if a transportation facility were rendered impassable. The loss of a roadway or railway would have serious effects on the City's economy and ability to provide services. Loss of travel routes on Interstate 80 or State Route 65 would result in loss of commerce, and may impact the City's ability to provide emergency services to its citizens by delaying response times or limiting routes for equipment such as fire apparatus, police vehicles, and ambulances. Fuel deliveries would also be impacted.

The effects of re-routed traffic could also have a serious impact on local roadways. For example, the closure of the roadway at Folsom Dam has resulted in severe local traffic and the closure of businesses in downtown Folsom due to lack of traffic along the Dam Road route. Heavy traffic on routes through central Roseville already occur at peak commute times when Interstate 80 is congested. Traffic control may burden the City's Public Works Department. Mass transit services would be impacted as routes may be delayed or forced to be detoured, causing economic impacts on Roseville transit and on those who ride buses in Roseville.

16.5 FUTURE TRENDS IN DEVELOPMENT

The potential for human-caused hazards in Roseville is not likely to lessen or prohibit development in Roseville. The threat of human-caused hazards and the availability of Homeland Security Funds will influence future development of the City's critical facilities. Multi-purpose facilities such as the Mahany Library (which also includes a community center and the public access studio) can be used as both an emergency response command center on the west side of Roseville and an information center to inform the public through the internet and broadcast facilities that will be on site.

16.6 REVIEW OF EXISTING ORDINANCES, PROGRAMS, AND PLANS

16.6.1 City of Roseville Emergency Response Plan

The Roseville Emergency Operations Plan addresses the planned response to emergency situations associated with natural disasters, technological (human-caused) emergencies, and war emergency operations in or affecting the City of Roseville. The plan is an operational plan as well as a reference document for pre-emergency planning and emergency operations. It establishes the following:

- An emergency management organization to mitigate any significant emergency or disaster affecting the City of Roseville
- Policies, responsibilities and procedures to protect the health and safety of citizens, public and private property, and the environment from the effects of natural and human-caused emergencies and disasters
- Operational concepts and procedures associated with field response to emergencies, emergency operations center activities, and the recovery process
- A framework for implementing the Standardized Emergency Management System in Roseville.

The Emergency Operations Plan outlines the natural and human-caused hazards most likely to occur in Roseville. It provides significant detail for each responding section assigned to City staff and mutual aid agencies prior to an emergency—management, operations, planning, logistics and finance. Roseville's Emergency Preparedness Manager conducts periodic tabletop and simulated exercises in conjunction with the Placer County Office of Emergency Services and affiliated agencies such as Sutter Roseville Medical Center and Kaiser Permanente Medical Center to ensure that staff is prepared and adequate resources are in place prior to any incident.

City of Roseville departments and other agencies providing emergency response within the City will review this plan at least annually in association with the Multi-Hazard Mitigation Steering Committee.

16.6.2 City of Roseville Terrorism Contingency Plan

The City of Roseville Terrorism Contingency Plan provides an overview of how the Emergency Operations Plan will be activated, how resources will be organized, and how staff will respond with state and federal resources. Specifically, the Terrorism Plan has the following provisions:

- Identifies how local, state, and federal response resources are integrated.
- Establishes a common response protocol to terrorist threats and events.
- Implements existing mutual aid programs.
- Outlines a unified strategic plan for all responders.

The Terrorism Plan is on file with the City of Roseville Fire Department. The City's Emergency Response Manager conducts training for all those assigned responsibilities as part of the plan in addition to coordinating with the Placer County Office of Emergency Services and other agencies charged with protecting the public in the event of a terrorist attack.

16.6.3 City of Roseville Hazardous Materials Contingency Plan

The Hazardous Materials Contingency Plan identifies non-terrorist related hazardous materials responsibilities in order for the City to prepare, respond and recover from an event. The objectives of the Hazardous Materials Plan are as follows:

- Establish policies and responsibilities for protecting the health and safety of the general population and visitors in the City of Roseville and surrounding communities, the environment, and public and private property from the effects of accidental hazardous materials incidents.
- Identify the emergency response organizations that are responsible for managing hazardous materials incidents in or near the City of Roseville.
- Establish operational concepts for staffing, training, operating and supporting the City of Roseville hazardous materials team. The Hazardous Materials Plan is coordinated with the Placer Operational Interagency Response Team Hazard Plan.
- Direct all individuals, agencies, and departments referenced in the Hazardous Materials Plan to develop standard operating procedures and emergency response checklists that are consistent with the Hazardous Materials Plan and the City's Emergency Operations Plan.

16.6.4 State of California Certified Unified Program Agency

The City of Roseville is a State of California Certified Unified Program Agency. This designation identifies the City as a licensing agency for six hazardous-material-related programs. It enables the City of Roseville to implement its own hazardous materials emergency response program. Mutual aid agreements are also in place for incident response. Each business that responds yes to any of the following questions must submit a Unified Program Consolidated Form with facility information to the Roseville Fire Department:

- **Hazardous Materials**—Do you have on-site hazardous materials at or above 55 gallons for liquids, 500 pounds for solids, or 200 cubic feet for compressed gases, or the applicable threshold for an extremely hazardous substance specified in federal law; or do you handle radiological materials in quantities for which an emergency plan is required pursuant to applicable law?
- **Underground Storage Tank**—Do you have on-site underground storage tanks?
- **Above-Ground Storage Tank**—Do you have on-site above-ground storage tanks for storage of petroleum?
- **Hazardous Waste**—Do you operate a facility that generates, recycles, or treats hazardous waste, among other activities?

The Fire Department requires existing and proposed businesses to submit lists of hazardous materials they use. The list is maintained by the Fire Department Life Safety/Hazardous Materials Officer and updated periodically.

16.6.5 Roseville Police Department

Following the provisions and emergency response, mitigation, and recovery structure of the State Emergency Management System, the federally mandated National Incident Management System, and the National Response Plan, the Roseville Police Department is prepared to meet the challenge of intentional criminal acts, including acts of terrorism, as well as technological, accidental, or natural hazards in the following ways:

- Activation of local emergency response plans using multi-disciplinary resources, including but not limited to regional municipal and county law enforcement, the Joint Terrorism Task Force overseen by the FBI, the Department of Justice Anti-Terrorism Information Center, state and federal military personnel, and private resource agencies
- Deployment of local tactical resources to mitigate human-caused acts of terrorism or intentional business disruption, including SWAT, hostage negotiators, rapid containment team, the tactical communications team, and explosive ordnance personnel as necessary
- Use of the Crime Scene Investigations Unit for post-incident evidence collection and investigation
- Intake, processing, analysis, and investigation of all incidents with the potential for large-scale impact in a professional, timely manner.

16.6.6 Roseville Public Safety Communications

Communications personnel are prepared to take the following actions:

- Appropriately recognize and document citizens' reports of suspicious activity.
- Deploy appropriate resources to prevent, investigate, mitigate, and provide recovery services following incidents of human caused hazards, as well as natural and technological disasters.
- Coordinate resource management of personnel, equipment, and facilities during established crisis incidents.
- Work within the framework of the State Emergency Management System to provide emergency communications to field units and emergency operations personnel during emergency events.
- Deploy mutual aid assistance in support of local, state, and national entities during crisis incidents.
- Provide life-saving pre-arrival instructions on emergency medical incidents, both large-scale and of an individual nature.

16.6.7 Roseville Fire Department

Training

Roseville Fire Department personnel are highly trained to handle all aspects of emergency service. All first response personnel are trained in incident command, advanced firefighting skills, basic life support, essential rescue skills, and basic hazardous materials response. All first response personnel are trained to meet or exceed the following state training certification levels: Firefighter I & II, CPR, Emergency Medical Technician I, Hazmat First Responder Operations Decon and ICS 200.

To support these first responders, specialized teams of personnel are trained and certified in tower rescue, above/below grade rescue, confined space rescue, trench rescue, technical rescue, swift water rescue, dive rescue, specialized hazardous materials response, hazardous materials railcar and tank truck response, terrorism response, multi-casualty management, and advanced life support.

The department's staffing includes a full-time training officer who oversees the Fire Training Division. In addition to the training officer, the department draws from a cadre of state certified ICS, fire, EMS, hazmat and technical rescue instructors to conduct regular training exercises to maintain and enhance competency of personnel in all aspects of emergency response. The department also sends personnel to the National Fire

Academy, California Specialized Training Institute, Hazmat Continuing Challenge and other off site programs for advanced certifications and training.

The Fire Department maintains a state-of-the-art training facility within the city limits. The Fire Training Center includes two classrooms, a six-story burn tower, command center and other specialized training props such as above- and below-grade vaults, tanks, cargo tanks and a rail tank car. The Roseville Fire Training Center has been state certified as a regional fire academy and for Hazardous Materials Technician / Specialist, Urban Search and Rescue Systems and Confined Space training.

In addition to training in-service response personnel, the Roseville Fire Training Center hosts a regional fire academy in cooperation with Sierra College. The Roseville Fire Training Center also provides regional training to other fire agencies, some of which are under contract with the Department of Homeland Security. Regular regional training includes the Hazardous Materials Technician / Specialist series, Low Angle Rope Rescue, Trench Rescue, Confined Space Rescue, and Urban Search and Rescue Systems I.

Response Time and Mutual Aid

The Roseville Fire Department is a fully functional agency that primarily provides fire suppression and emergency medical services for the urban environment of the City. The department operates eight stations. The department has eight paramedic engine companies, with a minimum staffing of three, two paramedic truck companies with a minimum staffing of four, and one battalion chief. The department also operates a hazardous materials response unit (cross-staffed the truck company); five grass/wildland units, and one technical rescue unit (cross-staffed by engine companies). The department maintains four reserve engines and one reserve truck.

The Fire Department has established a Standards of Response Coverage Plan that includes a travel time standard of 4 minutes from the time the apparatus leaves the station to the arrival of the first engine on scene. Due to significant growth in the City, additional fire stations are needed to achieve this response time. Fire Station 9 opened in May 2013 to serve the new development anticipated in West Roseville.

The City of Roseville has mutual aid agreements with local fire departments and districts in surrounding Placer County and Sacramento County. These personnel cooperate in the same training program as the City firefighters to ensure a high level of competency even with borrowed resources. The department participates in the statewide mutual aid system to bring additional resources from anywhere in California or the nation if this level of aid does not meet the incident needs.

Hazardous Materials Response

Hazardous Materials Listing

All hazardous materials handlers that store in excess of 55 gallons of liquid, 500 pounds of solids, or 200 cubic feet of gas are required to submit Hazardous Materials Management Business Plans to the Roseville Fire Department. These plans provide emergency contact information, site-specific chemical inventories, and vicinity and facility maps. Facilities storing materials that are “acutely” hazardous and in excess of the quantities in CCR, Title 19, Tables I, II or III must submit a more comprehensive Risk Management Plan, which includes off-site consequences analysis, maintenance, and training programs, and an executive summary. Owners/operators of above-ground tanks containing in excess of 660 gallons of petroleum hydrocarbons (or an aggregate quantity of

1,320 gallons) must comply with the California Aboveground Petroleum Storage Act, which requires the preparation of a spill prevention, control, and countermeasure plan.

Development Review Process

The Fire Department reviews any development proposal that may be impacted by or cause an impact related to the storage, handling, or disposal of hazardous materials. A Hazardous Materials Management Plan and, if necessary, a Risk Management Prevention Plan are required as part of the development process per state law. When considering any use, the City analyses the use of toxic or hazardous materials requiring the filing of a business plan for emergency response pursuant to Section 25503.5 of the California Health and Safety Code or materials identified in Section 5194, Title 8 of the CCR. All users must submit a list of hazardous and toxic materials with a qualified discussion of potential chronic and acute long-term health effects, including effects on children, and effects from acute short-term or chronic long-term exposure.

In addition, a plan must be submitted specifying procedures for mitigating the emissions of toxic substances and groundwater monitoring and for identifying methods of hazardous waste disposal. All projects must be reviewed for compliance with the Placer County Hazardous Waste Management Plan.

Intergovernmental Coordination

The Roseville Fire Department works cooperatively with other local and state agencies in a coordinated effort to inform and educate the public regarding the storage, handling, and disposal of household hazardous materials. This includes continued coordination with the Placer County Hazardous Materials Response Teams.

Hazardous Waste Drop-off

The City of Roseville partners with public and private entities to remove household hazardous waste from Roseville's waste stream. The disposals include the following:

- **Household Hazardous Waste Collection**—The Western Placer Waste Management Authority provides a collection service for household hazardous waste. Residents can transport waste to the Authority's facility north of Roseville or schedule a pickup through the Roseville Solid Waste Division.
- **Used Electronic Equipment**—The Materials Recovery Facility accepts old televisions and other electronic waste.
- **Used Motor Oil Recycling**—There are six locations in Roseville designated for used motor oil recycling drop-off.
- **Sharps (or Needles)**—Roseville residents who use medical needles for in-home care are encouraged to purchase sharps containers, which hold 100 needles, at a nominal cost from several drug stores in the City. Residents are asked to dispose of all medical needles and containers properly so they do not enter the waste stream.

Interagency Cooperation for Emergency Response

The City of Roseville Fire Department responds in accordance with the City of Roseville Hazardous Materials Emergency Response Plan to hazardous materials emergencies. Both the California Highway Patrol and the City of Roseville have developed a Hazardous Materials Emergency Plan that discusses the participants'

responsibilities, organization and operation to be complied with in the event of a hazardous materials emergency, including clean-up and decontamination procedures.

Hazardous Materials Truck Route

The City of Roseville does not have specific truck routes for hazardous materials. The City does have established truck routes in the city limits, and in the event hazardous materials are to be transported within the city limits, a permit is required from the Roseville Police Department. Typically, trucks with bulk deliveries of hazardous materials use State Route 65 to Blue Oaks Boulevard and then access any of the north-south corridors, including Washington Boulevard, Industrial Avenue, and Foothills Boulevard where local businesses use hazardous materials in their business activities.

Routes for hazardous materials are coordinated with the California Department of Transportation (Caltrans), the California Highway Patrol, and the Roseville Police, Fire, and Public Works Departments.

Since Blue Oaks Boulevard remains incomplete, there is a risk of hazardous material being transported on bulk trucks through residential areas to reach the Pleasant Grove Wastewater Treatment Plant and the Energy Park. The same is true for transportation of hazardous material to the Booth Road plant, but chlorine gas is no longer used for disinfection there (nor at other water plants serving Roseville).

Hazardous Materials Fee Program

The Roseville Fire Department has adopted a fee schedule for hazardous material permitting, storage, use, handling, and generation. The department also charges for fire and life safety inspections, plan review, and miscellaneous activities such as a Hazardous Materials Business Plan Review.

16.7 SCENARIO

Two human-caused hazard scenarios could have a significant impact on the City of Roseville:

- The first scenario would involve hazardous materials being transported via rail or highway (Interstate 80) across the planning area. The release of hazardous materials via intentional or unintentional means could impact large population centers within the City. Advance knowledge of these shipments and their contents would play a role in preparedness for this scenario, thus reducing its potential impact. The biggest issue in response to hazardous material is material identification and containment.
- The second scenario would be a terrorist event at a large gathering place such as a mall or event center. Terrorist events happen with little or no warning. With a population in excess of 120,000 people, Roseville does possess potential targets for terrorist activities. The City has taken steps to assess these sites as well as probable scenarios in its Terrorism Contingency Plan.

16.8 ISSUES

Future actions needed at the local level to address human-caused hazards include but are not limited to the following:

- Continue all facets of emergency preparedness training for police, fire, public works, and city manager/public information staff in order to respond quickly in the event of a human-caused disaster.

Enhance awareness training for all City employees to recognize threats or suspicious activity in order to prevent an incident from occurring.

- Continue all facets of the City's hazardous materials team training and response through commitment of resources from the Fire Department budget and the addition of funding through the Sacramento Regional Homeland Security budget.
- Continue to improve response times for public safety throughout the City so as to reduce exposure to human-caused incidents. The City will maintain appropriate staffing levels of public safety personnel to address vulnerabilities identified in this chapter.
- Train first responders and all appropriate City staff to implement protocols contained in the City of Roseville Terrorism Response Plan.
- Continue to implement the City of Roseville Hazardous Materials Contingency Plan with enhancements as warranted by the type of uses in the City and new technologies in preventing hazardous materials incidents.
- Continue to work proactively with Union Pacific Railroad regarding the following:
  - Placards and labeling of containers
  - Emergency plans and coordination
  - Standardized response procedures
  - Notification of the types of materials being transported through Roseville on at least an annual basis
  - Random inspections of transporters as allowed by Union Pacific
  - Installation of mitigating techniques along the rail yard at critical locations
  - Routine hazard communication initiatives
  - Enhancing security along the rail corridor should the alert system go higher than Orange
  - Continuously looking to the use of safer alternative products to conduct rail transport operations.
- Continue regular testing of the alarm system along the Union Pacific railroad tracks in Central Roseville.
- Utilize Crime Prevention Through Environmental Design (CPTED) in future planning efforts as well as enhancing existing infrastructure and buildings to prevent or mitigate human-cause incidents. CPTED is an urban planning design process that integrates crime prevention with neighborhood design and community development. CPTED is based on the theory that the proper design and effective use of the built environment can reduce crime and the fear of crime and improve the quality of life. CPTED creates an environment where the physical characteristics, building layout, and site planning allow inhabitants to become key agents in ensuring their own security.
- Work with the private sector to enhance and create Business Continuity Plans in the event of an emergency.
- Relocate or construct a redundant Emergency Operations Center farther from the Roseville Rail Yard and floodplain.
- Maintain an emergency services information line that the public can contact 24 hours a day during an emergency incident to ask questions of emergency staff.
- Coordinate with all Roseville school districts to ensure that their emergency preparedness plans include preparation for human-caused incidents.
- Encourage local businesses to adopt Information Technology and telecommunications recovery plans.
- Promote 72-hour self-sufficiency through the Emergency Preparedness Manager's efforts, the Roseville website, Roseville Coalition of Neighborhood Associations, and other media.

- Continue to share the human-caused hazard risk and preparedness presentation given at the public meetings and City Council workshop as part of this preparedness effort.
- Maintain the on-line Citizens Advisory Panel of 2,400 households and periodically e-mail emergency preparedness information including human-caused hazard preparedness instructions and reminders.

Future actions needed at the regional level to address human-caused hazards include but are not limited to the following:

- Participate in regional, state and federal efforts to gather terrorism information at all levels and keep public safety officials briefed at all times regarding any local threats. Staff will then further develop response capabilities based on emerging threats.
- Participate in the Cal OES Disaster Resistant California annual conference and other training sessions sponsored by regional, state and federal agencies.
- Participate in regional training exercises per the requirements of Homeland Security Presidential Directive #8 in support of national preparedness. These training exercises, sponsored by the Sacramento Regional Office of Homeland Security, will test and evaluate the ability to coordinate the activities of city, county and state government first responders, volunteer organizations and the private sector in responding to terrorism and technological hazards. The trainings will enhance interagency coordination, provide training to staff, test response and recovery capabilities, and activate the National Incident Management System and the mutual aid system.
- Review existing automatic/mutual aid agreements with other public safety agencies to identify opportunities for enhancement.

17. HAZARD RISK RANKING

A risk ranking was performed for the hazards of concern described in this Plan. This risk ranking assesses the probability of each hazard's occurrence as well as its likely impact on the people, property, and economy of the planning area. The results are used in establishing priorities for mitigation actions.

The climate change hazard was not ranked because its impacts are factored into each individual hazard and thus are peripherally included in this assessment. The human-health and human-caused hazards were not ranked because they are not considered natural hazards. Federal hazard mitigation planning regulations do not require the assessment of non-natural hazards (44 CFR, 201.6).

17.1 PROBABILITY OF OCCURRENCE

The probability of occurrence of a hazard is indicated by a factor based on likelihood of occurrence:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor =2)
- Low—Hazard event is not likely to occur within 100 years (Probability Factor =1)
- No exposure—There is no probability of occurrence (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area. Figure 17-1 summarizes the probability assessment for each hazard of concern for this plan.

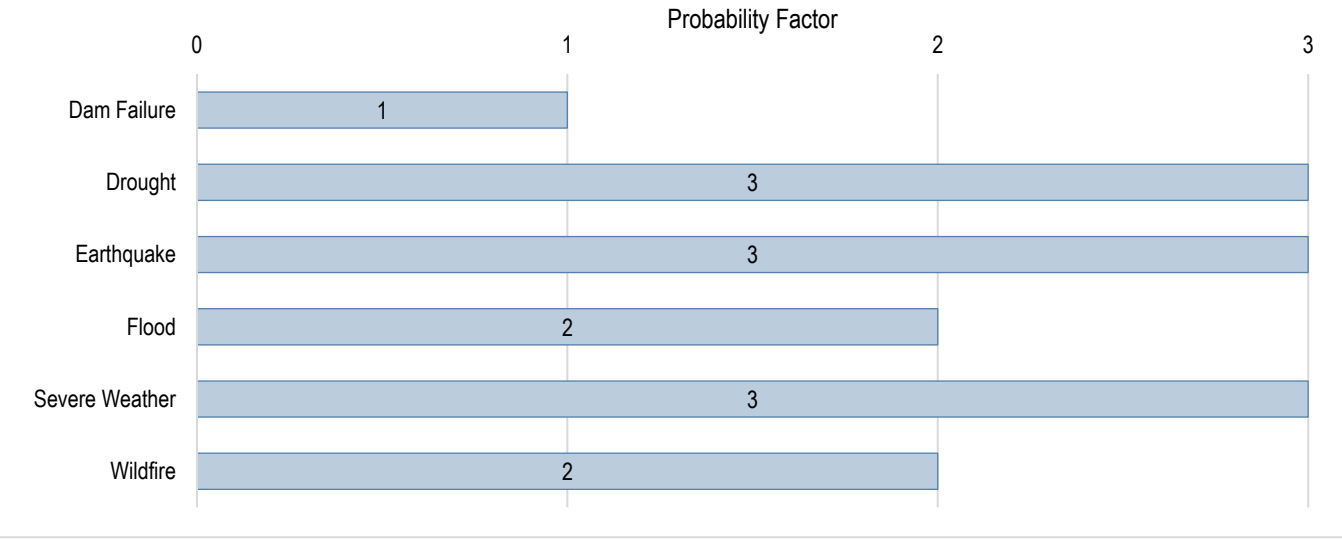


Figure 17-1. Probability Factors for Hazards of Concern

17.2 IMPACT

Hazard impacts were assessed in three categories: impacts on people, impacts on property and impacts on the local economy. Numerical impact factors were assigned as follows:

- **People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. An element of subjectivity can be used in assigning values for impacts on people. Impact factors were assigned as follows:
  - High—50 percent or more of the population is exposed to a hazard (Impact Factor = 3)
  - Medium—25 percent to 49 percent of the population is exposed to a hazard (Impact Factor = 2)
  - Low—25 percent or less of the population is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the population is exposed to a hazard (Impact Factor = 0)
- **Property**—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event:
  - High—30 percent or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)
  - Medium—15 percent to 29 percent of the total assessed property value is exposed to a hazard (Impact Factor = 2)
  - Low—14 percent or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)
- **Economy**—Values were assigned based on the percentage of the total ***property value vulnerable*** to the hazard event. Values represent estimates of the loss from a major event of each hazard in comparison to the total assessed value of the property exposed to the hazard. For some hazards, such as wildfire, landslide and severe weather, vulnerability was considered to be the same as exposure due to the lack of loss estimation tools specific to those hazards. Loss estimates separate from the exposure estimates were generated for the earthquake and flood hazards using Hazus.
  - High—Estimated loss from the hazard is 20 percent or more of the total exposed property value (Impact Factor = 3)
  - Medium—Estimated loss from the hazard is 10 percent to 19 percent of the total exposed property value (Impact Factor = 2)
  - Low—Estimated loss from the hazard is 9 percent or less of the total exposed property value (Impact Factor = 1)
  - No impact—No loss is estimated from the hazard (Impact Factor = 0)

Each category of impact was assigned a weighting factor to reflect its significance: impact on people was given a weighting factor of 3; impact on property was given a weighting factor of 2; and impact on the economy was given a weighting factor of 1. Figure 17-2 summarizes the unweighted and weighted impact factors, respectively, for each hazard.

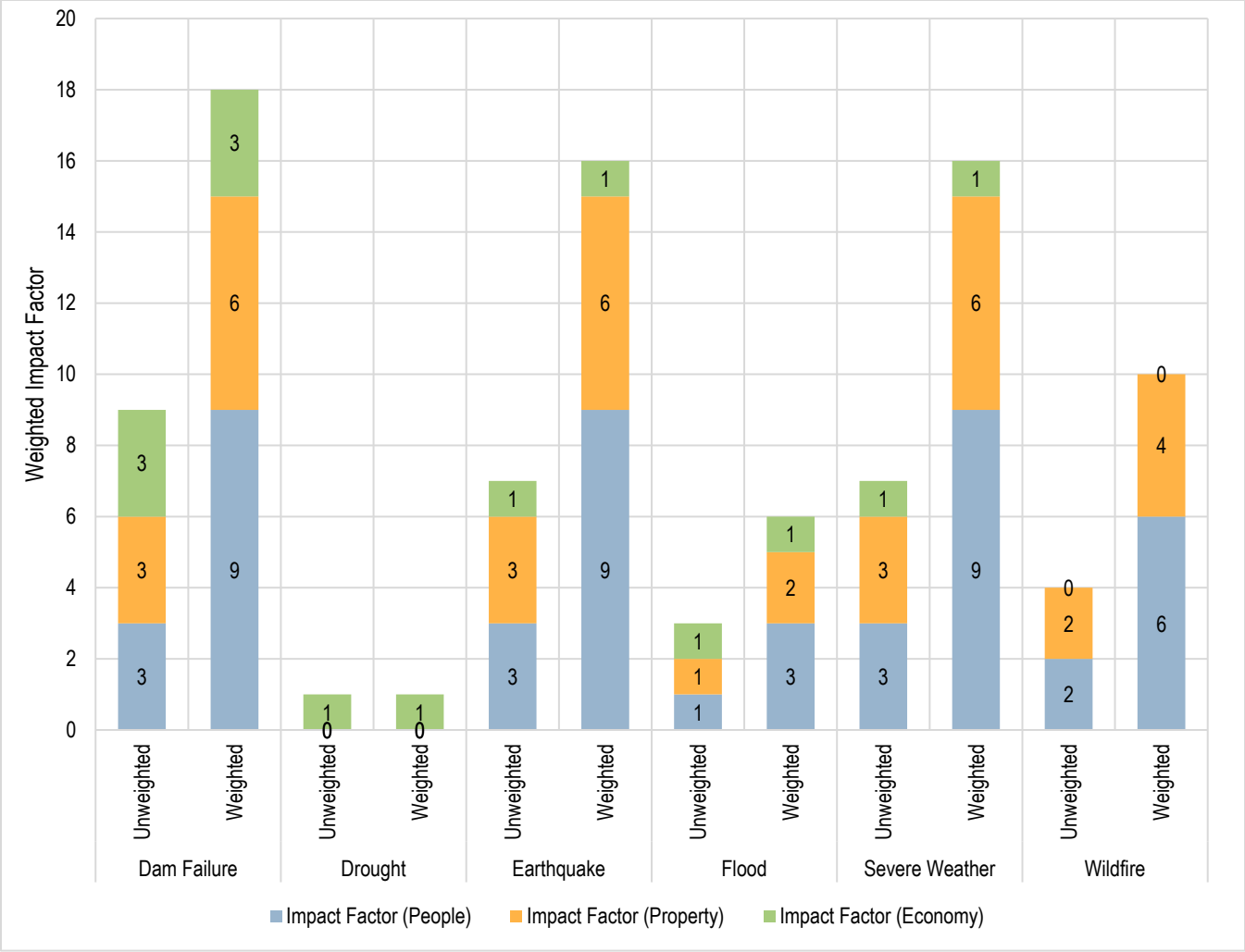


Figure 17-2. Impact Factors for Hazards of Concern

17.3 RISK RATING AND RANKING

The risk rating for each hazard was determined by multiplying the probability factor by the sum of the weighted impact factors for people, property, and operations, as summarized in Figure 17-3. Based on these ratings, a priority of high, medium, or low was assigned to each hazard. Figure 17-4 shows the hazard risk ranking.

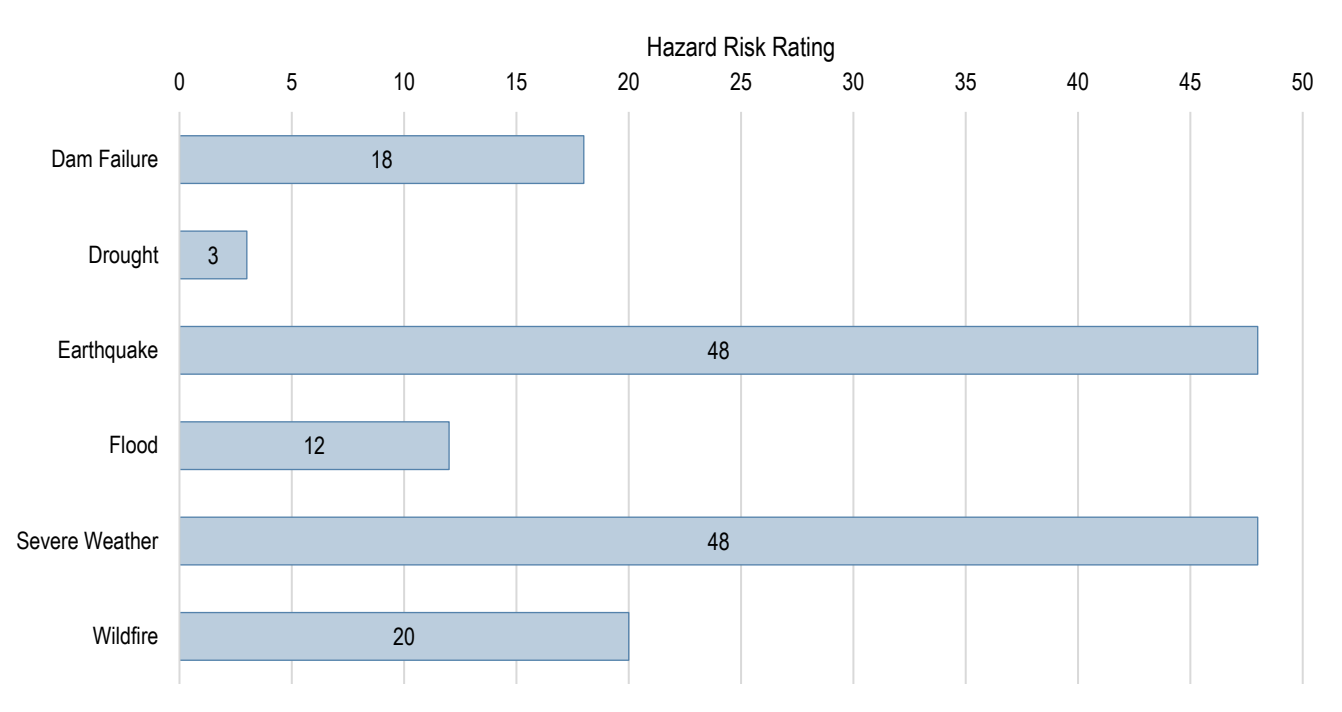


Figure 17-3. Total Risk Rating for Hazards of Concern

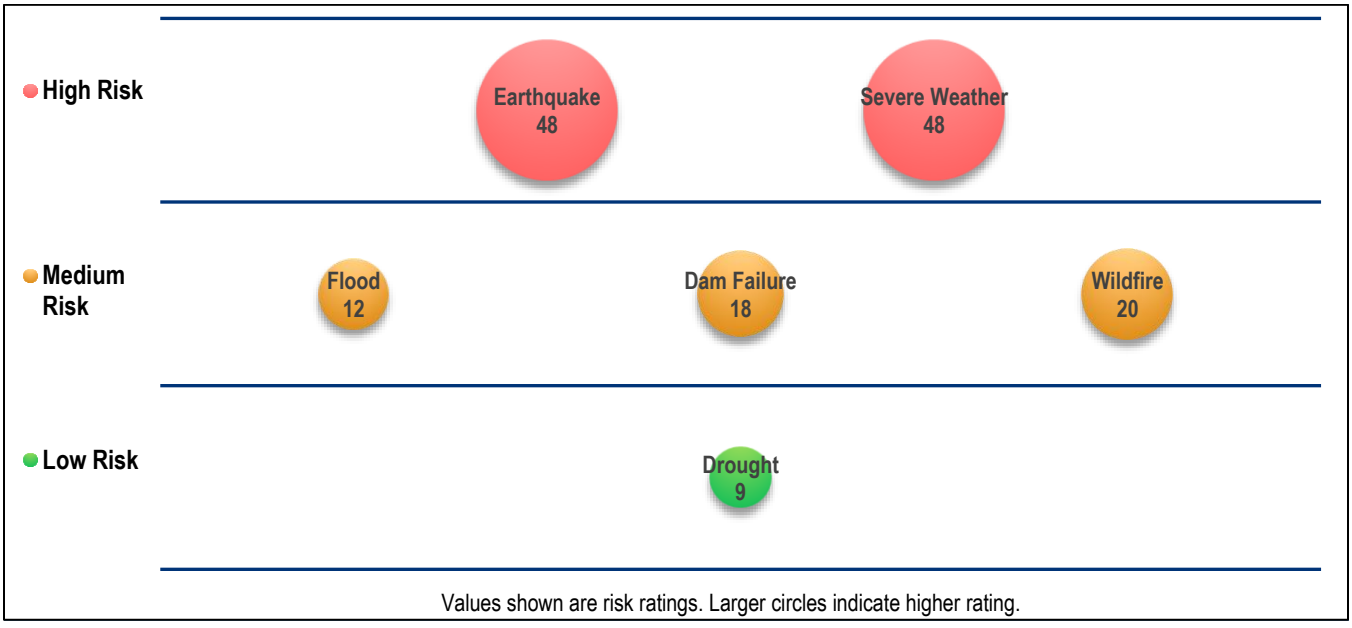


Figure 17-4. Hazard Risk Ranking

PART 3—MITIGATION STRATEGY

18. GUIDING PRINCIPLE, GOALS, AND OBJECTIVES

Hazard mitigation plans must identify goals for reducing long-term vulnerabilities to identified hazards (44 CFR Section 201.6(c)(3)(i)). After establishing a guiding principle for this hazard mitigation plan, the City of Roseville developed goals and objectives through discussions, research, and meetings of the Steering Committee and based on input from stakeholders and the public. Information for this process was garnered from the public involvement strategy, the risk assessment, and review of the California and Placer County hazard mitigation plans.

18.1 GUIDING PRINCIPLE

A guiding principle for a plan is a written declaration of the plan's core purpose and focus. It normally remains unchanged over time, regardless of a change to the plan's goals or objectives. Though not required for DMA compliance, the incorporation of a guiding principle provides a clear, singular message that can be a focal point throughout all facets of the planning process. The City of Roseville developed the following guiding principle for 2023:

> *Through community partnerships, establish a plan to reduce the vulnerability to hazards in order to protect the health, safety, welfare, environment and economy of the City for all Roseville residents, businesses, and visitors.*

18.2 GOALS

The goals for the 2023 Plan, consistent with the hazards identified in this plan, are as follows:

- G-1: Protect lives and reduce injury.
- G-2: Promote hazard mitigation as an integrated policy.
- G-3: Protect the continuity of local government to ensure no significant disruption of services during or due to a disaster.
- G-4: Maintain a safe community using emergency management principles through collaboration and outreach.
- G-5: Minimize or reduce damage to property, including critical facilities.
- G-6: Develop and implement mitigation strategies that optimize funding in an efficient and cost-effective way to maintain a fiscally sound city.
- G-7: Monitor and support the natural environment's capacity to deal with the impacts of natural hazards, taking into account the potential impacts of global climate change.
- G-8: Strengthen inclusiveness, equity and justice efforts for all in partnership by building a resilient community.

18.3 OBJECTIVES

The Steering Committee selected the objectives listed in Table 18-1 to meet multiple goals. The objectives serve as a stand-alone measurement of a mitigation action rather than as a subset of a goal. Achievement of the objectives is a measure of the effectiveness of a mitigation strategy. The objectives are also used to help establish priorities.

Table 18-1. Objectives for 2023 Multi-Hazard Mitigation Plan

Objective Number	Objective Statement	Goals for which it can be applied
O-1	Consider the impacts of hazards on future land uses in the City of Roseville by coordinating with other planning mechanisms such as the General Plan and land-use code development.	1, 2, 5, 7
O-2	Protect and sustain reliable local emergency operations and communication facilities during and after disasters.	1, 3, 4
O-3	Develop new or enhance existing early warning response systems and plans.	1, 3, 4, 5
O-4	Seek to enhance emergency response capabilities through improvements to infrastructure and City programs.	1, 4, 5
O-5	Enhance the understanding of all present and future hazards that impact the City of Roseville and the risk they pose.	1, 3, 4, 5, 7
O-6	Seek mitigation projects that provide the highest degree of hazard protection at the least cost.	1, 5, 6
O-7	Seek to update information on natural, environmental, and human-caused hazards, vulnerabilities, and mitigation measures by coordinating planning efforts and creating partnerships with appropriate local, private, county, state, and federal agencies.	1, 2, 3, 4, 5, 7
O-8	Seek to implement codes, standards, and policies that will protect life and property, including natural habitat, from the impacts of hazards within the City of Roseville.	1, 2, 3, 5, 6
O-9	Educate the whole community on preparedness for and mitigation of potential impacts of hazards on the City of Roseville.	1, 2, 4
O-10	Support efforts to retrofit, purchase, or relocate structures in high hazard areas, including those known to be repetitively damaged.	3, 5, 6
O-11	Increase the resilience of the City's Lifelines	

19. MITIGATION BEST PRACTICES

19.1 HAZARD-SPECIFIC MITIGATION BEST PRACTICES

Catalogs of hazard mitigation alternatives were developed that present a broad range of alternatives to be considered for use in the planning area, in compliance with 44 CFR (Section 201.6(c)(3)(ii)). One catalog was developed for each hazard of concern evaluated in this Plan. The catalogs present alternatives that are categorized in two ways:

- By who would have responsibility for implementation:
  - Community scale (one or a group of individuals, households, or families)
  - Organizational scale (businesses and organizations, including non-profits and community-based organizations)
  - Government scale (any government agency that has permit authorities and police powers within a defined planning area)
- By what the alternative would do:
  - Reduce the probability of hazard events
  - Limit risk to new development and redevelopment
  - Reduce risk to existing structures
  - Increase the ability to respond to or be prepared for the hazard.

The catalogs are lists of what could be considered to reduce risk from natural hazards in the planning area. They include practices that will mitigate current risk from hazards or help reduce new risk resulting from climate change. Hazard mitigation actions recommended in this plan were selected from an analysis of the best practices presented in the catalogs. The catalogs provide a baseline of mitigation alternatives that are backed by a planning process and are consistent with the established goals and objectives. Actions were selected out of the catalogs based on an analysis of the City's ability to implement them. Best practices in the catalog that are not included in the action plan were omitted for one or more of the following reasons:

- The action is not feasible
- The action is already being implemented
- The City does not have the capability to implement the action
- There is an apparently more cost-effective alternative
- The action does not have public or political support

The catalogs for each hazard are presented in Table 19-1 through Table 19-8.

Table 19-1. Alternatives to Mitigate the Dam Failure Hazard

Community Scale	Organizational Scale	Government Scale
• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ Relocate out of dam failure inundation areas. • **Reduce risk to existing structures:** ○ Elevate home to appropriate levels. • **Increase the ability to respond to or be prepared for the hazard:** ○ Learn about risk reduction for the dam failure hazard. ○ Learn the evacuation routes for a dam failure event. ○ Educate yourself on early warning systems and the dissemination of warnings.	• **Reduce the probability of hazard events:** ○ Remove dams. ○ Harden dams. • **Limit risk to new development/ redevelopment:** ○ None • **Reduce risk to existing structures:** ○ Flood-proof facilities within dam failure inundation areas. • **Increase the ability to respond to or be prepared for the hazard:** ○ Educate employees on the probable impacts of a dam failure. ○ Develop a continuity of operations plan.	• **Reduce the probability of hazard events:** ○ Remove dams. ○ Harden dams. • **Limit risk to new development/ redevelopment:** ○ Consider open space land use in designated dam failure inundation areas. ○ Adopt higher regulatory floodplain standards in mapped dam failure inundation areas. ○ Adopt real-estate disclosure requirements for the re-sale of property located within dam failure inundation areas. • **Reduce risk to existing structures:** ○ Relocate critical facilities out of dam failure inundation areas. ○ Retrofit critical facilities within dam failure inundation areas. • **Increase the ability to respond to or be prepared for the hazard:** ○ Map dam failure inundation areas. ○ Enhance emergency operations plan to include a dam failure component. ○ Institute monthly communications checks with dam operators. ○ Inform the public on risk reduction techniques ○ Consider the probable impacts of climate in assessing the risk associated with the dam failure hazard. ○ Establish early warning capability downstream of listed high hazard dams. ○ Consider the residual risk associated with protection provided by dams in future land use decisions.

Table 19-2. Alternatives to Mitigate the Drought Hazard

Community Scale	Organizational Scale	Government Scale
• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ None • **Reduce risk to existing structures:** ○ Drought-resistant landscapes ○ Reduce water system losses ○ Modify plumbing systems (through water saving kits) • **Increase the ability to respond to or be prepared for the hazard:** ○ Practice active water conservation	• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ None • **Reduce risk to existing structures:** ○ Drought-resistant landscapes ○ Reduce private water system losses • **Increase the ability to respond to or be prepared for the hazard:** ○ Practice active water conservation	• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ None • **Reduce risk to existing structures:** ○ Identify and create groundwater backup sources ○ Reduce water system losses ○ Distribute water saving kits ○ Increase use of recycled water ○ Diversify water supply diversion points • **Increase the ability to respond to or be prepared for the hazard:** ○ Groundwater recharge through stormwater management ○ Public education on drought resistance ○ Identify alternative water supplies for times of drought; mutual aid agreements with alternative suppliers ○ Implement drought contingency plan ○ Develop criteria “triggers” for drought-related actions ○ Improve accuracy of water supply forecasts

Table 19-3. Alternatives to Mitigate the Earthquake Hazard

Community Scale	Organizational Scale	Government Scale
• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ Locate outside of hazard area (off soft soils) ○ Build to higher design • **Reduce risk to existing structures:** ○ Retrofit structure (anchor house structure to foundation) ○ Secure household items that can cause injury or damage (such as water heaters, bookcases, and other appliances) • **Increase the ability to respond to or be prepared for the hazard:** ○ Practice "drop, cover, and hold" ○ Develop household mitigation plan, such as creating a retrofit savings account, communication capability with outside, 72-hour self-sufficiency during an event ○ Keep cash reserves for reconstruction ○ Become informed on the hazard and risk reduction alternatives available. ○ Develop a post-disaster action plan for your household	• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ Locate or relocate mission-critical functions outside hazard area where possible ○ Adopt higher standard for new construction; consider "performance-based design" when building new structures • **Reduce risk to existing structures:** ○ Build redundancy for critical functions and facilities ○ Retrofit critical buildings and areas housing mission-critical functions • **Increase the ability to respond to or be prepared for the hazard:** ○ Keep cash reserves for reconstruction ○ Inform your employees on the possible impacts of earthquake and how to deal with them at your work facility. ○ Develop a continuity of operations plan	• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ Locate critical facilities or functions outside hazard area where possible ○ Adopt higher regulatory standards • **Reduce risk to existing structures:** ○ Harden infrastructure ○ Provide redundancy for critical functions • **Increase the ability to respond to or be prepared for the hazard:** ○ Provide better hazard maps ○ Provide technical information and guidance ○ Enact tools to help manage development in hazard areas (e.g., tax incentives, information) ○ Include retrofitting and replacement of critical system elements in capital improvement plan ○ Develop strategy to take advantage of post-disaster opportunities ○ Warehouse critical infrastructure components such as pipe, power line, and road repair materials ○ Develop and adopt a continuity of operations plan ○ Initiate triggers guiding improvements (such as <50% substantial damage or improvements) ○ Further enhance seismic risk assessment to target high hazard buildings for mitigation opportunities. ○ Develop a post-disaster action plan that includes grant funding and debris removal components.

Table 19-4. Alternatives to Mitigate the Flooding Hazard

Community Scale	Organizational Scale	Government Scale
• **Reduce the probability of hazard events:** ○ Clear storm drains and culverts ○ Use low-impact development techniques • **Limit risk to new development/ redevelopment:** ○ Locate outside of hazard area ○ Use low-impact development techniques ○ Build new homes above base flood elevation • **Reduce risk to existing structures:** ○ Elevate utilities above base flood elevation ○ Raise structures above base flood elevation ○ Elevate items within house above base flood elevation ○ Flood-proof structures • **Increase the ability to respond to or be prepared for the hazard:** ○ Buy flood insurance ○ Develop household plan, such as retrofit savings, communication with outside, 72-hour self-sufficiency during and after an event	• **Reduce the probability of hazard events:** ○ Clear storm drains and culverts ○ Use low-impact development techniques • **Limit risk to new development/ redevelopment:** ○ Locate critical facilities or functions outside hazard area ○ Use low-impact development techniques ○ Provide flood-proofing when new critical infrastructure must be located in floodplains • **Reduce risk to existing structures:** ○ Build redundancy for critical functions or retrofit critical buildings • **Increase the ability to respond to or be prepared for the hazard:** ○ Keep cash reserves for reconstruction ○ Support and implement hazard disclosure for sale of property in risk zones. ○ Solicit cost-sharing through partnerships with others on projects with multiple benefits.	• **Reduce the probability of hazard events:** ○ Maintain drainage system ○ Institute low-impact development techniques on property ○ Dredging, levee construction, and providing regional retention areas ○ Structural flood control, levees, channelization, or revetments. ○ Stormwater management regulations and master planning ○ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff ○ Adopt "no-adverse impact" floodplain management policies that strive to not increase the flood risk on downstream communities. • **Limit risk to new development/ redevelopment:** ○ Locate or relocate critical facilities outside of hazard area ○ Acquire or relocate identified repetitive loss properties ○ Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks. ○ Adopt land development criteria such as planned unit developments, density transfers, clustering ○ Institute low impact development techniques on property ○ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff ○ Adopt regulatory standards such as freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold; compensatory storage, non-conversion deed restrictions. ○ Stormwater management regulations and master planning. • **Reduce risk to existing structures:** ○ Harden infrastructure, bridge replacement program ○ Provide redundancy for critical functions and infrastructure • **Increase the ability to respond to or be prepared for the hazard:** ○ Produce better hazard maps ○ Provide technical information and guidance ○ Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information) ○ Incorporate retrofitting or replacement of critical system elements in capital improvement plan ○ Develop strategy to take advantage of post-disaster opportunities ○ Warehouse critical infrastructure components ○ Develop and adopt a continuity of operations plan ○ Consider participation in the Community Rating System ○ Maintain and collect data to define risks and vulnerability ○ Train emergency responders ○ Create an elevation inventory of structures in the floodplain ○ Develop and implement a public information strategy ○ Charge a hazard mitigation fee ○ Integrate floodplain management policies into other planning mechanisms within the planning area. ○ Consider the probable impacts of climate change on the risk associated with the flood hazard ○ Consider the residual risk associated with structural flood control in future land use decisions ○ Enforce National Flood Insurance Program ○ Adopt a Stormwater Management Master Plan

Table 19-5. Alternatives to Mitigate the Severe Weather Hazard

Community Scale	Organizational Scale	Government Scale
• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ None • **Reduce risk to existing structures:** ○ Insulate house ○ Provide redundant heat and power ○ Insulate structure ○ Plant appropriate trees near home and power lines ("Right tree, right place" National Arbor Day Foundation Program) • **Increase the ability to respond to or be prepared for the hazard:** ○ Trim or remove trees that could affect power lines ○ Promote 72-hour self-sufficiency ○ Obtain a NOAA weather radio. ○ Obtain an emergency generator.	• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ Relocate critical infrastructure such as power lines to meet performance expectations • **Reduce risk to existing structures:** ○ Relocate critical infrastructure (such as power lines) underground ○ Reinforce critical infrastructure such as power lines to meet performance expectations ○ Install tree wire • **Increase the ability to respond to or be prepared for the hazard:** ○ Trim or remove trees that could affect power lines ○ Create redundancy ○ Equip facilities with a NOAA weather radio ○ Equip vital facilities with emergency power sources.	• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ None • **Reduce risk to existing structures:** ○ Harden infrastructure such as locating utilities underground ○ Trim trees back from power lines • **Increase the ability to respond to or be prepared for the hazard:** ○ Designate snow routes and strengthen critical road sections and bridges ○ Support programs such as "Tree Watch" that proactively manage problem areas through use of selective removal of hazardous trees, tree replacement, etc. ○ Establish and enforce building codes that require all roofs to withstand snow loads ○ Increase communication alternatives ○ Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors. ○ Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines ○ Provide NOAA weather radios to the public

Table 19-6. Alternatives to Mitigate the Wildfire Hazard

Community Scale	Organizational Scale	Government Scale
• **Reduce the probability of hazard events:** ○ Clear potential fuels on property such as dry overgrown underbrush and diseased trees • **Limit risk to new development/ redevelopment:** ○ Locate outside of hazard area ○ Create and maintain defensible space around structures ○ Use fire-retardant building materials • **Reduce risk to existing structures:** ○ Mow regularly ○ Create and maintain defensible space around homes and provide water on site ○ Install/replace roofing material with non-combustible roofing materials. • **Increase the ability to respond to or be prepared for the hazard:** ○ Employ techniques from the National Fire Protection Association's Firewise Communities program to safeguard home ○ Identify alternative water supplies for fire fighting	• **Reduce the probability of hazard events:** ○ Clear potential fuels on property such as dry underbrush and diseased trees • **Limit risk to new development/ redevelopment:** ○ Locate outside of hazard area ○ Use fire-retardant building materials ○ Use fire-resistant plantings in buffer areas of high wildfire threat. • **Reduce risk to existing structures:** ○ Create and maintain defensible space around structures and infrastructure and provide water on site ○ Use fire-resistant plantings in buffer areas of high wildfire threat. • **Increase the ability to respond to or be prepared for the hazard:** ○ Support Firewise community initiatives. ○ Create /establish stored water supplies to be used for firefighting.	• **Reduce the probability of hazard events:** ○ Clear potential fuels on property such as dry underbrush and diseased trees ○ Implement best management practices on public lands. • **Limit risk to new development/ redevelopment:** ○ Create and maintain defensible space around structures and infrastructure ○ Locate outside of hazard area ○ Enhance building code to include use of fire resistant materials in high hazard area. ○ Use fire-retardant building materials ○ Use fire-resistant plantings in buffer areas of high wildfire threat. ○ Consider higher regulatory standards (such as Class A roofing) ○ Establish biomass reclamation initiatives • **Reduce risk to existing structures:** ○ Create and maintain defensible space around structures and infrastructure ○ Use fire-retardant building materials ○ Use fire-resistant plantings in buffer areas of high wildfire threat. • **Increase the ability to respond to or be prepared for the hazard:** ○ More public outreach and education efforts, including an active Firewise program ○ Possible weapons of mass destruction funds available to enhance fire capability in high-risk areas ○ Identify fire response and alternative evacuation routes ○ Seek alternative water supplies ○ Become a Firewise community ○ Use academia to study impacts/solutions to wildfire risk ○ Establish/maintain mutual aid agreements between fire service agencies. ○ Create/implement fire plans ○ Consider the probable impacts of climate change on the risk associated with the wildfire hazard in future land use decisions

Table 19-7. Alternatives to Mitigate Health Hazards

Community Scale	Organizational Scale	Government Scale
• **Reduce the probability of hazard events:** ○ Eliminate or reduce environments on private property that favor mosquito infestation • **Limit risk to new development/ redevelopment:** ○ None • **Reduce risk to existing structures:** ○ None • **Increase the ability to respond to or be prepared for the hazard:** ○ Immunization ○ Get informed	• **Reduce the probability of hazard events:** ○ Eliminate or reduce environments on private property that favor mosquito infestation • **Limit risk to new development/ redevelopment:** ○ None • **Reduce risk to existing structures:** ○ None • **Increase the ability to respond to or be prepared for the hazard:** ○ Immunize employees ○ Inform employees on human health hazards	• **Reduce the probability of hazard events:** ○ Mosquito abatement ○ Eliminate or reduce environments on public property that favor mosquito infestation • **Limit risk to new development/ redevelopment:** ○ None • **Reduce risk to existing structures:** ○ None • **Increase the ability to respond to or be prepared for the hazard:** ○ Immunize employees ○ Collaborate with the Placer County Health Department to ensure the health and welfare of the community ○ Public education on mosquito abatement and general human health issues

Table 19-8. Alternatives to Mitigate Human-Cause Hazards

Community Scale	Organizational Scale	Government Scale
• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ None • **Reduce risk to existing structures:** ○ None • **Increase the ability to respond to or be prepared for the hazard:** ○ Increase awareness of vulnerability to threats ○ Neighborhood watch program ○ Keep informed ○ Develop an emergency response plan ○ Report suspicious activities	• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ Incorporate anti-terrorism and security mitigation measures in site and layout design of facilities ○ Consider site security in landscape design of facilities • **Reduce risk to existing structures:** ○ Restrict access by implementing controlled access zones ○ Increase security measures ○ Install physical barriers around critical facilities ○ Employ parking restrictions as a means to reduce vulnerability • **Increase the ability to respond to or be prepared for the hazard:** ○ Become a partner (stakeholder) in mitigation and prevention ○ Educate employees ○ Develop an emergency response plan ○ Develop a Continuity of Operations Plan ○ Use liberal signage techniques to inform and increase capability of users of facilities	• **Reduce the probability of hazard events:** ○ None • **Limit risk to new development/ redevelopment:** ○ Construct new critical facilities with clear zones. ○ Retrofit existing critical facilities • **Reduce risk to existing structures:** ○ Restrict access by implementing controlled access zones ○ Reduce single-point vulnerabilities such as: redundancy for critical lifelines and infrastructure ○ Install physical barriers around critical facilities ○ Provide regular education to personnel regarding cyber attacks • **Increase the ability to respond to or be prepared for the hazard:** ○ Educate public on threats and vulnerability ○ Enhance emergency response capability by contingency planning for specific events based on identified vulnerabilities ○ Consider performance-based zoning as a land use alternative to mitigate impacts of human-caused hazards ○ Employ Crime Prevention Through Environmental Design (CPTED techniques in design of public facilities ○ Consider providing incentives for mitigation ○ Develop a City THIRA ○ Establish secure communications between multiple entities to communicate sensitive information.

19.2 CLIMATE CHANGE BEST MANAGEMENT PRACTICES

19.2.1 General Approaches

Communities and governments worldwide are working to address, evaluate and prepare for climate changes that are likely to affect communities in coming decades. Generally, climate change discussions encompass two separate but inter-related considerations: mitigation and adaptation. The term "mitigation" can be confusing because its meaning changes across disciplines:

- Mitigation in emergency management—as generally addressed in this hazard mitigation plan—is typically defined as the effort to reduce loss of life and property by lessening the impact of disasters.
- Mitigation in climate change discussions is defined as a human intervention to reduce effects on the climate system. It includes strategies to reduce greenhouse gas sources and emissions and enhance greenhouse gas sinks.

Adaptation refers to adjustments in natural or human systems in response to actual or anticipated effects of climate change. These adjustments may moderate harm or exploit beneficial opportunities. Mitigation and adaptation are related, as the world's ability to reduce greenhouse gas emissions will affect the degree of

adaptation that will be necessary. Some initiatives and actions can both reduce greenhouse gas emissions and support adaptation to likely future conditions.

Societies across the world need to adapt to climate change. Farmers are altering crops and agricultural methods to deal with changing rainfall and rising temperature; architects and engineers are redesigning buildings; planners are looking at managing water supplies to deal with droughts or flooding.

19.2.2 Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences" (IPCC, 2014). The following are general alternatives that can be considered to build capacity for adapting to current and future risks associated with climate change:

- Incorporate climate change adaptation into relevant local and regional plans and projects.
- Establish a climate change adaptation and hazard mitigation public outreach and education program.
- Build collaborative relationships between regional entities and neighboring communities to promote complementary adaptation and mitigation strategy development and regional approaches.
- Establish an ongoing monitoring program to track local and regional climate impacts and adaptation strategy effectiveness.
- Increase participation of low-income, immigrant, non-English-speaking, racially and ethnically diverse, and special-needs residents in planning and implementation.
- Ask local employers and business associations to participate in local efforts to address climate change and natural hazard risk reduction.
- Conduct a communitywide assessment and develop a program to address health, socioeconomic, and equity vulnerabilities.
- Focus planning and intervention programs on neighborhoods that currently experience social or environmental injustice or bear a disproportionate burden of potential public health impacts.
- Use performance metrics and data to evaluate and monitor the impacts of climate change and natural hazard risk reduction strategies on public health and social equity.
- Develop coordinated plans for mitigating future flood and related impacts through concurrent adoption of updated general plan safety elements and local hazard mitigation plans.
- Update safety elements to reflect existing hazards and projected climate change impacts on hazards.
- Implement general plan safety elements through zoning and subdivision practices that restrict development in floodplains and other natural hazard areas.
- Identify and protect locations where native species may shift or lose habitat due to climate change impacts (sea level rise, loss of wetlands, warmer temperatures, drought).
- Collaborate with agencies managing public lands to identify, develop, or maintain corridors and linkages between undeveloped areas.
- Promote economic diversity.
- Incorporate consideration of climate change impacts as part of infrastructure planning and operations.

- Conduct a climate impact assessment on community infrastructure.
- Identify gaps in legal and regulatory capabilities and develop ordinances or guidelines to address them.
- Identify and pursue new sources of funding for mitigation and adaptation activities.
- Hire new staff or provide training to current staff to ensure an adequate level of administrative and technical capability to pursue mitigation and adaptation activities.

19.2.3 Ecosystem-Based Adaptation

Adaptive capacity goes beyond human systems. Some ecosystems can adapt to change and buffer surrounding areas from the effects of change. Forests can bind soils and hold large volumes of water, releasing it through the year; floodplains can absorb water during peak flows; coastal ecosystems can attenuate waves and reduce erosion. Other ecosystem services—such as food provision, timber, materials, medicines, and recreation—can provide buffers in the face of changing conditions.

Ecosystem-based adaptation is the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change. This includes the sustainable management, conservation and restoration of specific ecosystems that provide key services. Most ecosystems show a remarkable ability to adapt to change and to buffer surrounding areas from the impacts of change.

20. ACTION PLAN

20.1 STATUS OF PREVIOUS ACTIONS

20.1.1 Mitigation Actions

The 2016 Multi-Hazard Mitigation Plan identified 62 mitigation actions for implementation. For the current update, each action was reviewed to determine whether it had been completed, was in progress or had not been started. Incomplete actions were reviewed to determine if they should be carried over to the current update or removed from the plan due to a change in priorities, capabilities, or feasibility.

The review found that 56 of the identified actions (90 percent) have been started or completed. Of the remaining actions, 53 (85 percent) are carried over to the current update. Four actions from the previous plan (6 percent) were withdrawn based on changed circumstances. The actions were withdrawn as no longer being considered feasible as written or no longer applicable to the hazards identified in the risk assessment. Two were rewritten to represent the city's current priorities. The status of each previous action is presented in Appendix D.

20.1.2 Integration Actions

The 2016 Multi-Hazard Mitigation Plan identified 24 actions related to plan integration. These are ongoing initiatives and have been carried over into the current update. During the performance period of the 2016 plan update, 21 of the identified actions resulted in measurable integration of hazard-mitigation goals, risk assessment, or recommendations into the following plans and programs:

- Specific Plans and Specific Plan Amendments
- Master Drainage Plan requirements for Specific Plans
- Watershed Flood Control Plans
- Emergency Response and Post-Disaster Plans

20.2 ACTION PLAN

The Steering Committee reviewed the catalogs of hazard mitigation alternatives and selected actions to be included in a hazard mitigation action plan. The selection of actions was based on the risk assessment of identified hazards of concern and the defined Roseville hazard mitigation goals and objectives. Table 20-1 lists the recommended hazard mitigation actions that make up the action plan.

Actions numbers include codes as follows to indicate which hazards they address:

- D = drought
- DF = dam failure
- EQ = earthquake
- F = flood
- HC = human-caused
- HH = human health
- MH = multiple hazards
- SW = severe weather
- WF = wildfire

Table 20-1. Action Plan

Benefits New or Existing Assets	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action D-2—Implement aquifer storage and recovery program that uses direct injection technique in areas identified as appropriate.					
Hazards Mitigated: Drought					
Both	6, 8	Environmental Utilities Department (EUD)	Medium	Water Construction Fund	Long-term
Action D-3—Continue to implement the Environmental Utility Department's recycled water program and seek all opportunities to expand its coverage, currently focusing on urban growth areas. The City pumps recycled water through a system of purple pipes completely separate from potable (drinking water) pipes. The City pumps the recycled water to customers such as streetscapes, golf courses and parks, where it irrigates turf and shrubs. Using recycled water for uses such as landscape irrigation reduces demand on the potable water system, creating a more reliable water supply for the entire City. Recycled water is not subject to the effects of drought.					
Hazards Mitigated: Drought					
Both	6, 8	EUD	Low	Water utility rates, developer-based fees under specific plan requirements	Short-term
Action D-4—Promote active water conservation techniques and strategies to private property owners through Roseville-sponsored outreach projects such as printed media and the City's website.					
Hazards Mitigated: Drought					
Both	5, 9	EUD	Low	General Fund	Short-term
Action DF-1—Create a dam failure element for the City's emergency response plan that includes a phased warning protocol in response to the findings of the Folsom Dam Containment Dike Risk Assessment.					
Hazards Mitigated: Dam Failure					
Both	2, 3, 4, 9	Roseville Police and Fire	Low	General Fund; Department of Homeland Security (DHS) grant funding	Short-term
Action EQ-1—Perform building-specific, structural seismic vulnerability assessment of City-owned critical facilities constructed prior to 1980 (including infrastructure). Included in this assessment will be recommended mitigation alternatives that meet goals and objectives of this Plan.					
Hazards Mitigated: Earthquake					
Existing	5, 10	Development Services Department	Medium	General Fund, BRIC	Long-term
Action EQ-2—Incorporate earthquake mitigation measures for private property into existing City-sponsored outreach programs such as printed media and the City's website.					
Hazards Mitigated: Earthquake					
Both	1, 9, 10, 11	Development Services Department	Low	General Fund	Short-term
Action EQ-3—Reassess the overall vulnerability to the earthquake hazard using the best available science and technology as it becomes available. State-sponsored programs, Seismic Hazards Mapping Act, and future FEMA- sponsored initiatives are anticipated to create a wealth of knowledge regarding this hazard that did not exist during the preparation of this Plan.					
Hazards Mitigated: Earthquake					
Both	1, 5, 7, 9	Development Services Department	Low	General Fund, BRIC	Short-term

Benefits New or Existing Assets	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action F-1—The City shall designate all areas identified as the 100-year floodplain. The boundaries of the 100-year floodplain shall be as specified in the floodplain designations section of this component of the City's General Plan. Floodplain areas shall be preserved as specified in the open space and conservation element. Such preservation may include required dedication to the City. If needed, modify the City's ordinances to include floodplain use regulations consistent with the goals, policies, and implementation measures of the safety, land use, open space and conservation, and parks and recreation elements of the City's General Plan.					
Hazards Mitigated: Flood					
Both	1, 6, 7	Development Services Department	Low	General Fund	Long-term
Action F-2—Refer any development proposal that has a direct or indirect impact on flood protection to Public Works for comment. In addition, forward such proposals to other agencies as applicable, including the U.S. Army Corps of Engineers, California Central Valley Flood Protection Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and Placer County Flood Control District. Consider the comments of the agencies during the development review process.					
Hazards Mitigated: Flood					
New	1, 5, 7	Development Services Department	Low	General Fund	Short-term
Action F-3—Continue City participation in the National Flood Insurance Program and the Community Rating System (CRS). Seek CRS classification improvements within capabilities of City programs, including adoption and administration of FEMA-approved ordinances and flood insurance rate maps (FIRM).					
Hazards Mitigated: Flood					
Both	1, 5, 9	Public Works Department	Low	General Fund	Ongoing
Action F-4—Maintain Roseville's compliance and good standing under the National Flood Insurance program.					
Hazards Mitigated: Flood					
Both	2, 3, 4, 5, 10	Public Works Department	Low	General Fund	Ongoing
Action F-5—Continue the City's outreach program to flood-prone property owners and the citizens of Roseville, to help make them aware of the flood threat and how best to deal with them. This includes a full-page message in the City's Summer Recreation Guide which is mailed to all Roseville households. Additionally, messages are shared through the City's utility mailer inserts, email newsletter, website, video, social media channels, and news media throughout the year.					
Hazards Mitigated: Flood					
Both	5, 9	Public Works Department	Low	General Fund	Ongoing
Action F-6—Continue to pursue a regional approach to flood issues by remaining actively involved in the Placer County Flood Control District. This involvement includes cooperation in the development of a comprehensive regional database. Continue to participate in regional flooding studies, including the Auburn Creek/Coon Creek/Pleasant Grove Creek flood mitigation plan (i.e., Natomas Cross Canal Watershed Plan) and the Dry Creek Watershed Flood Control Plan.					
Hazards Mitigated: Flood					
Both	1, 5, 7	Public Works Department	Low	General Fund	Ongoing
Action F-7—Continue City coordination with other agencies on issues of flood control. Coordination between the City and adjacent jurisdictions occurs through several mechanisms, including distribution of development proposals for review and comment. Continue City cooperation with federal, state, and local agencies, including the U.S. Army Corps of Engineers, California Central Valley Flood Protection Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and the Placer County Flood Control District.					
Hazards Mitigated: Flood					
Both	1, 5, 7	Public Works Department	Low	General Fund	Ongoing
Action F-8—Continue to develop, implement, and expand the Flood Alert and Early Warning Program systems and integrate the systems with other local jurisdictions to form a regional warning program.					
Hazards Mitigated: Flood					
Both	2, 3	Public Works Department	Medium	General Fund; Possible grant funding (BRIC, HMGP, and FMA)	Ongoing

Benefits New or Existing Assets	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action F-9—Ensure that future specific plans and specific plan amendments are consistent with the goals and policies of the General Plan. The specific plans shall include the designation and preservation of floodplain areas and adjacent habitat. Provisions shall be incorporated to ensure that public infrastructure, utilities, and emergency services remain functional during flood conditions. Such infrastructure and facilities include water, sewer and gas mains, telephone and electric lines, streets and bridges, hospitals, and fire and police stations. Financing mechanisms shall be explored to fund necessary flood protection improvements and maintenance. Development agreements may be used to secure implementation and funding provisions.					
Hazards Mitigated: Flood					
New	1, 6, 7, 8	Development Services Department	Low	Specific plans have 100% cost recovery by developers	Long-term
Action F-10—Monitor and regularly update City flood studies, modeling, and associated land use, zoning, and other development regulations at a minimum of every 5 years or whenever information becomes available that would significantly modify previous data. New information could include new studies, change in City policy, consideration of a major development project or specific plan, or implementation of a flood control project.					
Hazards Mitigated: Flood					
Both	1, 5, 7	Public Works Department	Medium	General Fund; FEMA map modernization; Developer-based funding and specific plan requirements	Ongoing
Action F-11—Require a master drainage plan as part of the approval process for all specific plans and large development projects as determined by the Public Works director. The master drainage plan should consider cumulative regional drainage and flooding mitigation. The plan's intent is to ensure that the overall rate of runoff from a project does not exceed predevelopment levels. If necessary, this objective shall be achieved by incorporating run-off control measures to minimize peak flows and/or assistance in financing or otherwise implementing comprehensive drainage plans.					
Hazards Mitigated: Flood					
New	1, 6, 8	Development Services Department	Medium	General Fund; Developer-based funding under specific plan requirements	Long-term
Action F-12—Continue the Parks, Recreation & Libraries Department's regular creek maintenance program within the City's creeks and floodplain areas. This program clears and removes debris that could contribute to blockage and flooding and includes vegetation removal. This is only done in areas of high risk to flood damage or where property or facilities are threatened by flooding.					
Hazards Mitigated: Flood					
Both	8	Parks, Recreation & Libraries Department: Parks Division	Medium	General Fund	Ongoing
Action F-13—Continue annual inspection and maintenance program of City storm drain systems. Review after every major storm system function and performance. This program removes debris that could contribute to blockage of the storm drain system.					
Hazards Mitigated: Flood					
Both	8	Public Works Department	Low	General Fund allocation; gas tax	Ongoing
Action F-14—Complete the final phase of the Cirby/Linda/Dry Creek flood control project (Phase 2). Six of the seven phases of this project have been completed at a cost of about $32,800,000 (in Oct. 2019 dollars). The basis for determining viability of this project will be a benefit /cost analysis to determine if project meets federal grant eligibility requirements.					
Hazards Mitigated: Flood					
Both	6, 8, 10	Public Works Department	High	General Fund; Impact fees; Grant funding (BRIC and HMGP)	Long-term
Action F-15—Analyze alternative improvements to the Cirby/Linda/Dry Creek flood control project that may be cost effective in the flood-prone areas of Roseville: Dry Creek from Darling Way to Riverside Avenue; Area on Dry Creek upstream of Folsom Road in the Columbia Avenue/Marilyn Avenue/Bonita Street area; Linda Creek near Champion Oaks Drive/Samoa Way/Hurst Way area; Cirby Creek in the Trimble Way/Zien Court area					
Hazards Mitigated: Flood					
Both	6, 8, 10	Public Works Department	Medium	General Funds; Developer-based funds, grant funding (BRIC, HMGP, and FMA)	Long-term

Benefits New or Existing Assets	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action F-17—Divert the main drainage storm drain system down Crestmont Avenue to Cirby Way and then into Dry Creek so that the existing system will not exceed capacity. If system capacity is exceeded, the intersection on Cirby Way and Crestmont Avenue and nearby homes will flood during major flood events.					
Hazards Mitigated: Flood					
Both	6, 10	Public Works Department	High	General Fund; CIP Rehab, Highway User Tax Funds, developer-based funds, grant funding (BRIC, HMGP, and FMA)	Short-term
Action F-18—Continue to promote and sponsor programs to buy out, relocate, and flood-proof existing flood-prone structures within Roseville.					
Hazards Mitigated: Flood					
Existing	6, 10	Public Works Department	Medium	Grant funding (BRIC, HMGP, and FMA)	Ongoing
Action F-20—Retrofit the City's Downtown library by sealing the exterior and installing a flood door to protect against flood damage should Dry Creek overspill the existing floodwall.					
Hazards Mitigated: Flood					
Existing	6, 10	Public Works Department	High	Grant funding (BRIC, HMGP, and FMA)	Long-term
Action F-21—Continue the Tree Mitigation Fund program administered by the Parks Division in conjunction with non-profit organizations. The planting of oak trees in the open spaces adjacent to riparian zones increases infiltration and slows storm water surges.					
Hazards Mitigated: Flood					
Both	1, 5, 7, 9	Parks, Recreation & Libraries Department: Parks Division	Low	General Fund	Ongoing
Action F-22—Manage beaver dam sites for flood control protection and habitat restoration after dam removal. One primary issue is impacts to floodwater capacity of creeks. Part of the desired comprehensive approach to beaver management includes establishment of quantitative and qualitative "carrying capacity," including acre-feet of flood capacity lost. Implement a standard monitoring and reporting process to track beaver dam locations, population, and impacts. Gain regulatory approval for beaver management techniques such as biological control and habitat manipulation using the most benign options first.					
Hazards Mitigated: Flood					
Both	1, 6, 8	Parks, Recreation & Libraries Department: Parks Division	Low	General Fund	Ongoing
Action F-23—Develop the City's multi-use, multi-benefit stormwater water retention project for volumetric flood flow mitigation within the Pleasant Grove Creek Watershed, the Pleasant Grove Stormwater Retention Facility (also referred to Reason Farms or the Al Johnson Wildlife Preserve).					
Hazards Mitigated: Flood					
Both	6, 10	Public Works Department	High	Developer-based funds, grant funding (BRIC, HMGP, and FMA)	Long-term
Action F-24—Leverage the results of the Cirby Creek Structural and Non-structural Hazard Mitigation Actions Study by: (1) Constructing a floodwall upstream of Sunrise Avenue or (2) By promoting specific non-structural actions in the flood-prone neighborhood adjacent to Cirby Creek to reduce flood hazards there.					
Hazards Mitigated: Flood					
Both	6, 10	Public Works Department, Engineering Division	High	General Fund, grant funding (BRIC, HMGP, and FMA)	Short-term
Action HC-1—Commit support to initiatives within the Sacramento-Roseville-Arden-Arcade Metropolitan Statistical Area; continue to seek funding from other federal sources to fund its initiatives					
Hazards Mitigated: Human-caused Hazards					
Both	2, 7	Police and Fire Department	Medium	General Fund	Ongoing

Benefits New or Existing Assets	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HC-2—Enhance emergency response capability of City by contingency planning for specific events based on identified vulnerabilities.					
Hazards Mitigated: Human-caused Hazards					
Both	2, 3, 4, 9	Police and Fire Department	Medium	General Fund; DHS grant funding	Short-term
Action HC-3—Seek to establish appropriate staffing levels of public safety personnel to address vulnerabilities identified through an incremental targeted study that provides immediate needs as well as anticipated needs in 1 year, 5 years, and 10 years.					
Hazards Mitigated: Human-caused Hazards					
Both	2, 4	City Council	Low	General Fund	Short-term
Action HC-4—Prepare a site-specific vulnerability assessment of City-owned critical facilities that use the best available science and technology with regards to human-caused hazards.					
Hazards Mitigated: Human-caused Hazards					
Both	2, 5, 7	Police and Fire Department	Medium	General Fund; DHS grant funding	Short-term
Action HC-5—Address vulnerabilities identified in vulnerability assessment of water facilities performed by the Environmental Utilities Department in response to EPA initiative.					
Hazards Mitigated: Human-caused Hazards					
Both	5, 7	EUD	Low	EUD CIP, and EPA grant funding	Long-term
Action HC-6—Support first responding agencies during emergencies by adhering to state and local laws for the inventory, storage, and maintenance of the utility's hazardous materials.					
Hazards Mitigated: Human-caused Hazards					
Both	5, 7	Roseville Electric Utility	Medium	REU - Generation, Operations, and Engineering Operating Budgets	Ongoing
Action HC-7—Maintain compliance with federal, state, and local laws and regulations for the operation and generation of the Roseville's power plants and the utility's engineering & operational activities.					
Hazards Mitigated: Human-caused Hazards					
Both	2, 5, 7	Roseville Electric Utility	Medium	REU - Generation, Operations, and Engineering Operating Budgets	Ongoing
Action HC-9—Protect the City's data, technology infrastructure and staff against malicious cyber-attacks and Cyber terrorism, such as but not limited to: • Identity and data theft • Virus/Malware/Ransomware/Spyware/Spam/Phishing • Network and system attacks • Web applications and database hacking • Denial-of-service attacks					
Hazards Mitigated: Human-caused Hazards					
Both	2, 5, 7	Information Technology Division	High	General Fund	Ongoing
Action HC-10—Improve evacuation transportation routes within the City of Roseville by removing traffic constrictions.					
Hazards Mitigated: Human Health Hazards					
Existing	6, 10	Public Works Department	High	Developer-based funds, grant funding (BRIC, HMGP, and FEMA)	Long-term
Action HH-1—Continue to collaborate with the Placer County Health Department to ensure the health and welfare of the community.					
Hazards Mitigated: Human Health Hazards					
Existing	5, 6, 7, 9	Police and Fire Department	High	General Fund	Ongoing

Benefits New or Existing Assets	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action HH-2—Support the public education efforts of the Placer County Health Department and the Placer Mosquito & Vector Control District. This includes sharing important health and safety information through the City's communication channels, including but not limited to email newsletters, social media channels, video updates, website, collateral materials, and news media.					
Hazards Mitigated: Human Health Hazards					
New	5, 6, 7, 9	Public Affairs & Communications Department	Low	General Fund	Ongoing
Action HH-3—Collaborate with the Placer County Mosquito Abatement District to review resource protection policies that conflict with human health protection in the City of Roseville and work to resolve these policy issues.					
Hazards Mitigated: Human Health Hazards					
Both	5, 6, 7, 9	City Manager's Office	Low	General Fund	Ongoing
Action MH-1—Continue to maintain Office of Emergency Services certification of all City inspectors for post-disaster damage assessment.					
Hazards Mitigated: Dam Failure, Earthquake, Flood, Severe Weather, Wildfire					
Existing	2, 7	Development Services Department	Low	General Fund	Ongoing
Action MH-2—Continue to maintain the hazard mitigation page on City website that provides following types of information: • The Hazard Management Plan and its progress reports • Hazard-specific information • Mitigation information by hazard, with specific emphasis on private property • Emergency response and warning information • Links to county, state, and federal related agencies					
Hazards Mitigated: Dam Failure, Drought, Earthquake, Flood, Severe Weather, Wildfire, Human-caused Hazards, Human Health Hazards					
Both	2, 3, 5, 6, 9	Public Affairs & Communications Department	Low	General Fund; BRIC	Ongoing
Action MH-3—Establish/maintain a post-disaster action plan to be part of the City Emergency operations plan that will include following elements: • Procedures for public information • Post-disaster damage assessment • Grant writing • Code enforcement • Redundant operations					
Hazards Mitigated: Dam Failure, Drought, Earthquake, Flood, Severe Weather, Wildfire, Human-caused Hazards, Human Health Hazards					
New	2, 3, 4, 7	Police and Fire Department	Low	General Fund; BRIC	Short-term
Action MH-4—Implement an "Adopt an Open Space" program in coordination with the open space management program. Develop "adoption contracts" with neighborhoods, organizations, businesses, etc., describing the level of stewardship and the terms of the "adoption." Publicize these activities through online resource directory and other media to encourage participation through the Dry Creek Conservancy.					
Hazards Mitigated: Dam Failure, Flood, Severe Weather, Wildfire					
Both	1, 5, 7, 9	Parks, Recreation & Libraries Department: Parks Division	Low	General Fund; Community Facilities District funding; BRIC grant funding	Ongoing
Action MH-5—Develop and disseminate best practices information to private property owners whose land is adjacent to open space areas describing stewardship opportunities and owners' role in preserving beneficial uses of open space areas (including vernal pool grassland and creek or riparian uses). Offer classes to provide in-depth information, such as demonstration projects, techniques for ecologically friendly weed abatement and vegetation control, and creating a backyard habitat compatible with open space areas.					
Hazards Mitigated: Dam Failure, Flood, Severe Weather, Wildfire					
Both	1, 5, 7, 9	Parks, Recreation & Libraries Department: Parks Division	Low	General Fund; BRIC	Short-term

Benefits New or Existing Assets	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action MH-6—Work with the Roseville City School District, local high school districts, and non-profit organizations to promote ecology-oriented curricula and stewardship activities. Identify resource and administrative barriers that may be limiting schools' abilities to more actively participate in stewardship, and work collaboratively to identify solutions.					
Hazards Mitigated: Dam Failure, Drought, Flood, Severe Weather, Wildfire					
Both	1, 5, 7, 9	Parks, Recreation & Libraries Department: Parks Division	Low	General Fund; BRIC	Long-term
Action MH-7—Strive to maintain high availability of essential communication services					
Hazards Mitigated: Dam Failure, Earthquake, Flood, Severe Weather, Wildfire, Human-caused Hazards, Human Health Hazards					
Both	2, 3, 4, 7	Information Technology Division	Low	EUD CIP, General Fund	Ongoing
Action MH-8—Secure the City's physical locations that contain technology infrastructure					
Hazards Mitigated: Dam Failure, Earthquake, Flood, Severe Weather, Wildfire, Human-caused Hazards					
Existing	2, 3, 4, 7	Information Technology Division	Low	EUD CIP, General Fund	Ongoing
Action MH-9—Work towards implementing the Multi-Hazard Mitigation Plan and associated action items.					
Hazards Mitigated: Dam Failure, Drought, Earthquake, Flood, Severe Weather, Wildfire, Human-caused Hazards, Human Health Hazards					
Both	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	Coordination among all city departments	Low	Staff Time, General Fund	Short-term
Action MH-10—Enhance the efficiency of the City's emergency operations and public communication by creating a dedicated space for Public Information Officers within an existing City building.					
Hazards Mitigated: Dam Failure, Drought, Earthquake, Flood, Severe Weather, Wildfire, Human-caused Hazards, Human Health Hazards					
Existing	2, 6	Public Affairs & Communications Department	Medium	General Fund	Short-term
Action MH-11—Continued purchase of critical equipment, impacted by supply chain availability and/or regulatory requirements. These items are critical to the success (build out, maintenance) of Power Generation and Electric Operational Assets.					
Hazards Mitigated: Dam Failure, Earthquake, Flood, Severe Weather, Wildfire, Human-caused Hazards, Human Health Hazards					
Both	2, 4, 6, 11	Roseville Electric Utility	High	REU - Generation and Operations, and Engineering Operating Budgets	Ongoing
Action SW-1—Continue the Shade Tree Program, an energy conservation rebate program provided by Roseville Electric					
Hazards Mitigated: Severe Weather					
Both	7, 9	Roseville Electric Utility	Low	Roseville Electric Operational Budget	Short-term
Action SW-2—Continue ongoing line clearing and weed abatement of electrical utility facilities in order to reduce public exposure to vegetation hazards and maintain higher reliability during severe weather conditions.					
Hazards Mitigated: Severe Weather					
Existing	2	Roseville Electric Utility	High	REU - Operations and Generation Operating Budget	Ongoing
Action SW-3—Continue education/outreach programs to improve winter preparedness and minimize loss of life or injury.					
Hazards Mitigated: Severe Weather					
Both	6, 9	Police and Fire Department	Low	General Fund	Ongoing
Action SW-4—Enhance and implement strategies for debris management and removal during severe weather events.					
Hazards Mitigated: Severe Weather					
Existing	6, 8	Environmental Utilities Department (EUD)	Medium	General Fund	Short-term

Benefits New or Existing Assets	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline[a]
Action SW-5—Continue to operate the Roseville Energy Park to support the City's electrical requirements and maintain service continuity during severe weather events.					
Hazards Mitigated: Severe Weather					
Both	5, 7	Roseville Electric Utility	High	REU - Generation Operating Budget	Ongoing
Action SW-6—Continue to maintain and operate Roseville Power Plant #2 to support the City's electrical requirements and maintain service continuity during severe weather events.					
Hazards Mitigated: Severe Weather					
Existing	5, 7	Roseville Electric Utility	High	REU - Generation Operating Budget	Ongoing
Action WF-1—Continue "Goat Grazing" program for removal of grassland in areas of Roseville potentially vulnerable to wildfire. Implement goat grazing in City open space and preserve areas for fire and invasive plant species management and native plant restoration.					
Hazards Mitigated: Wildfire					
Both	6, 9	Parks, Recreation & Libraries Department: Parks Division	High	General Fund; Community Facilities District funding; BRIC grant funding	Ongoing
Action WF-2—Enhance existing City public outreach programs to include information on fire safety, defensible spaces, and areas of concern.					
Hazards Mitigated: Wildfire					
Both	6, 9	Police and Fire Department	Medium	General Fund; Grant funding under BRIC program and HMGP	Short-term

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

Acronyms used here are defined at the beginning of this volume.

20.3 ACTION PLAN PRIORITIZATION

The actions recommended in the action plan were prioritized based on the following factors:

- Cost and availability of funding
- Benefit, based on likely risk reduction to be achieved
- Number of plan objectives achieved
- Timeframe for project implementation
- Eligibility for grant funding programs

Two priorities were assigned for each action:

- A high, medium, or low priority for implementing the action
- A high, medium, or low priority for pursuing grant funding for the action

The sections below describe the analysis of benefits and costs and the assignment of the two priority ratings.

20.3.1 Benefit/Cost Review

The action plan must be prioritized according to a benefit/cost analysis of the proposed actions (44 CFR, Section 201.6(c)(3)(iii)). For this hazard mitigation plan, a qualitative benefit-cost review was performed for each action by assigning ratings for benefit and cost as follows:

- Cost:
  - **High**—Existing funding will not cover the cost of the action; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).
  - **Medium**—The action could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the action would have to be spread over multiple years.
  - **Low**—The action could be funded under the existing budget. The action is part of or can be part of an ongoing existing program.
- Benefit:
  - **High—**Action will provide an immediate reduction of risk for life and property.
  - **Medium—**Action will provide a long-term reduction of risk for life and property, or an immediate reduction in risk for property.
  - **Low—**Long-term benefits of the action are difficult to quantify in the short term.

To assign priorities, each action with a benefit rating equal to or higher than its cost rating (such as high benefit/medium cost, medium benefit/medium cost, medium benefit/low cost, etc.) was considered to be cost-beneficial. This is not the detailed level of benefit/cost analysis required for some FEMA hazard-related grant programs. Such analysis would be performed at the time a given action is being submitted for grant funding.

20.3.2 Implementation Priority

The priority for implementing each action was assigned based on the following definitions:

- **High Priority**—An action that meets multiple objectives, has benefits that exceed costs, and has a secured source of funding. Action can be completed in the short term (1 to 5 years).
- **Medium Priority**—An action that meets multiple objectives, has benefits that exceed costs, and is eligible for funding though no funding has yet been secured for it. Action can be completed in the short term (1 to 5 years) once funding is secured. Medium-priority actions become high-priority actions once funding is secured.
- **Low Priority**—An action that will mitigate the risk of a hazard, has benefits that do not exceed the costs or are difficult to quantify, has no secured source of funding, and is not eligible for any known grant funding. Action can be completed in the long term (1 to 10 years). Low-priority actions are generally "wish-list" actions. They may be eligible for grant funding from programs that have not yet been identified.

20.3.3 Grant Pursuit Priority

The priority for pursuing grant funding for each action was assigned based on the following definitions:

- **High Priority**—An action that meets identified grant eligibility requirements, has high benefits, and is listed as high or medium implementation priority; local funding options are unavailable or available local funds could be used instead for actions that are not eligible for grant funding.

- **Medium Priority**—An action that meets identified grant eligibility requirements, has medium or low benefits, and is listed as medium or low implementation priority; local funding options are unavailable.
- **Low Priority**—An action that has not been identified as meeting any grant eligibility requirements.

20.3.4 Prioritization Summary for Mitigation Actions

Table 20-2 lists the priority of each action, based on the qualitative benefit-cost review, the number of plan objectives achieved, and the availability of funding:

Table 20-2. Prioritization of Mitigation Actions

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is project Grant Eligible?	Can Project be Funded under Existing Programs/ Budgets?	Implementation Priority	Grant Priority
D-2	2	Medium	Medium	Yes	No	Yes	Medium	Low
D-3	2	High	Low	Yes	No	Yes	High	Low
D-4	2	High	Low	Yes	No	Yes	High	Low
DF-1	4	High	Low	Yes	Yes	Yes	High	High
EQ-1	2	Medium	Medium	Yes	Yes	Yes	Medium	Medium
EQ-2	4	High	Low	Yes	No	Yes	High	Low
EQ-3	4	Medium	Low	Yes	Yes	Yes	Medium	Medium
F-1	3	High	Low	Yes	No	Yes	High	Low
F-2	3	High	Low	Yes	No	Yes	High	Low
F-3	3	High	Low	Yes	No	Yes	High	Low
F-4	5	High	Low	Yes	No	Yes	High	Low
F-5	2	High	Low	Yes	No	Yes	High	Low
F-6	3	High	Low	Yes	No	Yes	High	Low
F-7	3	High	Low	Yes	No	Yes	High	Low
F-8	2	High	Medium	Yes	Yes	Yes	Medium	High
F-9	3	High	Low	Yes	No	Yes	High	Low
F-10	3	High	Medium	Yes	Yes	Yes	Medium	High
F-11	3	Medium	Medium	Yes	No	Yes	Medium	Low
F-12	1	High	Medium	Yes	Yes	Yes	Medium	High
F-13	3	Medium	Low	Yes	No	Yes	Medium	Low
F-14	3	High	High	Yes	Yes	No	Low	High
F-15	3	Medium	Medium	Yes	Yes	Yes	Medium	Medium
F-17	2	High	Medium	Yes	Yes	No	Medium	High
F-18	2	High	Medium	Yes	Yes	No	Medium	High
F-20	2	High	High	Yes	Yes	No	Low	High
F-21	4	High	Low	Yes	No	Yes	High	Low
F-22	3	High	Low	Yes	No	Yes	High	Low
F-23	2	High	High	Yes	Yes	No	Medium	High
F-24	2	High	High	Yes	Yes	No	Medium	High
HC-1	2	Medium	Low	Yes	No	Yes	Medium	Low
HC-2	4	Medium	Low	Yes	No	Yes	Medium	Low

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is project Grant Eligible?	Can Project be Funded under Existing Programs/ Budgets?	Implementation Priority	Grant Priority
HC-3	2	High	Low	Yes	No	Yes	High	Low
HC-4	3	Medium	Medium	Yes	Yes	Yes	Medium	Medium
HC-5	2	High	High	Yes	Yes	Yes	Low	High
HC-6	2	High	Low	Yes	No	Yes	High	Low
HC-7	3	High	Low	Yes	No	Yes	High	Low
HC-9	3	High	Low	Yes	No	Yes	High	Low
HC-10	2	High	High	Yes	Yes	No	Medium	High
HH-1	4	Medium	Low	Yes	No	Yes	Medium	Low
HH-2	2	High	Low	Yes	No	Yes	High	Low
HH-3	4	High	Low	Yes	No	Yes	High	Low
MH-1	2	Medium	Low	Yes	No	Yes	Medium	Low
MH-2	5	High	Low	Yes	No	Yes	High	Low
MH-3	4	Medium	Low	Yes	Yes	Yes	Medium	Medium
MH-4	4	Medium	Low	Yes	Yes	Yes	Medium	Medium
MH-5	4	Medium	Low	Yes	Yes	Yes	Medium	Medium
MH-6	4	Medium	Low	Yes	Yes	Yes	Medium	Medium
MH-7	4	High	Low	Yes	No	Yes	High	Low
MH-8	4	High	Low	Yes	No	Yes	High	Low
MH-9	11	Medium	Low	Yes	No	Yes	High	Low
MH-10	2	Medium	Medium	Yes	No	Yes	High	Low
MH-11	4	High	High	No	No	Yes	High	Low
SW-1	2	High	Low	Yes	No	Yes	High	Low
SW-2	1	High	Low	Yes	No	Yes	High	Low
SW-3	2	Medium	Low	Yes	No	Yes	Medium	Low
SW-4	2	Medium	Medium	Yes	No	Yes	Medium	Low
SW-5	2	High	Low	Yes	No	Yes	High	Low
SW-6	2	High	Low	Yes	No	Yes	High	Low
WF-1	2	High	Low	Yes	No	Yes	High	Low
WF-2	2	Medium	Low	Yes	No	Yes	Medium	Low

20.3.5 Analysis of Mitigation Actions

20.4 CLASSIFICATION OF ACTIONS

Each recommended action was classified based on the hazard it addresses and the type of mitigation it involves. Mitigation types used for this classification are as follows:

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.

- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**—Actions to inform residents and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, wetland restoration and preservation, and green infrastructure.
- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.
- **Climate Resilience**—Actions that incorporate methods to mitigate and/or adapt to the impacts of climate change. Includes aquifer storage and recovery activities, incorporating future conditions projections in project design or planning, or actions that specifically address jurisdiction-specific climate change risks, such as sea level rise or urban heat island effect.
- **Community Capacity Building**—Actions that increase or enhance local capabilities to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. Includes staff training, memorandums of understanding, development of plans and studies, and monitoring programs.

Table 20-3 shows the classification based on this analysis.

Table 20-3. Analysis of Mitigation Actions

Hazard	Actions That Address the Hazard, by Mitigation Type							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilience	Community Capacity Building
High-Risk Hazards								
Earthquake	EQ-3, MH-2, MH-3	EQ-1, MH-8	EQ-2, MH-10		MH-1, MH-7, MH-11			EQ-1, EQ-3, MH-3, MH-9
Severe Weather	SW-1, SW-6, MH-2, MH-3, MH-4	SW-2, SW-4, MH-8	SW-3, MH-5, MH-6, MH-10	MH-4	SW-5, MH-1, MH-7, MH-11		SW-1	MH-3, MH-4, MH-6, MH-9
Medium-Risk Hazards								
Flood	F-1, F-2, F-3, F-4, F-6, F-7, F-9, F-10, F-11, F-21, F-22, MH-2, MH-3, MH-4	F-13, F-18, F-20, MH-8	F-5, MH-5, MH-6, MH-10	F-1, F-21, F-22, F-23, MH-4	F-8, F-12, MH-1, MH-7, MH-11	F-14, F-15, F-17, F-23, F-24		F-3, F-6, F-7, F-9, F-10, F-11, F-12, F-13, F-21, MH-3, MH-4, MH-6, MH-9
Dam Failure	MH-2, MH-3, MH-4	MH-8	MH-5, MH-6, MH-10	MH-4	DF-1, MH-1, MH-7, MH-11			DF-1, MH-3, MH-4, MH-6, MH-9

Hazard	Actions That Address the Hazard, by Mitigation Type							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilience	Community Capacity Building
Wildfire	WF-1, MH-2, MH-3, MH-4	MH-8	WF-2, MH-5, MH-6, MH-10	MH-4	MH-1, MH-7, MH-11			MH-3, MH-4, MH-6, MH-9
Low-Risk Hazards								
Drought	D-2, D-3, D-4, MH-2, MH-3		D-4, MH-6, MH-10				D-2, D-3, D-4	D-3, MH-3, MH-6, MH-9
Unranked Hazards								
Health Hazards	HH-1, HH-2, MH-2, MH-3		HH-2, MH-10		MH-7, MH-11			HH-1, HH-2, HH-3, MH-3, MH-9
Human-Caused Hazards	HC-3, HC-5, HC-6, HC-7, HC-9, MH-2, MH-3	HC-4, MH-8	MH-10		HC-1, HC-2, HC-3, HC-6, HC-10, MH-7, MH-11			HC-1, HC-3, HC-4, HC-5, MH-3, MH-9

21. PLAN ADOPTION, IMPLEMENTATION AND MAINTENANCE

21.1 ADOPTION

A hazard mitigation plan must document that it has been formally adopted by the governing body of the jurisdiction requesting federal approval of the plan (44 CFR Section 201.6(c)(5)). DMA compliance and its benefits cannot be achieved until the plan is adopted. This plan will be submitted for review prior to adoption to Cal OES and FEMA. Once pre-adoption approval has been provided, the City will formally adopt the plan. FEMA's letter of approval and the City's adoption resolution will be provided in Appendix E.

21.2 PLAN IMPLEMENTATION

The effectiveness of the hazard mitigation plan depends on its implementation and incorporation of its action items into existing local plans, policies and programs. Together, the action items in the Plan provide a framework for activities that the City can implement over the next 5 years. The planning team and the Steering Committee have established goals and objectives and have prioritized mitigation actions that will be implemented through existing plans, policies, and programs.

The Roseville City Manager's Office and the Development Services Department will be jointly responsible for overseeing the Plan's implementation and maintenance through existing City programs. The Deputy City Manager or designated appointee will assume lead responsibility for facilitating plan implementation and maintenance meetings. Although the City Manager's Office will have primary department responsibility for review, coordination, and promotion, plan implementation and evaluation will be a shared responsibility among all departments and agencies identified as lead agencies in the mitigation action plan (Table 20-1).

21.3 PLAN MAINTENANCE

Plan maintenance is the formal process for achieving the following:

- Incorporating the mitigation strategies outlined in this plan into existing planning mechanisms and programs, such as any relevant comprehensive land-use planning process, capital improvement planning process, and building code enforcement and implementation
- Ensuring that the hazard mitigation plan remains an active and relevant document and that the City maintains its eligibility for applicable funding sources
- Monitoring and evaluating the plan annually and producing an updated plan every five years
- Integrating public participation throughout the plan maintenance and implementation process

To achieve these ends, a hazard mitigation plan must present a plan maintenance process that includes the following (44 CFR Section 201.6(c)(4)):

- A method and schedule for monitoring, evaluating, and updating the mitigation plan
- A process for incorporating the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate
- A strategy for continuing public participation through the plan maintenance process.

This section details the formal process that will ensure that the hazard mitigation plan remains an active and relevant document and that the City of Roseville maintains its eligibility for applicable funding sources. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing an updated plan every five years. This section also describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in this Plan will be incorporated into existing planning mechanisms and programs, such as comprehensive land-use planning processes, capital improvement planning, and building code enforcement and implementation. The Plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant.

21.3.1 Incorporation into Other Planning Mechanisms

The City views the General Plan and the hazard mitigation plan as complementary documents that work together to reduce risk exposure to the citizens of Roseville. A comprehensive update to the General Plan will trigger an update to the hazard mitigation plan. Many of the ongoing recommendations identified in the current hazard mitigation plan are programs recommended by the General Plan. Processes and programs that the City will coordinate with the hazard mitigation plan recommendations include the following:

- City emergency response plan
- Capital improvement programs
- Roseville municipal code
- Community design guidelines
- Stormwater management program

Implementation of the 2023 mitigation action plan will enhance and expand the City's previous and ongoing integration efforts. Inter-agency coordination that occurred during the planning process through involvement by local, regional, state, and federal stakeholders will continue through the plan maintenance period. As the plan is implemented, all City agencies will use information from this updated plan as the best available science and data on natural hazards impacting the City of Roseville.

The current action plan includes 30 actions related to plan integration. Some action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation.

21.3.2 Plan Monitoring and Evaluation

The City will monitor the plan by tracking the status of all recommended mitigation actions in the action plan. The plan will be evaluated by how successfully the implementation of identified actions has helped to achieve the

plan goals and objectives. This will be assessed by a review of the changes in risk that occur over the performance period and by the degree to which mitigation goals and objectives are incorporated into existing plans, policies and programs.

21.3.3 Annual Progress Report

The City will prepare a formal annual report on the progress of the current Plan. An annual progress report will provide the City with a streamlined approach for fulfilling update requirements delineated in 44 CFR 201.6(d)(3) during the next plan update initiative. The objective of the progress report will be to evaluate the progress of individual actions. The review will include the following:

- Summary of any hazard events that occurred during the prior year and their impact on the planning area
- Review of successful mitigation actions identified in the 2016 Plan
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term project because of funding availability)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impacts of any other planning programs or actions in the City that involve hazard mitigation

This report will be used as follows:

- Posted on the City website on the page dedicated to the hazard mitigation plan
- Announced on multiple social media platforms
- Provided to the local media through a press release
- Presented to the Roseville City Council
- Provided as part of the CRS annual re-certification package.

The CRS program requires an annual recertification to be submitted by October 1 of every calendar year for which the community has not received a formal audit. To meet this recertification timeline, the City will strive to complete the progress report process between June and September every year.

21.3.4 Plan Update

FEMA requires the hazard mitigation plan to be revised and resubmitted for review and approval by Cal OES and FEMA prior to the five-year anniversary date of the plan's adoption in order to remain eligible for benefits under the DMA (44 CFR, Section 201.6(d)(3)). The City of Roseville intends to update its hazard mitigation plan on a 5-year cycle. This cycle may be accelerated to less than 5 years based on the following triggers:

- A presidential disaster declaration that impacts the City of Roseville
- A hazard event that causes loss of life
- A comprehensive update of the City of Roseville General Plan

It will not be the intent of this update process to start from scratch and develop a complete new hazard mitigation plan. Based on needs identified by the planning team, this update will, at a minimum, include the following elements:

- The update process will be convened through a steering committee.
- The hazard risk assessment will be reviewed and updated using best available information and technologies.
- The action plan will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or new City policies identified under other planning mechanisms, as appropriate (such as the General Plan).
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The Roseville City Council will adopt the updated Plan.

21.3.5 Continuing Public Involvement

The public will continue to be apprised of hazard mitigation actions through the City website and by providing copies of the annual progress reports to the media. Copies of this Plan will be distributed to the Roseville City Library System. Upon initiation of the update process, a new public involvement strategy will be initiated based on the needs and capabilities of the City at the time of the update. At a minimum, this strategy will include the use of local media outlets within the planning area.

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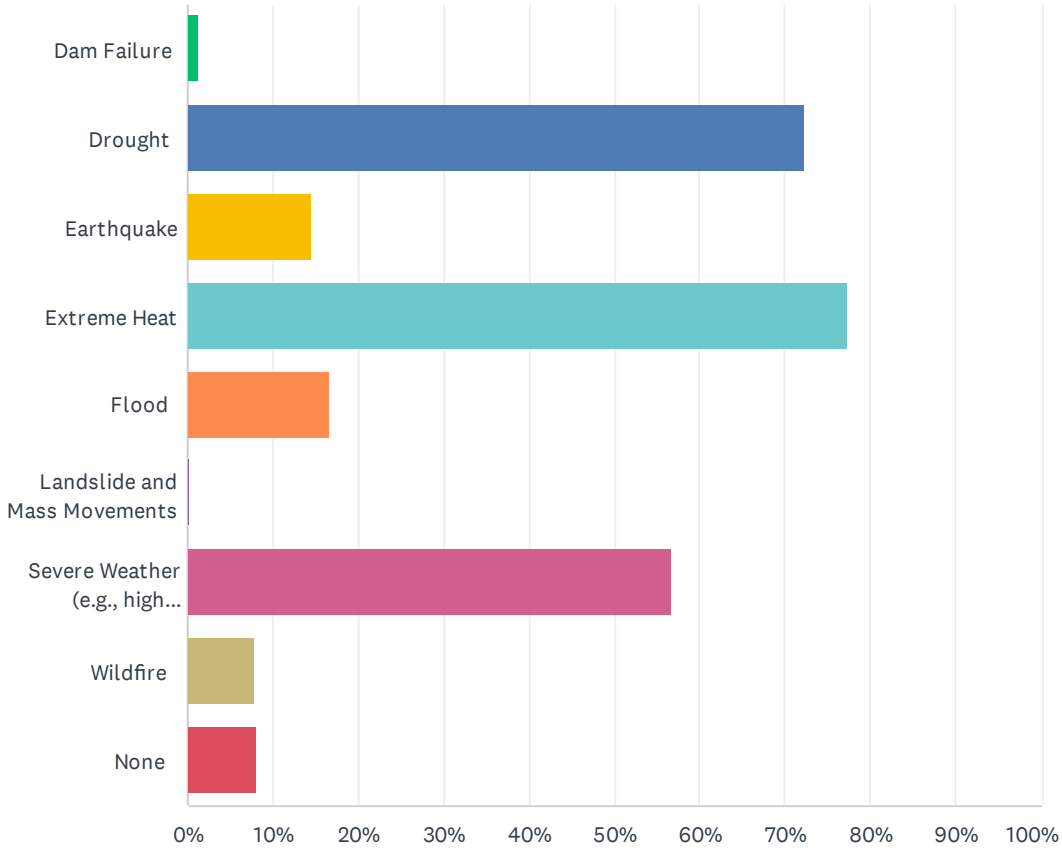
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Appendix A. Hazard Mitigation Survey Results

Q1 Which of the following natural hazards have you experienced in Roseville? (Check all that apply)

Answered: 513 Skipped: 7



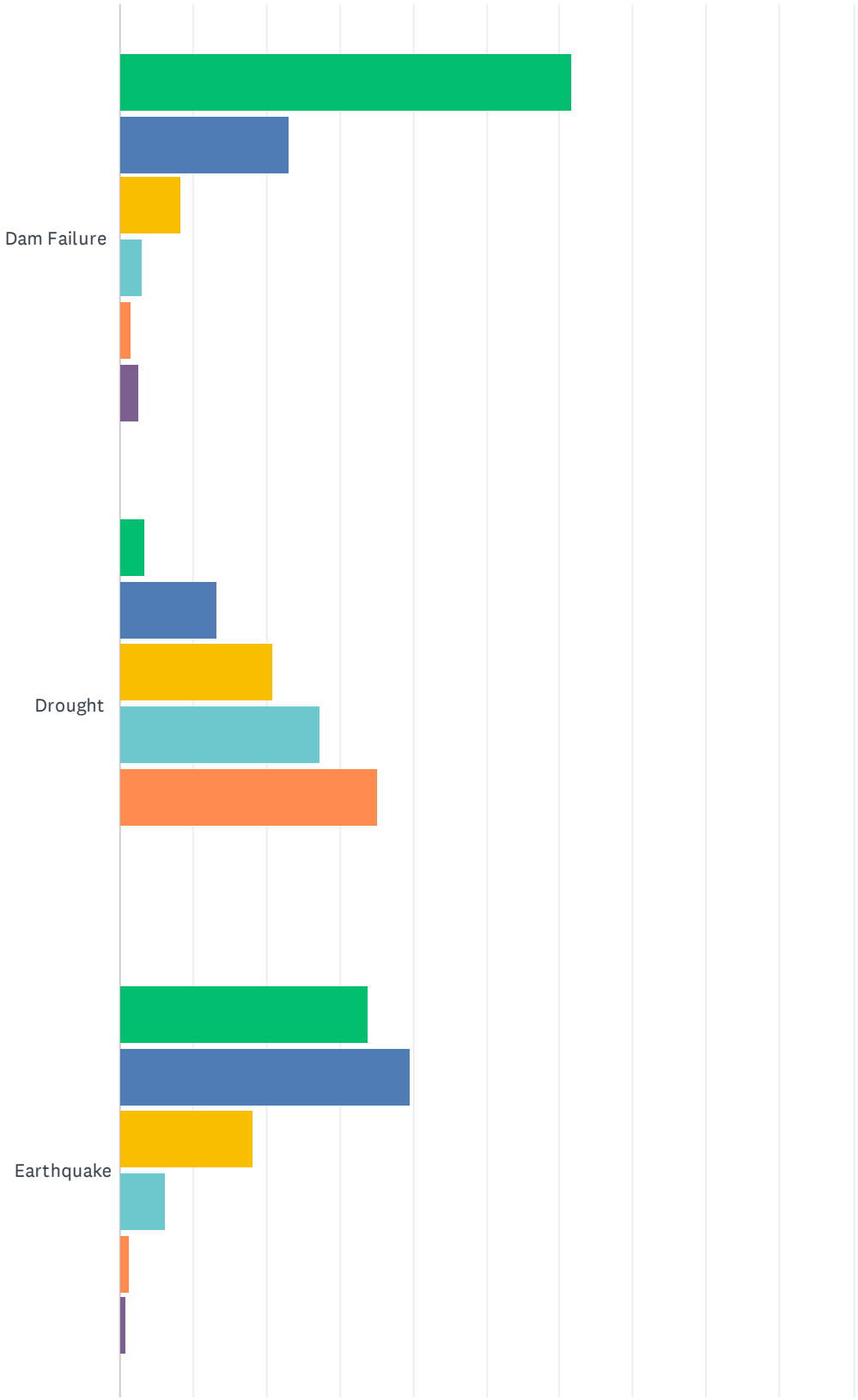
ANSWER CHOICES	RESPONSES	
Dam Failure	1.36%	7
Drought	72.32%	371
Earthquake	14.42%	74
Extreme Heat	77.39%	397
Flood	16.57%	85
Landslide and Mass Movements	0.19%	1
Severe Weather (e.g., high wind, lightning, winter storm)	56.73%	291
Wildfire	7.99%	41
None	8.19%	42
Total Respondents: 513		

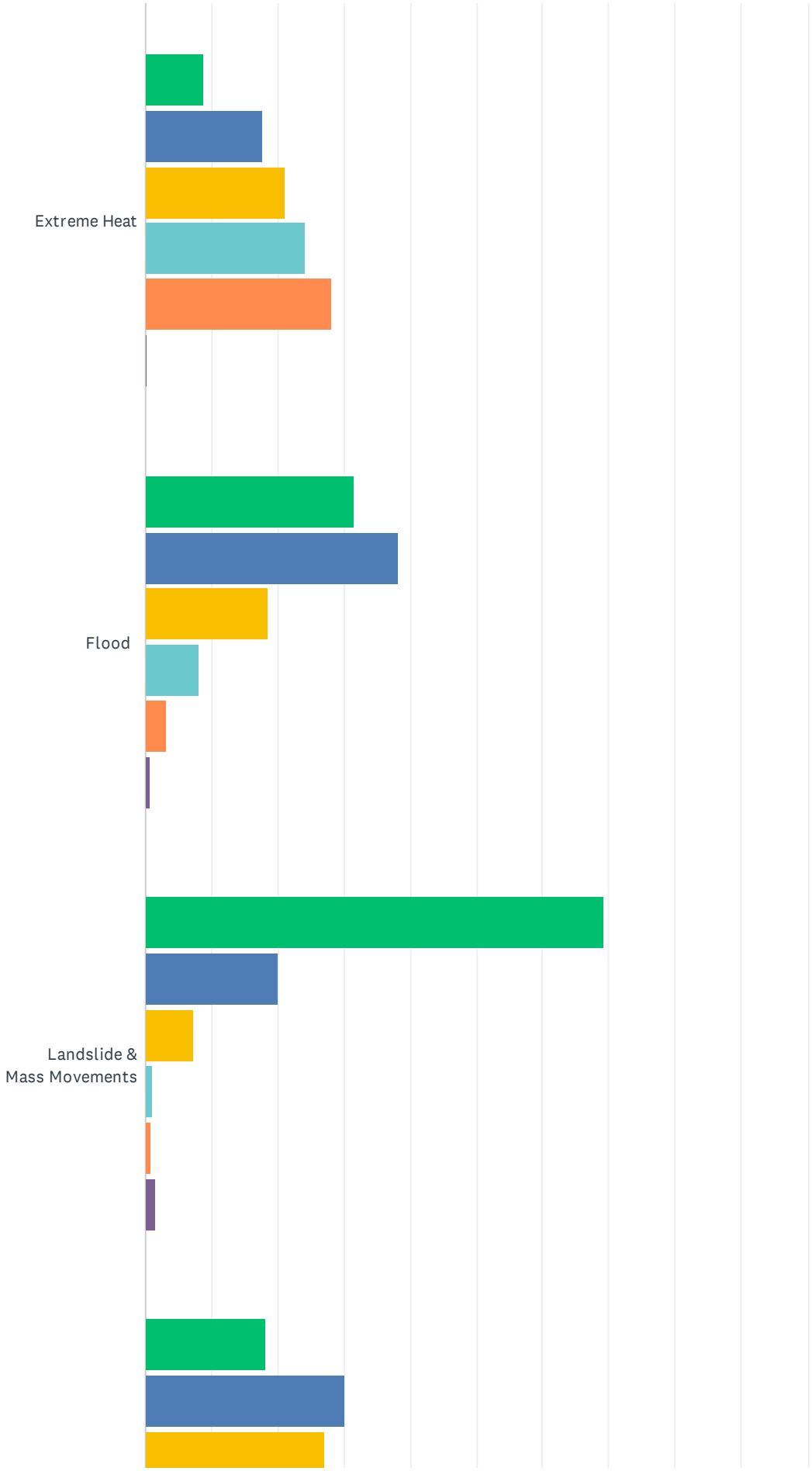
#	OTHER (PLEASE SPECIFY)	DATE

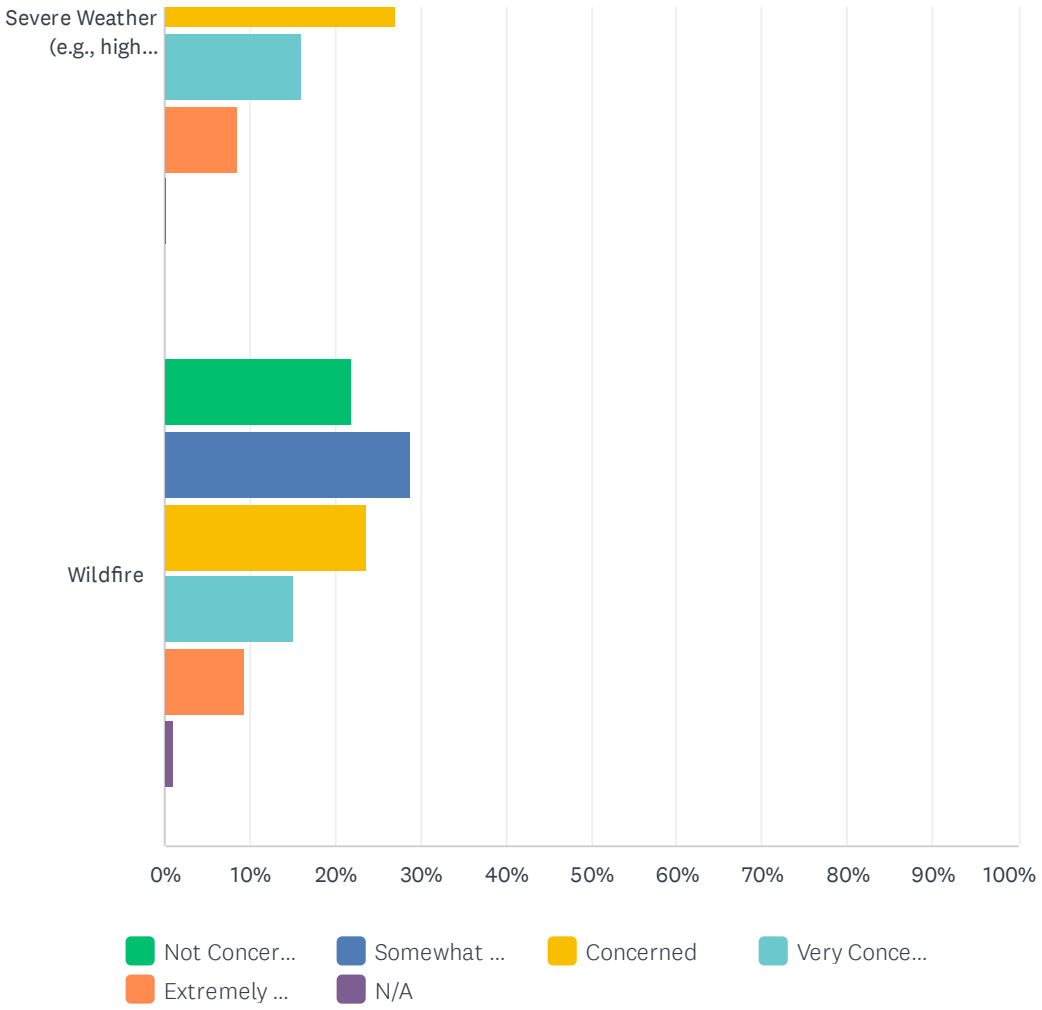
1	Poor air quality (Due to to neighboring County wild fires)	1/27/2023 6:55 PM
2	Air Pollution and Smoke from Wildfires	1/26/2023 12:57 AM
3	Smoke	1/25/2023 1:34 AM
4	Train cars blowing up in the 70's?	1/4/2023 1:26 PM
5	Dense smoke from wildfires	12/10/2022 8:35 AM
6	earthquake in bay area 1989	11/30/2022 8:27 PM
7	Smoke from fires	11/20/2022 9:23 AM
8	Tornado	11/19/2022 7:47 AM
9	Overwhelmed Schools starting to fail	11/16/2022 3:38 PM
10	Excessive cockroaches. City does not have enough people to treat sewers. You only have 3 employees to treat 12,000 sewer lines? According to your Environmental Div	11/16/2022 3:11 PM
11	poor air from smoke	11/16/2022 7:13 AM
12	Severe smoke from wildfires	11/15/2022 7:42 PM
13	Air Pollution and Smoke from Wildfires	11/15/2022 6:27 PM
14	Smoke	11/15/2022 11:16 AM
15	smoke from nearby forest fires	11/10/2022 5:43 PM
16	Hazmat @ rail yard	11/10/2022 1:41 PM
17	Over population	11/9/2022 7:49 AM
18	Maidu Park arson fire	11/9/2022 4:42 AM
19	Smoke from wildfire	11/8/2022 6:47 PM
20	I did not choose drought as I think a lot of that is because of poor water management in the state not building reservoirs for the last 50 years or more.	11/8/2022 5:23 PM
21	Wildfire smoke	11/8/2022 1:49 PM
22	Homeless Addicts Ruin Creeks and Streams	11/8/2022 8:50 AM
23	Small tornado a couple years ago.	11/7/2022 8:19 PM
24	Pandemic	10/26/2022 4:49 PM

Q2 How concerned are you about the following natural hazards in Roseville?

Answered: 518 Skipped: 2




Extreme Heat
Flood
Landslide &
Mass Movements

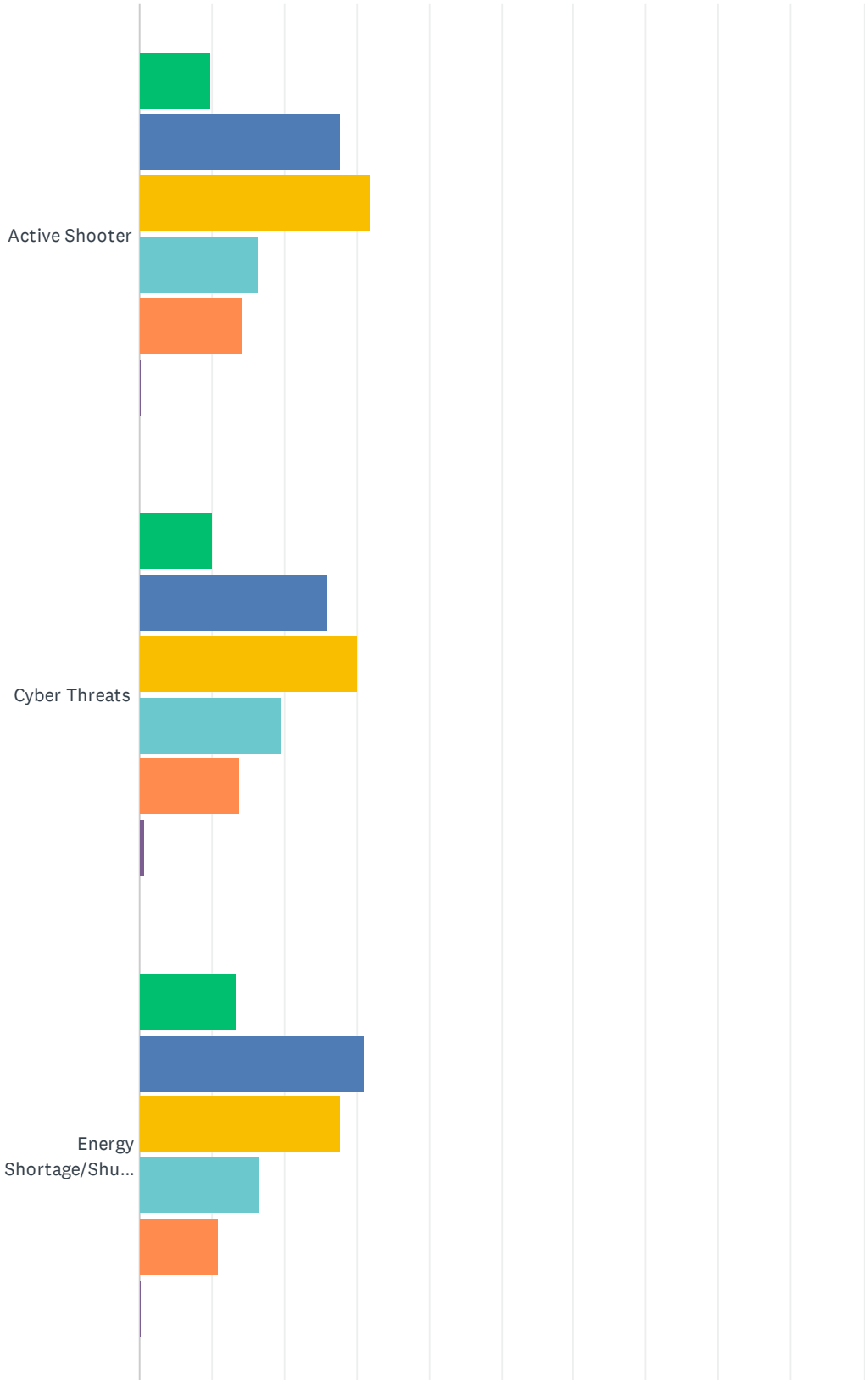

Severe Weather (e.g., high...
Wildfire
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Not Concer...
Somewhat ...
Concerned
Very Conce...
Extremely ...
N/A

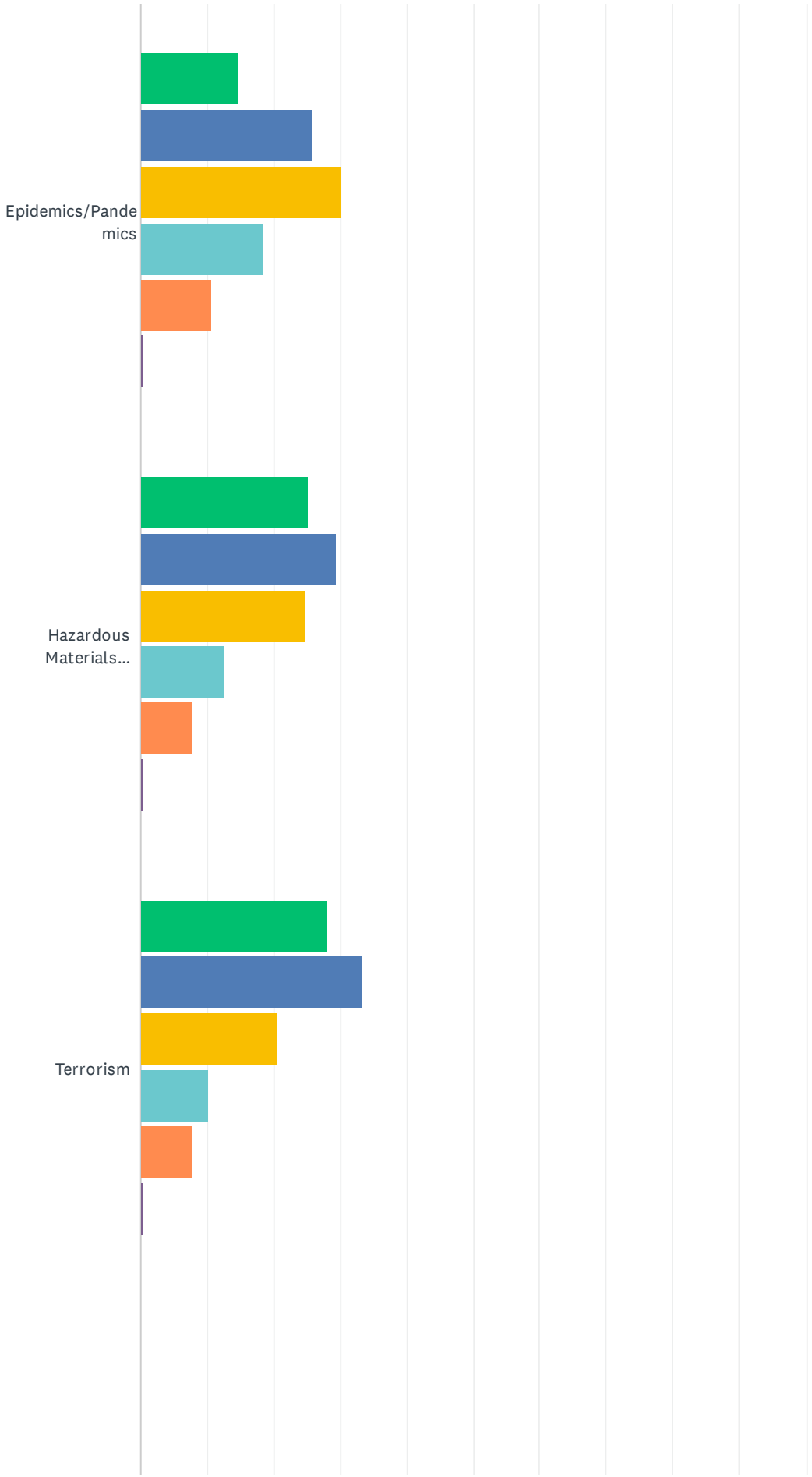
	NOT CONCERNED	SOMEWHAT CONCERNED	CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	N/A	TOTAL	WEIGHTED AVERAGE
Dam Failure	61.58% 311	22.97% 116	8.32% 42	2.97% 15	1.58% 8	2.57% 13	505	1.56
Drought	3.32% 17	13.28% 68	20.90% 107	27.34% 140	35.16% 180	0.00% 0	512	3.78
Earthquake	33.99% 173	39.69% 202	18.07% 92	6.29% 32	1.18% 6	0.79% 4	509	2.00
Extreme Heat	8.75% 45	17.70% 91	21.01% 108	24.12% 124	28.21% 145	0.19% 1	514	3.45
Flood	31.63% 161	38.11% 194	18.47% 94	8.06% 41	3.14% 16	0.59% 3	509	2.12
Landslide & Mass Movements	69.38% 349	20.08% 101	7.36% 37	0.99% 5	0.80% 4	1.39% 7	503	1.42
Severe Weather (e.g., high wind, lightning, winter storm)	18.11% 92	30.12% 153	27.17% 138	15.94% 81	8.46% 43	0.20% 1	508	2.66
Wildfire	22.02% 109	28.89% 143	23.64% 117	15.15% 75	9.29% 46	1.01% 5	495	2.60

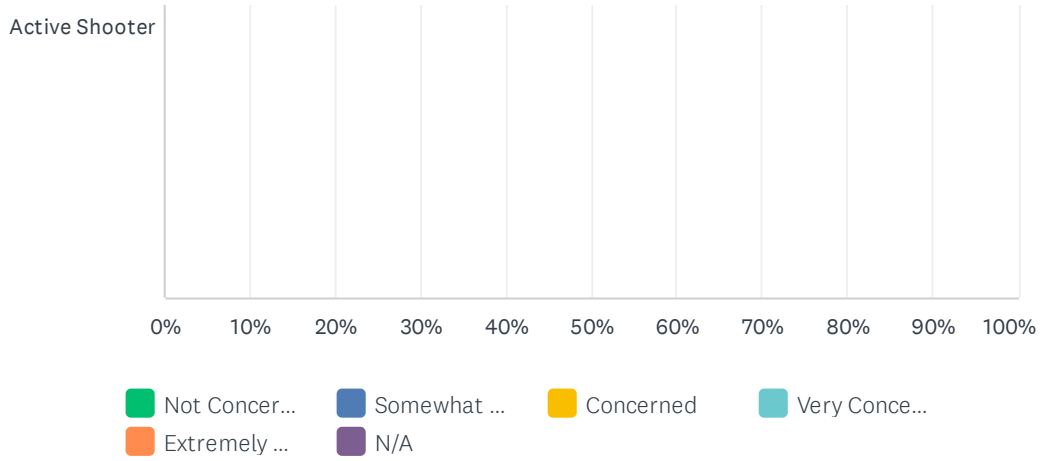
#	OTHER (PLEASE SPECIFY)	DATE
1	Again... poor air quality is a whole separate category on its own even if there are wild fires... we get the poor air quality	1/27/2023 6:55 PM
2	Very concerned about the environmental impact of Wildfires on Our Region	1/26/2023 12:57 AM
3	Smoke	1/4/2023 2:34 PM
4	Trains - what passes through the city w/o our knowledge.	1/4/2023 1:26 PM
5	Fire Hazard is highest concern as no where in calif is safe as was seen in Santa Rosa. Persons living right next to the freeway in mobile homes .. some did not make it.	12/10/2022 2:23 PM
6	electric outage	12/7/2022 9:22 AM
7	Air Quality, Polution & Global Warming: Very Concerned;	11/17/2022 7:11 AM
8	The area along Linda Creek from Oakridge to the ped. bridge needs to be cleared of undergrowth and fire hazzard.	11/16/2022 8:38 AM
9	Very concerned about the environmental impact of Wildfires on Our Region	11/15/2022 6:27 PM
10	Concerned about wildfire based on proximity to open space. Lower hazard; dead tress falling near open space trails.	11/14/2022 12:29 PM
11	Because of the homeless along the train tracks where I live.	11/14/2022 7:02 AM
12	Homeless addicts ruining our city	11/8/2022 8:50 AM

Q3 How concerned are you about the following other hazards of interest in Roseville?

Answered: 517 Skipped: 3




Epidemics/Pandemics
Hazardous Materials...
Terrorism



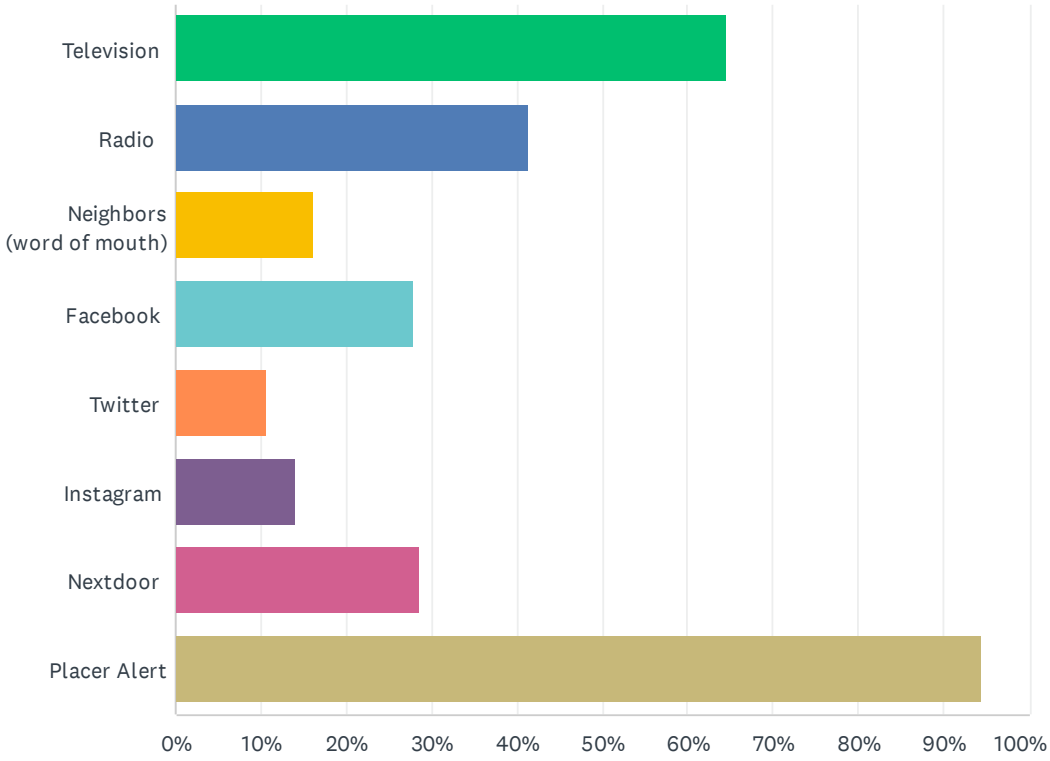
	NOT CONCERNED	SOMEWHAT CONCERNED	CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	N/A	TOTAL	WE AVI
Active Shooter	9.73% 50	27.63% 142	31.91% 164	16.34% 84	14.20% 73	0.19% 1	514	
Cyber Threats	9.96% 51	25.98% 133	30.08% 154	19.53% 100	13.87% 71	0.59% 3	512	
Energy Shortage/Shutoffs	13.42% 69	31.13% 160	27.63% 142	16.73% 86	10.89% 56	0.19% 1	514	
Epidemics/Pandemics	14.62% 75	25.73% 132	30.02% 154	18.52% 95	10.72% 55	0.39% 2	513	
Hazardous Materials Release	25.24% 130	29.32% 151	24.66% 127	12.62% 65	7.77% 40	0.39% 2	515	
Terrorism	28.04% 143	33.33% 170	20.39% 104	10.20% 52	7.65% 39	0.39% 2	510	
Active Shooter	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0	

#	OTHER NON-NATURAL HAZARDS (PLEASE SPECIFY)	DATE
1	Poor air quality	1/27/2023 6:55 PM
2	Bomb Threats and Hostage Situations	1/26/2023 12:57 AM
3	water shortage	1/7/2023 6:08 AM
4	Mentally challenged politicians	1/4/2023 3:16 PM
5	Rsvl has its own electric company- not too concerned	1/4/2023 1:26 PM
6	Mostly concerned with threats to our infrastructures via cyber terrorists or radical groups shooting up power stations etc. Just a sick world we live in these days	1/3/2023 7:29 PM
7	We should not continue to build houses after houses in Roseville with issues we have about drought and limiting our water usage and possible power issues	1/3/2023 5:54 PM
8	Smoke in air during fire season, can't breathe. Pandemic ... myself and a family member have dehabilitating effects of have long covid.	12/10/2022 2:23 PM
9	Crazies on Hwy 65	12/10/2022 8:35 AM
10	attack on electric grid	12/7/2022 9:22 AM
11	F	12/6/2022 3:50 PM
12	Air Quality, Polution & Global Warming: Very Concerned	11/17/2022 7:11 AM

13	train disaster	11/16/2022 10:52 PM
14	threats to politicians	11/16/2022 7:13 AM
15	homelessness and homeless people all over ROSEVILLE, MANY SHOOTING UP DRUGS	11/16/2022 5:29 AM
16	censorship	11/15/2022 6:17 PM
17	Because of the 'way' the country is headed in general	11/15/2022 6:04 PM
18	Red light running by careless drivers	11/15/2022 5:48 PM
19	Train yard chemical issues	11/14/2022 7:01 PM
20	Accident at the Rail Yard	11/11/2022 7:04 PM
21	Some unseen event within the WestPark energy/wastewater site.	11/9/2022 2:23 PM
22	Political threats, intimidation	11/9/2022 9:26 AM
23	Ample police protection. No ceiling on predetermined growth.	11/9/2022 7:49 AM
24	Crowding	11/9/2022 4:37 AM
25	Homeless free range asshole druggies	11/8/2022 5:53 PM
26	My concern for terrorism is purely domestic, not foreign. Nationalism is rising, being mistaken for patriotism.	11/8/2022 5:40 PM
27	The media always producing negative subjects and fear into the public. They're not very natural are they?	11/8/2022 5:23 PM
28	Homeless addicts ruining our community	11/8/2022 8:50 AM

Q4 How would you prefer to be notified about a disaster event?(Check all that apply)

Answered: 508 Skipped: 12



ANSWER CHOICES	RESPONSES	
Television	64.57%	328
Radio	41.34%	210
Neighbors (word of mouth)	16.14%	82
Facebook	27.95%	142
Twitter	10.63%	54
Instagram	13.98%	71
Nextdoor	28.54%	145
Placer Alert	94.49%	480
Total Respondents: 508		

#	OTHER (PLEASE SPECIFY)	DATE
1	Text	1/29/2023 8:29 AM
2	youtube	1/29/2023 5:05 AM
3	Text	1/27/2023 6:55 PM

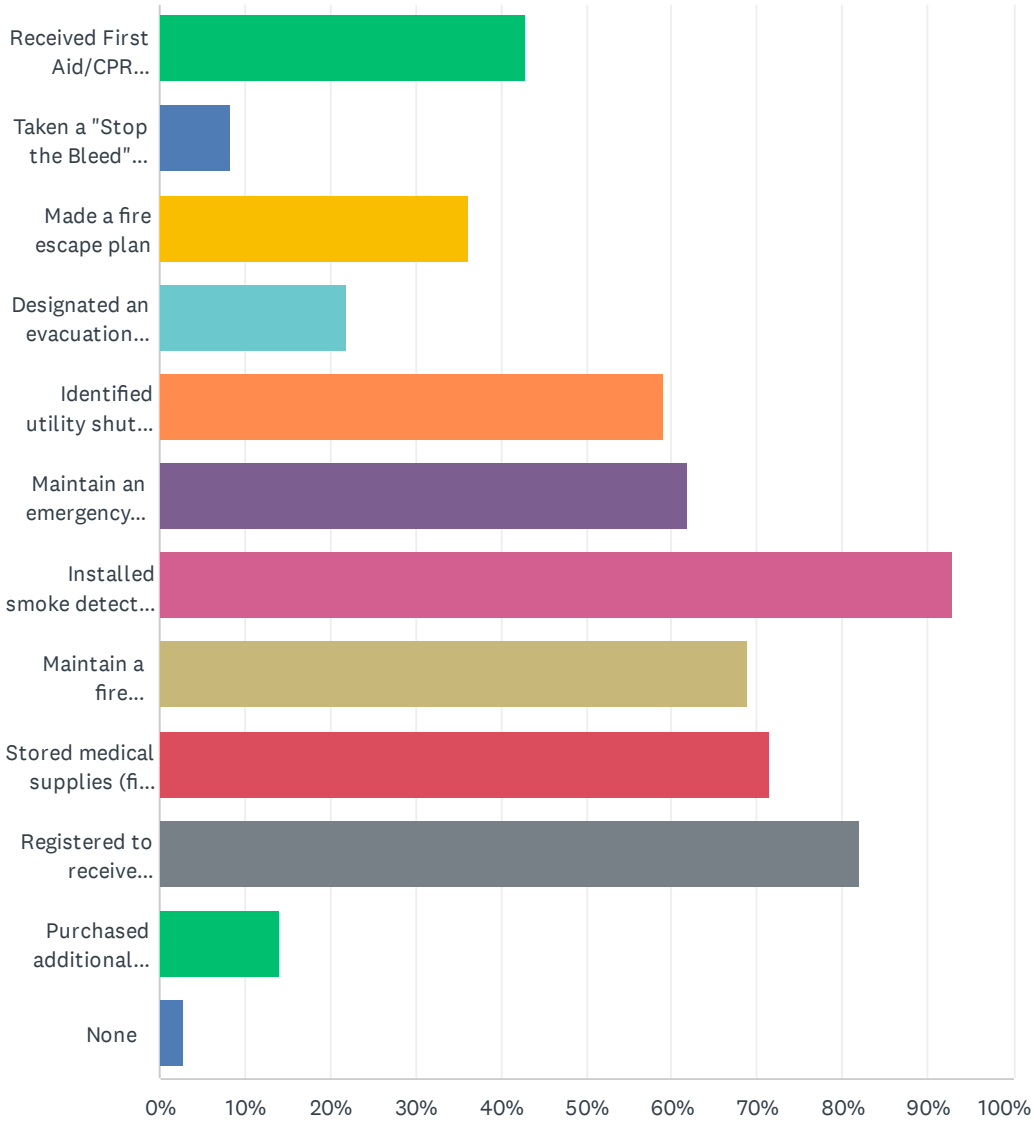
4	caritaK@pacbell.net	1/27/2023 5:26 PM
5	text	1/26/2023 9:42 AM
6	Email or text message	1/26/2023 5:37 AM
7	Text alerts, telephone service announcement	1/26/2023 12:57 AM
8	Text Message	1/25/2023 4:26 PM
9	Text message	1/25/2023 11:23 AM
10	Text alert system	1/25/2023 10:38 AM
11	Through text message	1/25/2023 7:47 AM
12	SMS / Text	1/25/2023 6:59 AM
13	Phone calls	1/25/2023 6:46 AM
14	Simplicity	1/25/2023 4:37 AM
15	Text	1/25/2023 4:03 AM
16	Local Emergency Alert, Ie, Railtard	1/24/2023 11:19 PM
17	iPhone	1/24/2023 10:19 PM
18	email	1/24/2023 10:01 PM
19	Email or text	1/24/2023 8:27 PM
20	Text	1/24/2023 8:23 PM
21	Sun City Roseville Administration and phone messaging	1/24/2023 7:54 PM
22	Text	1/24/2023 6:08 PM
23	Phone alerts	1/4/2023 11:28 PM
24	Message boards throughout the city and 1-80	1/4/2023 5:35 PM
25	Text/phone call	1/4/2023 2:34 PM
26	All of the above since it’s important to stay informed and prepare.	1/4/2023 1:26 PM
27	Mastadon	1/4/2023 12:33 PM
28	phone call	1/4/2023 11:18 AM
29	cell phone	1/4/2023 7:36 AM
30	email/text	1/3/2023 11:41 PM
31	City of Roseville alerts	1/3/2023 10:22 PM
32	All	1/3/2023 7:29 PM
33	Text	1/3/2023 5:24 PM
34	Alexa	1/3/2023 5:19 PM
35	Giant voice/public address system	1/2/2023 10:20 AM
36	Text message or phone message	12/10/2022 6:59 PM
37	Siren, cell phone , TV, radio, Faceb ook, next door, placer alert all.	12/10/2022 2:23 PM
38	Text	12/10/2022 9:18 AM
39	Text/sms and/or reverse 911	12/9/2022 11:23 AM
40	Phone and E-mail.	12/9/2022 9:05 AM
41	email	12/7/2022 9:22 AM

42	email, text message	12/7/2022 7:33 AM
43	Cell phone text message through placer county emergency	12/7/2022 2:56 AM
44	Text	12/7/2022 1:36 AM
45	Text	12/6/2022 4:16 PM
46	Ring	12/6/2022 4:01 PM
47	phone text	12/6/2022 3:51 PM
48	Cell Phone Message	12/1/2022 1:36 PM
49	text message	11/20/2022 3:55 PM
50	Cell alerts	11/19/2022 7:47 AM
51	phone alert, loud speaker	11/16/2022 10:52 PM
52	Text msg.	11/16/2022 6:35 PM
53	email	11/16/2022 3:49 PM
54	Cell phone text!	11/16/2022 3:13 PM
55	Text	11/16/2022 3:11 PM
56	Text	11/16/2022 3:03 PM
57	Text	11/16/2022 2:57 PM
58	text messages	11/16/2022 1:47 PM
59	text	11/16/2022 1:35 PM
60	Text or by call	11/16/2022 8:39 AM
61	Email	11/16/2022 8:30 AM
62	text	11/16/2022 7:13 AM
63	Text	11/16/2022 5:59 AM
64	Text	11/16/2022 5:35 AM
65	EMAIL	11/16/2022 5:29 AM
66	Text message	11/16/2022 4:50 AM
67	TEXT MESSAGE	11/16/2022 3:17 AM
68	Text	11/15/2022 8:59 PM
69	Phone	11/15/2022 7:42 PM
70	Cell phone	11/15/2022 6:51 PM
71	Text	11/15/2022 6:40 PM
72	email	11/15/2022 6:04 PM
73	What is Placer Alert?	11/15/2022 5:54 PM
74	Text	11/15/2022 5:53 PM
75	telephone and/or text	11/15/2022 5:40 PM
76	Text	11/14/2022 2:39 PM
77	email, text	11/14/2022 2:00 PM
78	cell phone message	11/11/2022 2:31 PM
79	email	11/10/2022 5:43 PM

80	Cell phone/phone number	11/10/2022 3:10 PM
81	Text to personal phone.	11/9/2022 2:23 PM
82	Direct text, call, or cell phone alert	11/9/2022 12:56 PM
83	I phone	11/9/2022 12:33 PM
84	Text message; reverse 911 calls	11/9/2022 12:07 PM
85	Mobile notification	11/9/2022 11:34 AM
86	Text message, if not in Placer Alert	11/9/2022 9:26 AM
87	texts	11/9/2022 7:51 AM
88	Little faith in today's media due to sensationalizing and being opinionated.	11/9/2022 7:49 AM
89	Text, email	11/9/2022 7:10 AM
90	All above rely on electronic or cell service. Other means need to be included!	11/9/2022 6:15 AM
91	Direct Text	11/9/2022 5:19 AM
92	Text, email	11/9/2022 4:44 AM
93	iPhone	11/9/2022 4:37 AM
94	Email and messages.	11/8/2022 7:22 PM
95	Text	11/8/2022 7:21 PM
96	Text message	11/8/2022 7:00 PM
97	via text message	11/8/2022 7:00 PM
98	Phone notification also	11/8/2022 6:08 PM
99	Smoke signals	11/8/2022 5:53 PM
100	Ham radio network. ARES	11/8/2022 5:40 PM
101	Text directly from source (similar to how PG&E notifies of an outage in your neighborhood and provides updates)	11/8/2022 5:40 PM
102	Text	11/8/2022 5:29 PM
103	Loudspeaker announcements	11/8/2022 5:24 PM
104	Phone text alert.	11/8/2022 5:23 PM
105	Text	11/8/2022 5:15 PM
106	text on cell phone	11/8/2022 3:14 PM
107	Text message	11/7/2022 6:55 PM

Q5 What steps has your household taken to prepare for a disaster? (Check all that apply)

Answered: 516 Skipped: 4



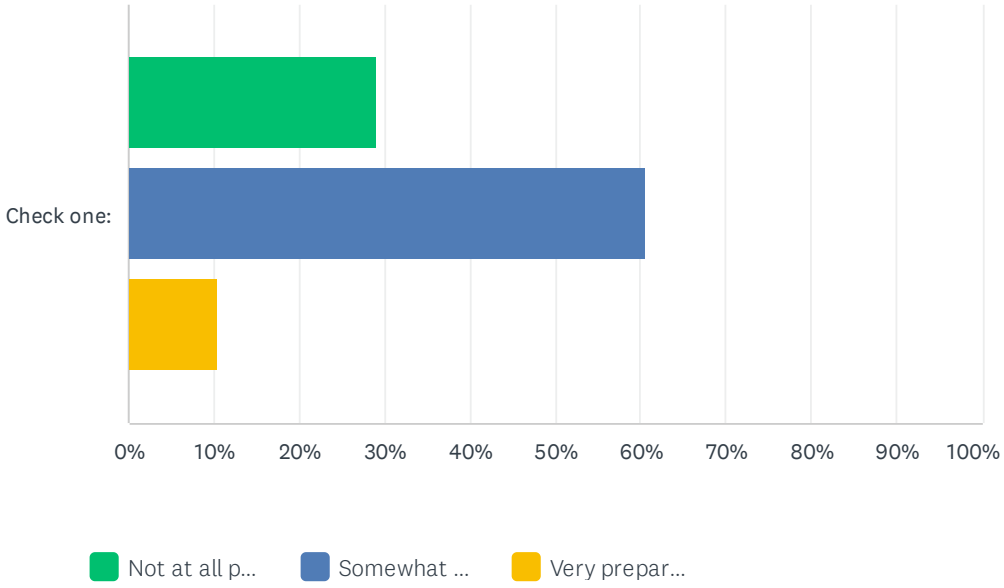
ANSWER CHOICES	RESPONSES	
Received First Aid/CPR training	42.83%	221
Taken a "Stop the Bleed" course	8.33%	43
Made a fire escape plan	36.24%	187
Designated an evacuation meeting place	21.90%	113
Identified utility shutoff locations	59.11%	305
Maintain an emergency supply kit (batteries, flashlights, battery-powered radio, food/water)	61.82%	319
Installed smoke detectors on each level of the house	93.02%	480
Maintain a fire extinguisher at home	68.80%	355
Stored medical supplies (first aid kit, medications)	71.51%	369
Registered to receive emergency alerts	82.17%	424
Purchased additional insurance	14.15%	73
None	2.71%	14
Total Respondents: 516		

#	OTHER (PLEASE SPECIFY)	DATE
1	Prepared clothing, blankets, raingear, tissue, towels (paper). Have adequate cash ($100) as emergency funds. Have insurance, house, car, medical, life, carrier/contact info w/You.	1/26/2023 12:57 AM
2	increased food and water storage	1/25/2023 11:23 AM
3	Stocked Go Bag	1/25/2023 6:46 AM
4	Keep gas in cars	1/24/2023 8:27 PM
5	Live in Loshe apartments on Vernon st. Second floor and totally disabled have no idea what we do in a emergency if elevator is out. Have no idea what to do?	1/24/2023 6:44 PM
6	Follow Roseville City and Placer County websites	1/4/2023 11:28 PM
7	Completed CERT (Community Emergency Response Team) training.	1/4/2023 8:30 PM
8	Always attempt to keep my vehicle fuel level above a half of tank and not less.	1/4/2023 5:35 PM
9	Armed	1/4/2023 3:16 PM
10	We need to do the first column .	12/10/2022 2:23 PM
11	CERT Training	12/9/2022 6:08 AM
12	packed a important documents kit in a fireproof bag	12/7/2022 9:22 AM
13	also have water stored	11/30/2022 8:27 PM
14	Keep a stocked "go" bag for my family and our animals.	11/16/2022 7:44 AM
15	New here. How do I "register"	11/15/2022 6:04 PM
16	We all need much, much more education on the above options!	11/15/2022 5:54 PM
17	Emergency food stocks	11/15/2022 5:40 PM
18	Have a 1-hr fire safe with important documents, and scanned/uploaded some to secure cloud location	11/13/2022 3:49 PM
19	Volunteered for disaster response agencies	11/10/2022 1:41 PM

20	actively work with RCONA-related neighborhood association	11/9/2022 5:15 PM
21	Grab and go bag with a two days of clothing etc.	11/9/2022 2:23 PM
22	Need to work on this!	11/9/2022 11:34 AM
23	rocket stove, generator, fuel	11/9/2022 9:26 AM
24	Always try to maintain not less than a half tank of fuel in one of our vehicles.	11/9/2022 7:49 AM
25	Keep adequate gas in vehicles, know how to open garage door without electricity	11/9/2022 7:10 AM
26	To go bag	11/8/2022 6:40 PM
27	Most of these are out of date, but we done them in the past.	11/8/2022 6:34 PM
28	Armed	11/8/2022 5:53 PM
29	Ham radio license and good network contacts	11/8/2022 5:40 PM
30	Portable radios in walkie talkies.	11/8/2022 5:23 PM

Q6 How prepared is your household to get along without electricity or natural gas for one to five days? Check one:

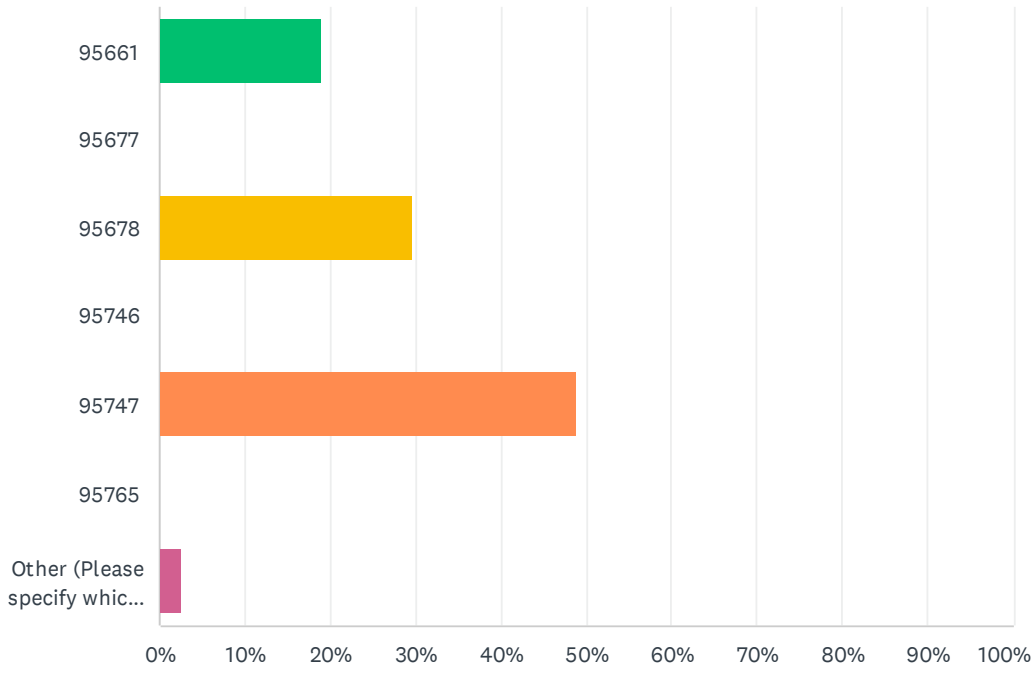
Answered: 506 Skipped: 14



	NOT AT ALL PREPARED	SOMEWHAT PREPARED	VERY PREPARED	TOTAL	WEIGHTED AVERAGE
Check one:	29.05% 147	60.47% 306	10.47% 53	506	2.02

Q7 What is the zip code where you live?

Answered: 516 Skipped: 4



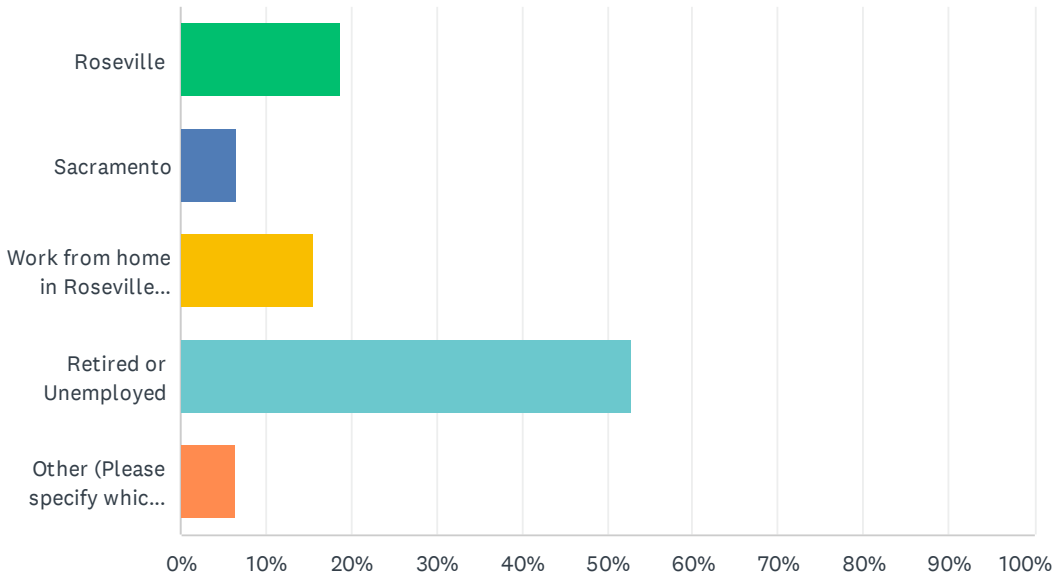
ANSWER CHOICES	RESPONSES	
95661	18.99%	98
95677	0.00%	0
95678	29.65%	153
95746	0.00%	0
95747	48.84%	252
95765	0.00%	0
Other (Please specify which zip code or community you live in.)	2.52%	13
TOTAL		516

#	OTHER (PLEASE SPECIFY WHICH ZIP CODE OR COMMUNITY YOU LIVE IN.)	DATE
1	95678	1/24/2023 6:08 PM
2	95765 ROCKLIN but grew up In RSVL most family is there	1/4/2023 1:26 PM
3	95762	1/3/2023 8:42 PM
4	95746	1/3/2023 7:13 PM
5	Sun City	12/6/2022 8:49 PM
6	95746	11/16/2022 3:25 PM
7	Thank	11/16/2022 2:57 PM

8	95610	11/16/2022 1:55 PM
9	95678	11/15/2022 6:09 PM
10	95610	11/14/2022 7:12 AM
11	95621	11/10/2022 11:46 AM
12	123456	10/27/2022 3:24 AM
13	95959	10/26/2022 4:49 PM

Q8 Where do you work?

Answered: 519 Skipped: 1



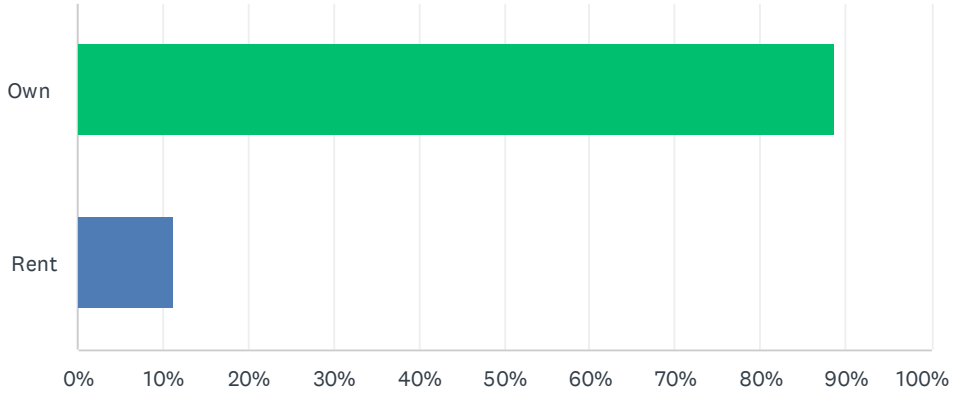
ANSWER CHOICES	RESPONSES	
Roseville	18.69%	97
Sacramento	6.55%	34
Work from home in Roseville (over 50% of the time)	15.61%	81
Retired or Unemployed	52.79%	274
Other (Please specify which city you work in.)	6.36%	33
TOTAL		519

#	OTHER (PLEASE SPECIFY WHICH CITY YOU WORK IN.)	DATE
1	Varies	1/29/2023 6:20 AM
2	Roseville and spouse works from home	1/26/2023 5:39 AM
3	Rocklin	1/25/2023 4:37 AM
4	Disabled	1/24/2023 6:44 PM
5	All over, const. Trades	1/4/2023 9:25 AM
6	El Dorado, Placer, Amador, and Sacramento counties	1/3/2023 8:42 PM
7	At home - in Roseville	1/3/2023 7:29 PM
8	One spouse is retired.	1/3/2023 5:54 PM
9	Retired and work at Beale	1/2/2023 10:20 AM
10	Rocklin	12/9/2022 9:05 AM
11	Folsom	12/9/2022 6:08 AM

12	WOODLAND	12/1/2022 1:16 PM
13	Rocklin	11/20/2022 9:23 AM
14	Marysville	11/18/2022 7:21 PM
15	Lincoln	11/18/2022 6:42 AM
16	Retired	11/17/2022 7:11 AM
17	Auburn	11/16/2022 2:40 PM
18	Auburn	11/16/2022 5:59 AM
19	Rocklin	11/16/2022 4:08 AM
20	Travel for work	11/15/2022 8:21 PM
21	Auburn	11/15/2022 6:17 PM
22	Carmichael	11/15/2022 6:09 PM
23	Potentially all over placer county, primarily Lincoln, Roseville & Elverta	11/10/2022 1:41 PM
24	Woodland	11/9/2022 5:33 PM
25	West Sacramento	11/9/2022 12:07 PM
26	Other	11/9/2022 8:22 AM
27	I travel nationally and work from home	11/9/2022 5:57 AM
28	Folsom	11/9/2022 4:35 AM
29	Rancho Cordova	11/9/2022 4:00 AM
30	Secret squirrel	11/8/2022 5:53 PM
31	Elk Grove, CA	11/8/2022 5:15 PM
32	Various	11/8/2022 1:49 PM
33	Folsom	11/7/2022 3:30 PM

Q9 Do you own or rent your place of residence?

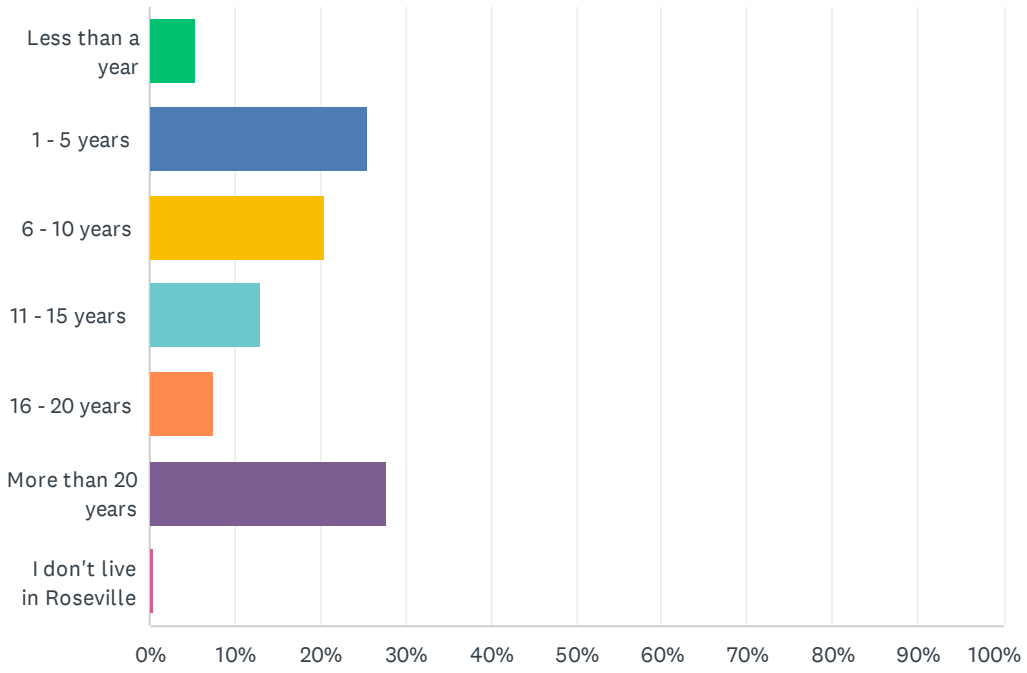
Answered: 514 Skipped: 6



ANSWER CHOICES	RESPONSES	
Own	88.72%	456
Rent	11.28%	58
TOTAL		514

Q10 How long have you lived in your current residence?

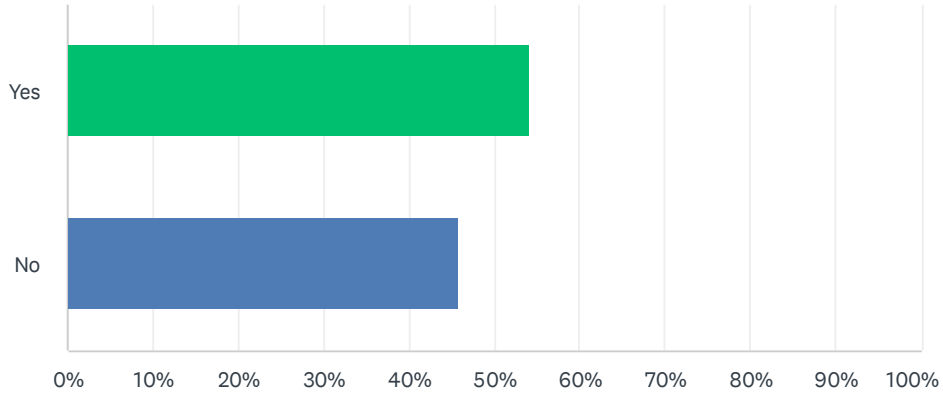
Answered: 516 Skipped: 4



ANSWER CHOICES	RESPONSES	
Less than a year	5.23%	27
1 - 5 years	25.58%	132
6 - 10 years	20.54%	106
11 - 15 years	12.98%	67
16 - 20 years	7.56%	39
More than 20 years	27.71%	143
I don't live in Roseville	0.39%	2
TOTAL		516

Q11 When you moved into your home, did you consider the impact a disaster could have on your property?

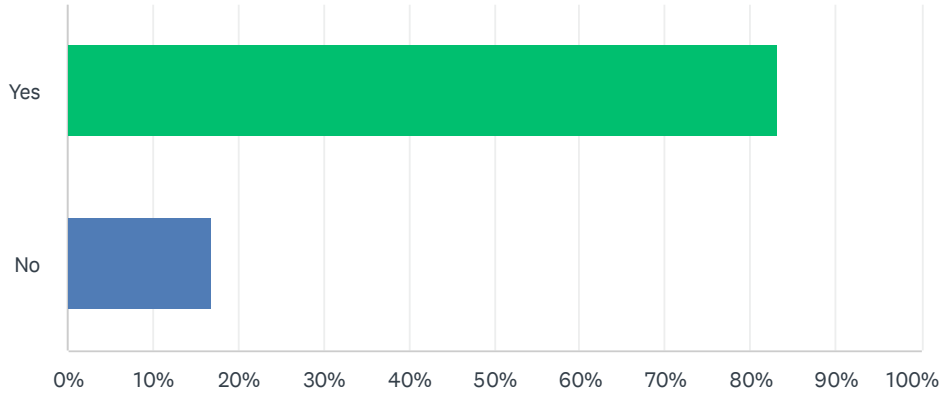
Answered: 517 Skipped: 3



ANSWER CHOICES	RESPONSES	
Yes	54.16%	280
No	45.84%	237
TOTAL		517

Q12 Would the disclosure of natural hazard information (including probability of occurrence and severity of the hazard) influence your decision to purchase or move into a home today?

Answered: 496 Skipped: 24

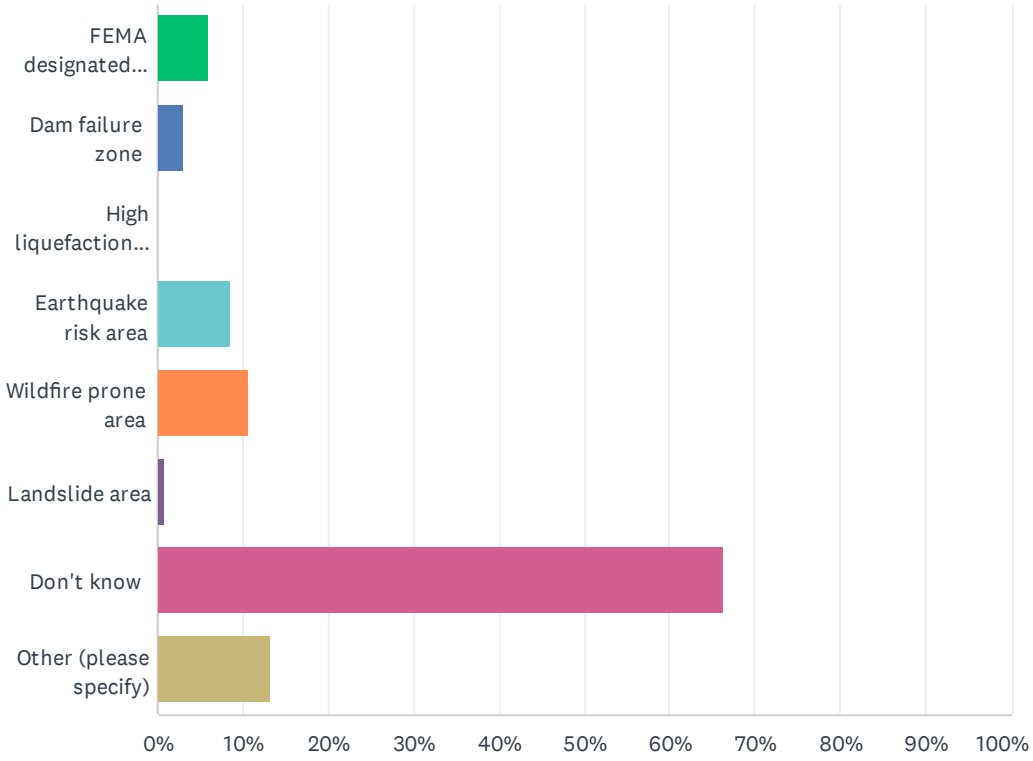


ANSWER CHOICES	RESPONSES	
Yes	83.06%	412
No	16.94%	84
TOTAL		496

#	COMMENT	DATE
	There are no responses.	

Q13 Is your home located in any of the following hazard areas (check all that apply):

Answered: 338 Skipped: 182



ANSWER CHOICES	RESPONSES	
FEMA designated floodplain	5.92%	20
Dam failure zone	2.96%	10
High liquefaction zone	0.00%	0
Earthquake risk area	8.58%	29
Wildfire prone area	10.65%	36
Landslide area	0.89%	3
Don't know	66.27%	224
Other (please specify)	13.31%	45
Total Respondents: 338		

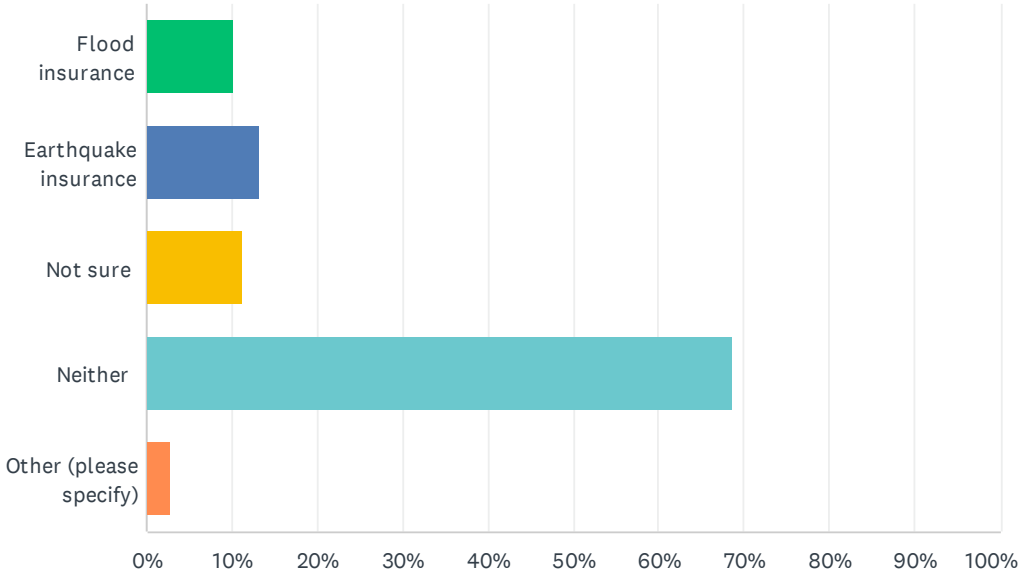
#	OTHER (PLEASE SPECIFY)	DATE
1	None of the above	1/29/2023 7:25 AM
2	None of the above	1/25/2023 12:26 PM
3	NA	1/25/2023 7:13 AM

4	Pretty sure none, but haven't checked in 10+ years	1/25/2023 4:41 AM
5	None of the above	1/25/2023 4:35 AM
6	None of the above	1/25/2023 1:40 AM
7	Not according to insurance co	1/24/2023 5:57 PM
8	Considering that earthquakes & wildfires are common concerns in CA.	1/4/2023 11:35 PM
9	Hazmat release from railyard	1/4/2023 8:39 PM
10	In reality it is all a flood plain based on an extraneous wet weather event.	1/4/2023 6:31 PM
11	Back to open space - fire is our immediate threat	1/4/2023 1:36 PM
12	no	1/4/2023 8:30 AM
13	None	1/3/2023 10:28 PM
14	The entire Sacramento area is on a floodplain regardless whether FEMA has designated it.	1/3/2023 10:16 PM
15	Not that we are aware of	1/3/2023 8:30 PM
16	None	1/3/2023 8:13 PM
17	I don’t believe I live in any of these areas.	1/3/2023 6:02 PM
18	None	1/3/2023 5:31 PM
19	Could have a wildfire. Cirby Creek free space is in my backyard.	12/9/2022 6:11 PM
20	I don't think we live in any of this risk areas	12/7/2022 6:55 PM
21	No, none of these apply	12/1/2022 5:42 PM
22	None, to the best of my knowledge, which may be limited knowledge..	11/17/2022 4:44 PM
23	Railyard hazardous release	11/16/2022 2:10 PM
24	I do not believe so	11/15/2022 9:06 PM
25	Moderate fire risk	11/15/2022 5:57 PM
26	none	11/15/2022 5:45 PM
27	Train yards/Railroad tracks	11/14/2022 6:41 PM
28	No	11/14/2022 7:15 AM
29	None	11/10/2022 11:15 AM
30	None	11/9/2022 2:29 PM
31	Prior wildfire in Maidu Park	11/9/2022 9:09 AM
32	Flooding. Not certain if designated by FEMA or the Army core of engineers.	11/9/2022 8:31 AM
33	No hazard area	11/9/2022 7:42 AM
34	None of the above	11/9/2022 7:15 AM
35	None	11/9/2022 5:53 AM
36	Might be chance of tornado hit in this area	11/9/2022 4:44 AM
37	Ravine	11/8/2022 7:49 PM
38	No	11/8/2022 7:24 PM
39	don't know about all of these, but not in a flood plain	11/8/2022 6:41 PM
40	We have a stucco house with a concrete tile roof in plenty of clear space around it in case of fire and other events. I am not afraid.	11/8/2022 5:28 PM
41	There is always a chance for flood and earthquake	11/7/2022 8:23 PM

42	None	11/7/2022 6:32 PM
43	None. Borderline for flood	11/7/2022 6:21 PM
44	no	11/7/2022 4:50 PM
45	Only if the Auburn Dam is built.	10/27/2022 8:03 AM

Q14 Do you have hazard-specific insurance (check all that apply)?

Answered: 477 Skipped: 43



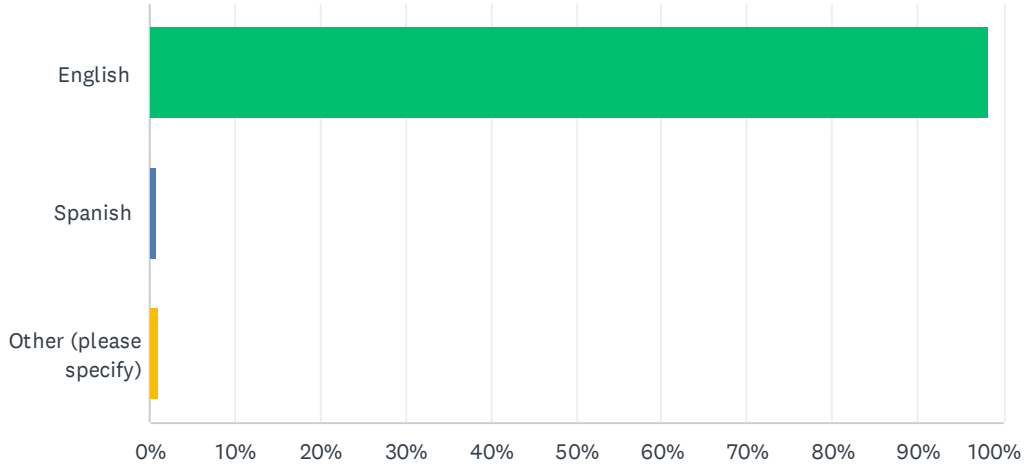
ANSWER CHOICES	RESPONSES	
Flood insurance	10.27%	49
Earthquake insurance	13.21%	63
Not sure	11.32%	54
Neither	68.76%	328
Other (please specify)	2.73%	13
Total Respondents: 477		

#	OTHER (PLEASE SPECIFY)	DATE
1	no	1/26/2023 9:46 AM
2	Homeowners	12/9/2022 6:11 PM
3	I know we don't have earthquake insurance	12/7/2022 6:55 PM
4	Not a flood zone area	12/6/2022 6:34 PM
5	EQ - No. Not sure about flood, but don't think so.	12/1/2022 2:33 PM
6	fire	11/18/2022 7:47 AM
7	Renter's insurance	11/18/2022 6:45 AM
8	additional umbrella policy	11/16/2022 6:07 AM
9	Fire insurance	11/15/2022 6:45 PM
10	No	11/14/2022 7:15 AM
11	Earthquake insurance as I have learned will only pay if the damage exceeded the agreed cost	11/9/2022 8:31 AM

	of coverage also if the accumulated claims were so excessive in numbers it would be likely you would not receive any compensation as noted in there fine print. Earthquake insurance is governed by the state as I believe. And the state by example does a "poor" job when it comes to managing any and all programs in my opinion.	
12	Flood insurance won't cover my basement which is the only floor that would flood. Also no pool or yard covered. Flood insurance is a waste of money for me.	11/9/2022 4:53 AM
13	No	11/8/2022 7:24 PM

Q15 What is the primary language spoken or written in your home?

Answered: 498 Skipped: 22

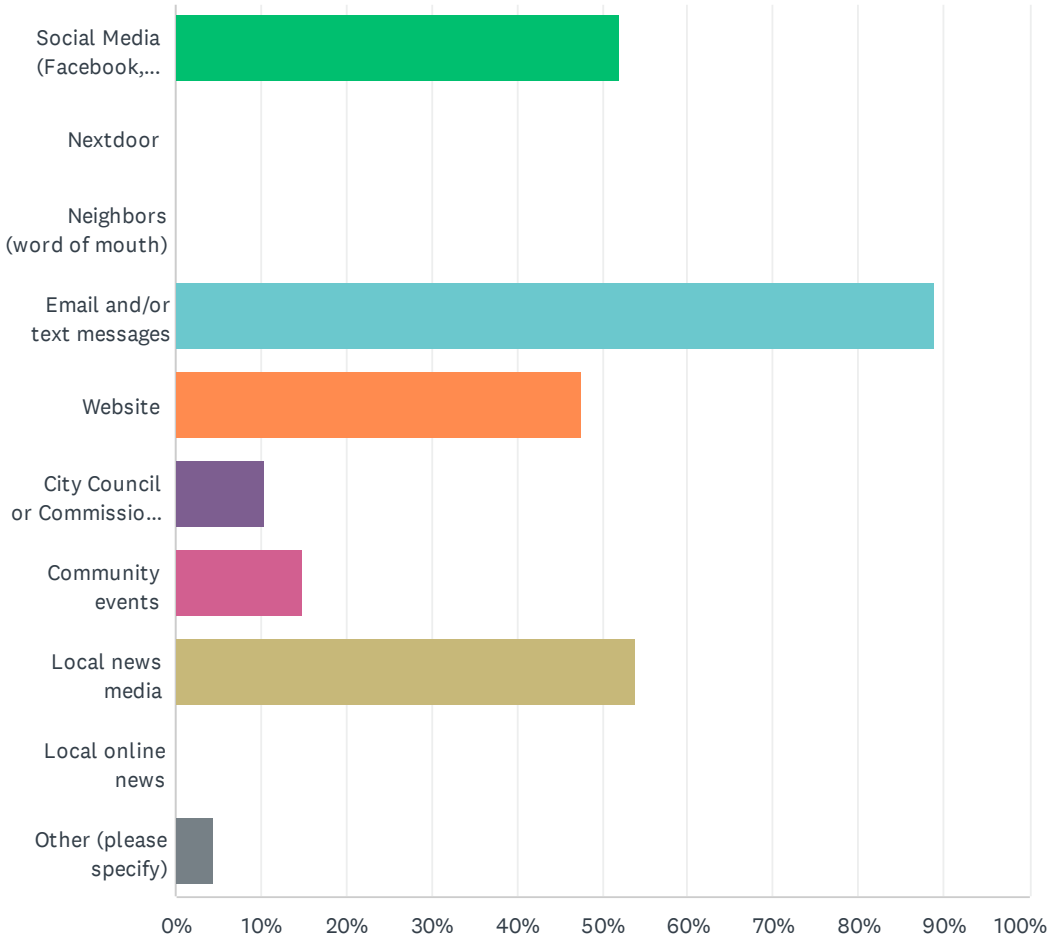


ANSWER CHOICES	RESPONSES	
English	98.19%	489
Spanish	0.80%	4
Other (please specify)	1.00%	5
TOTAL		498

#	OTHER (PLEASE SPECIFY)	DATE
1	None	11/16/2022 3:01 PM
2	Chinese	11/11/2022 6:24 AM
3	But we speak and read English also.	11/8/2022 7:26 PM
4	Scottish	11/8/2022 5:56 PM
5	Black folk wort’s and syllableses’s	11/8/2022 8:57 AM

Q16 Which of the following ways do you receive official news and information about the City of Roseville? Check all that apply.

Answered: 497 Skipped: 23

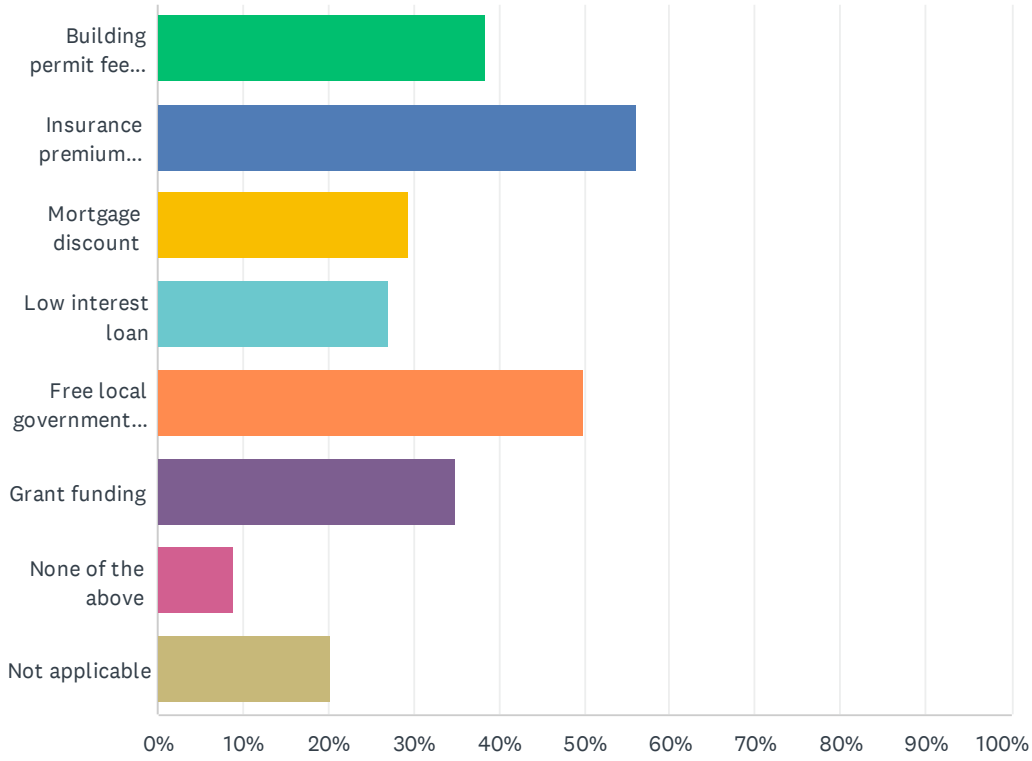


ANSWER CHOICES	RESPONSES	
Social Media (Facebook, Twitter, Instagram, Nextdoor, etc.)	52.11%	259
Nextdoor	0.00%	0
Neighbors (word of mouth)	0.00%	0
Email and/or text messages	88.93%	442
Website	47.48%	236
City Council or Commission meetings	10.46%	52
Community events	14.89%	74
Local news media	53.92%	268
Local online news	0.00%	0
Other (please specify)	4.43%	22
Total Respondents: 497		

#	OTHER (PLEASE SPECIFY)	DATE
1	youtube	1/29/2023 5:07 AM
2	Friends	1/28/2023 8:47 PM
3	Community news paper and neighbors	1/25/2023 1:40 AM
4	Emergency Alert System	1/24/2023 11:38 PM
5	Next door	1/24/2023 7:22 PM
6	Local Newspaper, The Patch	1/4/2023 8:56 AM
7	City of Roseville newetters	1/4/2023 4:12 AM
8	Text message	1/3/2023 5:18 PM
9	Word of mouth	12/1/2022 5:42 PM
10	Placer alert	11/19/2022 7:51 AM
11	Nextdoor	11/17/2022 7:59 AM
12	USPS mailings	11/17/2022 7:20 AM
13	Mail	11/16/2022 3:15 PM
14	I prefer to receive a text message or a phone call	11/15/2022 9:37 PM
15	None. Sporadic from various entities - basically TV, which almost never mentions Roseville.	11/15/2022 6:10 PM
16	Newspaper	11/9/2022 3:38 PM
17	Neighbors	11/9/2022 2:29 PM
18	RCONA/Neighborhood	11/9/2022 9:09 AM
19	RCONA newsletter	11/9/2022 5:33 AM
20	Placer Alerts	11/8/2022 6:41 PM
21	Neighborhood chats.	11/8/2022 5:28 PM
22	My boy Mac-10 and Skittles down at 4th and Vernon	11/8/2022 8:57 AM

Q17 Which incentives would encourage you to retrofit your home to protect against natural disasters? (Check all that apply)

Answered: 483 Skipped: 37



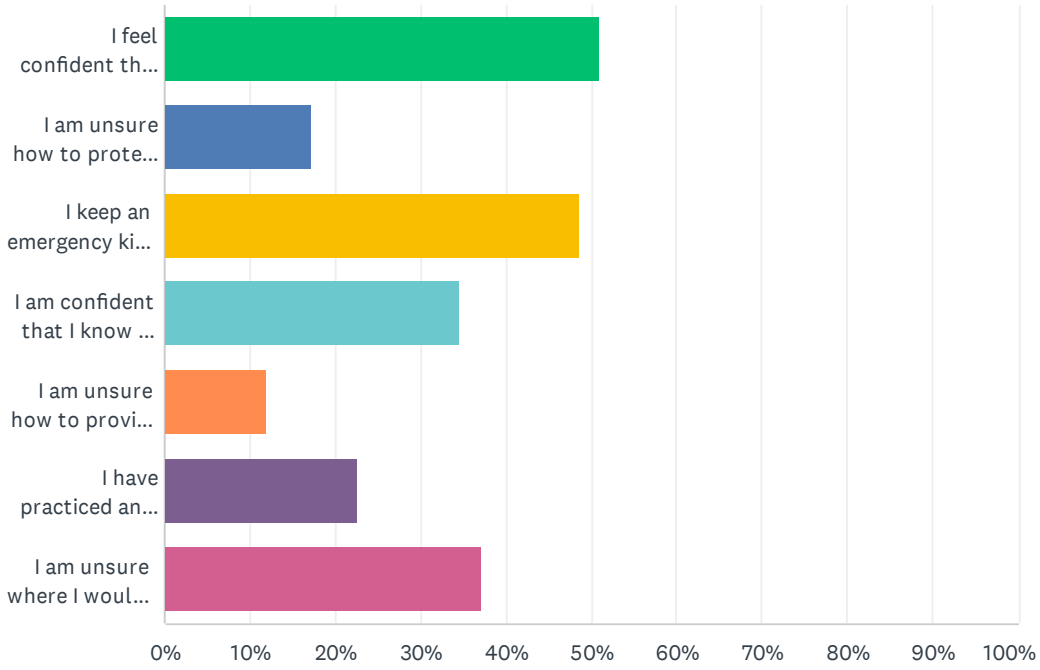
ANSWER CHOICES	RESPONSES	
Building permit fee waiver	38.30%	185
Insurance premium discount	56.11%	271
Mortgage discount	29.40%	142
Low interest loan	27.12%	131
Free local government technical assistance	49.90%	241
Grant funding	34.99%	169
None of the above	8.90%	43
Not applicable	20.29%	98
Total Respondents: 483		

#	OTHER (PLEASE SPECIFY)	DATE
1	Winning a big lottery	1/29/2023 3:30 PM
2	Waiver of residential (re)assessment	1/25/2023 3:33 AM
3	Rebates	1/24/2023 7:36 PM

4	depends on type of disaster and retrofit alternatives	1/4/2023 11:21 AM
5	Up to my landlord	1/4/2023 9:28 AM
6	CERT Courses and active membership engagement	1/3/2023 5:18 PM
7	New build 2022	12/6/2022 6:02 PM
8	Unsure	11/19/2022 5:33 PM
9	Don't raise my taxes to encourage individual responsibility.	11/17/2022 7:20 AM
10	Really need specific details of what I would need.	11/16/2022 8:38 AM
11	Don't know	11/16/2022 3:48 AM
12	I'm a Renter	11/15/2022 6:41 PM
13	Although all of the homes in my complex are individually owned, the property itself is “ruled” by a board. Terrible communication among the homeowners.	11/15/2022 6:10 PM
14	Planning to buy in Roseville, interested in all	11/15/2022 5:37 PM
15	Rebates	11/15/2022 4:15 AM
16	More info & examples	11/13/2022 10:17 PM
17	No fear of code enforcement looking at other unrelated projects during the visit	11/9/2022 6:59 PM
18	Less paper work when applying for any services that Roseville provides. One on one customer service sadly is becoming a loss skillset in the world of business.	11/9/2022 8:31 AM
19	I don’t know	11/9/2022 6:24 AM
20	High wall and landmines	11/8/2022 5:56 PM
21	Don't have a dime to implement improvements other than small things	11/8/2022 5:48 PM

Q18 If a natural disaster such as a large earthquake were to strike tomorrow... (Check all that apply)

Answered: 489 Skipped: 31



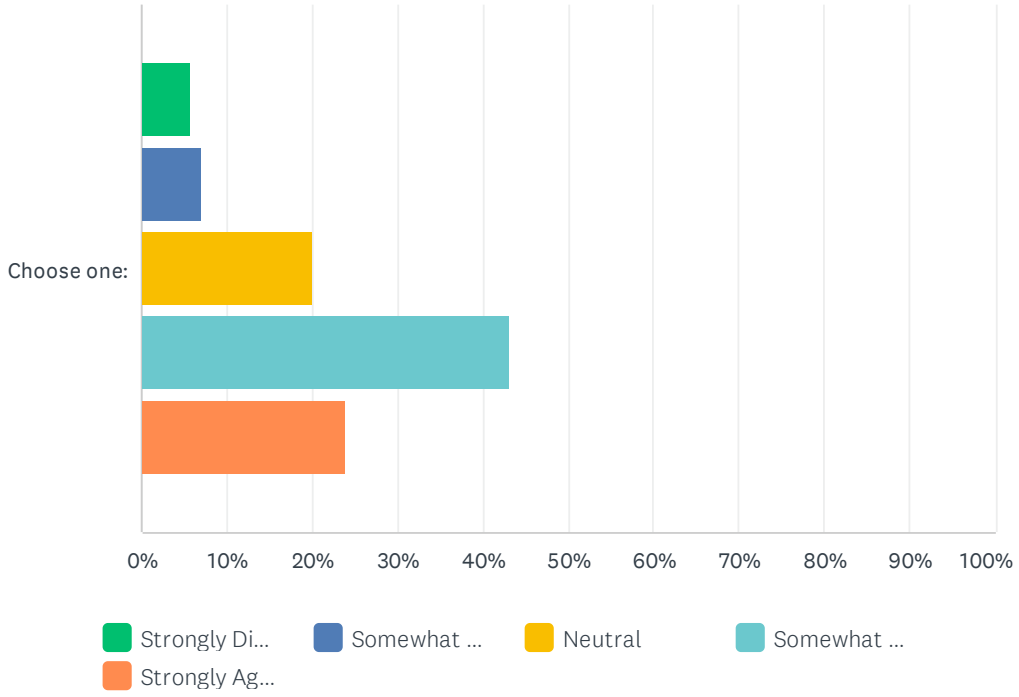
ANSWER CHOICES	RESPONSES	
I feel confident that I know how to protect myself	50.92%	249
I am unsure how to protect myself	17.18%	84
I keep an emergency kit with spare food and water for myself and my family	48.67%	238
I am confident that I know how to provide proper care for my animals during a disaster, including evacuation options	34.56%	169
I am unsure how to provide proper care for my animals during a disaster	11.86%	58
I have practiced an evacuation plan and/or know where my family and I would go if we needed to evacuate our home	22.49%	110
I am unsure where I would go if I needed to evacuate my home	37.01%	181
Total Respondents: 489		

#	OTHER (PLEASE SPECIFY)	DATE
1	I moved from OH to CA … yikes, I'm unprepared	1/25/2023 1:40 AM
2	We moved here due to the minimal chance of having an earthquake.	1/24/2023 7:57 PM
3	Been thru large earthquakes before	1/24/2023 5:57 PM
4	accessibility is key for any plan to be successfully exercised.	1/4/2023 6:31 PM
5	I would probably have family come here or vice versa	1/4/2023 1:36 PM
6	It is highly unlikely Roseville will experience large earthquake. I lived on the San Andreas fault	1/4/2023 4:12 AM

	most of my life.	
7	Have spare food and water but not in a kit. Evacuation location would be determined by nature of disaster.	12/11/2022 5:45 AM
8	new to area and not that familiar with our surroundings yet	11/16/2022 3:52 PM
9	We think about the hazzards in our home and fix them.	11/16/2022 8:44 AM
10	There is NO PROTECTION in case of an earthquake as I have been in two major quakes in the L.A. area.	11/16/2022 7:29 AM
11	I don’t have animals	11/15/2022 9:06 PM
12	somewhat prepared	11/15/2022 6:26 PM
13	since I moved from San Jose, I feel more comfortable about the risk of earthquakes	11/15/2022 6:10 PM
14	I’m from Southern CA … lots of earthquake experiences. Review of local gathering sites would be helpful.	11/15/2022 6:10 PM
15	New to Roseville so not familiar with resources	11/15/2022 5:57 PM
16	Our preparedness has been somewhat sporadic	11/9/2022 5:24 PM
17	It would all be speculated at this point as to what one should respond to but I do know as a result of continued growth in Roseville and its surrounding geographical area our existing roadways are now substandard. A good example would be Hwy. 65, Cirby Way (east & west) and Douglas Blvd. from I-80 East to Granite Bay.	11/9/2022 8:31 AM
18	Live alone. Have a second home I can go to.	11/9/2022 4:53 AM
19	Haven’t really thought about this!	11/8/2022 7:24 PM
20	If people reverted to common sense a lot of these issues wouldn't even be concerns.	11/8/2022 5:28 PM
21	I’d be gettin’ that insurance paper yo!	11/8/2022 8:57 AM
22	I am 80 and live alone..No family in the area	11/7/2022 4:43 PM

Q19 Please indicate how you feel about the following statement: (Check one)"It is the responsibility of government (local, state, and federal) to provide education and programs that promote citizen actions that will reduce exposure to the risks associated with natural hazards."

Answered: 498 Skipped: 22



	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEUTRAL	SOMEWHAT AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
Choose one:	5.82% 29	7.03% 35	20.08% 100	43.17% 215	23.90% 119	498	3.72

#	LIST ANY LOCALLY-SPONSORED EMERGENCY PREPAREDNESS COURSES YOU HAVE TAKEN:	DATE
1	FEMA Courses on disaster response, Homeland Security courses on Planning and preparedness for bomb and IED incidents, ICS 100, 200, Emergency vehicle operators course Solano County	1/26/2023 9:13 AM
2	Active shooter training, earthquake response,	1/25/2023 7:13 AM
3	AAA sponsored Diaster preparedness seminar	1/25/2023 4:49 AM
4	CPR	1/25/2023 4:41 AM
5	You are the experts	1/25/2023 4:35 AM
6	None	1/25/2023 1:40 AM
7	Employment DWR/OES	1/24/2023 11:38 PM
8	Before moving here, took CERT, First Aid, CPR	1/24/2023 8:18 PM
9	CPR	1/24/2023 6:57 PM

10	CPR, First Aid, Disaster Prep	1/4/2023 11:35 PM
11	CERT Training through city of Folsom because Roseville does not have a program.	1/4/2023 8:39 PM
12	Before my retirement I had taken a course presented by FEMA	1/4/2023 6:31 PM
13	NA	1/4/2023 1:36 PM
14	none	1/3/2023 7:15 PM
15	I am a type1/11 Cert volunteer	1/3/2023 5:18 PM
16	First aid, cpr	12/11/2022 5:45 AM
17	None: I would like to see a video that would reinact different scenarios such as flood, fire, exists etc specific to roseville	12/10/2022 2:29 PM
18	I have a Master's degree in Emergency Mgt and a I am a local CEM!	12/9/2022 6:11 PM
19	None	12/7/2022 11:57 AM
20	BLS through UC Davis Health	12/6/2022 6:34 PM
21	I take them all through my place of employment.	12/1/2022 2:33 PM
22	EMT,FirstAid,CPR,	12/1/2022 1:52 PM
23	NERT/CERT, 1st Aide	12/1/2022 1:42 PM
24	Williamburger0@gmail.com	11/16/2022 8:32 AM
25	None	11/16/2022 7:29 AM
26	I think the government should provide information about potential risks	11/16/2022 6:50 AM
27	cpr and first aid	11/16/2022 4:03 AM
28	I take them through work	11/15/2022 10:35 PM
29	ERT & First Aid at work, Active Shooter, Citizens Police Academy,	11/15/2022 9:06 PM
30	None	11/15/2022 6:20 PM
31	CPR/First Aid	11/15/2022 6:10 PM
32	Nothing since moving to the area …	11/15/2022 6:10 PM
33	it is not the responsibility of government.	11/15/2022 11:19 AM
34	They exist?	11/10/2022 6:21 PM
35	When working in the civil service arena I had taken a course offered by FEMA. I had also taken an Anti-Utility Terrorism Course. Even with that being said, I believe when one relies solely on government to look out for their best interest, they become weak in effect.	11/9/2022 8:31 AM
36	I was a member of the CERT team in San Jose before our move to Roseville in June.	11/9/2022 7:58 AM
37	Cpr classes, hostile environment protection,	11/9/2022 7:42 AM
38	In Bay Area received prep materials & training program inperson	11/9/2022 7:05 AM
39	CERTS in Napa County	11/9/2022 6:24 AM
40	I’m an RN. Wilderness first aid certification also.	11/9/2022 4:53 AM
41	Semper fi	11/8/2022 5:56 PM
42	CERT Member and trainer at previous residence in Bay Area	11/8/2022 4:52 PM
43	None	11/7/2022 3:21 PM

Appendix B. Summary of Federal and State Agencies, Programs and Regulations

B. Summary of Federal and State Agencies, Programs and Regulations

Existing laws, ordinances, plans and programs at the federal and state level can support or impact hazard mitigation actions identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (44 CFR, Section 201.6(b)(3)). The following federal and state programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement mitigation actions or has a nexus with a mitigation action in this plan. Information presented in this section can be used to review local capabilities to implement the action plan presented in this hazard mitigation plan.

FEDERAL

Americans with Disabilities Act

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations.

The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have all necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or other visual alerts. Two technical documents for shelter operators address physical accessibility needs of people with disabilities, as well as medical needs and service animals.

The ADA intersects with disaster preparedness programs in regard to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

Civil Rights Act of 1964

The Civil Rights Act of 1964 prohibits discrimination based on race, color, religion, sex or nation origin and requires equal access to public places and employment. The Act is relevant to emergency management and hazard mitigation in that it prohibits local governments from favoring the needs of one population group over another. Local government and emergency response must ensure the continued safety and well-being of all residents equally, to the extent possible. FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, and pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. Numerous issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

The CWA is important to hazard mitigation in several ways. There are often permitting requirements for any construction within 200 feet of water of the United States, which may have implications for mitigation projects identified by a local jurisdiction. Additionally, CWA requirements apply to wetlands, which serve important functions related to preserving and protecting the natural and beneficial functions of floodplains and are linked with a community's floodplain management program. Finally, the National Pollutant Discharge Elimination System is part of the CWA and addresses local stormwater management programs. Stormwater management plays a critical role in hazard mitigation by addressing urban drainage or localized flooding issues within jurisdictions.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

Community Development Block Grant Disaster Resilience Program

In response to disasters, Congress may appropriate additional funding for the U.S. Department of Housing and Urban Development Community Development Block Grant programs to be distributed as Disaster Recovery grants (CDBG-DR). These grants can be used to rebuild affected areas and provide seed money to start the recovery process. CDBG-DR assistance may fund a broad range of recovery activities, helping communities and neighborhoods that otherwise might not recover due to limited resources. CDBG-DR grants often supplement disaster programs of FEMA, the Small Business Administration, and the U.S. Army Corps of Engineers. Housing and Urban Development generally awards noncompetitive, nonrecurring CDBG-DR grants by a formula that considers disaster recovery needs unmet by other federal disaster assistance programs. To be eligible for CDBG-DR funds, projects must meet the following criteria:

- Address a disaster-related impact (direct or indirect) in a presidentially declared county for the covered disaster
- Be a CDBG-eligible activity (according to regulations and waivers)
- Meet a national objective.

Incorporating preparedness and mitigation into these actions is encouraged, as the goal is to rebuild in ways that are safer and stronger. CDBG-DR funding is a potential alternative source of funding for actions identified in this plan.

Community Rating System

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions meeting the following three goals of the CRS:

- Reduce flood losses.
- Facilitate accurate insurance rating.
- Promote awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The discount partially depends on location of the property. Properties outside the special flood hazard area receive smaller discounts: a 10-percent discount if the community is at Class 1 to 6 and a 5-percent discount if the community is at Class 7 to 9. The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness.

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 66 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks.

Disaster Mitigation Act

The DMA is the current federal legislation addressing hazard mitigation planning. It emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Assistance grant funds are available to communities. This plan is designed to meet the requirements of DMA, improving eligibility for future hazard mitigation funds.

Emergency Relief for Federally Owned Roads Program

The U.S. Forest Service's Emergency Relief for Federally Owned Roads Program was established to assist federal agencies with repair or reconstruction of tribal transportation facilities, federal lands transportation facilities, and other federally owned roads that are open to public travel and have suffered serious damage by a natural disaster over a wide area or by a catastrophic failure. The program funds both emergency and permanent repairs (Office of Federal Lands Highway, 2016). Eligible activities under this program meet some of the goals and objectives for this plan and the program is a possible funding source for actions identified in this plan.

Emergency Watershed Program

The U. S. Department of Agriculture Natural Resources Conservation Service administers the Emergency Watershed Protection Program, which responds to emergencies created by natural disasters. Eligibility for assistance is not dependent on a national emergency declaration. The program is designed to help people and conserve natural resources by relieving imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences. Emergency Watershed Protection is an emergency recovery program. Financial and technical assistance are available for the following activities (Natural Resources Conservation Service, 2016):

- Remove debris from stream channels, road culverts, and bridges
- Reshape and protect eroded banks
- Correct damaged drainage facilities
- Establish cover on critically eroding lands
- Repair levees and structures
- Repair conservation practices.

This federal program could be a possible funding source for actions identified in this plan.

Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms:

- Endangered means that a species of fish, animal or plant is "in danger of extinction throughout all or a significant portion of its range." (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)

- Threatened means that a species "is likely to become endangered within the foreseeable future." Regulations may be less restrictive for threatened species than for endangered species.
- Critical habitat means "specific geographical areas that are…essential for the conservation and management of a listed species, whether occupied by the species or not."

Five sections of the ESA are of critical importance to understanding it:

- Section 4: Listing of a Species—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or citizens may petition for them. A listing must be made "solely on the basis of the best scientific and commercial data available." After a listing has been proposed, agencies receive comment and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing.
- Section 7: Consultation—Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed or proposed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a "consultation." If the listing agency finds that an action will "take" a species, it must propose mitigations or "reasonable and prudent" alternatives to the action; if the proponent rejects these, the action cannot proceed.
- Section 9: Prohibition of Take—It is unlawful to "take" an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding or sheltering.
- Section 10: Permitted Take—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These agreements often take the form of a "Habitat Conservation Plan."
- Section 11: Citizen Lawsuits—Civil actions initiated by any citizen can require the listing agency to enforce the ESA's prohibition of taking or to meet the requirements of the consultation process.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) cooperates with a large number of federal and state agencies to ensure and promote dam safety. More than 3,000 dams are part of regulated hydroelectric projects in the FERC program. Two-thirds of these are more than 50 years old. As dams age, concern about their safety and integrity grows, so oversight and regular inspection are important. FERC inspects hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters

- Issues concerning compliance with the terms and conditions of a license.

Every five years, an independent engineer approved by the FERC must inspect and evaluate projects with dams higher than 32.8 feet (10 meters), or with a total storage capacity of more than 2,000 acre-feet.

FERC monitors seismic research and applies it in performing structural analyses of hydroelectric projects. FERC also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication Engineering Guidelines for the Evaluation of Hydropower Projects guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies.

FERC requires licensees to prepare emergency action plans and conducts training sessions on how to develop and test these plans. The plans outline an early warning system if there is an actual or potential sudden release of water from a dam due to failure. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that everyone knows what to do in emergency situations.

National Dam Safety Act

Potential for catastrophic flooding due to dam failures led to passage of the National Dam Inspection Act in 1972, creation of the National Dam Safety Program in 1996, and reauthorization of the program through the Dam Safety Act in 2006. National Dam Safety Program, administered by FEMA requires a periodic engineering analysis of the majority of dams in the country; exceptions include the following:

- Dams under jurisdiction of the Bureau of Reclamation, Tennessee Valley Authority, or International Boundary and Water Commission
- Dams constructed pursuant to licenses issued under the Federal Power Act
- Dams that the Secretary of the Army determines do not pose any threat to human life or property.

The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect lives and property of the public. The National Dam Safety Program is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most of the dams in the United States.

National Environmental Policy Act

The National Environmental Policy Act requires federal agencies to consider the environmental impacts of proposed actions and reasonable alternatives to those actions, alongside technical and economic considerations. The National Environmental Policy Act established the Council on Environmental Quality, whose regulations (40 CFR Parts 1500-1508) set standards for compliance. Consideration and decision-making regarding environmental impacts must be documented in an environmental impact statement or environmental assessment. Environmental impact assessment requires the evaluation of reasonable alternatives to a proposed action, solicitation of input

from organizations and individuals that could be affected, and an unbiased presentation of direct, indirect, and cumulative environmental impacts. FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act. NFIP participation is limited to local governments that possess permit authority and have the ability to adopt and enforce regulations that govern land use.

For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1-percent-annual-chance flood and the 0.2-percent-annual-chance flood. Base flood elevations and the boundaries of the flood hazard areas are shown on Flood Insurance Rate Maps, which are the principle tool for identifying the extent and location of the flood hazard. Flood Insurance Rate Maps are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under the local floodplain management program. In recent years, Flood Insurance Rate Maps have been digitized as Digital Flood Insurance Rate Maps, which are more accessible to residents, local governments and stakeholders.

NFIP participants must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure that three criteria are met:

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 1-percent-annual-chance flood.
- New floodplain development must not aggravate existing flood problems or increase damage to other properties.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.

In California, the Department of Water Resources (DWR) is the coordinating agency for floodplain management. DWR works with FEMA and local governments by providing grants and technical assistance, evaluating community floodplain management programs, reviewing local floodplain ordinances, participating in statewide flood hazard mitigation planning, and facilitating annual statewide workshops. Compliance is monitored by FEMA regional staff and by DWR.

National Incident Management System

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In some cases, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency responder disciplines. These cases necessitate coordination across a spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of

emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, technological hazards, and human-caused hazards) regardless of size or complexity.

Although participation is voluntary, federal departments and agencies are required to make adoption of NIMS by local and state jurisdictions a condition to receive federal preparedness grants and awards. The content of this plan is considered to be a viable support tool for any phase of emergency management. The NIMS program is considered as a response function, and information in this hazard mitigation plan can support the implementation and update of all NIMS-compliant plans within the planning area.

Presidential Executive Order 11988, Floodplain Management

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. It requires federal agencies to provide leadership and take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values of floodplains. The requirements apply to the following activities (FEMA, 2015a):

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

Presidential Executive Order 11990, Protection of Wetlands

Executive Order 11990 requires federal agencies to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The requirements apply to the following activities (National Archives, 2016):

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

All actions identified in this plan will seek full compliance with all applicable presidential executive orders.

U.S. Army Corps of Engineers Dam Safety Program

The U.S. Army Corps of Engineers operates and maintains approximately 700 dams nationwide. It is also responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. The Corps has inventoried dams; surveyed each state and federal agency's capabilities, practices and regulations regarding design, construction, operation and maintenance of the dams; and developed guidelines for inspection and evaluation of dam safety. The Corps maintains the National Inventory of Dams, which contains information about a dam's location, size, purpose, type, last inspection and regulatory status (U.S. Army Corps of Engineers, 2017).

U.S. Army Corps of Engineers Flood Hazard Management

The following U.S. Army Corps of Engineers authorities and programs related to flood hazard management:

- The Floodplain Management Services program offers 100-percent federally funded technical services such as development and interpretation of site-specific data related to the extent, duration and frequency of flooding. Special studies may be conducted to help a community understand and respond to flood risk. These may include flood hazard evaluation, flood warning and preparedness, or flood modeling.
- For more extensive studies, the Corps of Engineers offers a cost-shared program called Planning Assistance to States and Tribes. Studies under this program generally range from $25,000 to $100,000 with the local jurisdiction providing 50 percent of the cost.
- The Corps of Engineers has several cost-shared programs (typically 65 percent federal and 35 percent non-federal) aimed at developing, evaluating and implementing structural and non-structural capital projects to address flood risks at specific locations or within a specific watershed:
  - The Continuing Authorities Program for smaller-scale projects includes Section 205 for Flood Control, with a $7 million federal limit and Section 14 for Emergency Streambank Protection with a $1.5 million federal limit. These can be implemented without specific authorization from Congress.
  - Larger scale studies, referred to as General Investigations, and projects for flood risk management, for ecosystem restoration or to address other water resource issues, can be pursued through a specific authorization from Congress and are cost-shared, typically at 65 percent federal and 35 percent non-federal.
  - Watershed management planning studies can be specifically authorized and are cost-shared at 50 percent federal and 50 percent non-federal.
- The Corps of Engineers provides emergency response assistance during and following natural disasters. Public Law 84-99 enables the Corps to assist state and local authorities in flood fight activities and cost share in the repair of flood protective structures. Assistance is provided in the flowing categories:
  - Preparedness—The Flood Control and Coastal Emergency Act establishes an emergency fund for preparedness for emergency response to natural disasters; for flood fighting and rescue operations; for rehabilitation of flood control and hurricane protection structures. Funding for Corps of Engineers emergency response under this authority is provided by Congress through the annual Energy and Water Development Appropriation Act. Disaster preparedness activities include coordination, planning, training and conduct of response exercises with local, state and federal agencies.
  - Response Activities—Public Law 84-99 allows the Corps of Engineers to supplement state and local entities in flood fighting urban and other non-agricultural areas under certain conditions (Engineering Regulation 500-1-1 provides specific details). All flood fight efforts require a project cooperation agreement signed by the public sponsor and the sponsor must remove all flood fight material after the flood has receded. Public Law 84-99 also authorizes emergency water support and drought assistance in certain situations and allows for “advance measures” assistance to prevent or reduce flood damage conditions of imminent threat of unusual flooding.
  - Rehabilitation—Under Public Law 84-99, an eligible flood protection system can be rehabilitated if damaged by a flood event. The flood system would be restored to its pre-disaster status at no cost to the federal system owner, and at 20-percent cost to the eligible non-federal system owner. All systems considered eligible for Public Law 84-99 rehabilitation assistance have to be in the Rehabilitation and Inspection Program prior to the flood event. Acceptable operation and maintenance by the public levee sponsor are verified by levee inspections conducted by the Corps on a regular basis. The Corps has the responsibility to coordinate levee repair issues with interested federal, state, and local agencies following natural disaster events where flood control works are damaged.

These authorities and programs are all available to support any related mitigation actions.

STATE

AB 32: The California Global Warming Solutions Act

This bill identifies the following potential adverse impacts of global warming:

> "… the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems."

AB 32 establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020 (a reduction of approximately 25 percent from forecast emission levels), with further reductions to follow. The law requires the state Air Resources Board to do the following:

- Establish a program to track and report greenhouse gas emissions.
- Approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions from sources of greenhouse gas emissions.
- Adopt early reduction measures to begin moving forward.
- Adopt, implement and enforce regulations—including market mechanisms such as "cap and-trade" programs—to ensure that the required reductions occur.

The Air Resources Board has adopted a statewide greenhouse gas emissions limit and an emissions inventory, along with requirements to measure, track, and report greenhouse gas emissions by the industries it determined to be significant sources of greenhouse gas emissions.

AB 70: Flood Liability

This bill provides that a city or county may be required to contribute a fair and reasonable share to compensate for property damage caused by a flood to the extent that it has increased the state's exposure to liability for property damage by unreasonably approving new development in a previously undeveloped area that is protected by a state flood control project, unless the city or county meets specified requirements.

AB 162: Flood Planning

This California State Assembly Bill passed in 2007 requires cities and counties to address flood-related matters in the land use, conservation, and safety and housing elements of their general plans. The land use element must identify and annually review the areas covered by the general plan that are subject to flooding as identified in floodplain mapping by either FEMA or the state Department of Water Resources (DWR). During the next revision of the housing element on or after January 1, 2009, the conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purpose of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards, including:

- Flood hazard zones

- Maps published by FEMA, DWR, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, and the Governor's Office of Emergency Services (Cal OES)
- Historical data on flooding
- Existing and planned development in flood hazard zones.

The general plan must establish goals, policies and objectives related to flooding risks, including:

- Avoiding or minimizing the risks of flooding new development
- Evaluating whether new development should be located in flood hazard zones
- Identifying construction methods to minimize damage.

AB 162 establishes goals, policies and objectives related to flooding risks. It establishes procedures for the determination of available land suitable for urban development, which may exclude lands where FEMA or DWR has concluded that the flood management infrastructure is not adequate to avoid the risk of flooding.

AB 747: Required Information for General Plan Safety Elements

This bill requires California communities with general plans to address evacuation routes in the safety element of the general plan. Information on the evacuation routes and their capacity, safety and viability under a range of emergency scenarios must be provided. For communities that have not adopted a local hazard mitigation plan, the safety element must be updated with this information by January 1, 2022. For those with a local hazard mitigation plan, the requirement applies upon the next revision of the hazard mitigation plan on or after January 1, 2022. Communities that have adopted a local hazard mitigation plan, emergency operations plan, or other document that fulfills the goals and objectives of this law may comply with this requirement by summarizing and incorporating by reference the other plan or document in the safety element.

In subsequent revisions to the safety element, communities also will be required to identify new information relating to flood and fire hazards and climate adaptation and resiliency strategies applicable to the city or county that was not available during the previous revision of the safety element. These subsequent updates must occur upon each revision of the general plan housing element or local hazard mitigation plan and not less than once every eight years.

AB 2140: General Plans—Safety Element

This bill provides that the state may allow for more than 75 percent of public assistance funding under the California Disaster Assistance Act only if the local agency is in a jurisdiction that has adopted a local hazard mitigation plan as part of the safety element of its general plan. The local hazard mitigation plan needs to include elements specified in this legislation. In addition, this bill requires Cal OES to give preference for federal mitigation funding to cities and counties that have adopted local hazard mitigation plans. The intent of the bill is to encourage cities and counties to create and adopt hazard mitigation plans.

AB 2800: Climate Change—Infrastructure Planning

This California State Assembly bill passed in 2016 and until July 1, 2020, requires state agencies to take into account the current and future impacts of climate change when planning, designing, building, operating, maintaining, and investing in state infrastructure. The bill, by July 1, 2017, and until July 1, 2020, requires an

agency to establish a Climate-Safe Infrastructure Working Group to examine how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was enacted in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent construction of buildings used for human occupancy on the surface trace of active faults. Before a new project is permitted, cities and counties require a geologic investigation to demonstrate that proposed buildings will not be constructed on active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards, such as liquefaction or seismically induced landslides. The law requires the State of California Geologist to establish regulatory zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures for human occupancy. All seismic hazard mitigation actions identified in this plan will seek full compliance with the Alquist-Priolo Earthquake Fault Zoning Act.

California Department of Water Resources

In California, the DWR is the coordinating agency for floodplain management. The DWR works with FEMA and local governments by providing grants and technical assistance, evaluating community floodplain management programs, reviewing local floodplain ordinances, participating in statewide flood hazard mitigation planning, and facilitating annual statewide workshops. Compliance is monitored by FEMA regional staff and by the DWR.

California Division of Safety of Dams

California's Division of Safety of Dams (a division of the DWR) monitors the dam safety program at the state level and maintains a working list of dams in the state. When a new dam is proposed, Division engineers and geologists inspect the site and the subsurface. Upon submittal of an application, the Division reviews the plans and specifications prepared by the owner to ensure that the dam is designed to meet minimum requirements and that the design is appropriate for the known geologic conditions. After approval of the application, the Division inspects all aspects of the construction to ensure that the work is done in accordance with the approved plans and specifications. After construction, the Division inspects each dam to ensure that it is performing as intended and is not developing problems. The Division periodically reviews the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California. Over 1,200 dams are inspected by Division engineers on a yearly schedule to ensure performance and maintenance of dams (California Division of Safety of Dams, 2017).

California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government enacted the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision-making process.

CEQA establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. Jurisdictions conduct analysis of the project to determine if there are potentially significant environmental impacts, identify mitigation measures, and possible project alternatives by preparing environmental reports for projects that requires CEQA review. This environmental review is required before an agency takes action on any policy, program, or project. Any project action identified in this plan will seek full CEQA compliance upon implementation.

California General Planning Law

California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The general plan expresses the community's goals, visions, and policies relative to future land uses, both public and private. The general plan is mandated and prescribed by state law (Cal. Gov. Code §65300 et seq.), and forms the basis for most local government land use decision-making.

The plan must consist of an integrated, internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. City and county actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with the plan.

California Multi-Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan to be eligible for certain disaster assistance and mitigation funding. The intent of the State of California Multi-Hazard Mitigation Plan is to reduce or prevent injury and damage from hazards in the state through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements

The plan is an annex to the State Emergency Plan, and it identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.

Under 44 CFR Section 201.6, local hazard mitigation plans must be consistent with their state's hazard mitigation plan. In updating this plan, the Steering Committee reviewed the California State Hazard Mitigation Plan to identify key relevant state plan elements (see Section 3.7).

California Residential Mitigation Program

The California Residential Mitigation Program was established in 2011 to help Californians strengthen their homes against damage from earthquakes. The program is a joint powers authority created by Cal OES and the California Earthquake Authority, which is a not-for-profit, publicly managed, privately funded provider of home earthquake insurance to California homeowners and renters.

Earthquake Brace + Bolt was developed to help homeowners lessen the potential for damage to their houses during an earthquake. A residential seismic retrofit strengthens an existing older house, making it more resistant to earthquake activity such as ground shaking and soil failure. The seismic retrofitting involves bolting the house to its foundation and adding bracing around the perimeter of the crawl space. Most homeowners hire a contractor to do the retrofit work, and owners of houses in ZIP Codes with house characteristics suitable for this type of retrofit are eligible for up to $3,000 toward the cost. A typical retrofit by a contractor may cost between $3,000 and $7,000, depending on the location and size of the house, contractor fees, and the amount of materials and work involved. If the homeowner is an experienced do-it-yourselfer, a retrofit can cost less than $3,000.

California State Building Code

California Code of Regulations Title 24 (CCR Title 24), also known as the California Building Standards Code, is a compilation of building standards from three sources:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes adopted to address particular California concerns

The state Building Standards Commission is authorized by California Building Standards Law (Health and Safety Code Sections 18901 through 18949.6) to administer the processes related to the adoption, approval, publication, and implementation of California's building codes. These building codes serve as the basis for the design and construction of buildings in California. The national model code standards adopted into Title 24 apply to all occupancies in California, except for modifications adopted by state agencies and local governing bodies. Since 1989, the Building Standards Commission has published new editions of Title 24 every three years.

On January 1, 2014, California Building Code Accessibility Standards found in Chapter 11B incorporated the 2010 Americans with Disabilities Act (ADA) Standards as the model accessibility code for California. The purpose was to ensure consistency with federal guidelines. As a result of this incorporation, the California standards will fully implement and include 2010 ADA Standards within the California Building Code while maintaining enhanced levels of accessibility already provided by existing California accessibility regulations.

Disadvantaged and Low-income Communities Investments

Senate Bill (SB) 535 directs state and local agencies to make investments that benefit California's disadvantaged communities. It also directs the California Environmental Protection Agency to identify disadvantaged communities for the purposes of these investments based on geographic, socio-economic, public health, and environmental hazard criteria. Assembly Bill (AB) 1550 increased the percent of funds for projects located in disadvantaged communities from 10 to 25 percent and added a focus on investments in low-income communities and households. This program is a potential alternative source of funding for actions identified in this plan.

Division of the State Architect's AB 300 List of Seismically At-Risk Schools

In 2002, California's Division of the State Architect completed an inventory of public school buildings built before 1978 that identifies buildings with characteristics that might make them unsafe in future earthquakes. This

inventory provides a list of potentially at-risk schools known as the AB 300 list (the inventory was authorized by Assembly Bill 300 in 1999). Using available information on school buildings' dates of construction, seismic retrofits, and structural systems (wood-frame, concrete shear wall, or steel moment frame, etc.), the inventory categorized California public school buildings into one of two categories: those expected to perform well in future earthquakes; and those that are not expected to perform well and require more detailed seismic evaluation.

The Division of the State Architect recommends that public schools on this list undergo detailed seismic evaluations to determine if they pose life safety risks, but the state has neither required nor funded school districts to do this.

Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. There are four key actions in the executive order:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.
- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

Senate Bill 92: Public Resources Portion of Biennial Budget Bill

The State of California updated its requirements regarding emergency action plans (EAPs) via Senate Bill 92, which became effective in June 2017 as part of the state Legislature's biennial budget process. The bill required dam owners to submit EAPs to Cal OES and the Department of Water Resources for approval by January 1, 2018 (for extremely high hazard dams), January 1, 2019 (for high-hazard dams), and January 1, 2021 (for significant hazard dams). The EAPs were to include the following (California Government Code Section 8589.5; Cal OES, 2018):

- Emergency notification flow charts
- Information on a four-step response process
- Description of agencies' roles and actions in response to an emergency incident
- Description of actions to be taken in advance of an emergency
- Inundation maps
- Additional information such as revision records and distribution lists

After the EAPs are approved by the state, the law requires dam owners to send the approved EAPs to relevant stakeholders. Local public agencies can then adopt emergency procedures that incorporate the information in the

EAP in a manner that conforms to local needs and includes methods and procedures for alerting and warning the public and other response and preparedness related items (State of California, 2018).

SB 92 also requires dams other than low-risk dams to have current inundation mapping, which must be updated every 10 years, or sooner if specific circumstances change. EAPs also must be updated every 10 years. It provides DWR with enforcement tools, including fines and operational restrictions for failure to comply. Cal OES is required by the law to work with state and federal agencies, dam owners, planners, and the public to make dam inundation maps available to citizens interested in learning their dam failure inundation risk.

Senate Bill 97: Guidelines for Greenhouse Gas Emissions

Senate Bill 97, enacted in 2007, amends CEQA to clearly establish that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for CEQA analysis. It directs the Governor's Office of Planning and Research to develop draft CEQA guidelines for the mitigation of greenhouse gas emissions or their effects by July 1, 2009, and directs the California Natural Resources Agency to certify and adopt the CEQA Guidelines by January 1, 2010.

Senate Bill 99: Evacuation Route Planning

Senate Bill 99, enacted in 2019, requires that cities' and counties' general plans address evacuation routes from any hazard area identified in the safety element. Under this law, the safety element must include information to identify residential developments in hazard areas that do not have at least two emergency evacuation routes. Each city or county must update its safety element with the new information upon the next revision of its housing element on or after January 1, 2020.

Senate Bill 379: General Plans: Safety Element—Climate Adaptation

Senate Bill 379 builds upon the flood planning inclusions into the safety and housing elements and the hazard mitigation planning safety element inclusions in general plans outlined in AB 162 and AB 2140, respectively. SB 379 focuses on a new requirement that cities and counties include climate adaptation and resiliency strategies in the safety element of their general plans beginning January 1, 2017. In addition, this bill requires general plans to include a set of goals, policies and objectives, and specified implementation measures based on the conclusions drawn from climate adaptation research and recommendations.

Senate Bill 1000: General Plan Amendments—Safety and Environmental Justice Elements

In 2016, Senate Bill 1000 amended California's Planning and Zoning Law in two ways:

- The original law established requirements for initial revisions of general plan safety elements to address flooding, fire, and climate adaptation and resilience. It also required subsequent review and revision as necessary based on new information. Senate Bill 1000 specifies that the subsequent reviews and revision based on new information are required to address only flooding and fires (not climate adaptation and resilience).
- Senate Bill 1000 adds a requirement that, upon adoption or revision of any two other general plan elements on or after January 1, 2018, an environmental justice element be adopted for the general plan or environmental justice goals, policies and objectives be incorporated into other elements of the plan.

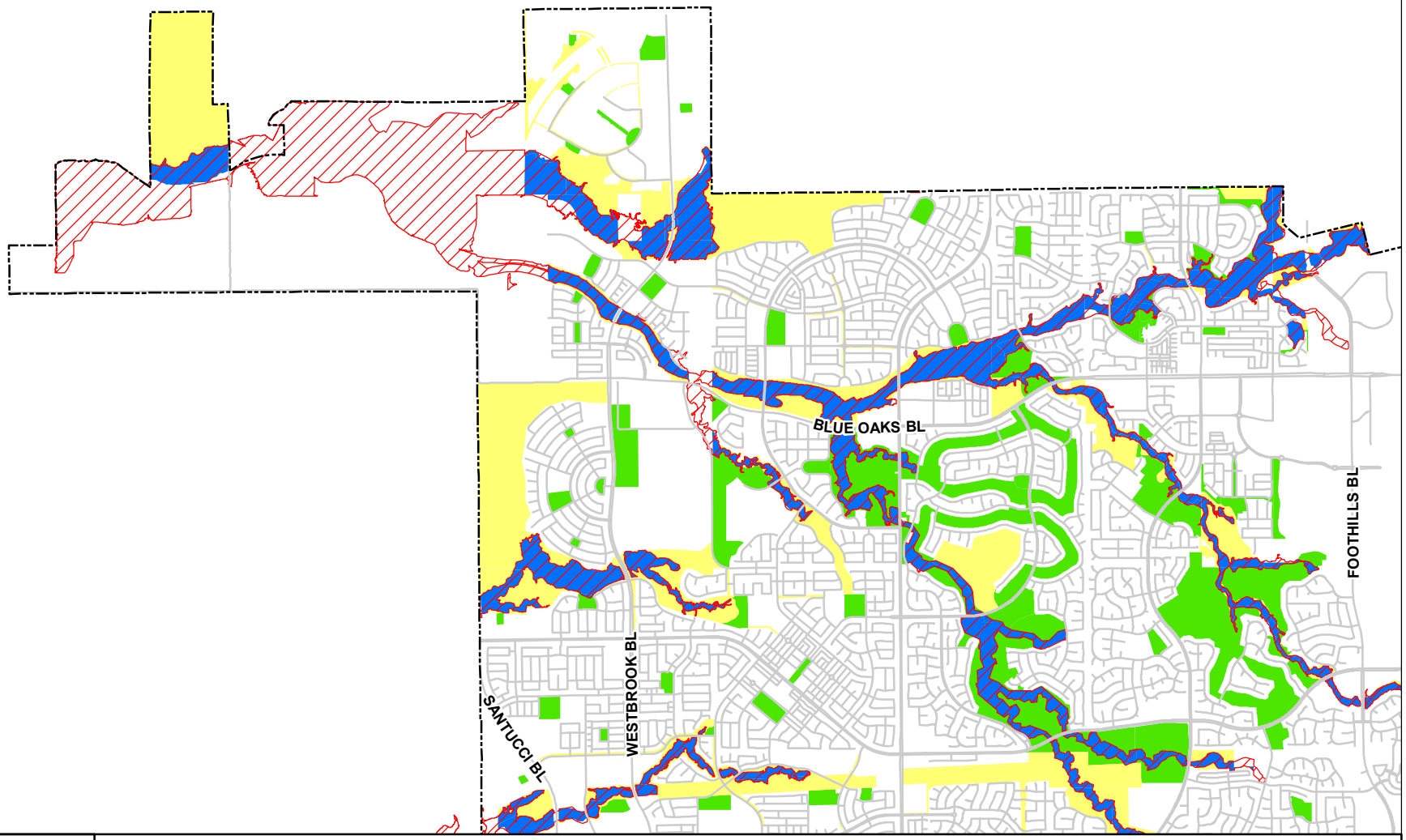
Senate Bill 1035: Fire, Flood, and Adaptation Safety Element Updates

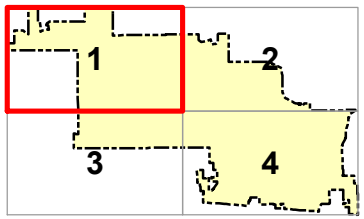
Senate Bill 1035 clarifies that revisions to a community's General Plan Safety Element—to address fire hazards, flood hazards, and climate adaptation and resilience strategies—must occur upon each revision to a Housing Element or Local Hazard Mitigation Program.

Standardized Emergency Management System

CCR Title 19 establishes the Standardized Emergency Management System (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. Local governments must use SEMS by December 1, 1996, to be eligible for state funding of response-related personnel costs under CCR Title 19 (Sections 2920, 2925 and 2930). The roles and responsibilities of Individual agencies contained in existing laws or the state emergency plan are not superseded by these regulations. This hazard mitigation plan is considered to be a support document for all phases of emergency management, including those associated with SEMS.

Appendix C. Maps of Open Space in the Floodplain





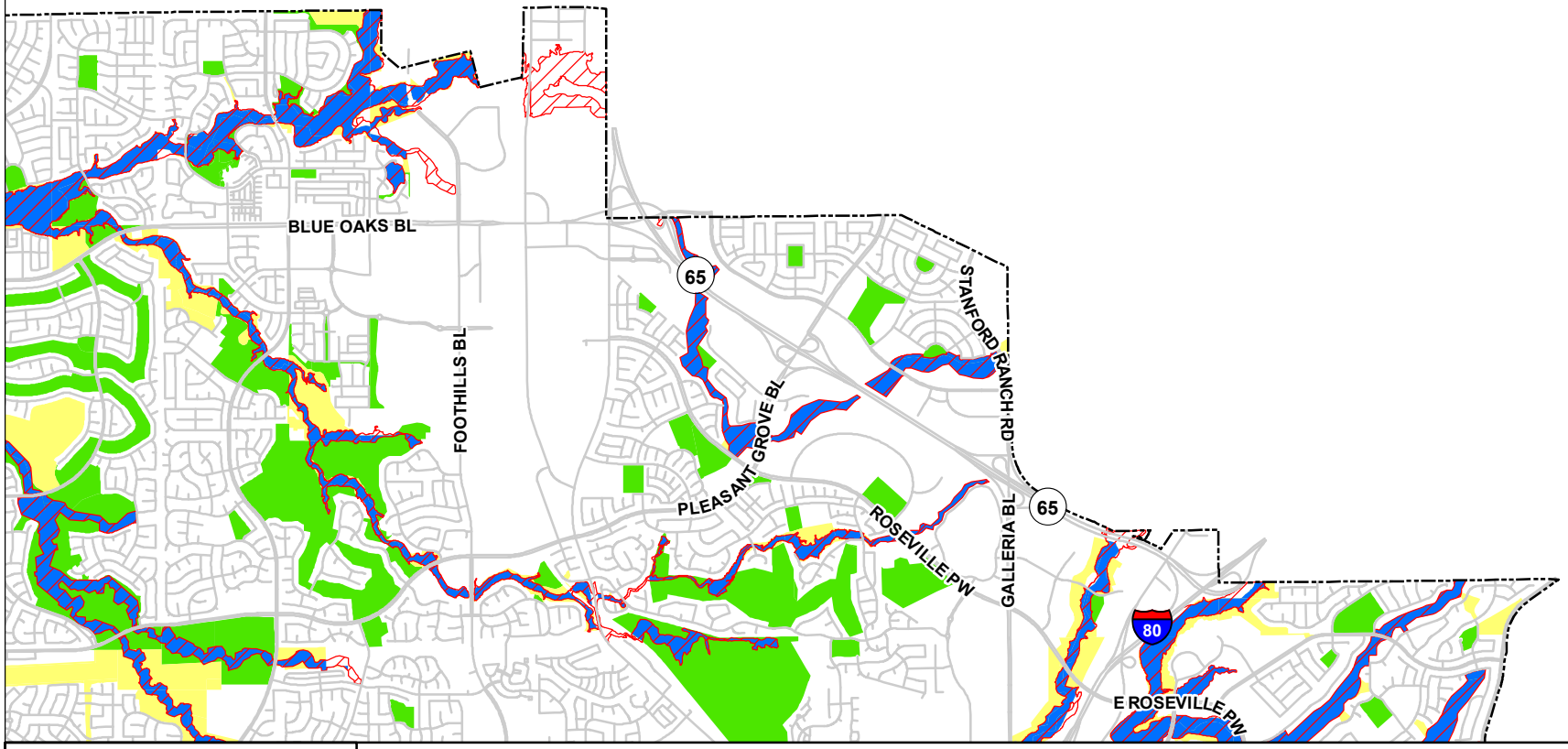
Open Space Preservation - Map Quadrant 1

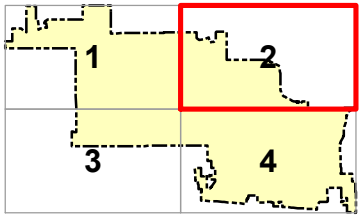
- Roseville Regulatory Floodplain (2,955.3 acres)
- Open Space (OS) & Parks & Recreation (PR) in Regulatory Floodplain (1,873.6 acres)
- General Plan: Open Space (OS)
- General Plan: Parks & Recreation (PR)

CITY OF ROSEVILLE CALIFORNIA

N

0 0.5 1 Miles





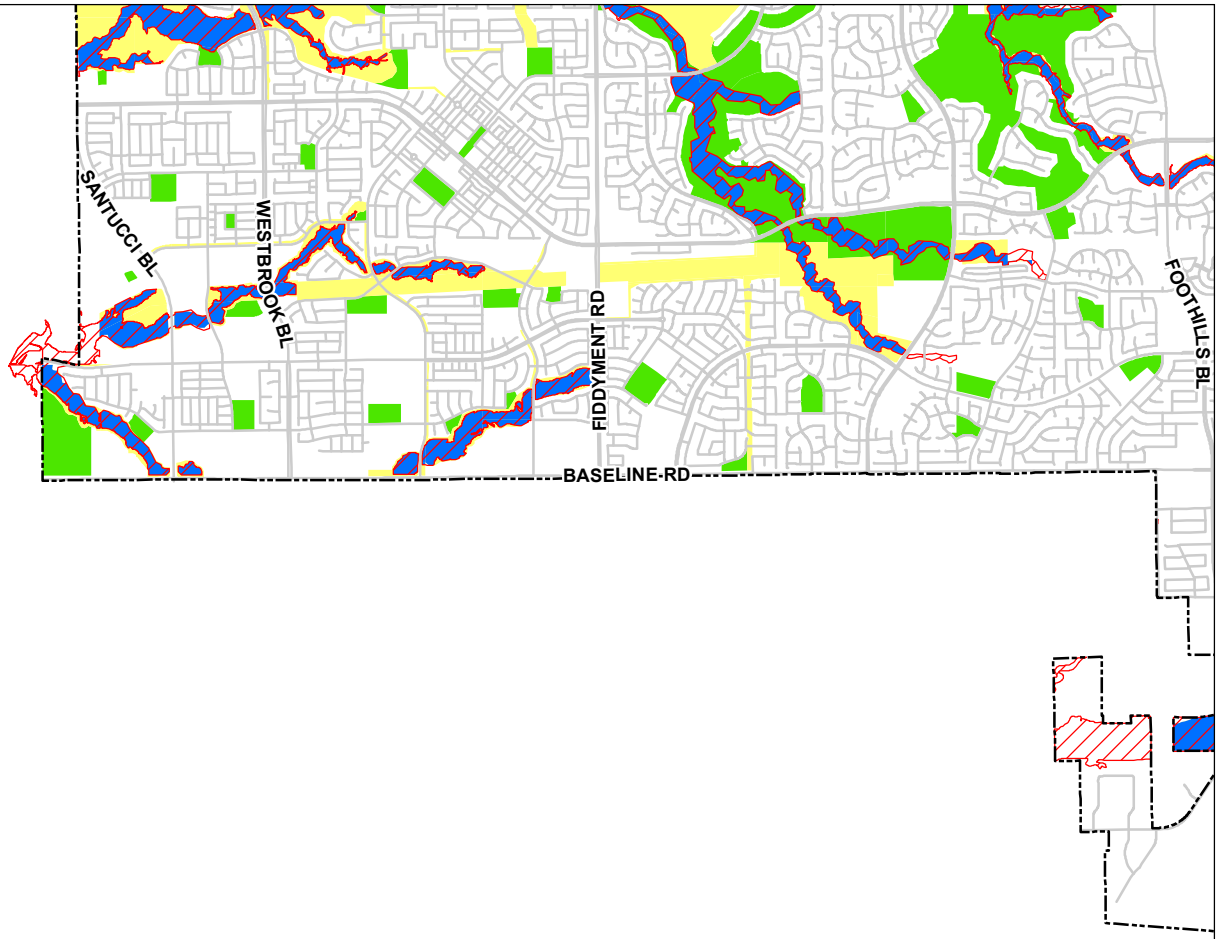
Open Space Preservation - Map Quadrant 2

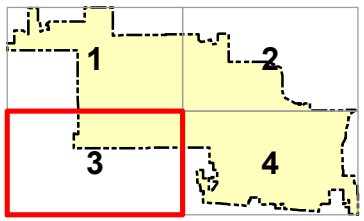
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- General Plan: Open Space (OS)
- General Plan: Parks & Recreation (PR)

CITY OF ROSEVILLE CALIFORNIA

N

0 0.5 1 Miles





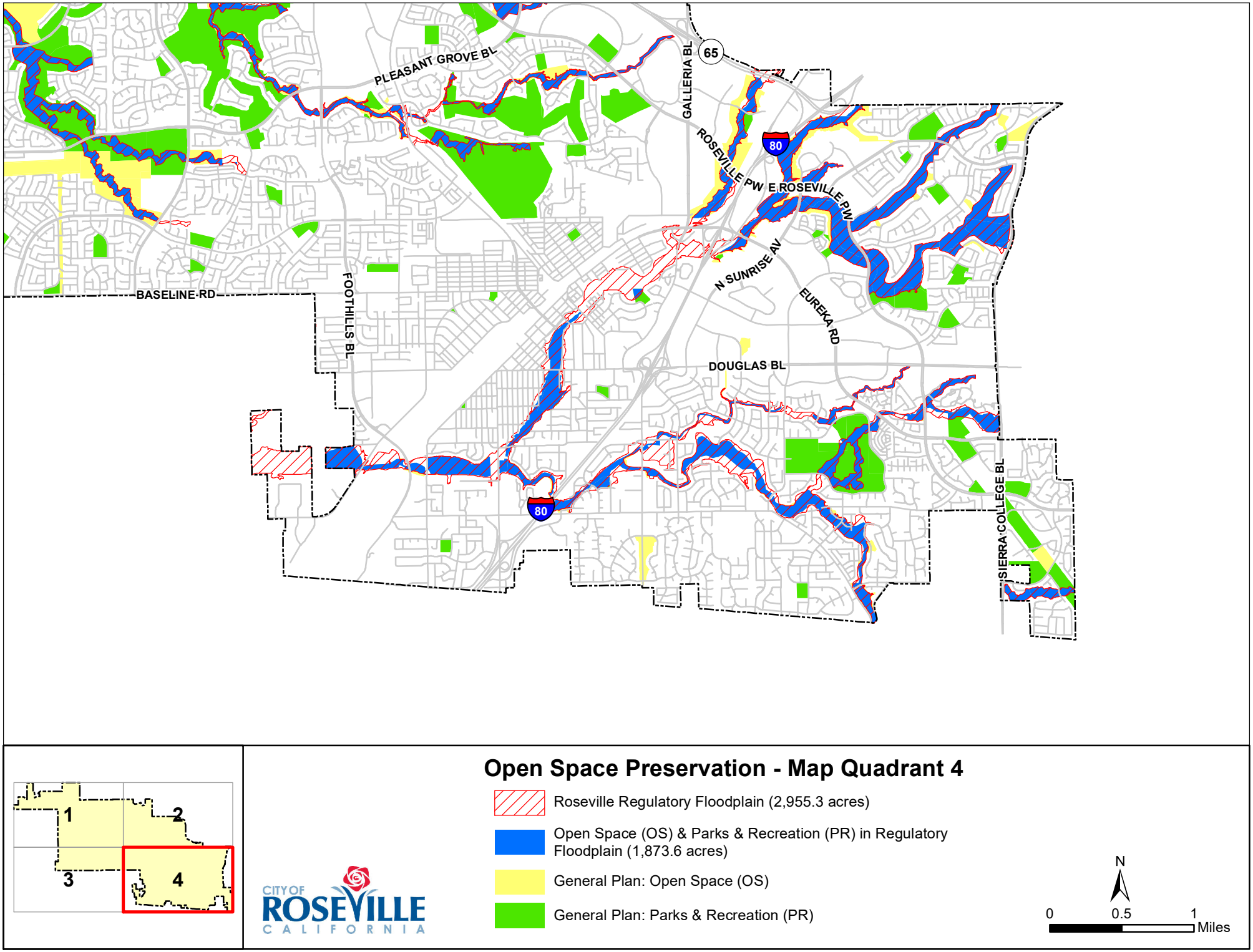
Open Space Preservation - Map Quadrant 3

- Roseville Regulatory Floodplain (2,955.3 acres)
- Open Space (OS) & Parks & Recreation (PR) in Regulatory Floodplain (1,873.6 acres)
- General Plan: Open Space (OS)
- General Plan: Parks & Recreation (PR)

CITY OF ROSEVILLE CALIFORNIA

N

0 0.5 1 Miles


PLEASANT GROVE BL
GALLERIA BL
65
80
ROSEVILLE PW
E ROSEVILLE PW
N SUNRISE AV
EUREKA RD
BASELINE RD
FOOTHILLS BL
DOUGLAS BL
SIERRA COLLEGE BL
80
1
2
3
4
CITY OF ROSEVILLE CALIFORNIA
Open Space Preservation - Map Quadrant 4
Roseville Regulatory Floodplain (2,955.3 acres)
Open Space (OS) & Parks & Recreation (PR) in Regulatory Floodplain (1,873.6 acres)
General Plan: Open Space (OS)
General Plan: Parks & Recreation (PR)
N
0
0.5
1
Miles

Appendix D. Status of Actions from Previous Plan

D. STATUS OF ACTIONS FROM PREVIOUS PLAN

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
D-1 - Perform a groundwater recharge feasibility study to determine the most cost-effective way to replenish groundwater resources within Roseville.				
Yes	Long Term (5+yrs.)	No	The City completed a program-wide Environmental Impact Report review under the California Environmental Quality Act requirements. The Environmental Impact Report was adopted by the City Council on March 21, 2012. The City received an operating permit from the State Water Quality Control Board in 2012. The City has implemented this action by recharging excess treated surface water into two existing wells in 2013 and resumed recharge in 2019, hydrology permitting, using the City's five ASR wells. A long term ASR operations plan has been developed in 2020. The City is also part of the Western Placer Groundwater Sustainability Agency.	Completed
D-2 - Implement aquifer storage and recovery program that uses direct injection technique in areas identified as appropriate.				
Yes	Long Term (5+yrs.)	No	EU has implemented this action by injecting treated drinking water into two wells in early 2013. And since 2019, has injected available unstorable flood water from Folsom Reservoir with permission from the U.S. Bureau of Reclamation during several windows of water availability. The City has five ASR wells, with two more to be completed by May 2023, and two more starting construction in 2023. By 2027, Roseville will have 11 ASR wells operational.	Ongoing Capability
D-3 - Continue to implement the Environmental Utility Department's recycled water program and seek all opportunities to expand its coverage, currently focusing on urban growth areas. The City pumps recycled water through a system of purple pipes completely separate from potable (drinking water) pipes. The City pumps the recycled water to customers such as streetscapes, golf courses and parks, where it irrigates turf and shrubs. Using recycled water for uses such as landscape irrigation reduces demand on the potable water system, creating a more reliable water supply for the entire City. Recycled water is not subject to the effects of drought.				
Yes	Short Term (<5yrs.)	No	A Water Recycling Master Plan has been developed and is being implemented. This includes expanding recycled water in the region as well as finding opportunities in the existing service areas. Recycled water is considered as a resource in all new development areas being considered.	Ongoing Capability

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
D-4 - Promote active water conservation techniques and strategies to private property owners through Roseville-sponsored outreach projects such as printed media and the City's website.				
Yes	Short Term (<5yrs.)	No	Conservation efforts are an ongoing initiative of the Water Division and have been increased and accelerated in all areas due to the unprecedented drought conditions facing the state. Senate Bill 606 and Assembly Bill 1668 provide a framework for setting water use targets, as well as implementing and enforcing the new water use requirements. As a result of these new laws, Environmental Utilities Water Efficiency section is enhancing their leak detection program, increasing water waste patrol, working with high water users in both our residential and commercial sectors, in addition to outreach and education related to water use efficiency.	Ongoing Capability
DF-1 - Create a dam failure element for the City's emergency response plan that includes a phased warning protocol in response to the findings of the Folsom Dam Containment Dike Risk Assessment.				
Yes	Short Term (<5yrs.)	No	This phased response plan that guides City emergency management staff is in the decision-making process. Discussions are ongoing among the hazard mitigation planning team.	In Progress
EQ-1 - Perform building-specific, structural seismic vulnerability assessment of City-owned critical facilities constructed prior to 1980 (including infrastructure). Included in this assessment will be recommended mitigation alternatives that meet goals and objectives of this Plan.				
Yes	Long Term (5+yrs.)	Yes	Major construction on any city-owned building would require an assessment of seismic vulnerability. The City will continue to apply for a Planning Grant under applicable FEMA programs to complete this task.	No Progress
EQ-2 - Incorporate earthquake mitigation measures for private property into existing City-sponsored outreach programs such as printed media and the City's website.				
Yes	Short Term (<5yrs.)	No	Information regarding earthquake safety and building requirements are communicated in existing Building Division literature made available at the front counter and on the City's website. In addition, the California Building Officials (CALBO) website has consumer web pages with information regarding seismic safety.	Ongoing Capability
EQ-3 - Reassess the overall vulnerability to the earthquake hazard using the best available science and technology as it becomes available. State-sponsored programs, Seismic Hazards Mapping Act, and future FEMA- sponsored initiatives are anticipated to create a wealth of knowledge regarding this hazard that did not exist during the preparation of this Plan.				
Yes	Short Term (<5yrs.)	No	Development Services will avail itself of any state- or federally-sponsored programed aimed at improving seismic safety as they become available. The City will conduct seismic risk assessment as necessary with applicable MHMP updates should new or revised earthquake fault or hazard zone maps be published by the California Department of Conservation. At present, the City of Roseville and Placer County are not listed as affected by Department of Conservation Seismic Hazard Mapping Program(SHMP) zones.	Ongoing Capability

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
F-1 - The City shall designate all areas identified as the 100-year floodplain. The boundaries of the 100-year floodplain shall be as specified in the floodplain designations section of this component of the City's General Plan. Floodplain areas shall be preserved as specified in the open space and conservation element. Such preservation may include required dedication to the City. If needed, modify the City's ordinances to include floodplain use regulations consistent with the goals, policies, and implementation measures of the safety, land use, open space and conservation, and parks and recreation elements of the City's General Plan.				
Yes	Long Term (5+yrs.)	No	The city continued to implement its ongoing protocols and standard for identifying, mapping, and preserving the 100 yr floodplain during this reporting period. This initiative will continue to be implemented on an on-going basis, with a high priority.	Ongoing Capability
F-10 - Monitor and regularly update City flood studies, modeling, and associated land use, zoning, and other development regulations at a minimum of every 5 years or whenever information becomes available that would significantly modify previous data. New information could include new studies, change in City policy, consideration of a major development project or specific plan, or implementation of a flood control project.				
Yes	Long Term (5+yrs.)	No	During the reporting period, new floodplains have been developed for and within the Amoruso Ranch Specific Plan; they have been added to the City's Regulatory Floodplain before development began in Amoruso Ranch. When hydraulic models are updated for various projects, these models are then used as best available data. The priority and timeline for this initiative will remain as assigned.	Ongoing Capability
F-11 - Require a master drainage plan as part of the approval process for all specific plans and large development projects as determined by the Public Works director. The master drainage plan should consider cumulative regional drainage and flooding mitigation. The plan's intent is to ensure that the overall rate of runoff from a project does not exceed predevelopment levels. If necessary, this objective shall be achieved by incorporating run-off control measures to minimize peak flows and/or assistance in financing or otherwise implementing comprehensive drainage plans.				
Yes	Long Term (5+yrs.)	No	The City will continue to require preparation of master drainage plans and flood studies for new growth areas. The priority and timeline for this initiative will remain as assigned.	Ongoing Capability
F-12 - Continue the Parks, Recreation & Libraries Department's regular creek maintenance program within the City's creeks and floodplain areas. This program clears and removes debris that could contribute to blockage and flooding and includes vegetation removal. This is only done in areas of high risk to flood damage or where property or facilities are threatened by flooding.				
Yes	Long Term (5+yrs.)	No	The city continued to implement its ongoing protocol of inspecting and maintaining its creeks and streams during the reporting period. The Department of Fish and Wildlife executed a 12-year Routine Maintenance Agreement with the City in March 2017 covering the summer clearing work during the reporting period: 2017/18. During the previous reporting period, the City of Roseville worked with the Placer County Resource Conservation District to remove Red Sesbania from stream segments within the Dry Creek basin. This initiative will continue to be implemented on an ongoing basis, with a high priority. The City began collecting all data in GIS to improve mapping and tracking of creek maintenance activities. The City will continue to seek grant funding opportunities from FEMA and state agencies, when available, to assist in funding Arundo eradication along infested stream channels in the Dry Creek watershed. During the reporting period, the City completed its Saugstad Restoration Project - a creekbank restoration project along Saugstad Park.	Ongoing Capability

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
F-13 - Continue annual inspection and maintenance program of City storm drain systems. Review after every major storm system function and performance. This program removes debris that could contribute to blockage of the storm drain system.				
Yes	Short Term (<5yrs.)	No	The City continued to implement its ongoing protocol of inspecting and maintaining its storm drain system during the reporting period. During this period, a series of storms pounded California. Inspection of the City's Flood Risk Reduction Facility (floodwalls, levees, and related drainage features) was conducted. Storm damage was found and reported for ongoing monitoring. Debris that could cause blockage of a couple outfalls was reported for maintenance. This initiative will continue to be implemented on an ongoing basis with a high priority. The creeks within Roseville are a part of the drainage system. With 77.7 miles of creeks, the City also relies on residents reporting fallen trees within the creek channels or floodplains and resolve accordingly.	Ongoing Capability
F-14 - Complete the final phase of the Cirby/Linda/Dry Creek flood control project (Phase 2). Six of the seven phases of this project have been completed at a cost of about $32,800,000 (in Oct. 2019 dollars). The basis for determining viability of this project will be a benefit /cost analysis to determine if project meets federal grant eligibility requirements.				
Yes	Long Term (5+yrs.)	No	No actions towards the completion of this initiative were completed during the reporting period. This will continue to be a long-term initiative with a low priority pending funding.	Ongoing Capability
F-15 - Analyze alternative improvements to the Cirby/Linda/Dry Creek flood control project that may be cost effective in the flood-prone areas of Roseville: Dry Creek from Darling Way to Riverside Avenue; Area on Dry Creek upstream of Folsom Road in the Columbia Avenue/Marilyn Avenue/Bonita Street area; Linda Creek near Champion Oaks Drive/Samoa Way/Hurst Way area; Cirby Creek in the Trimble Way/Zien Court area				
Yes	Long Term (5+yrs.)	No	Multiple actions towards the completion of this initiative were implemented during this and the former reporting period. The City pursued opportunities to acquire (from willing sellers), elevate, or floodproof flood-prone buildings to significantly reduce their flood risk as a viable alternative to structural flood control. Offers were made to multiple owners of flood-prone properties for City aid in obtaining FEMA hazard mitigation grants. No structure owner elected to obtain the federal grant with a commitment to provide the 25% local cost. The City has dedicated funding to analyze the hydraulic nature of Cirby Creek upstream of Sunrise Ave with the goal of creating more accurate 1% annual flood FEMA maps and to better understand what mitigation measures may work best in this area. This will continue to be a long-term initiative with a low priority pending funding.	Ongoing Capability
F-16 - Replace the Huntington Drive/Cirby Creek culvert with a bridge to protect Queens Court/Huntington Drive area and potentially reduce flood exposure further up Cirby Creek. The Public Works Department oversees this project.				
Yes	Long Term (5+yrs.)	Yes	This action has been discontinued and replaced by a more holistic action that takes in additional areas and flood mitigation methods.	Discontinued

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
F-17 - Divert the main drainage storm drain system down Crestmont Avenue to Cirby Way and then into Dry Creek so that the existing system will not exceed capacity. If system capacity is exceeded, the intersection on Cirby Way and Crestmont Avenue and nearby homes will flood during major flood events.				
Yes	Short Term (<5yrs.)	No	A portion of the project, consisting of the 48-inch outfall into Linda Creek and the storm drain pipe crossing South Cirby Way at the intersection of Piedmont Way, was constructed in 2010. A constructable design for the complete engineered solution is complete. This design was put out to bid during the summer of 2018. The City received only a single bid valued at twice the engineer's estimate; construction was not authorized. The City plans to bid the project again for construction in 2024. The priority and timeline for this initiative will remain as assigned.	Ongoing Capability
F-18 - Continue to promote and sponsor programs to buy out, relocate, and flood-proof existing flood-prone structures within Roseville.				
Yes	Short Term (<5yrs.)	No	The City will continue to pursue flood hazard reduction via these "nonstructural mitigation measures" of additional target properties with a high priority. During the reporting period, City Floodplain Management staff have mailed owners of structures within a historic area of repetitive flooding inviting those who may benefit from them, to use nonstructural mitigation measures to buy-down their flood risk. This activity remains largely influenced by available grant funding.	Ongoing Capability
F-2 - Refer any development proposal that has a direct or indirect impact on flood protection to Public Works for comment. In addition, forward such proposals to other agencies as applicable, including the U.S. Army Corps of Engineers, California Central Valley Flood Protection Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and Placer County Flood Control District. Consider the comments of the agencies during the development review process.				
Yes	Short Term (<5yrs.)	No	The city continued to implement its ongoing protocols and standard for reviewing flooding impacts that may be caused by new developments and forward such developments to other agencies as applicable during this reporting period. This initiative will continue to be implemented on an ongoing basis, with a high priority.	Ongoing Capability
F-20 - Retrofit the City's Downtown library by sealing the exterior and installing a flood door to protect against flood damage should Dry Creek overspill the existing floodwall.				
Yes	Long Term (5+yrs.)	No	No progress was completed on this Action item during the reporting period.	No Progress
F-21 - Continue the Tree Mitigation Fund program administered by the Parks Division in conjunction with non-profit organizations. The planting of oak trees in the open spaces adjacent to riparian zones increases infiltration and slows storm water surges.				
Yes	Other, please specify	No	The Tree Mitigation program for native oak woodland restoration uses oak mitigation funds for projects in the open spaces. Over 8,000 trees have been planted to date. An additional 1000 Oaks are being planted this year with our local non-profit organization, the Roseville Urban Forest Foundation and volunteers for the community. The Oak plantings are maintained for 3 years and monitored for 5 years to ensure success criteria is met.	Ongoing Capability

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
F-22 - Manage beaver dam sites for flood control protection and habitat restoration after dam removal. One primary issue is impacts to floodwater capacity of creeks. Part of the desired comprehensive approach to beaver management includes establishment of quantitative and qualitative "carrying capacity," including acre-feet of flood capacity lost. Implement a standard monitoring and reporting process to track beaver dam locations, population, and impacts. Gain regulatory approval for beaver management techniques such as biological control and habitat manipulation using the most benign options first.				
Yes	Other, please specify	No	The Parks & Open Space Division continues to use a Geographical Information Systems (GIS) database for tracking beaver dam locations and coordinates beaver removal per the City's Beaver Management Policy and Nuisance Abatement Ordinance. Beaver dam removal is also covered under the City's Routine Maintenance Agreement with the CDFW.	Ongoing Capability
F-23 - Develop the City's multi-use, multi-benefit stormwater water retention project for volumetric floodflow mitigation within the Pleasant Grove Creek Watershed, the Pleasant Grove Stormwater Retention Facility (also referred to Reason Farms or the Al Johnson Wildlife Preserve).				
Yes	Long Term (5+yrs.)	No	Placer County, including developers within the unincorporated parts of the County, desire to participate in the City of Roseville's volumetric flood control project, thus making it a regional facility. City and County staff were meeting through 2017 and 2018 to evaluate the opportunities of the City's flood control project to accommodate the County's mitigation needs. Discussions have been fruitful. During the former reporting period, a conceptual basin redesign was produced that adds additional storage capacity within the City flood control project to include the County needs, assessed the hydraulic capability of the creek systems to deliver enough water to meet those needs, and assessed the fair share construction costs of the added capacity. During this reporting period, the following occurred: the City completed developing a cost estimate for operations and maintenance of the proposed facility; discussions with the County resumed and a draft Memo-of-Understanding (MOU) is being considered by the City for the reservation of storage capacity for Placer County projects; contracts are being considered for several aspects of a possible regional facility; the City is dedicating funding in FY2023-24 for the project-level EIR and design of the facility.	Ongoing Capability
F-3 - Continue City participation in the National Flood Insurance Program and the Community Rating System (CRS). Seek CRS classification improvements within capabilities of City programs, including adoption and administration of FEMA-approved ordinances and flood insurance rate maps (FIRM).				
Yes	Short Term (<5yrs.)	No	The City of Roseville continued to participate in the NFIP and CRS programs and re-certified its participation in CRS during the reporting period. The City's CRS Class 1 classification became effective on October 1, 2006. Flood insurance policy holders within the City for property owners in flood areas will receive up to a 45% premium discount based on this classification. Roseville is the first CRS Class 1 community in the nation. This initiative will continue to be implemented on an ongoing basis, with a high priority. The City has maintained its Class 1 rating through the reporting period.	Ongoing Capability

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
F-4 - Maintain Roseville's compliance and good standing under the National Flood Insurance program.				
Yes	Short Term (<5yrs.)	No	A Community Assistance Visit (CAV) was last performed on the City of Roseville on March 27, 2023. The CAV is the principle means by which FEMA monitors a community's NFIP compliance. This CAV found that the City was in full compliance and is in good standing under the NFIP. A CAV is also to be performed within 12-months of Roseville's Reverification audit; that meeting occurred Nov. 16-17, 2022. The City of Roseville will happily perform a CAV when FEMA Region IX staff contact us and request one.	Ongoing Capability
F-5 - Continue the City's outreach program to flood-prone property owners and the citizens of Roseville, to help make them aware of the flood threat and how best to deal with them. This includes a full-page message in the City's Summer Recreation Guide which is mailed to all Roseville households. Additionally, messages are shared through the City's utility mailer inserts, email newsletter, website, video, social media channels, and news media throughout the year.				
Yes	Short Term (<5yrs.)	No	This is an on-going action that is a part of the City's CRS program.	Ongoing Capability
F-6 - Continue to pursue a regional approach to flood issues by remaining actively involved in the Placer County Flood Control District. This involvement includes cooperation in the development of a comprehensive regional database. Continue to participate in regional flooding studies, including the Auburn Creek/Coon Creek/Pleasant Grove Creek flood mitigation plan (i.e., Natomas Cross Canal Watershed Plan) and the Dry Creek Watershed Flood Control Plan.				
Yes	Long Term (5+yrs.)	No	The City continued to be actively involved in the Placer County Flood Control & Water Conservation District (District) and participate in regional flooding studies during this reporting period. Staff from the City's Floodplain Management (FPM) Section participates within the District meetings on a monthly basis and a City Councilmember serves on the District Board. The District developed the Antelope Creek Flood Control Project, which is a regional flood control project, located within the City of Roseville. City FPM staff assisted the District with the development and construction of the regional flood control project, construction completed in 2018, and assisted the District through the 5-year project performance monitoring period. The City's FPM staff actively contribute to the FEMA mapping update "CTP3" and "CTP4" contracts lead by the District and recommended to the District member agencies to begin investing in our regional watershed model update. City FPM staff and District staff have an integrated web-based Flood Alert Monitoring System that we jointly manage. This initiative will continue to be implemented on an ongoing basis, with a high priority.	Ongoing Capability

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
F-7 - Continue City coordination with other agencies on issues of flood control. Coordination between the City and adjacent jurisdictions occurs through several mechanisms, including distribution of development proposals for review and comment. Continue City cooperation with federal, state, and local agencies, including the U.S. Army Corps of Engineers, California Central Valley Flood Protection Board, FEMA, California Department of Fish and Wildlife, Placer County Resource Conservation District, and the Placer County Flood Control District.				
Yes	Short Term (<5yrs.)	No	The City continued to coordinate with other outside agencies on issues of flood control during this reporting period. The coordination typically occurs on a project-by-project basis and agencies are included in the meetings based on their particular jurisdiction or expertise. This initiative will continue to be implemented on an on-going basis, with a high priority. The City is also actively involved with the State Dept. of Water Resources (DWR) Flood Emergency Response Program and implementing California Central Valley Flood Protection Board project encroachment permits. City staff are actively engaging with CDFW staff on a number of City activities and projects during this reporting period.	Ongoing Capability
F-8 - Continue to develop, implement, and expand the Flood Alert and Early Warning Program systems and integrate the systems with other local jurisdictions to form a regional warning program.				
Yes	Long Term (5+yrs.)	No	The City continues to develop, implement, and expand the Flood Alert system. New "ALERT" software was installed and the Flood Warning website was updated. During the reporting period, the City and the Placer County Flood Control & Water Conservation District are in-process of implementing a grant-funded project received from the State Department of Water Resources Flood Emergency Response program. The City and District are grant partners in 1 project. The project upgrades the Flood Alert System data transmission system to the "ALERT-2" protocol and install 2 new District stations. The City has completed their portion of the upgrade project. The ALERT 2 protocol better integrates with multiple agencies. The City and District are in-process of planning the upgrade of the operating system for better reliability and user functionality. This initiative will continue to be implemented on an ongoing basis with a high priority.	Ongoing Capability
F-9 - Ensure that future specific plans and specific plan amendments are consistent with the goals and policies of the General Plan. The specific plans shall include the designation and preservation of floodplain areas and adjacent habitat. Provisions shall be incorporated to ensure that public infrastructure, utilities, and emergency services remain functional during flood conditions. Such infrastructure and facilities include water, sewer and gas mains, telephone and electric lines, streets and bridges, hospitals, and fire and police stations. Financing mechanisms shall be explored to fund necessary flood protection improvements and maintenance. Development agreements may be used to secure implementation and funding provisions. (Specific plans have 100% cost recovery by developers).				
Yes	Long Term (5+yrs.)	No	The city continued to implement its protocols and standard for reviewing proposed public infrastructure, utilities, and other emergency services so that they would remain functional during flood during this reporting period. This initiative will continue to be implemented on an ongoing basis, with a high priority.	Ongoing Capability

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
HC-1 - Commit support to initiatives within the Sacramento-Roseville-Arden-Arcade Metropolitan Statistical Area; continue to seek funding from other federal sources to fund its initiatives				
Yes	Short Term (<5yrs.)	No	The Police and Fire Departments are actively involved with the Sacramento Urban Area Security Initiative (UASI) in identifying training and equipment needs that can be funded through UASI. During the past year, the Police Department has received UASI funded officer safety training and terrorism liaison training. The Police Department partnered with the other agencies in our region to receive UASI equipment for each high school to be outfitted with trauma kits containing numerous tourniquets for use during mass casualty incidents. The Police Department also worked with UASI in developing a shared resource of traffic barricade systems for use in protecting large public gatherings from vehicular-borne attacks.	Ongoing Capability
HC-10 - Improve evacuation transportation routes within the City of Roseville by removing traffic constrictions. This City is also making additional improvements to along the corridor to improve traffic flow. Currently under construction is a roundabout at Washington Blvd and All America City Blvd that will improve the traffic flow at this intersection. This project is scheduled to be completed in 2023.				
Yes	Long Term (5+yrs.)	No	Actions have been made by the City during the reporting period. The proposed Andora Widening Project will widen Washington Boulevard to four-lanes between Sawtell Road and Pleasant Grove Boulevard in Roseville. Washington Blvd is a four-lane roadway in the region except for at the project site, where it is a two-lane road beneath a UPRR rail bridge. The City is continuing to identify grant funding opportunities for this project and is awaiting a successful grant funding obligation to construct. The project plans are currently developed to ~90% completion with final plans scheduled for completion once construction funding is identified. Environmental documents are completed for the next phase of the project. Construction could occur as soon as 2025 if sufficient funding is identified.	Ongoing Capability
HC-2 - Enhance emergency response capability of City by contingency planning for specific events based on identified vulnerabilities.				
Yes	Short Term (<5yrs.)	No	The Police Department continues to plan for specific response to critical incidents either by incident type or location. Specifically this year, continued training in response to active shooter incidents occurred along with the implementation of the combined Rescue Task Force concept for police and fire response to these incidents. The Police Department specifically trained with the Galleria Mall for planning and response to incidents at the mall. The Police Department continues to train and plan for critical incident response. Additionally, the Police Department funded and prepared emergency response equipment stockpiles for mutual aid response to fire areas after several recent deployments for emergency assistance during large scale wildfires.	Ongoing Capability
HC-3 - Seek to establish appropriate staffing levels of public safety personnel to address vulnerabilities identified through an incremental targeted study that provides immediate needs as well as anticipated needs in 1 year, 5 years, and 10 years.				
Yes	Short Term (<5yrs.)	No	The Police and Fire Chiefs meet monthly with the Assistant City Manager to discuss staffing levels and needs based on current trends, population growth, and calls for service. Staffing levels are addressed on an annual basis as part of the City's budget process.	Ongoing Capability

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
HC-4 - Prepare a site-specific vulnerability assessment of City- owned critical facilities that use the best available science and technology with regards to human-caused hazards.				
Yes	Short Term (<5yrs.)	No	The Police Department Threat Assessment Unit has conducted site assessments at numerous city facilities including Fire Stations, Libraries, the Corporation Yard complex, the Civic Center, and power facilities. Assessments are completed with the stake holder to include areas of needed improvement and potential action plans. Threat Assessment has also completed similar assessments for critical potential threat locations within the city to include the Galleria Mall and other identified locations with target potential. The Police Department's Threat Assessment Unit has conducted numerous site assessments over the last two years including city facilities and critical business and religious sites throughout the city. TAU is currently working with Roseville Electric on site assessments at Electric facilities across the city.	Ongoing Capability
HC-5 - Address vulnerabilities identified in vulnerability assessment of water facilities performed by the Environmental Utilities Department in response to EPA initiative.				
Yes	Long Term (5+yrs.)	No	A Water System Security assessment update was completed in 2020 under the American Water Infrastructure Act requirement by the Environmental Utilities Department and continues to be updated as new facilities come online. The project enhanced the physical security of water facilities with video monitoring and access control. The timeline for this initiative has been changed from long-term to ongoing. EU also has a CIP in place to fund continual security and resiliency improvements to water facilities.	Ongoing Capability
HC-6 - Maintain compliance with California Energy Commission (“CEC”) license conditions for the operations of the Roseville Energy Park (“REP”) with respect to Hazardous Material Management				
Yes	Long Term (5+yrs.)	No	Implementation of best management practices are necessary for minimizing non-compliance events and protecting Roseville's air quality and waterways.	Ongoing Capability
HC-7 - Maintain compliance with federal, state, and local laws and regulations for the operation of Roseville's power plants and the utility's engineering & operational activities.				
Yes	Long Term (5+yrs.)	No	Compliance with all federal, state and local laws, regulations and requirements are necessary to ensure continuous reliable and safe operations of the electric distribution and generation assets with no negative environmental impact.	Ongoing Capability
HC-8 - Maintain compliance with all North American Electric Reliability Corporation mandatory reliability standards related to the utility as a distribution provider and resource planner including critical infrastructure protection standards (cyber security).				
Yes	Short Term (<5yrs.)	No	This action was combined with HC-7	Discontinued

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
HC-9 - Protect the City's data, technology infrastructure and staff against malicious cyber-attacks and Cyber terrorism, such as but not limited to: Identity and data theft Virus/Malware/Ransomware/Spyware/Spam/Phishing Network and system attacks Web applications and database hacking Denial-of-service attacks				
Yes	Short Term (<5yrs.)	No	The Information Technology Department uses several strategies and technologies to combat Cyber-attacks including: •Anti-phishing, Anti-Spam capability • Internet content filtering • PCI-DSS compliance • Anti-malware protection, advanced threat detection • Perimeter firewalls report and prevent intrusions •Secure authentication • Regular data backups • Regular system patching • Cyber Security Incident Exercises • Threat intelligence monitoring • Cybersecurity awareness training	Completed
HH-1 - Continue to collaborate with the Placer County Health Department to ensure the health and welfare of the community				
Yes	Short Term (<5yrs.)	No	Close coordination was accomplished during the COVID-19 pandemic: vaccination site coordination, public health personnel were involved in the city emergency operations and planning process	Ongoing Capability
HH-2 - Support the public education efforts of the Placer County Health Department and the Placer Mosquito & Vector Control District. This includes sharing important health and safety information through the City's communication channels, including but not limited to: email newsletters, social media channels, video updates, website, collateral materials, and news media.				
Yes	Short Term (<5yrs.)	No		Ongoing Capability
HH-3 - Collaborate with the Placer County Mosquito Abatement District to review resource protection policies that conflict with human health protection in the City of Roseville and work to resolve these policy issues.				
Yes	Short Term (<5yrs.)	No	The Placer Mosquito Abatement District and Roseville Environmental Coordinator are working together to both protect open space and wetland areas while limiting the amount of habitat for mosquitoes and vectors.	Ongoing Capability
LS-1 - Once California Geological Survey (CGS) completes soils mapping for the Roseville vicinity under the Seismic Hazards Mapping Act, reassess landslide hazard using best available data to gauge the true vulnerability to this hazard.				
Yes	Long Term (5+yrs.)	No	The City of Roseville has no impacts from the landslide hazard and does not need to continue pursuing actions to mitigate landslides.	Discontinued
LS-2 - Continue to implement policies adopted by the General Plan that promote open space land uses within identified steep slope areas of Roseville. The City of Roseville Northeast Roseville Specific Plan and Stoneridge Specific Plans include the identified steep slope areas within Roseville. Both Plan Areas have continuing development.				
Yes	Short Term (<5yrs.)	No	The City of Roseville has no impacts from the landslide hazard and does not need to continue pursuing actions to mitigate landslides.	Discontinued
MH-1 - Continue to maintain Office of Emergency Services certification of all City inspectors for post-disaster damage assessment.				
Yes	Short Term (<5yrs.)	No	All building inspectors are certified by the Office of Emergency Services. The Building Division will continue to make sure staff maintains their certifications and that the certifications are documented per the International Accreditation requirements.	Ongoing Capability

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
MH-2 - Continue to maintain the hazard mitigation page on City website that provides following types of information: The Hazard Management Plan and its progress reports Hazard-specific information Mitigation information by hazard, with specific emphasis on private property Emergency response and warning information Links to county, state, and federal related agencies				
Yes	Short Term (<5yrs.)	No	This is an on-going action. The City continues to maintain its website as specified in the plan maintenance section of the plan. The website can be viewed at: roseville.ca.us/HazardPlan	Ongoing Capability
MH-3 - Establish/maintain a post-disaster action plan to be part of the City Emergency operations plan that will include following elements: Procedures for public information Post-disaster damage assessment Grant writing Code enforcement Redundant operations				
Yes	Short Term (<5yrs.)	No	The County of Placer has started the review and update of the County Wide EOP which will contain a local annex for each City and Local Agency. Currently in contract to update this EOP.	In Progress
MH-4 - Implement an “Adopt an Open Space” program in coordination with the open space management program. Develop “adoption contracts” with neighborhoods, organizations, businesses, etc., describing the level of stewardship and the terms of the “adoption.” Publicize these activities through online resource directory and other media to encourage participation through the Dry Creek Conservancy.				
Yes	Short Term (<5yrs.)	No	During the reporting period, the City has implemented an “Adopt a Creek” program. The Adopt a Creek program is administered by the City’s Park & Open Space Division. Currently working with Enviromental Utilities and the nonprofit called the Dry Creek Conservancy to organize volunteer restoration actives and maintenance work in our two watersheds.	Ongoing Capability
MH-5 - Develop and disseminate best practices information to private property owners whose land is adjacent to open space areas describing stewardship opportunities and owners’ role in preserving beneficial uses of open space areas (including vernal pool grassland and creek or riparian uses). Offer classes to provide in-depth information, such as demonstration projects, techniques for ecologically friendly weed abatement and vegetation control, and creating a backyard habitat compatible with open space areas.				
Yes	Short Term (<5yrs.)	No	The City has begun developing brochures and pamphlets to provide information on the do’s and don’ts related best management practices for residents living adjacent to open space areas as well as providing the benefits of the open space to the community. This effort included code enforcement-informed door hanger placards, which are currently in use.	Ongoing Capability
MH-6 - Work with the Roseville City School District, local high school districts, and non-profit organizations to promote ecology-oriented curricula and stewardship activities. Identify resource and administrative barriers that may be limiting schools’ abilities to more actively participate in stewardship, and work collaboratively to identify solutions.				
Yes	Long Term (5+yrs.)	No	No actions towards the completion of this initiative were completed during the reporting period. This will continue to be an ongoing initiative with a medium priority pending funding.	No Progress

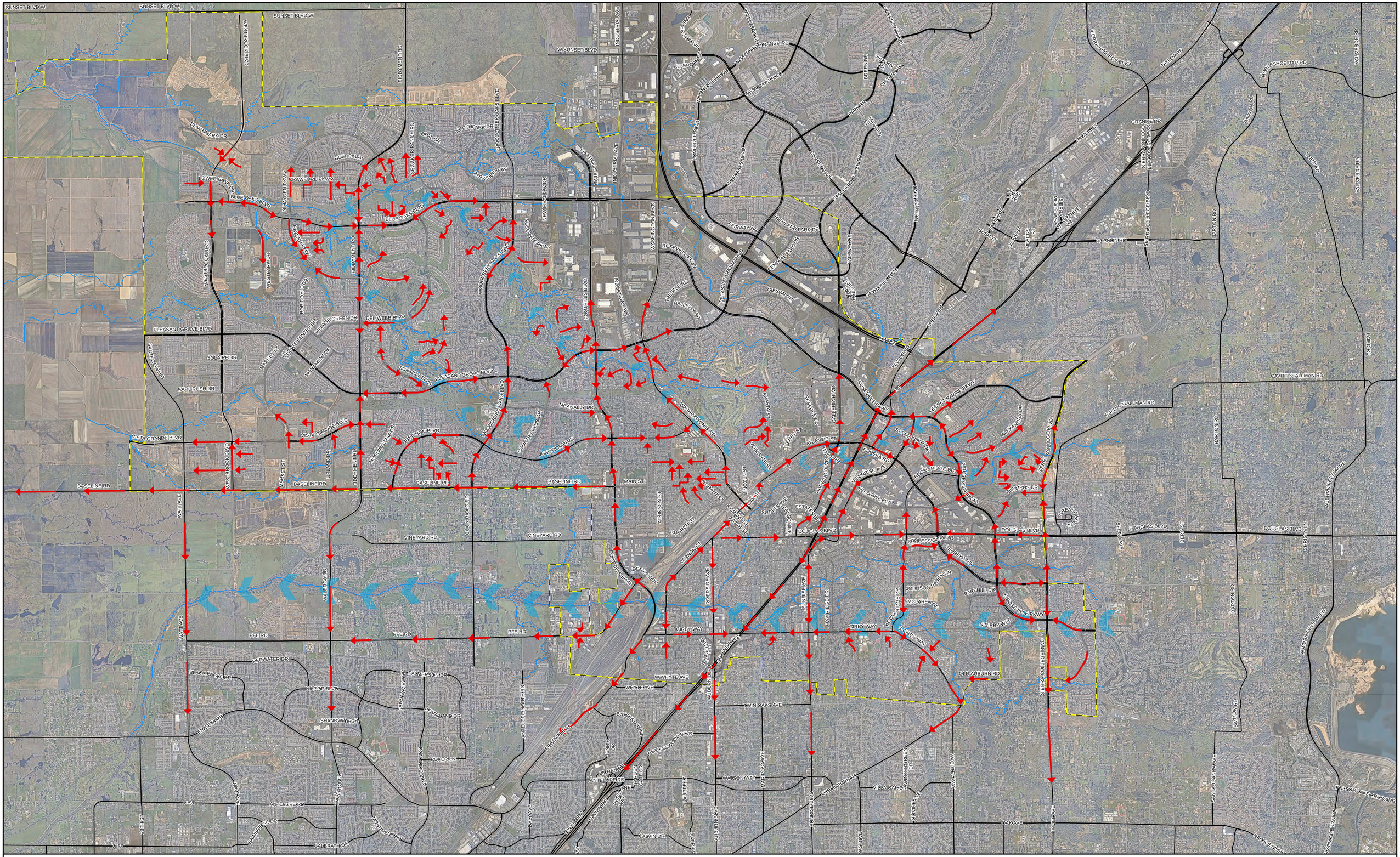
Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
MH-7 - Strive to maintain high availability of essential communication services				
Yes	Other, please specify	No	For the Communication and Information Systems: The City has multiple, fully functional data centers which provide redundant server, storage and network infrastructure. The City leverages multiple Internet Service Providers terminating at different data centers in order to maintain seamless connectivity during incidents impacting a particular data center or an ISP. In the event of an extended outage; procedures are in place to restore essential communication and information services. The City's primary radio system has a distributed architecture with redundant components throughout. In addition, the Police and Fire departments have alternative and independent radio systems in case the primary system fails. As a tertiary means of providing communications, Roseville established a MOU with Sacramento County to use their radio talkgroups.	Completed
MH-8 - Secure the City's physical locations that contain technology infrastructure				
Yes	Other, please specify	No	Both of the City's data centers are armed with perimeter alarm systems and internal and external security cameras. Also access to these sites is restricted to a limited number of city employees. In addition, vendors and visitors along with most City employees will be required to sign in and be escorted.	Completed
SW-1 - Continue the Shade Tree Program, an energy conservation rebate program provided by Roseville Electric				
Yes	Short Term (<5yrs.)	Yes	This program was reinstated in FY22. It was previously suspended due to the severe drought.	Ongoing Capability
SW-2 - Continue ongoing line clearing and weed abatement of electrical utility facilities in order to reduce public exposure to vegetation hazards and maintain higher reliability during severe weather conditions.				
Yes	Long Term (5+yrs.)	No	This is an ongoing program of Roseville Electric to both protect the public from hazards and to maintain the reliability of electricity service to Roseville Electric's more than 61,000 customers.	Ongoing Capability
SW-3 - Continue education/outreach programs to improve winter preparedness and minimize loss of life or injury.				
Yes	Short Term (<5yrs.)	No	During December 2022, the city held and EOC exercise to prepare for severe winter weather and heavy rain and flooding events. Shortly after the new year, a series of atmospheric river storms impacted California and resulted in local, state, and federal disaster declarations. As a result of this training, the city of Roseville was able to respond effectively to the needs of the community, which minimized impact to the built environment and loss of life and injury.	Ongoing Capability
SW-4 - Enhance and implement strategies for debris management and removal during severe weather events.				
Yes	Short Term (<5yrs.)	No	No change in the debris management and removal strategy that was adopted in 2009. The Parks and Open Space Divisions implemented an Emergency action plan for storm situations. The Open Space Division under Parks Department purchased a new bucket truck during the previous reporting period that aids in the removal of hazardous and storm damaged trees.	Ongoing Capability

Action Taken?	Timeline	Priority Changed?	Comment (Describe progress or changed priority)	Status
SW-5 - Continue to operate the Roseville Energy Park to support the City's electrical requirements and maintain service continuity during severe weather events.				
Yes	Long Term (5+yrs.)	No	The Roseville Energy Park (REP), which opened in October 2007, is producing power and provides additional electric support to meet the City's electrical needs. In the event of a transmission line outage, the REP will help maintain electric service continuity.	Ongoing Capability
SW-6 - Continue to maintain and operate Roseville Power Plant #2 to support the City's electrical requirements and maintain service continuity during severe weather events.				
Yes	Long Term (5+yrs.)	No	Roseville Power Plant #2 is operated from the Roseville Energy Park Control Room. Roseville Power Plant #2 continues to provide additional peaking power to Roseville businesses and customers.	Ongoing Capability
WF-1 - Continue "Goat Grazing" program for removal of grassland in areas of Roseville potentially vulnerable to wildfire. Implement goat grazing in City open space and preserve areas for fire and invasive plant species management and native plant restoration.				
Yes	Other, please specify	No	The Fire Department and the Parks & Open Space Division continue working together to implement a goat grazing program. Approximately 1,200 goats have been utilized for the grazing of open space preserves, grazing over 1,500 acres. Goats provide an innovative, environmentally sensitive way to reduce fire fuel load by keeping open space vegetation under control. Grazing reduces fuel load by removing thatch and thinning woody plants and also removes non-native vegetation. This initiative will be implemented as funding allows. The City continues to look for opportunities to expand and maintain this practice.	Ongoing Capability
WF-2 - Enhance existing City public outreach programs to include information on fire safety, defensible spaces, and areas of concern.				
Yes	Short Term (<5yrs.)	No	The city has an ongoing weed abatement program that utilizes city staff, contractors, and four herds of goats that are mobilized to areas that need vegetation control.	Ongoing Capability

Appendix E. City Adoption Resolution and FEMA Approval

E. City Adoption Resolution and FEMA Approval

TO BE PROVIDED WITH FINAL DRAFT



Sources: California Department of Fish and Game, City of Roseville, FLO-2D

This analysis was developed for the City of Roseville, CA. For questions regarding this map, please contact City of Roseville Public Works Department at 916-746-1300 or PublicWorks3@roseville.ca.us

Figure 7-2. Folsom Dam Containment Dike Failure Flow Direction and Emergency Evacuation Routes

CITY OF ROSEVILLE CALIFORNIA