Attachment 1

City of Santa Rosa
Local Hazard Mitigation Plan

OCTOBER **2016**

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Introduction

CHAPTER 1

The impacts of natural hazards vary across landscapes and time. Within this variance, cyclical patterns of disaster and recovery emerge. These patterns can be identified and analyzed in order to best initiate each phase of emergency management: preparedness, response, recovery, and mitigation. At the peak of an event, natural hazards have the potential to severely impact life and property. Optimization of each phase of emergency management is essential to protect a community from the worst impacts of natural hazards and disasters. A clear understanding of potential hazards and a coordinated plan to address these risks is essential to an effective emergency management regime and ultimately assists the City's efforts toward resiliency. Santa Rosa, a city rich in social, economic, and environmental resources, has developed this plan as a strategy to protect people and livelihoods, reduce vulnerability, and minimize risk from all hazards.

1.1 Plan Purpose

High disaster recovery costs, potential impacts to human life, and rising variability in hazard impacts and frequency are all motivators for the City of Santa Rosa to identify effective ways to reduce the City's vulnerability to disasters. This Local Hazard Mitigation Plan (LHMP) identifies the capabilities, resources, information, strategies for risk reduction, and critical facilities, as well as providing guidance for and coordination of mitigation actions, all of which are important for the City to reduce its vulnerability to disasters. The City of Santa Rosa has developed this plan to ensure that hazard profiles reflect current conditions and best available science, that policies in the plan are consistent with current City standards and/or other relevant federal, state, or regional regulations, and that the City has an updated plan consistent with Federal Emergency Management Agency (FEMA) requirements. The LHMP provides a set of strategies to reduce vulnerability to disaster through education and outreach programs, the development of partnerships, and implementation of actions to reduce the of impacts from a disaster.

The City of Santa Rosa Local Hazard Mitigation Plan:

- Establishes a basis for coordination and collaboration among participating private entities and public agencies, and key stakeholders;
- Identifies and prioritizes future mitigation projects; and
- Meets the requirements of federal assistance grant programs, including FEMA's Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) funding.
- Works in conjunction with other plans, including the City's General Plan.

1.2 Authority

FEMA

Hazard mitigation planning is directed by the Robert T. Stafford Disaster and Relief and Emergency Assistance Act (Stafford Act), as amended by the Disaster Mitigation Act of 2000 (DMA 2000), and by federal regulations implementing the Stafford Act. DMA 2000 amended the Stafford Act to require state, local, and tribal governments to develop and submit to FEMA a mitigation plan that outlines processes for identifying the natural hazards, risks, and vulnerabilities of the jurisdiction. Plan approval by FEMA is a prerequisite to receiving federal hazard mitigation grant funds (see 42 USC Section 5165(a)).

To implement the mitigation planning requirements of the Stafford Act, FEMA promulgated 44 Code of Federal Regulations (CFR) Part 201, the federal regulations governing the planning process, plan content, and the process for obtaining approval of the plan from FEMA. The planning requirements set forth in the CFR, including plan revision requirements, are identified through the FEMA Regulation Checklist in the Local Mitigation Plan Review Tool.

The Santa Rosa Local Hazard Mitigation Plan (LHMP) complies with the DMA 2000, Federal Register 44 CFR Parts 201 and 206, Section 322, Mitigation Planning. This law, as of November 1, 2004, requires local governments to develop and submit hazard mitigation plans as a condition of receiving Hazard Mitigation Grant Program (HMGP) and other mitigation project grants.

State of California

In addition to the requirements listed above, the State of California has also enacted revisions to California Government Code Sections 8685.9 and 65302.6 (commonly known as Assembly Bill [AB] 2140 [Chaptered 2006]) which addresses the requirements to have a local hazard mitigation plan. Excerpts of these government code sections are included below.

California Government Code Section 8685.9:

Notwithstanding any other provision of law, including Section 8686, for any eligible project, the state share shall not exceed 75 percent of total state eligible costs unless the local agency is located within a city, county, or city and county that has adopted a local hazard mitigation plan in accordance with the federal Disaster Mitigation Act of 2000 (P.L. 106-390) as part of the safety element of its general plan adopted pursuant to subdivision (g) of Section 65302. In that situation,

the legislature may provide for a state share of local costs that exceeds 75 percent of total state eligible costs.

California Government Code Section 65302.6:

(a) A city, county, or a city and county may adopt with its safety element pursuant to subdivision (g) of Section 65302 a local hazard mitigation plan (HMP) specified in the federal Disaster Mitigation Act of 2000 (Public Law 106-390). The hazard mitigation plan shall include all of the following elements called for in the federal act requirements:

(1) An initial earthquake performance evaluation of public facilities that provide essential services, shelter, and critical governmental functions.

(2) An inventory of private facilities that are potentially hazardous, including, but not limited to, multiunit, soft story, concrete tilt-up, and concrete frame buildings.

(3) A plan to reduce the potential risk from private and governmental facilities in the event of a disaster.

(b) Local jurisdictions that have not adopted a local hazard mitigation plan shall be given preference by the Office of Emergency Services in recommending actions to be funded from the Pre-Disaster Mitigation Program, the Hazard Mitigation Grant Program, and the Flood Mitigation Assistance Program to assist the local jurisdiction in developing and adopting a local hazard mitigation plan, subject to available funding from the Federal Emergency Management Agency.

This LHMP includes the information required by California Government Code Sections 8685.9 and 65302.6.

1.3 Plan Adoption

The City of Santa Rosa will adopt this Local Hazard Mitigation Plan through a resolution of the City Council, following plan approval by FEMA. **Appendix D** contains the City Council resolution adopting the 2016 Local Hazard Mitigation Plan.

1.4 Plan Use

Each section of the LHMP provides information and resources to assist plan users in understanding the hazard-related issues facing residents, businesses, and critical facilities in Santa Rosa. The structure of the plan enables users to review each section as needed and allows the City of Santa Rosa to review and update sections with new data as it becomes available. This increases the ease of new data entry and can help keep the plan current.

The LHMP is composed of the following chapters:

- **Chapter 1: Introduction:** Describes the background and purpose of developing the plan, introduces the mitigation priorities and goals, and summarizes the planning process.
- **Chapter 2: Community Profile:** Presents the history, geography, and demographics of Santa Rosa, including a historical perspective of natural hazards in the City.

- **Chapter 3: Hazards Assessment:** Identifies and profiles hazards that pose a threat to Santa Rosa, including the vulnerability and risk associated with natural hazards and climate change. This chapter also includes a vulnerability assessment of critical facilities in relation to identified hazards in the City.
- **Chapter 4: Mitigation Actions:** Provides strategies and mitigation actions to reduce potential risks to critical facilities, residents, and businesses in Santa Rosa.
- **Chapter 5: Plan Maintenance and Capabilities:** Provides information on plan implementation, monitoring, and evaluation; discusses the available resources for the City to implement the proposed mitigation actions outlined in Chapter 4 and opportunities for continued public involvement.

1.5 Mitigation Priorities and Goals

The City of Santa Rosa established LHMP project goals as part of the planning process to guide the development of a strong, thoughtful plan. The goals were drawn from the previous LHMP and from the City's General Plan Noise and Safety Element, which were reviewed and adapted for this plan by the planning team. The following are the goals for this plan:

1. Implement the Local Hazard Mitigation Plan to better prepare Santa Rosa for disaster and minimize impacts associated with natural and man-made hazards.
2. Provide for the safety of Santa Rosa community members by maintaining efficient, well-trained, and adequately equipped City personnel.
3. Preserve and enhance the City's water infrastructure by maintaining and enhancing an operational drainage system, preserving drainage capacity, and protecting water quality.
4. Maintain and enhance a disaster-resistant region by reducing the potential for loss of life, property damage, and environmental degradation from natural disasters, while accelerating the capacity for economic recovery from those disasters.
5. Reduce the vulnerability of public and private buildings to the effects of earthquakes, flooding, wildfire, and landslides.

1.6 Hazard Mitigation Planning Process

This plan is the result of a process involving City departments, stakeholder agencies, residents, businesses, and the general public.

The LHMP planning team consisted of the following representatives from across City departments:

- Molly Dillon, Assistant City Attorney, City Attorney's Office
- Rita Miller, Supervising Engineer, Water
- Rocky Vogler, Senior Water Resources Planner, Water
- Alan Alton, Deputy Director of Finance, Finance
- Cherice Fulton, Administrative Services Officer, Finance
- Paul Lowenthal, Assistant Fire Marshal, Santa Rosa Fire

- Matt Dahl, Battalion Chief of Emergency Medical Services, Santa Rosa Fire
- Neil Bregman, Emergency Preparedness Coordinator, Santa Rosa Fire
- Nancy Gornowicz, Economic Development and Housing Manager, Housing and Community Services
- Chris Greene and Mike Hargreaves, GIS Analysts, IT-GIS
- Erin Morris, Senior Planner, Planning and Economic Development
- Lisa Kranz, Supervising Planner, Planning and Economic Development
- Mike Enright, Supervising Engineer, Planning and Economic Development
- Ron Simi, Crew Supervisor, Public Works
- Mark Armstrong, Facilities Maintenance Coordinator, Recreation and Parks
- Nathan Barnette, Risk Management Analyst, Risk Management
- John Cregan, Police Lieutenant, Police
- Lori Urbanek, Supervising Engineer, Water

Appendix A of this plan contains the information distributed during LHMP planning team meetings, which includes sign-in sheets and contact information for participants. The LHMP team is responsible for the development, implementation, and maintenance of this plan.

The planning team held four meetings throughout the plan development process to discuss the preparation of the LHMP. At these meetings, team members discussed the objectives of the plan, identified the hazards that pose a threat to Santa Rosa, and prepared and reviewed mitigation strategies to reduce the City's vulnerabilities.

The meetings were held on the following dates:

- Kickoff Meeting – November 19, 2015
- LHMP Team Meeting 1 – December 4, 2015
- LHMP Team Meeting 2 – December 17, 2015
- LHMP Team Meeting 3 – January 6, 2016

Table 1 provides summaries of these meetings, with additional detailed information available in Appendix A.

Table 1: LHMP Team Meeting Summaries

Date	Purpose
November 19, 2015	Provided an introduction to the project, discussed overarching goals for the effort, discussed communication protocols, and identified points of contact.
December 4, 2015	Provided an overview of the LHMP process, identified hazards of concern, finalized critical facilities list, and prioritized hazards with LHMP team members.
December 17, 2015	Provided an overview of the hazard profiles and preliminary results of the risk assessment for each hazard and critical facility identified.
January 6, 2016	Reviewed, modified, and prioritized the draft mitigation actions.

In addition to the meetings held with the LHMP planning team, a public engagement and outreach process was developed to give members of the general public in Santa Rosa an opportunity to learn about and contribute to the plan. As part of this process, the City created an online survey for community members, which was used to gauge interest and understanding of concerns regarding hazards in Santa Rosa. Approximately 500 community members completed the survey. The survey asked about potential hazards facing Santa Rosa and what steps community members have taken or are interested in taking to reduce the threat from these hazards. The survey produced the following key outcomes:

- Of survey participants, 94 percent indicated that they had never been impacted by a disaster in their current residence.
- The potential impacts from earthquakes, drought, and flooding caused the greatest amount of concern to respondents.
- About one-third (34 percent) of participants have participated in training as part of a local or national emergency preparedness program, such as Citizens Organized to Prepare for Emergencies (COPE), the Community Emergency Response Team (CERT), or the American Red Cross.
- Nearly 70 percent of participants stated that their employer has a plan for disaster recovery in place.

A complete copy of the survey and a detailed summary of its findings are included in **Appendix B**.

In addition to the online survey effort, the City conducted a stakeholders' roundtable meeting on January 6, 2016, at the Santa Rosa Utilities Field Operations office. Attendees at this meeting included representatives from Sonoma County, nonprofit organizations, local groups/organizations affiliated with disaster preparedness, and utility providers. This meeting included an overview presentation of the planning process and results of the hazard identification and mapping processes completed up to that point.

In addition to members of the community, stakeholders present at the roundtable meeting included:

- Matt Dahl, Battalion Chief from the Santa Rosa Fire Department
- Neil Bregman, City of Santa Rosa Emergency Preparedness Coordinator
- Jen Arnet, Director of Senior Resources for Sonoma County, Episcopal Senior Communities
- Deanna Contreras, Facility Services Director, Friends House Retirement Community
- John Suazo, Customer Relations manager, Pacific Gas & Electric
- Mark Wheeler, Facilities Manager, Redwood Empire Food Bank
- Brentt Blaser, Deputy Emergency Services Coordinator, Sonoma County
- James Salvante Emergency Medical Services Coordinator, Sonoma County
- Luigi Lozano, Sonoma County Human Services Department
- Barbara Rivera and Edie Martin, Sonoma County Indian Health Project

- Bill Willenchel, Chris Helgren, Bill Stirnus, Mike Mortensson, and Zach Hamice, Community Members.

Materials from this meeting are provided in Appendix B.

The City also developed a half-page project fact sheet to provide a brief, user-friendly summary of the LHMP effort. The City provided copies of this flyer at City facilities, such as libraries, community centers, and City offices. A copy of this flyer is provided in Appendix B.

1.7 Public Review Draft

On February 23, 2016, the City of Santa Rosa's public review draft Local Hazard Mitigation Plan was completed and released to the general public for review and comment for a period of 30 days. Electronic versions of the document were placed on the City's website (www.srcity.org/lhmp) and on the City's Facebook account. Hard copies of the document were placed in the public counter areas of the Planning and Economic Development, Fire Department, and City Manager's office and in the downtown branch of the Sonoma County Library.

1.8 Plans, Studies, and Technical Reports Used to Develop the Plan

Table 2 shows the sections of the LHMP and the corresponding plans, studies, and technical reports used to develop certain discussions and maps of hazards in this plan.

Table 2: Plans, Studies, and Technical Reports Used to Develop the LHMP

LHMP Section	Corresponding Source
3.5 Critical Facilities	• City of Santa Rosa, landmarks dataset (2015)
3.5.1 Earthquakes	• CGS, Alquist-Priolo fault zones • USGS, earthquake shaking scenarios • USGS, UCERF3
3.5.2 Floods	• ABAG, FEMA flood zones • Michael Baker International, additional riverine engineering analysis
3.5.3 Dam Inundation	• Cal OES, dam inundation risk • City of Santa Rosa, dam locations
3.5.4 Landslides	• ABAG, USGS distribution of landslides evident in the landscape
3.5.5 Hazardous Materials	• City of Santa Rosa, hazardous materials • SWRCB, GeoTracker database

LHMP Section	Corresponding Source
3.5.6 Fires	• ABAG, Santa Rosa fire responsibility areas • ABAG, Santa Rosa historic fire perimeter • City of Santa Rosa, wildland-urban interface (WUI) boundary • ABAG, CalFIRE wildland-urban interface (WUI) boundary
3.5.7 Drought	USDA, US drought monitor, California State Water Resources Control Board

Community Profile

CHAPTER 2

2.1 Physical Setting

Santa Rosa is the largest city in Sonoma County, located approximately 55 miles north of San Francisco along US Highway 101 (**Figure 1**). According to California Department of Finance estimates for 2015, the City's population is approximately 173,070. The City's urban growth boundary (UGB) spans 45.5 square miles. Santa Rosa is bisected by US Highway 101, which runs north to south through the City. State Route (SR) 12 runs east to west across the City, roughly dissecting Santa Rosa into quadrants. Santa Rosa is bordered by unincorporated Sonoma County on most sides. Sebastopol is to the southwest. Rohnert Park is located approximately 8 miles due south of Santa Rosa.

Santa Rosa is in the natural region of California known as the Coast Ranges geomorphic province. The City's geology can vary from bedrock uplands to alluvial flatlands. The City lies in the Santa Rosa Plain, to the east of the Laguna de Santa Rosa catchment basin. The City is centered around a traditional downtown, which includes retail, office, and residential uses. The rest of the City's land is distributed in mostly single-use designations, nearly half of which are designated for residential uses.

2.2 History

Santa Rosa has a rich history and cultural heritage. Before Spanish settlement in the early 1800s, the Pomo, Miwok, and Wappo Indians populated the area, followed by the Spanish in the early 1800s. The first deeded land was held as the Rancho Cabeza de Santa Rosa and was given to Senora Maria Ignacia Lopez de Carrillo by Spanish authorities. The Gold Rush, along with California's statehood, initially brought an influx of travelers along the roads past Santa Rosa. The region's rich soils drew in numerous passersby, creating a flourishing agricultural community. Commercial ventures followed to support the new economy, creating the City's town square in the early 1850s. In 1867, the town was granted incorporation by Sonoma County's Board of Supervisors and in 1868 it was approved by the State of California, marking the birth of the City as it stands today.

In the nearly 150 years since incorporation, Santa Rosa has remained an economic and cultural center for Sonoma County. The rich agricultural setting that initially drew settlers to the area has continued to flourish and is a center for the tourism economy surrounding the region's world-renowned wineries. Downtown Santa Rosa, centered on the original town square, provides a central location for shopping, dining, and cultural activities. Santa Rosa is now the fifth most populous city in the San Francisco Bay Area.

2.3 Community Profile

Tables 3, 4, and 5 provide an overview of the City's population data, ethnicity, and education levels based on the 2013 American Community Survey (ACS) 5-Year Estimates.

Table 3: Population Data (2013 ACS 5-Year Estimates)

Total Population	167,815
Males	81,846
Females	85,969
Median Resident Age	36.7
Median Household Income	$59,326
Median House Value	$ 468,600

Source: US Census Bureau 2013

Table 4: Race and Ethnicity (2013 ACS 5-Year Estimates)

Race and Ethnicity	Population	Percentage of Population
White (non-Hispanic)	119,158	71.0%
Black	4,079	2.4%
American Indian	2,808	1.7%
Asian	8,746	5.2%
Pacific Islander	810	0.5%
Other Race	23,723	14.1%
Two or More Races	8,491	5.1%
Hispanic or Latino (of any race)	47,970	28.6%

Source: US Census Bureau 2013
Note: Population percentages may not total 100% due to overlaps.

Figure 1: Regional Vicinity Map

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Table 5: Educational Attainment (2013 ACS 5-Year Estimates)

Educational Attainment	Population	Percentage of Population
Less than 9th Grade	8,632	8.0%
9th to 12th Grade (no diploma)	7,985	7.4%
High School Graduate	22,984	21.3%
Some College, No Degree	27,624	25.6%
Associate Degree	9,172	8.5%
Bachelor Degree	20,394	18.9%
Graduate or Professional Degree	11,222	10.4%

Source: US Census Bureau 2013
Note: Population percentages may not total 100% due to overlaps.

2.4 Economic Trends

Santa Rosa, the largest city between Portland and San Francisco, serves as an economic hub for Sonoma County and the surrounding region. Technology, business, retail, banking, and tourism all help to make the City's economy diverse and resilient. Santa Rosa is located in one of the world's leading wine regions and is home to the region's state and federal offices and to California's latest Welcome Center. A Local Economic Profile of Santa Rosa completed by the City and Sonoma County in 2016 illustrates how the diverse economy and economic growth in the larger Bay Area has impacted Santa Rosa.

The City has experienced small but steady gains in population since 2000, growing under 1 percent per year on average. While the City remains largely white (over 70 percent of the population identifies as non-Hispanic white), growth in Santa Rosa's Hispanic population is expected to increase nearly 5 percent between 2010 and 2019, reaching over one-third of the community's population (Sonoma County EDB 2016).

Reaching a peak unemployment rate of 11.2 percent in March 2010, the City has seen a sustaining downward trend in the unemployment rate. As of mid-2015, the unadjusted unemployment rate in Santa Rosa had reached 4.8 percent, almost half of the peak four years prior and below both the state (6.2 percent) and national (5.5 percent) averages. Each year, Santa Rosa experiences seasonal peaks and lows in employment as a result of tourism and agricultural demand. In 2015, roughly half of Santa Rosa's employed population worked in the service industry, a broad sector that includes education, health care, tourism, and legal services (Sonoma County EDB 2016).

Santa Rosa is an economic hub for all of Sonoma County, evidenced by the over 13,000 business establishments in the City. Including all unincorporated areas, this represents about a third of all businesses in the county. While retail vacancy rates in Santa Rosa have declined from a peak of 9.8 percent in 2009 to 3.3% in 2015, office vacancies rates have grown slightly since 2011, from 14% percent to 16% percent (Sonoma County EDB 2016).

2.5 Existing Land Use

Existing land use information was taken from the Santa Rosa General Plan Land Use Element and the Santa Rosa Zoning Map. The General Plan and Zoning Code (City Code Chapter 20) are the principal policy documents regulating land use in the City. The City's adopted General Plan Land Use Designations divides Santa Rosa into 21 land use types. These land uses are further described in the Chapter 2 – Land Use and Livability of the Santa Rosa General Plan, which can be accessed by following this link (http://ci.santa-rosa.ca.us/doclib/Documents/2035_General_Plan.pdf).

2.6 Development Trends and Future Development

Table 6 provides an overview of recently completed, ongoing, and projected development in Santa Rosa. Understanding where new development is centered allows the City to compare this information to the risks identified in Chapter 3 and adequately prepare residents and alter future building requirements to best protect the community. These developments have implemented the latest building codes and policies adopted by Santa Rosa. However, this does not completely alleviate the presence of some of the underlying hazards, especially seismic hazards. Compared to older, existing buildings in Santa Rosa, these developments built to higher safety standards decrease community vulnerability. Ongoing improvements to building codes and policies to improve community resilience are recommended in Chapter 4.

Table 6: Development Activity

Since 2011 LHMP		
Year	**Residential**	**Non-residential**
2011	257 permits issued • 183 single family dwellings • 73 multifamily dwellings • 1 second dwelling unit Located: • 45 in northeast Santa Rosa • 157 in southeast Santa Rosa • 6 in southwest Santa Rosa • 49 in northwest Santa Rosa	15,257 square feet of new construction permitted, including: • 6,000 square foot retail shell on Steele Lane • Interpretive center at the Stone Farm • Equipment building at the Laguna Treatment Plant
2012	238 permits issued • 96 single family dwellings • 138 multifamily dwellings Located: • 137 in northeast Santa Rosa • 71 in southwest Santa Rosa • 30 in northwest Santa Rosa	31,672 square feet of new construction permitted, including: • Three auto dealership showrooms, two on Corby Avenue and one on Santa Rosa Avenue • New retail building on Montgomery Village

Since 2011 LHMP		
Year	**Residential**	**Non-residential**
2013	488 permits issued • 121 single family dwellings • 359 multifamily dwellings • 7 second dwelling units • 1 mobile home Located: • 39 in northeast Santa Rosa • 139 in southeast Santa Rosa • 8 in southwest Santa Rosa • 302 in northwest Santa Rosa	239,465 square feet of new construction permitted, including: • 144,388 square foot Target store in Coddingtown • 14,450 square foot parts storage and service bay to Volkswagen and Subaru • 8,600 square foot Firestone store on Santa Rosa Avenue • 4,000 square foot market and gas station on Farmers Lane
2014	252 permits issued • 183 single family dwellings • 64 multifamily dwellings • 5 second dwelling units Located: • 28 in northeast Santa Rosa • 96 in southeast Santa Rosa • 73 in southwest Santa Rosa • 55 in northwest Santa Rosa	151,311 square feet of new construction permitted, including: • 87,800 square foot storage facility on Sonoma Highway • Dick's Sporting Goods store in Coddingtown • Fiat dealership on Santa Rosa Avenue
2015	126 permits issued • 93 single family dwellings • 26 multifamily dwellings • 7 second dwelling units Located: • 23 in northeast Santa Rosa • 56 in southeast Santa Rosa • 47 in northwest Santa Rosa	99,805 square feet of new construction permitted, including: • Nordstrom Rack store in Coddingtown • Senior Care Facility, Vineyard at Fountaingrove • Museum of the Square renovation • Industrial Building on Square Court

2016-2017	Building Permits			
	Permit Number	**Land Use**	**Size**	**Status**
	Catalina	SFR-Attached	60 units	Under construction
	Duke Court Lot #6	General Industrial	16,390 sq ft	Under construction
	Nordstrom Rack	Retail	31,000 sq ft	Under construction
	Popeyes Louisiana Kitchen	Restaurant	2,695 sq ft	Application under review
	Range Ranch	Multi-family	270 units	Recently completed
	Range Ranch II	Multi-family	120 units	Application under review
	Rock Star University	Light Industrial	10,025 sq ft	Under construction
	SR Sports & Entertainment	Recreational	128,000 sq ft	Under construction
	Southern Gardens	SFR-Detached	14 units	Under construction
	Tapestry	SFR-Detached	34 units	Under construction
	The Meadows at Oakmont	SFR-Detached	36 units	Recently completed
	Wilibees of Sonoma	Retail	6,500 sq ft	Recently completed
2017+	Engineering Permits			
	Permit Number	**Land Use**	**Size**	**Status**
	Bay Village Development	SFR-Attached	12 units	Final Map under review
	Calistoga Village	SFR-Detached	17 units	Grading permit issued
	CarMax	Auto retail		Grading permit issued
	Fox Hollow Subdivision	SFR-Detached	143 units	Under review
	Francisco Village	SFR-Detached	77 units	Under review
	Kawana Meadows Subdivision	SFR-Detached/ Duplex lots	124 units	Grading permit issued
	Kylie Lane Subdivision	SFR-Detached	12 units	Grading permit issued
	North Street Apartments	Multi-family	20 units	Under review

	Pantoja Lane Subdivision	SFR-Detached	16 units	Under review
	Prospect Oaks Subdivision	SFR-Attached	32 units	Grading permit issued
	Pullman Lofts	Multi-family	72 units	Approved
	Ravello Subdivision	SFR-Detached	13 units	Under review
	Sandalwood	SFR-Detached/ Multi-family	16 units/ 2 units	Grading permit issued
	Skyfarm 3	SFR-Detached	30 units	Under review
2017+	**Planning Permits**			
	Permit Number	**Land Use**	**Size**	**Status**
	Airway Community Care	Community care	90 units	Application under review
	Canyon Oaks	Multi-family	96 units	Application under review
	Smith Village/ Pantoja Lane	SFR-Detached/ Second units	67 units/ 9 units	Approved
	Spring Lake Village East Grove	Multi-family	24 units	Application under review
	Stony Village North	SFR-Detached	40 units	Application under review
	Stony Village South	SFR-Detached	115 units	Application under review
	Terrazzo at Fountaingrove	SFR-Detached	19 units	Application under review
	The Shops at Austin Creek	Retail	43,206 sq ft	Application under review

(SFR) – Single-Family Residential

2.7 Critical Facilities

The LHMP team identified 180 critical facilities for incorporation in the hazard vulnerability and risk analysis. A complete vulnerability and risk assessment was completed for all facility types, including City-owned utilities. However, because of the confidential nature of these facilities (including reservoirs and water pumps), exact locations and names of the utilities analyzed have been kept confidential and are not included in the lists or maps in this plan. The list of critical facilities, as well as their location and replacement and contents values, can be found in Appendix C, while a summary of facility types and numbers can be found in Table 7.

The facilities selected mirror the categories identified in the 2010 LHMP Annex to the Association of Bay Area Governments (ABAG) plan, adopted by the City in March 2012. These facilities include fire stations, several City-owned properties, and other facilities that provide important services to the community. In addition, facilities such as hospitals, water treatment plants, and dams provide the ability to protect important services and could cause further harm if damaged. Damage to these facilities caused by a hazard event has the potential to impair response and recovery from the event and may lead to disruption of services. This list includes critical facilities owned and operated by the City or agencies that work closely with the City and which are outside of the City's control, such as schools. The potential impacts of natural hazards were critically analyzed with special attention on Santa Rosa's Subregional Water Reuse System, which includes a single waste water treatment facility, a compost facility, and a water reclamation system. Although this system is outside of the City's urban growth boundary, it is a key infrastructure resource for the entire region, providing water treatment and reclamation services for Santa Rosa, Sebastopol, Cotati, Rohnert Park, and the Sonoma County South Park Sanitation District.

Where available, the LHMP team identified replacement and contents values for a majority of the facilities (based on the City's insured values); these represent the total potential loss value for each facility. If a facility is completely destroyed in a hazard event, the replacement and contents values indicate the cost to replace the facility. Depending on the year in which the facility was built, the cost to repair a damaged facility may be more than the replacement value. While the replacement and content values are used throughout this plan to estimate potential losses, it is noted that the actual cost to recover from a hazard event will depend on the type and magnitude of the event.

Table 7: City of Santa Rosa Critical Facilities

Facility Type	Number of Facilities
City	16
Fire	12
Government Center	4
Health & Hospitals	12
Schools	58
Utilities	78

2.8 Evacuation Routes

US Highway 101 (US 101) and State Route (SR) 12 are the main arterial evacuation routes in Santa Rosa. US 101 runs north–south, bisecting the City and crossing over both Santa Rosa and Spring Creeks. US 101 intersects SR 12, which runs east–west, just southwest of the City's center. These roads are the only uninterrupted ingress and egress routes in Santa Rosa. However, some other key roadways could be used as evacuation routes in the event of an emergency. Major evacuation routes are listed below.

North–South Routes

- US Highway 101
- Old Redwood Highway/ Mendocino Avenue/ Santa Rosa Avenue/Petaluma Hill Road
- Summerfield Road/ Bennett Valley Road
- Marlow Road/ Stony Point Road
- Fulton Road/ S. Wright Road
- N. Dutton Avenue/ Dutton Avenue
- Fountaingrove Parkway/ Mission Boulevard

East–West Routes

- State Route 12
- Guerneville Road/ Steele Lane/ Lewis Road
- Hall Road/ West 3rd Street/ Montgomery Drive/ Melita Road
- Occidental Road
- West College Avenue/ College Avenue
- Hoen Avenue

2.9 Energy Infrastructure

Energy infrastructure, responsible for delivering natural gas and electricity across a region, is a critical consideration for risk reduction and speed of recovery after a disaster. A downed power line can pose a secondary threat to passerby, and availability of power is essential in ensuring continued heat, light, and communication for residents, businesses, and emergency responders. In Santa Rosa, the City works closely with Pacific Gas and Electric (PG&E) to collaborate on public safety efforts, including cross-organization training and regular communications about emergency-related issues. This section details natural gas and electrical infrastructure serving Santa Rosa.

Natural Gas

Natural gas is delivered to homes and businesses through a main pipeline system (System Name 1305-45) that runs west of and parallel with US 101. Additionally, the main line has an arm that runs from west to east along Steele Lane, where it turns north at Mendocino Avenue and follows Lomitas Avenue, where it ends on Chanate Road. It is operated by PG&E (Operator ID 15007). Businesses and homes connect to the pipeline through natural gas laterals that run between the pipeline and final destination.

Clockwise from top left: decal, soil indicator, paddle, and composite marker

PG&E has a comprehensive inspection and monitoring program to ensure that its natural gas transmission pipeline system is safe, including 24-hour real time monitoring and regular leak inspections, surveys, and patrols. Public outreach efforts to educate residents, farmers, businesses, and construction crews about appropriate safety measures focus on awareness and clear labeling of pipelines. Residents are encouraged to call 811 before digging to avoid hitting laterals. Pipelines are marked by decals, soil indicators, curb indicators, and paddle and composite markers, shown below.

Electricity

PG&E's electrical system consists of high voltage overhead and underground distribution lines and associated transformers and switchgears. Power outages are typically caused by severe weather which causes tree branches to fall on overhead lines, vehicle collisions into poles or transformer failures. The system consists of numerous circuits that can be de-energized locally to sectionalize outages in order to continue serving residences and businesses in the vicinity. Long-duration and regional outages are responded to as necessary and appropriate as determined by PG&E. The City maintains communication between PG&E and Santa Rosa's emergency response team in the event of these emergencies. PG&E has a maintenance and capital program to trim trees around the lines and replace aging poles in an effort to minimize the risk of outages. While all of PG&E's substations within Santa Rosa are critical for high quality and sustaining electrical service, the Fulton substation on River Road is PG&E's top priority for restoration in the event of a disaster.

Hazards Assessment

CHAPTER 3

3.1 Hazard Identification

Using FEMA's hazard mitigation planning resources as guidance, the LHMP team analyzed the relevance of a comprehensive list of natural hazards to Santa Rosa. In the December 4, 2015, LHMP team meeting, all possible hazards were discussed, and those that posed a potential or definite risk to the City were selected. Using the 2010 LHMP as a starting point, **Table 8** summarizes the determination for each natural hazard, including the discussion and reasoning for its inclusion or exclusion from the updated LHMP. Hazards that are not relevant to Santa Rosa are shaded in gray. This table is consistent with the hazards identified as part of FEMA's hazard mitigation planning guidance.

Table 8: City of Santa Rosa Hazard Identification and Discussion

Potential Hazard	Identified in 2010 LHMP?	Included in 2016 LHMP Update?	Discussion Summary
Avalanche	No	No	Not an applicable hazard in this part of California.
Dam Inundation	Yes	Yes	Dam inundation poses a low, but present threat to the City
Drought	Yes	Yes	The City has experienced ongoing impacts from drought conditions
Earthquake	Yes	Yes	Seismic activity is a known and historic threat to the City
Erosion	No	No	Impacts from erosion have been included in the analysis of flood hazards
Expansive Soils	No	No	There has been no significant damage from prior events.
Extreme Cold	No	No	There has been no significant damage from prior events.
Extreme Heat	No	No	Heat waves have increased in recent years, but vulnerability to the hazard remains low.
Fault Rupture	Yes	Yes	The Rodgers Creek Fault runs through the City, and Santa Rosa is surrounded by other active faults.
Flood	Yes	Yes	The City has experienced flood impacts in the past

Potential Hazard	Identified in 2010 LHMP?	Included in 2016 LHMP Update?	Discussion Summary
Hail	No	No	There has been no significant damage from prior events.
Hazardous Materials	No	Yes	Santa Rosa has a significant number of hazardous material sites that should be included in the risk assessment.
Hurricane	No	No	Not an applicable hazard in this part of California.
Landslide	Yes	Yes	Landslides have caused serious injury and property damage in the past.
Lightning	No	No	Small risk, but not a common or pressing occurrence.
Liquefaction	Yes	Yes	The City's earthquake risk and soil composition also makes Santa Rosa vulnerable to liquefaction
Sea Level Rise	No	No	Not an applicable hazard in this part of California.
Severe Wind	No	No	There has been no significant damage from prior events.
Severe Winter Weather	No	No	There has been no significant damage from prior events.
Storm Surge	No	No	Not an applicable hazard in this part of California.
Subsidence	No	No	There has been no significant damage from prior events.
Tornado	No	No	Minor risk, not evaluated.
Tsunami	No	No	Not an applicable hazard in this part of California.
Wildfire	Yes	Yes	The City has experienced wildfire in the past.

3.2 Hazard Prioritization

After identifying relevant hazards, the LHMP team used a Microsoft Excel–based tool to identify priorities for each hazard. These priorities were assigned based on the likelihood of the hazard occurring, as well as its potential magnitude of impact. Rankings were assigned by the LHMP team, which used an understanding of past occurrences, existing vulnerabilities, and City infrastructure to identify priorities. Four criteria were used to establish priority:

- Probability (likelihood of occurrence)
- Location (size of potentially affected area)
- Maximum Probable Extent (intensity of damage)
- Secondary impacts (severity of impacts to community)

For each criterion, a score between one and four was given, with one being the lowest probability and impact, and four the highest. Each criterion was also given a weight, which allowed the LHMP team to prioritize the importance of each potential impact to Santa Rosa. **Table 9** shows the identified hazards, ranked from highest to lowest priority. **Table 10** details how probability, affected area, and primary and secondary impacts were weighted and scored for each hazard. Seismic hazards (liquefaction, fault rupture, and ground shaking) are grouped together in this prioritization. The LHMP team used this ranking to confirm the level of importance (from a hazard planning perspective) for each hazard type in the LHMP.

Table 9: Hazard Probability

Hazard Type	Probability	Impact			Total Score	Hazard Planning Consideration
		Affected Area	Primary Impact	Secondary Impacts		
Seismic hazards (fault rupture, shaking, liquefaction)	4	4	4	4	64.00	**High**
Flood	4	3	4	4	57.60	**High**
Drought	4	4	3	3	54.40	**High**
Wildfire	4	3	4	3	53.60	**High**
Hazardous materials	2.5	3	2	2	24.00	**Medium**
Landslide (seismic and non-seismic)	2	3	2	2	19.20	**Medium**
Dam inundation	1	3	3	2	11.00	**Low**

Note: Scores are based on a scale of 1 to 4, where 4 is the highest score and 1 is the lowest. Total score is based on an equation that weights categories by importance. See Table 11 for more information.

Table 10: Hazard Probability Weights

Probability	Importance	**Secondary Impacts**	Importance
Based on estimated likelihood of occurrence from historical data	2.0	*Based on estimated secondary impacts to community at large*	0.5
Probability	Score	Impact	Score
Unlikely	1	Negligible – no loss of function, downtime, and/or evacuations	1
Occasional	2	Limited – minimal loss of function, downtime, and/or evacuations	2
Likely	3	Moderate – some loss of function, downtime, and/or evacuations	3
Highly Likely	4	High – major loss of function, downtime, and/or evacuations	4
Location	Importance	**Total Score = Probability x Impact,** where:	
Based on size of geographical area of community affected by hazard	0.8	Probability = Probability Score x Importance	
Affected Area	Score	Impact = Affected Area + Primary Impact + Secondary Impacts, where:	
Negligible	1	Affected Area = Affected Area Score x Importance	
Limited	2	Primary Impact = Primary Impact Score x Importance	
Significant	3	Secondary Impacts = Secondary Impacts Score x Importance	
Extensive	4		

Maximum Probable Extent (Primary Impact)	Importance		**Hazard Planning Consideration**			
Based on percentage of damage to typical facility in community	0.7		Total Score	Range	Distribution	Hazard Level
Impact	Score		0.0	12.0	1	Low
Weak – little to no damage	1		12.1	42.0	2	Medium
Moderate – some damage, loss of service for days	2		42.1	64.0	4	High
Severe – devastating damage, loss of service for months	3					
Extreme – catastrophic damage, uninhabitable conditions	4					

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area and primary impact and secondary impact levels of each hazard. Each level's score is reflected in the table. The total score for each hazard is the probability score multiplied by its importance factor times the sum of the impact level scores multiplied by their importance factors. Based on this total score, the hazards are separated into three categories based on the hazard level they pose to the communities: High, Medium, and Low.

3.3 Climate Change Considerations

As scientific understanding and consensus grow, climate change is expected to exacerbate some of the existing hazards in Santa Rosa. To address and plan for this burgeoning issue, the LHMP team determined that it would be best to discuss applicable climate change considerations for each hazard profile in this chapter. This discussion is intended to supplement, not replace, any discussion of the probability of future occurrence.

3.4 Vulnerability/Risk Assessment Method

The critical facilities listed in Chapter 2 and Appendix C were mapped using geographic information systems (GIS), then overlaid with mapped hazard areas to determine which assets are located within each hazard area. Additionally, information about the population in each hazard area, including metrics such as median household income, poverty rates, and education levels, were used to determine the social vulnerability to each hazard. Hazard area, critical facility, and social vulnerability overlays were conducted for seismic hazards (liquefaction, ground shaking, and fault rupture), flood, landslides, hazardous materials, fire, and dam inundation. The impacts of drought and resulting vulnerabilities were analyzed, but because this hazard affects the entire City and all encompassed facilities, no spatial analysis was conducted. Each hazard profile in the following section includes a Vulnerability and Risk Assessment section that presents the results of the method described above.

3.5 Hazard Profiles

3.5.1 Earthquake

Hazard Description

Earthquakes happen when two tectonic plates slip past each other beneath the earth's surface. At the surface, the location of this slip is called a fault. As the plates slide past each other, the stresses between them tend to cause a buildup of energy that when released causes an earthquake. The stored energy from this process is released as seismic waves, causing ground shaking in the area around the slip. The deformation of plates and accumulated stress from this process creates faults in a wider area around the plate boundary, meaning that earthquakes can happen in areas outside of the plate boundary itself. Earthquakes vary in size and intensity with a range of potential impacts. The amount of damage from an earthquake is determined not only by the duration and intensity of ground shaking but also by the conditions in the impacted area, including soil conditions, construction quality, distance from the center of the earthquake, and the type of fault rupture. This hazard profile covers fault rupture, ground shaking, and liquefaction, the most common impacts from an earthquake.

The Bay Area is in the heart of earthquake country. Major faults cross all nine Bay Area counties. Every point in the Bay Area is within 30 miles of an active fault, and 97 of the 101 cities in the Bay Area are within 10 miles of an active fault.

Fault Rupture

Fault rupture is the actual movement and displacement of the ground's surface along the fault boundary when an earthquake occurs. Depending on the type of fault, this displacement may be horizontal, vertical, or both. Damage from fault rupture can be severe depending on the size of the displacement, but is limited to the relatively small area along the fault boundary where the slip occurred. Not all earthquakes result in fault rupture that is visible at the surface, and strong earthquakes can occur without any discernible displacement along the boundary.

Location and Extent

The Rodgers Creek fault runs north–south through the center of Santa Rosa, to the east of US 101 (**Figure 2**). This is the only active fault running through the City and the UGB and poses the greatest risk of surface fault rupture in Santa Rosa. The zone of potential concern surrounding this fault covers 781.05 acres in the City and the UGB.[1]

Ground Shaking

Ground shaking is the primary cause of damage and injury during earthquakes. Ground shaking impacts can lead to surface rupture, liquefaction, landslides, and infrastructure failures, which could lead to fires and other secondary hazards. The geology of the impacted area alters the amount of ground shaking felt. Thick, water-saturated, unconsolidated materials will generally experience greater shaking motion than areas of firm bedrock.

The size and magnitude of an earthquake have different ways of being measured. The magnitude is a number that characterizes the relative size of an earthquake. Magnitude is based on measurement of the maximum motion recorded by a seismograph. Many scales, such as the Richter scale, do not provide accurate estimates for the magnitudes of large earthquakes. To account for these large earthquakes, the moment magnitude scale (abbreviated as MMS; denoted as Mw or M) is preferred for its ability to cover a wide range of earthquake sizes and be applied globally. The moment magnitude scale is based on the total moment release of the earthquake. Moment magnitude is a product of the distance a fault moved and the force required to move it. It is derived from modeling recordings of the earthquake at multiple stations.

The Modified Mercalli Intensity Scale for Earthquakes shown in **Table 11** measures ground shaking intensity in terms of perception and damage and takes into account localized earthquake effects. The amount of shaking experienced at different locations varies based not only on the overall magnitude but also on the distance from the fault that ruptured in the earthquake, geologic conditions, and the level of preparedness built into surrounding infrastructure.

[1] *The zone of potential concern includes the Alquist-Priolo Special Study Zone as defined by the State of California, as well as a 500-foot buffer on both sides of this zone.*

Figure 2: Rodgers Creek Fault Zone

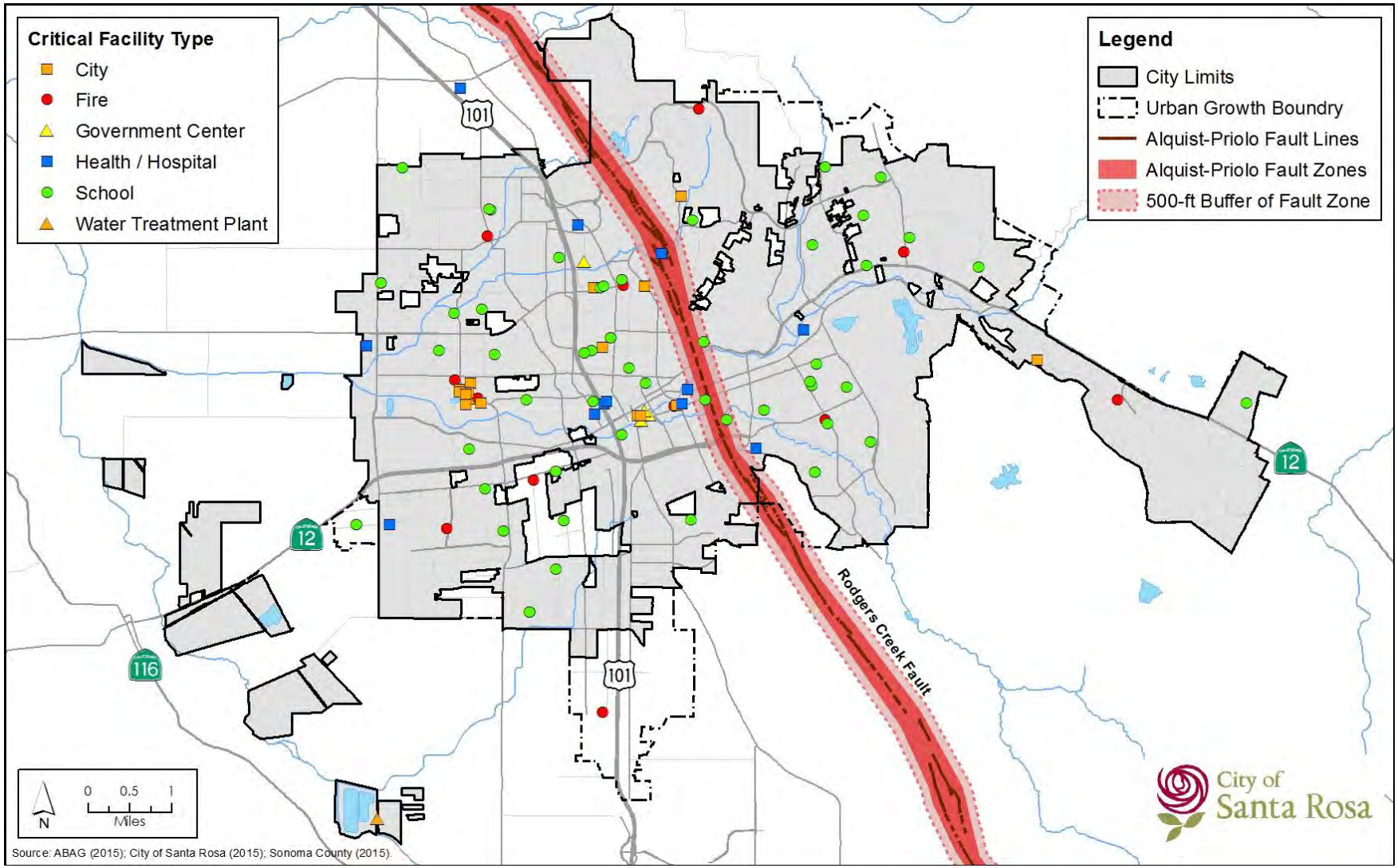

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Table 11: Modified Mercalli Intensity Scale for Earthquakes

Scale	Equivalent Moment Magnitude	Intensity	Earthquake Effects
I	1.0 to 2.0	Instrumental	Detected only on seismographs
II	2.0 to 3.0	Feeble	Some people feel it
III	3.0 to 4.0	Slight	Felt by people resting; like a truck rumbling by
IV	4.0	Moderate	Felt by people walking
V	4.0 to 5.0	Slightly Strong	Sleepers awake; church bells ring
VI	5.0 to 6.0	Strong	Trees sway; suspended objects swing; objects fall off shelves
VII	6.0	Very Strong	Mild alarm; walls crack; plaster falls
VIII	6.0 to 7.0	Destructive	Moving cars uncontrollable; masonry fractures; poorly constructed buildings damaged
IX	7.0	Ruinous	Some houses collapse; ground cracks; pipes break open
X	7.0 to 8.0	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread
XI	8.0	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards
XII	8.0 or greater	Catastrophic	Total destruction; trees fall; ground rises and falls in waves

Source: USGS 2014

Location and Extent

Figure 3 shows the worst-case ground shaking scenario in Santa Rosa, associated with a rupture of the Rodgers Creek fault. ABAG developed 16 scenarios of earthquake events at different magnitudes along different faults across the Bay Area. While other scenarios had a higher magnitude than the M6.7 event along the Rodgers Creek fault (such as a M7.8 scenario along the San Andreas fault), the fault's location through the center of Santa Rosa increases the impact associated with ground shaking because of the City's close proximity to the fault.

Liquefaction

Liquefaction occurs when loosely packed sandy or silty materials saturated with water are shaken hard enough to lose strength and stiffness. Liquefied soils behave like a liquid and are responsible for tremendous damage in an earthquake, causing pipes to leak, roads and airport runways to buckle, and building foundations to be damaged. The risk of liquefaction depends on many factors, including the height of the groundwater table and the composition of the underlying soil.

Liquefaction susceptibility is typically defined on a scale ranging from very low to very high based on the factors identified above. Through discussion with the LHMP team, soils with a medium to very high liquefaction potential were identified as part of the risk assessment.

Location and Extent

The potential impacts of liquefaction in Santa Rosa are shown in **Figure 4**. Most of Santa Rosa is at medium, low, or very low risk of liquefaction impacts in a seismic event. The area surrounding Santa Rosa and Spring Creeks, extending east to west across the City, however, is at a high risk for liquefaction because of the presence of shallow groundwater in this area.

Hazard History

Santa Rosa's location in the Bay Area has made the City vulnerable to seismic impacts for centuries. Despite the surrounding risk, only a few earthquakes have caused significant damage in the City. In 1906, the same earthquake that notoriously shook San Francisco had even stronger shaking impacts in Santa Rosa, stemming from a nearly 300-mile fault rupture along the San Andreas Fault. The shaking collapsed Santa Rosa City Hall and many other buildings across the City (USGS 2006).

On October 1, 1969, two earthquakes (M5.6 and M5.7), both with epicenters just two miles north of the City rocked Santa Rosa, along the Healdsburg Fault. Aftershocks (M3.4 and M4.3) continued to impact the City for hours to come. No lives were lost, but significant damage was sustained to local infrastructure, with an estimated range of damage from 5 to 7 million dollars. Personal injuries included heart attacks, broken arms, and a broken wrist. 99 structures were seriously damaged in the quake. Unreinforced buildings and chimneys were commonly collapsed. Water pipelines between Matanzas and Santa Rosa Creeks burst, although relationship to liquefaction or slope failure in this area was found. No major landslides were triggered (DMG 1970).

The 1989 Loma Prieta earthquake (M7.1), one of the most significant earthquakes in recent history to strike the Bay Area, created light ground shaking (Modified Mercalli V), but did not cause significant losses in the county.

Vulnerability/Risk Assessment

As shown in **Figure 3**, all of Santa Rosa would be subject to areas of elevated ground shaking in the event of a magnitude 6.7 earthquake on the Rodgers Creek fault. Of the 180 critical facilities in Santa Rosa, including multiple facilities that exist on the same parcel of land, as well as facilities not shown on the map above because of their sensitivity, all facilities are located in an elevated earthquake risk area. The number of critical facilities in these areas is shown in **Table 12.**

Figure 3: Worst-Case Ground Shaking Scenario – M6.7 Rodgers Creek Fault Rupture

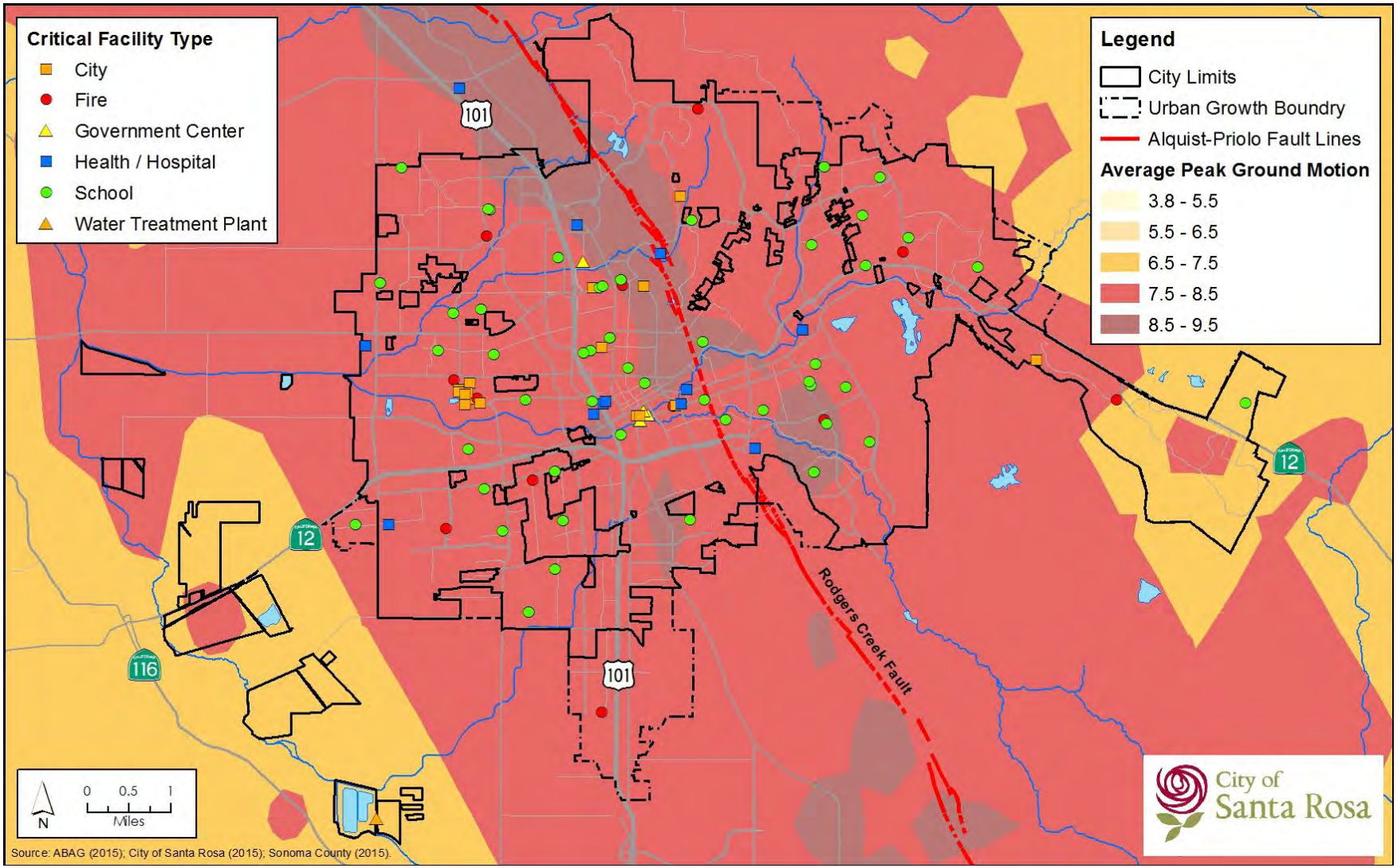


Figure 4: Liquefaction Susceptibility

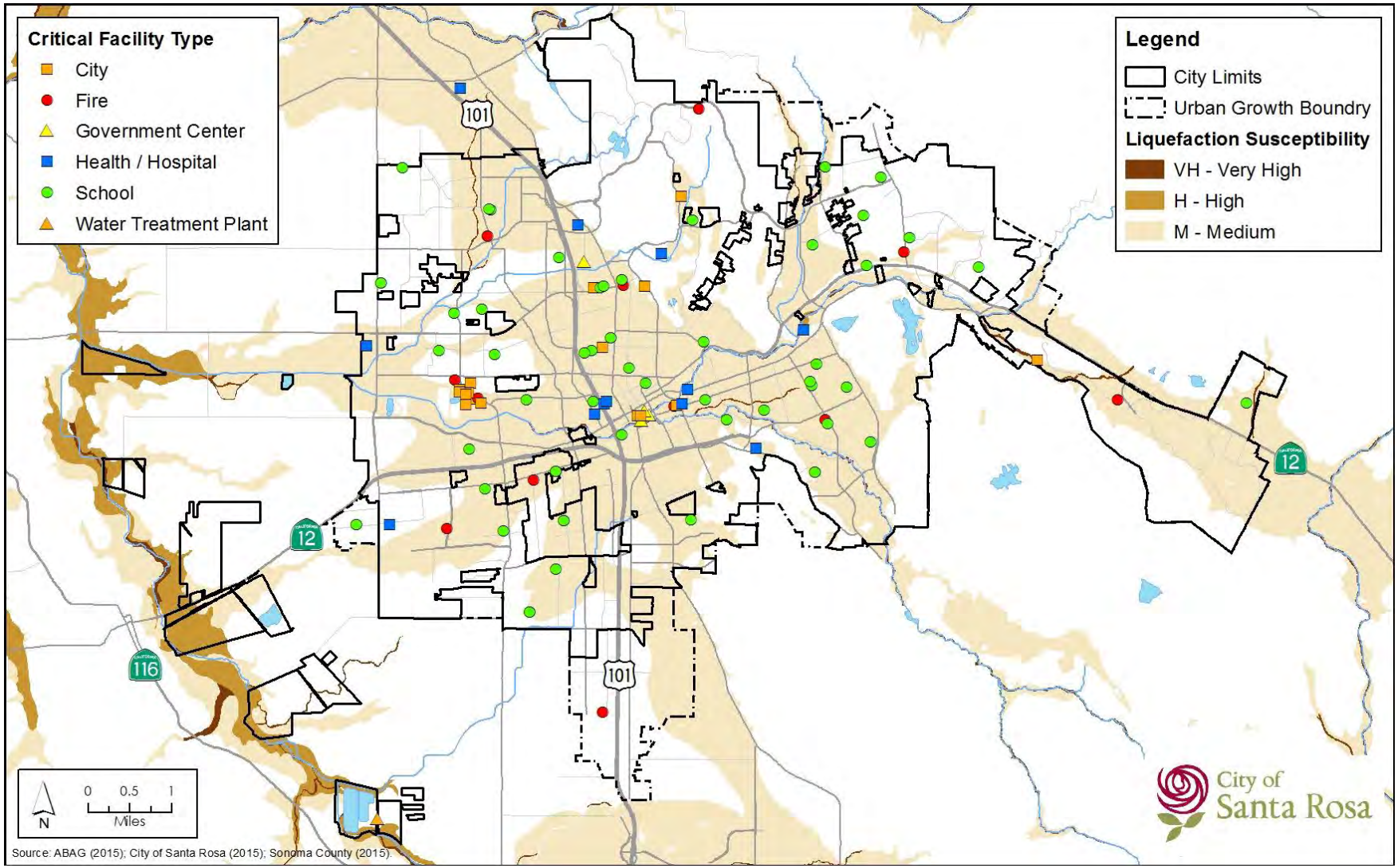


Table 12: Risk to Critical Facilities from Ground Shaking

Facility Type	Number of Facilities Not at Risk	Number of Facilities at Risk		
		Moderate Ground Shaking	High Ground Shaking	Very High Ground Shaking
City	0	0	15	1
Fire	0	1	9	2
Government center	0	0	4	0
Healthcare/hospital	0	0	9	3
School	0	1	48	9
Utility	0	11	58	9
Total	**0**	**13**	**143**	**24**

** For the purposes of this analysis, a facility not at risk is subject to an average peak ground motion no greater than 6.5, in the event of a magnitude 6.7 earthquake on the Rogers Creek fault. No area within the City limits of Santa Rosa would be below this threshold.*

Table 13: Risk to Critical Facilities from Liquefaction

Facility Type	Number of Facilities Not at Risk	Number of Facilities at Risk		
		Medium Susceptibility	High Susceptibility	Very High Susceptibility
City	3	13	0	0
Fire	4	8	0	0
Government center	0	4	0	0
Healthcare/hospital	1	9	1	0
School	16	42	0	0
Utility	54	24	0	0
Total	**79**	**100**	**1**	**0**

** For the purposes of this analysis, a facility not at risk is in an area of low or very low liquefaction susceptibility.*

Large sections of Santa Rosa face at least a medium susceptibility to liquefaction, as illustrated in **Figure 5**. Although liquefaction does not pose a risk to the entire community, it does threaten the majority of the 180 critical facilities, as shown in **Table 13**.

In addition to ground shaking and liquefaction, a small number of critical facilities are located within 500 feet of an Alquist-Priolo fault zone and so may be subject to fault rupture hazards if a seismic event occurs on the Rodgers Creek fault. These critical facilities are a healthcare/hospital center, three schools, and a component of the City's water supply infrastructure.

When looking at the social vulnerability of residents living in the various elevated risk zones associated with seismic hazards, nothing suggests that residents of the risk zones are more vulnerable than the community at large. The social vulnerability for ground shaking is shown in **Table 14**, while the social vulnerability for liquefaction and fault rupture is shown in **Table 15**.

Table 14: Social Vulnerability to Ground Shaking

Social Vulnerability Metric	Ground Shaking Risk			Total Community
	Moderate	High	Very High	
Population	3,088	160,428	21,307	184,823
Households (HH)	1,828	57,591	8,638	68,057
Median HH income	$60,400	$58,800	$60,400	$59,000
Percentage of HHs in poverty	5%	12%	11%	12%
Percentage of adults with high school degree or higher	98%	83%	89%	84%
Percentage with English competency	100%	91%	95%	92%
Percentage of HHs with a disabled member	38%	23%	24%	23%

Source: ESRI BAU ACS Population Summary, 2013 3-Year Estimates

Table 15: Social Vulnerability to Liquefaction and Fault Rupture

Social Vulnerability Metric	Liquefaction Susceptibility			Fault Rupture Zone	Total Community
	Medium	High	Very high		
Population	115,079	121	506	5,843	184,823
Households (HH)	42,981	44	178	2,422	68,057
Median HH income	$55,500	$60,000	$73,200	$67,800	$59,000
Percentage of HHs in poverty	12%	9%	11%	6%	12%
Percentage of adults with high school degree or higher	83%	75%	85%	94%	84%
Percentage with English competency	91%	88%	90%	98%	92%
Percentage of HHs with a disabled member	24%	25%	22%	26%	23%

Source: ESRI BAU ACS Population Summary, 2013 3-Year Estimates
** Due to the small size of the population in these affected areas, the numbers provided are more likely to have errors and should be used with caution when evaluating risk.*

Risk of Future Hazards

The City's location in Northern California and its proximity to numerous active fault zones means the City will continue to face earthquake hazards into the future. The City's proximity to the Rodgers Creek and Hayward faults exposes much of Santa Rosa to ground shaking potential. The Rodgers Creek Fault Zone runs through central Santa Rosa, which further exposes the community to fault rupture hazards. The Rodgers Creek and San Andreas faults are the two most active Bay Area faults and have experienced movement within the last 150 years. The San Andreas Fault Zone is a major structural feature in the region; however, it does not impact the City in the same way the Rodgers Creek fault does. Other principal faults capable of producing ground shaking in Santa Rosa include the Hayward fault, the Calaveras fault, and the Concord-Green Valley fault.

It is anticipated the Rodgers Creek Fault Zone could experience significant fault rupture, which poses a threat to the City, as the fault runs beneath the downtown area. In addition, areas in the City not underlain by bedrock are more vulnerable to liquefaction impacts. A 2015 ABAG analysis of the City's Priority Development Areas identifies that the areas surrounding Colgan Creek have a moderate risk of liquefaction. A discussion of seismic-related landslide risk is covered in a separate hazard profile in this chapter.

Climate Change Considerations

The likelihood, size, and severity of seismic events are not expected to be directly impacted by climate change. It is possible that anticipated changes to precipitation regimes and storm intensity may affect groundwater aquifer levels, which could expand/contract the areas of liquefaction potential in Santa Rosa. Since the field of climate change science is dynamic, the City will continue to review and summarize new research that occurs on this topic during the next update cycle.

3.5.2 Floods

Hazard Description

Flooding is a temporary condition in which land that is normally dry is partially or completely inundated. Flooding occurs when water bodies, such as streams, rivers, lakes, or reservoirs, are abnormally high and overflow into adjacent low-lying areas. These areas are known as floodplains, defined by their exposure to risk of recurring floods. Coastal flooding, which is generally associated with high tides and coinciding strong winds, is not applicable to Santa Rosa because of its inland location. Instead, floods in the planning area are a result of heavy rains in low-lying areas with limited drainage routes and along creeks that are prone to flooding in 100-year storm events. Even smaller, more frequent storm events have led to flooding and erosion in Santa Rosa's creeks, although the potential for these events is not mapped by FEMA.

Floods can be powerful enough to move large objects swiftly into other objects, cause damage to buildings and infrastructure, and weaken foundations and soils. Secondary impacts of flooding, including saturated soils and erosion from flooding events can cause trees to weaken and collapse, increasing the potential for property damage and loss of life. All of these impacts make infrastructure more susceptible to sustained damage or collapse. Floods are among the most common types of disaster in California according to the State's Multi-Hazard Mitigation Plan, second only to fires.

From 1950 to 2012, floods killed nearly 300 people, more than any other type of disaster. The State has administered approximately $4.8 billion in costs for flooding events. Four flood-related fatalities occurred in Sonoma County from 1995 to 2006, and the County estimates losses from flood disasters in that period at nearly $200 million. No federally declared flood disasters have occurred in Sonoma County since 2006.

Location and Extent

FEMA has identified several 100-year and 500-year flood zones in Santa Rosa along creeks that are prone to flood in heavy rains. **Figure 5** shows these flood zones, which surround portions of Spring Creek, Matanzas Creek, Colgan Creek, Naval Creek, Roseland Creek, and Kawana Springs Creek. The City of Santa Rosa has participated in the National Flood Insurance Program since June 1974. Approximately 167.71 acres in Santa Rosa's UGB are in the FEMA 100-year flood zone and 283.99 acres are in the 500-year flood zone. Additional areas of Santa Rosa have not yet been analyzed by FEMA.

Erosion has been found as a prominent secondary hazard related to flooding in Santa Rosa, especially along Matanzas Creek. Public property, such as Doyle Park, and privately owned residential properties adjacent to the creek have experienced erosion. In a flash flood event, large volumes of water have the potential to cause extreme erosion over a short period of time. This can lead to road failure, bank destabilization, and loss of property. In addition, increased sedimentation from heavy erosion can cause clogging and other issues in stormwater infrastructure and increase turbidity of the water, which damages the quality of the creek for fish and other wildlife.

Hazard History

In 2010, five repetitive loss properties were identified in the 2010 LHMP Annex, although the building location and type (commercial or residential) could not be identified. Repetitive loss properties are properties that have suffered more than one insured flood loss, indicating that the risk of flooding may be a systemic issue. Flooding has had serious impacts on Santa Rosa in the past, most notably the January 2006 flooding and landslides in the Russian River watershed. Seven days of heavy rains resulted in a near-record rainfall totaling nearly 18 inches. The Laguna de Santa Rosa wetlands, that normally buffer the City from high-flood conditions along the Russian River, reached peak capacity and overflowed. The rising water levels in the Laguna created a backwater condition and subsequently raised levels in surrounding creeks, leading to erosion, sedimentation, and flooding. FEMA declared the flood a major disaster, and the City's Emergency Operations Center (EOC) activated in response to the incident.

Risk of Future Hazards

Flooding in northern Santa Rosa is expected to remain minimal because of the distribution of creeks that can serve as drainage channels and hillier topography in the area. The flatter nature of southern Santa Rosa, along with fewer drainage routes makes this part of the City more prone to flooding in a 100-year, or smaller, storm event. Roseland and Colgan Creeks receive a majority of the stormwater drainage from southern Santa Rosa and will require improvements to minimize future risk of flood hazards. Continued erosion may cause further issues, weakening banks and leading to

infrastructure failures, especially along Matanzas Creek. Erosion may occur, even in floods smaller than a 100-year event.

As of early 2016, FEMA had started the process of determining whether a Risk Mapping, Assessment, and planning (Risk MAP) project is necessary in the San Pablo Bay Watershed, which includes Santa Rosa and 21 other incorporated cities, as well unincorporated Marin, Sonoma, Napa, and Solano Counties. This process, called the Discovery Process, allows FEMA to work closely with the local communities and stakeholders in the watershed to identify risks and mitigation actions specific to the area. The San Pablo Bay Watershed Discovery Project builds on the existing hazard mitigation efforts in the region, and if moved forward, would provide Santa Rosa and other communities with increased access to flooding related data and mapping. It is important to note that this watershed only covers the very easternmost part of Santa Rosa in Oakmont, affecting a small number of properties.

In 2011, sections of southwestern Santa Rosa were surveyed and mapped by FEMA to identify flood hazard zones. These maps provided residents and property owners more information about flood risk and the flood hazard they face and how to best prepare for flood emergencies. Santa Rosa's Subregional Water Reuse System is comprised of eight sections that maintain and operate the Region's water and sewer treatment and reuse. This system is located in the southwestern portion of the City, and has demonstrated flood risk. Further analysis of these risks will allow Santa Rosa to best prepare these facilities and avoid costly, dangerous service outages for the City and surrounding areas.

Climate Change Considerations

Although overall precipitation in the Santa Rosa area is expected to decline due to climate change, it is possible that climate change may cause more frequent intense storms, resulting in an increased risk of flooding. With a range of potential precipitation scenarios, most projections predict that the frequency of intense storm events will increase. This suggests that prolonged periods of drought will be coupled with strong rains in a short period of time, rather than rainfall throughout the year (California Natural Resources Agency, *2014).* More intense storms in a shorter period of time can exceed the ability of soils, water bodies, and stormwater infrastructure to accommodate all of the water, creating ponding or flash flooding and creek bank erosion. If precipitation levels decline in Santa Rosa and drought conditions become more frequent, soils are likely to become drier with a reduced capability to absorb water. As a result, rainfall is more likely to run off the soil rather than soaking in, exacerbating the potential for flooding.

Vulnerability/Risk Assessment

The currently mapped flood zones in Santa Rosa are quite small, as illustrated in **Figure 5**. Only two critical facilities are in the flood zone: two schools, both located within the 500-year floodplain. Additionally, three utility sites in the southwestern portion of the City fall within 30 feet of the 100-year floodplain, and within 20 feet of the 500-year flood plain. It is possible that because the critical facilities data uses point locations, rather than facility square footage, parts of these facilities are vulnerable to impacts from flooding. Continued analysis and planning for resilience in these facilities will help avoid service disruptions during flood events. Looking at the social vulnerability

of residents in the flood hazard zones, residents of both the 100-year and 500-year floodplains are less likely to have a high school degree than the average Santa Rosa resident. Additionally, residents of the 100-year floodplain have a lower median income and lower rates of English competency than residents in the community overall, indicating that they may be more socially vulnerable than the average Santa Rosa resident if a flood hazard occurs. However, these may be statistical flaws due to the small population in both types of flood hazard zones. **Table 16** shows the social vulnerability for residents in the flood hazard zones.

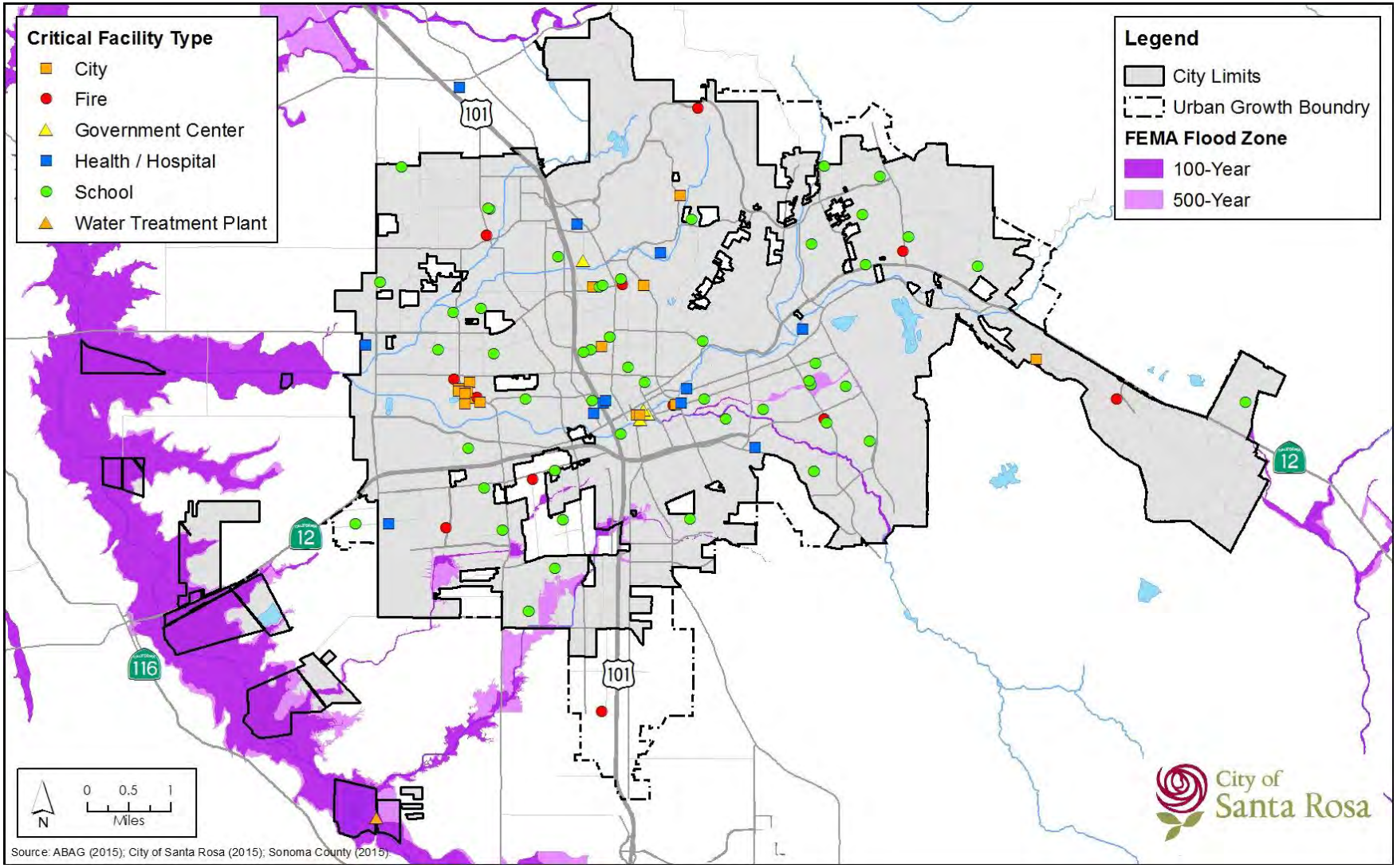
As of March 2016, Santa Rosa had 115 structures enrolled in the National Flood Insurance Program (NFIP). Since the program's adoption by the City, NFIP has paid 25 losses, totaling $500,875.85. Two of these paid losses were characterized as substantial damage. One property participated in an Increased Cost of Compliance (ICC) claim process, totaling $15,000, to help fund on-site mitigation solutions to reduce the likelihood or extent of future flood damage. Five buildings covered by the program have experienced repetitive losses since 1978.

Table 16: Social Vulnerability to Floods

Social Vulnerability Metric	Flood Risk		Total Community
	100-Year *	500-Year *	
Population	268	1,140	184,823
Households (HH)	105	387	68,057
Median HH income	$57,400	$71,000	$59,000
Percentage of HHs in poverty	13%	9%	12%
Percentage of adults with high school degree or higher	68%	79%	84%
Percentage with English competency	84%	93%	92%
Percentage of HHs with a disabled member	24%	17%	23%

Source: ESRI BAU ACS Population Summary, 2013 3-Year Estimates

Figure 5: 100- and 500-Year Flood Zones



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3.5.3 Dam Inundation

Hazard Description

Dam inundation is a hazard that occurs when a flood control dam/water reservoir is damaged severely enough to compromise its ability to hold back water. While rare, this hazard has the potential to have a catastrophic impact on a community, destroying structures and critical infrastructure and further decreasing available water supply in periods of prolonged drought. This damage can occur as a result of earthquakes or other seismic activity, erosion of the dam face or foundation, rapidly rising floodwaters that weaken the dam or overwhelm its capacity to drain excess water, or flaws in the ground on which the dam rests. Human error, such as design or operation failures, can also result in dam failure and inundation. When a dam fails, sudden fast-moving floods migrate throughout the inundation zone. The speed and volume of these floodwaters can damage or destroy property, cause injury or loss of life, and displace large numbers of residents and employees in the flood's path. A dam failure event can also damage regional infrastructure such as transportation and energy networks, impacting residents and systems outside of the flood's immediate path.

The US Army Corp of Engineers (USACE) has developed a five-degree rating system for dam safety, called the Dam Safety Action Classification (DSAC) system, shown in **Table 17**.

Table 17: Dam Safety Action Classification (DSAC) System

DSAC Rating	Description
DSAC-I (Very High Urgency)	Dams where progression toward failure is confirmed to be taking place under normal operations and the dam is almost certain to fail under normal operations within a time frame from immediately to within a few years without intervention; or the combination of life or economic consequences with probability of failure is extremely high.
DSAC-II (High Urgency)	Dams where failure could begin during normal operations or be initiated as the consequence of an event. The likelihood of failure from one of these occurrences, prior to remediation, is too high to assure public safety; or the combination of life or economic consequences with probability of failure is very high.
DSAC-III (Moderate Urgency)	Dams that have issues where the dam is significantly inadequate or the combination of life, economic, or environmental consequences with probability of failure is moderate to high.
DSAC-IV (Low Urgency)	Dams are inadequate with low risk such that the combination of life, economic, or environmental consequences with a probability of failure is low and the dam may not meet all essential USACE engineering guidelines.
DSAC-V (Normal)	Dams considered adequately safe, meeting all essential agency guidelines and the residual risk is considered tolerable.

Location and Extent

Eight dams are located within Santa Rosa's urban growth boundary (**Figure 6**). Five additional dams outside of the City's borders have the potential to cause damage within Santa Rosa in the case of failures. In the Santa Rosa UGB, approximately 2,488 acres are exposed to flooding as a result of dam failure.

Hazard History

Dam failure events are extremely rare, as dams that are large enough to hold back large quantities of water have very high safety standards and are designed with failure-stopping redundancies in mind. During floods, dam operators will often release more water than normal from the dam, reducing the risk of incoming water unintentionally exceeding the dam's capacity. There has never been a dam failure in Santa Rosa or in the larger Bay Area (ABAG, 2015).

Risk of Future Hazards

As dam and levee infrastructure in and around Santa Rosa ages, the likelihood of dam failure and consequent inundation increases if no mitigation actions are taken. Although dam failure is unlikely because of current state regulations related to the design, maintenance, and monitoring of dams, Santa Rosa is exposed to the hazard of inundation from failure of local dams.

Climate Change Considerations

Similar to the climate change considerations for non-dam-related flooding, increased intensity of storms may increase the potential for flooding. Higher volumes of rain in a shorter period of time may increase the rate of erosion around dams, increasing the risk of failure. Pressure from drastic fluctuations in reservoir volumes may place stress on dam systems that were not accounted for in original designs.

Vulnerability/Risk Assessment

The risk of dam inundation is more limited than other hazards, but a sizeable portion of Santa Rosa remains susceptible to this hazard, as shown in **Figure 7**. There are 25 critical facilities located in an area at risk of dam inundation, or approximately 14 percent of the critical facilities in the community. Of the different facility types, the only site type with a majority of facilities in the hazard zone is the government center type. One school facility, Rincon Valley Union Elementary Office, is within the inundation zone for two dams (Lake Ralphine and Matanzas Creek).The number and type of the at-risk facilities are listed in **Table 18**.

Table 18: Facilities at Risk of Dam Inundation

Facility Type	Number of Facilities Not at Risk	Number of Facilities at Risk
City	13	3
Fire	10	2
Government center	1	3
Healthcare/hospital	11	1
School	51	7
Utility	70	8
Total	**155**	**24**

Residents in areas of potential dam inundation do not appear to be more socially vulnerable than the average Santa Rosa resident. If anything, these residents may be marginally less vulnerable, as all five metrics show less social vulnerability than for the community at large. The social vulnerability of residents in the dam inundation zone is illustrated in **Table 19**.

Table 19: Social Vulnerability of Dam Inundation

Social Vulnerability Metric	Dam Inundation Zone	Total Community
Population	14,807	184,823
Households (HH)	5,864	68,057
Median HH income	$60,600	$59,000
Percentage of HHs in poverty	8%	12%
Percentage of adults with high school degree or higher	89%	84%
Percentage with English competency	94%	92%
Percentage of HHs with a disabled member	22%	23%

Source: ESRI BAU ACS Population Summary, 2013 3-Year Estimates

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Figure 6: Dam Locations

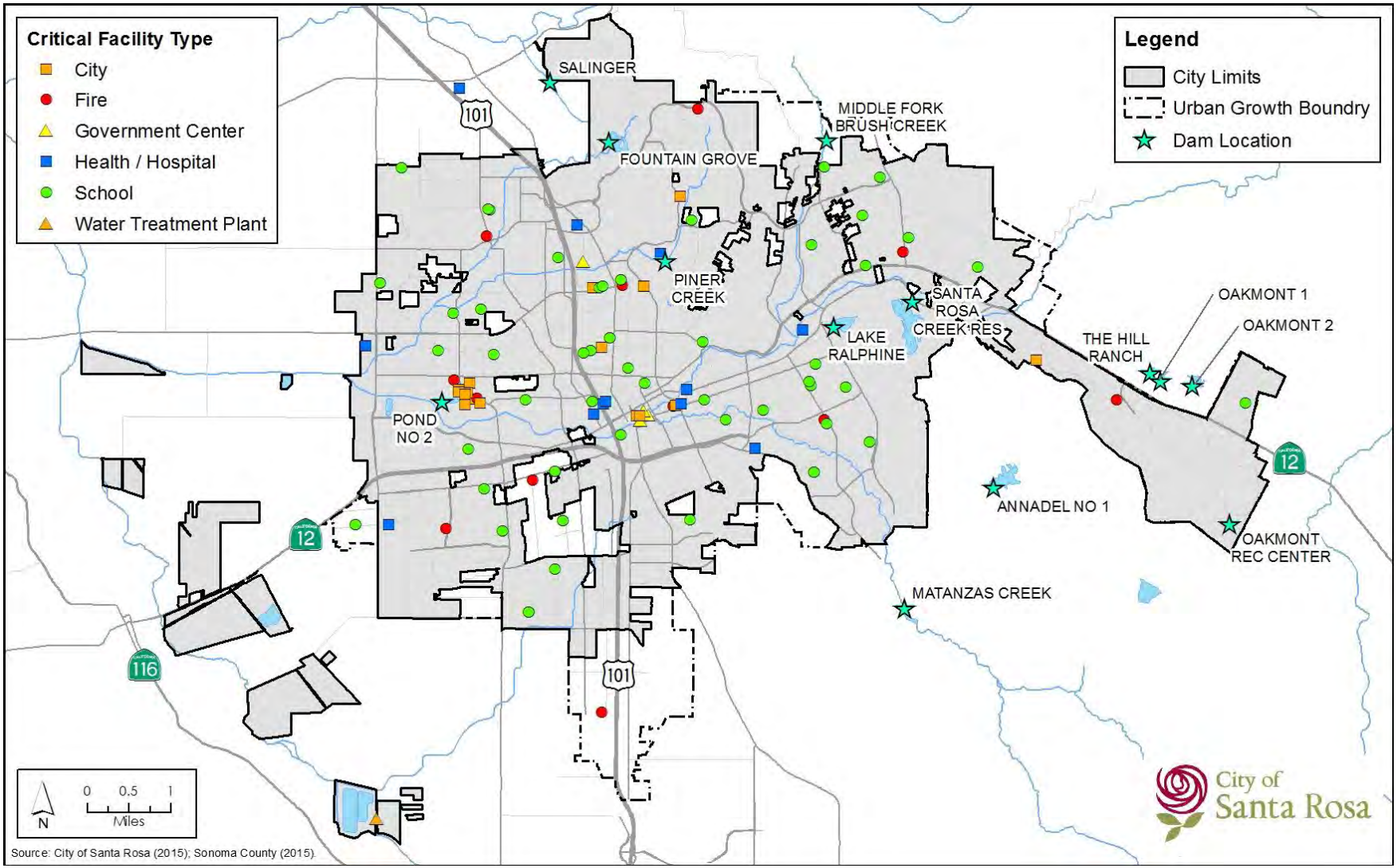
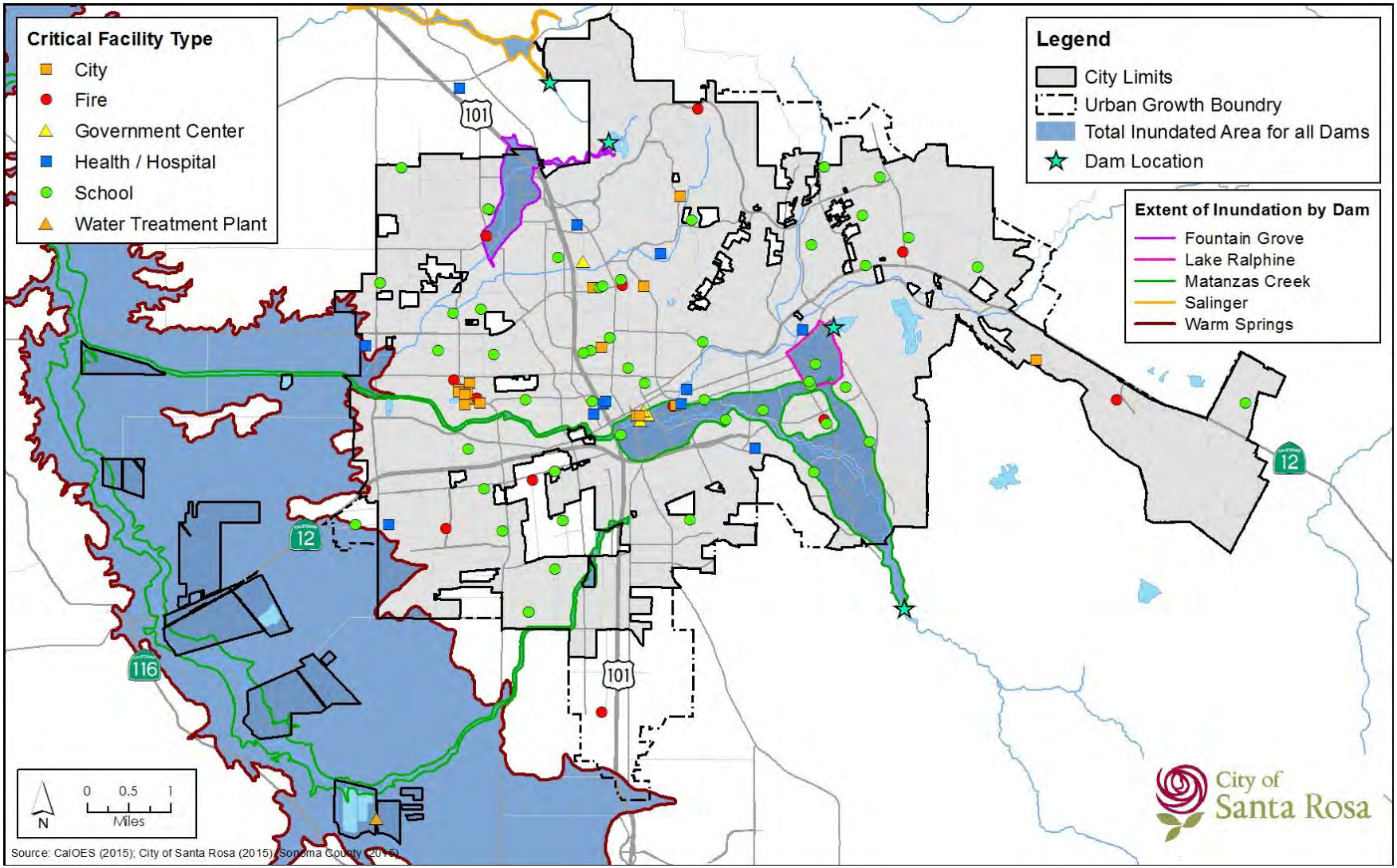


Figure 7: Dam Inundation Area



3.5.4 Landslides

Hazard Description

Landslides occur when soils on a hillside become unstable and slide down toward the base of the hill. They can occur very quickly or may unfold slowly over a period of days, weeks, months, or years. Landslides can damage or destroy any structures built on or in (e.g., pipelines) the moving soil, and the flow of material can cause further damage to any structure in its path. Landslide risk depends on the types of earth materials of the hillside and the steepness of the slope. There are multiple types of landslides and they can be triggered by a number of different events, but the two most common forms are earthquake-induced landslides and moisture-induced (rain, flooding, irrigation) landslides. Earthquake-induced landslides can happen when the ground shaking makes the soil looser (sometimes as a result of liquefaction) or when rocks in the slope fracture, creating unstable conditions. Moisture-induced landslides can occur when the ground soaks up enough water to cause it to weaken and become unstable. Water can also erode the base of slopes, making hillsides more unstable and increasing landslide risk. Landslide risk in Santa Rosa is shown in **Figure 8** by the distribution of occurrence in the City and the UGB. Some areas in the City never experience landslides, but portions of land along Santa Rosa's northern and southern borders have experienced few to many landslides.

Hazard History

Santa Rosa has experienced landslides in the past ranging from small, localized events to events that have resulted in injury and substantial damage. A recent notable event occurred on December 31, 2005, when a mudslide on Montgomery Drive collided with houses and automobiles, extending into the middle of the road. In its path, two houses were damaged and one was destroyed. The home that sustained the heaviest amount of damage also involved a person that was trapped alone for an hour. She sustained minor injuries and was rescued by Santa Rosa Fire Department. An additional SRFD engine was sent to the end of Sullivan Court to evaluate the home above the slide, secure utilities, and evacuate residents at risk. This area, to the north of Lake Ralphine, is an area of elevated landslide risk, indicated below in **Figure 8**.

In addition to past landslides within Santa Rosa, unincorporated County land outside of the City has experienced slipping events in recent years, where infrastructure and road projects to the north have experienced failure from minor landslides. The Bennett Valley area (outside of Santa Rosa city limits) has also experienced repeated landslide events in 1995, 1997, and 2003. The Hidden Acres (a.k.a. Lost Acres) landslide is a large, deep-seated rotational failure that covers approximately 12 acres and encompasses a hillside bench and flanking slopes of the adjacent drainages, beneath an east-north facing slope in the Bennett Valley. The 1997 activation of the Hidden Acres landslide damaged four homes and injured one resident (California Department of Conservation 2015). Loose native soils, decreased vegetation as a result of wildfires, and excessive ground moisture from heavy rains caused the landslide, conditions that are important to monitor in and around the City to shape future risk reduction efforts.

Location and Extent

Landslide prone areas in the City and the UGB are depicted on **Figure 8** and are broken down into two categories, with "mostly landslides" indicating slopes that are mostly susceptible to the hazard, and "many" landslides demonstrating a slightly lower susceptibility. **Table 20** describes the slope categories used by the California Geological Survey to describe landslide risk criteria.

Risk of Future Hazards

Most of Santa Rosa lies on flat land with little to no risk of landslides. The steeper slopes with a higher risk of landslides are generally in the northeastern part of the City, east of Mendocino Avenue and north of 4th Street/SR 12. ABAG has identified historic landslide events in these areas of steeper slopes, increasing the likelihood of future landslides. ABAG has found evidence of frequent historic landslides in patches of the Fountaingrove neighborhood and surrounding the Bennett Valley area, as well as in County lands to the north of Santa Rosa.

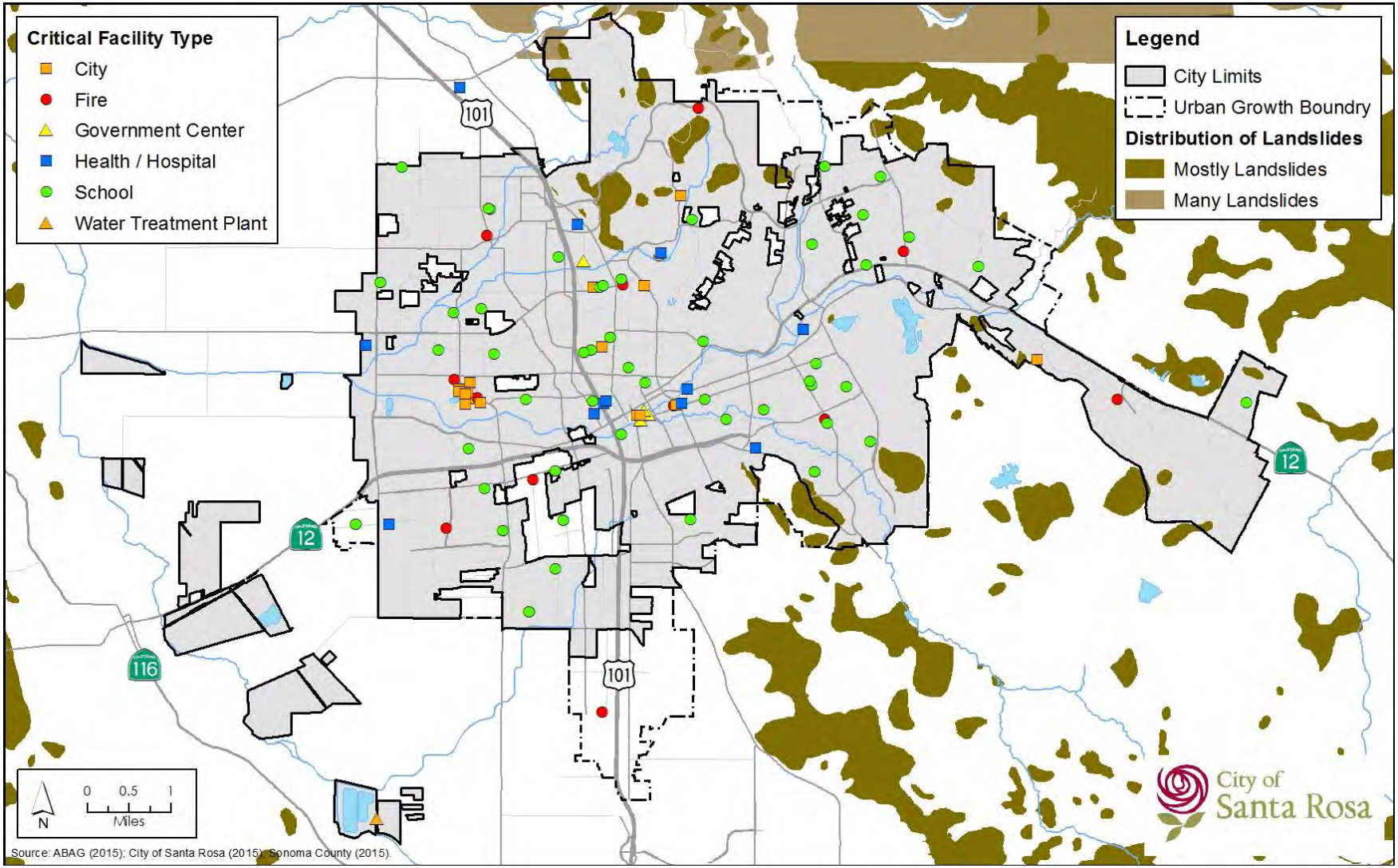
The California Geologic Survey (CGS) has conducted slope stability studies for large portions of the state, including the Santa Rosa area. The CGS classifies slopes into five different categories, as shown in **Table 20**.

Table 20: CGS Slope Categorization

Risk	Category	Description
Most stable – lowest risk	A	Areas of greatest relative stability due to low slope inclination—predominantly less than 15%.
	Bf	Locally level areas within hilly terrain; may be underlain or bounded by unstable or potentially unstable rock materials.
	B	Areas of relatively stable rock and soil units, on slopes greater than 15%, containing few landslides.
	C	Areas of relatively unstable rock and soil units, on slopes greater than 15%, containing abundant landslides.
Least stable – highest risk	Landslide	Areas of lowest relative slope stability. Failure and downslope movement of rock and soil have occurred or may have occurred.

Most of Santa Rosa is designated as an A zone, suggesting flat land with minimal risk of landslides. Extensive areas are designated as Bf and C in the northeast part of the City, along with a limited number of Landslide areas, suggesting that this portion of Santa Rosa is at a greater risk. There are also areas designated Bf, C, and occasional landslide areas in and around the Bennett Valley area of southeastern Santa Rosa, indicating an increased risk in this part of the community.

Figure 8: Landslide-Prone Areas



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Outside of these larger areas, localized landslides are possible along small slopes elsewhere in the City. These slopes include the sides of the Santa Rosa Creek and the Santa Rosa Flood Control Channel. Landslides in these areas are unlikely to cause substantial injuries or destruction, but may result in limited damage. Parts of Santa Rosa with an elevated risk of liquefaction may also be at risk from a phenomenon called lateral spreading, which occurs when soil undergoing liquefaction spreads horizontally across shallow slopes, much like a low-angle landslide.

Climate Change Considerations

There is no known link between climate change and seismic activity, and so climate change is not anticipated to have any effect on earthquake-induced landslides. However, climate change may result in more frequent and/or intense rainstorms, which could increase the risk of moisture-induced landslides in vulnerable parts of the community. In addition, as the climate warms, soil conditions in the planning area may become less stable due to either drier conditions or excessive irrigation that could increase landslide hazards.

Vulnerability/Risk Assessment

The landslide risk in Santa Rosa is largely in the more hilly parts of the community east of US 101, as shown in **Figure 8**. Most of Santa Rosa's critical facilities are located in the flatter parts of the City and so are not considered to be at high risk. Of the at-risk critical facilities, virtually all are in areas with few or very few historic landslides, with only one utility facility in an area of elevated landslide risk (**Table 21**).

Table 21: Risk to Critical Facilities from Landslides

Facility Type	Number of Facilities Not at Risk	Number of Facilities at Risk	
		Many landslides	Mostly landslides
City	16	0	0
Fire	12	0	0
Government center	4	0	0
Healthcare/hospital	12	0	0
School	58	0	0
Utility	77	0	1
Total	**179**	0	1

The hilly parts of urbanized areas often include more expensive residential neighborhoods. This is reflected in the social vulnerability metrics of the areas in Santa Rosa with greater landslide risk as shown in **Table 22**. The areas with elevated landslide risks have a substantially lower social vulnerability risk than the entire community. This difference is particularly evident in median household income and average educational attainment for adults.

Table 22: Social Vulnerability to Landslide

Social Vulnerability Metric	Landslide Risk		Total Community
	Many landslides	Mostly landslides	
Population	0	2,472	184,823
Households (HH)	0	1,011	68,057
Median HH income	-	$101,200	$59,000
Percent HHs in poverty	-	6%	12%
Percent adults with high school degree or higher	-	96%	84%
Percent English competency	-	99%	92%
Percent HHs with a disabled member	-	18%	23%

Source: ESRI BAU ACS Population Summary, 2013 3-Year Estimates

** Due to the small size of the population in these affected areas, the numbers provided are more likely to have errors and should be used with caution when evaluating risk.*

3.5.5 Hazardous Materials

Hazard Description

California law defines a hazardous material as follows:

> *A substance that, because of physical or chemical properties, quantity, concentration, or other characteristics, may either (1) cause an increase in mortality or an increase in serious, irreversible, or incapacitating illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported, or disposed of, or otherwise managed (California Health and Safety Code Section 25141b).*

Hazardous materials are a wide-ranging category of substances that include toxic substances, flammable or explosive materials, corrosive substances such as acids, and radioactive substances. While some hazardous materials are dangerous at all times, others may only be dangerous under specific conditions (flammable materials, for example, which may be perfectly inert and harmless until exposed to a spark or a heat source). Hazardous wastes refer to hazardous materials that are no longer used and have been disposed of or are awaiting disposal.

Emergencies involving hazardous materials often occur due to mechanical failure or human error. These types of emergencies also sometimes occurs as a secondary impact of another emergency, such as an earthquake or flood. Hazardous material releases can occur from buildings such as factories and processing facilities, as well as from vehicles that transport chemicals or other hazardous substances. Road vehicles, trains, and (more rarely) aircraft can all suffer accidents that cause a release of hazardous materials. Locations of State Hazardous Materials Certified Unified

Program Agencies (CUPA) permit sites in Santa Rosa can be found in **Figure 10**. The CUPA program is a consolidation of six environmental programs, and is used to ensure consistency in permits, inspections, reporting and enforcement of standards surrounding hazardous materials.

Hazard History

Between 2010 and 2015, 108 hazardous materials events occurred that required the response of Santa Rosa Fire Department's HazMat Team. Some notable events are profiled below in **Table 23**. Additionally, the State's EnviroStor and GeoTracker databases lists open cases for investigating or remediating hazardous materials sites in the City, indicating historical releases that are in the midst of remediation related primarily to underground storage tanks and sites where toxic chemicals were utilized for industrial processing. There are 641 permits issued under the State Hazardous Materials Certified Unified Program Agencies (CUPA) in Santa Rosa.

Risk of Future Hazards

Santa Rosa contains a variety of industrial facilities that contain significant quantities of hazardous materials. However, the City encompasses a number of smaller facilities where hazardous materials can be found, including dry cleaners and automotive repair shops. There is a risk of transportation-related hazardous materials releases from vehicles traveling along the US 101 corridor. Santa Rosa also may face a hazardous materials risk from contaminated soil or groundwater. This type of contamination can be caused by current or former industrial activities at a site, leaking storage tanks, or improper disposal of hazardous materials on a site. The State Department of Toxic Substances' EnviroStor Database lists 50 project sites in the City that have previously or currently undergone evaluation and remediation. The State Water Resources Control Board identifies 650 individual sites in Santa Rosa, most of which are underground storage tanks, which are monitored and regulated to help prevent contamination to surface water bodies and groundwater. Cleanup activities have successfully finished at a majority of these sites. The 641 permitted CUPA sites in the City may continue to pose a potential risk of hazardous material release.

Table 23: Santa Rosa Hazardous Material Incidents

Date	Location	Incident Description
April 2011	1400 Fountaingrove Parkway	Explosion and Fire with injuries
June 2011	3555 Round Barn Boulevard	Release of Ozone in a hotel that resulted in the transport of 2 employees
December 2011	1400 Fountaingrove Parkway	Tanker truck carrying acid spilled during off hauling and severely injured the driver.
January 2012	421 Santa Rosa Avenue	Release from an automotive repair shop to a neighboring residence resulted in an exposure to a child.
February 2014	1400 Fountaingrove Parkway	Release of hazardous waste to the storm drain
April 2014	1287 Fulton Road	Large vat of liquid wine waste broken open during transport in a public street and discharged to a storm drain
May 2014	Spring Lake	Chlorine gas cloud resulting in evacuations

Date	Location	Incident Description
February 2015	Paulin Creek	Release of transformer oil to Paulin Creek resulting in a multi-day cleanup operation
August 2015	1835 Mendocino Avenue	Release of an asphyxiate (CO2 dewar) in a restaurant
September 2015	440 Hearn Avenue	Commercial propane filling operation with a fire and injury

Source: City of Santa Rosa Fire Department 2016

There is also a risk from hazardous materials used in building construction, which can be released during renovation or demolition without the use of proper control strategies. Many older buildings and structures may contain lead-based paint, asbestos, and polychlorinated biphenyls (PCBs, materials used in electrical equipment, including fluorescent lighting). While these hazardous materials were banned in new buildings in the 1970s, many buildings in Santa Rosa are old enough to possibly contain these substances. According to recent data from the US Census Bureau, 31.2 percent of homes in Santa Rosa were constructed before 1970 and potentially include these materials. A significant release of these substances from older buildings is unlikely, but renovation and demolition activities (especially post-disaster) should include steps to reduce exposure to these materials and minimize the chance of them being released into the environment.

Climate Change Considerations

Climate change is not directly linked to the risk of hazardous material releases. However, it may indirectly increase the risk by increasing the frequency, severity, or range of other hazards, such as severe storms or fires. It is possible that an increase in these other hazards may increase the likelihood of an accidental hazardous materials release.

Vulnerability/Risk Assessment

Although hazardous materials sites are most concentrated around the US 101 corridor, they can be found throughout Santa Rosa, as shown in **Figure 9**. As a result, a large number of the community's critical facilities are within 1,000 feet of CUPA sites, including all critical facilities. **Table 24** shows the distribution of critical facilities by type in the areas within 1,000 feet of a hazardous materials site (as determined by the City's CUPA permits) and so with elevated risk from a hazardous materials event. These facilities include the majority of City, fire, government center, and healthcare/hospital facilities.

Figure 9: Identified Hazardous Materials Sites

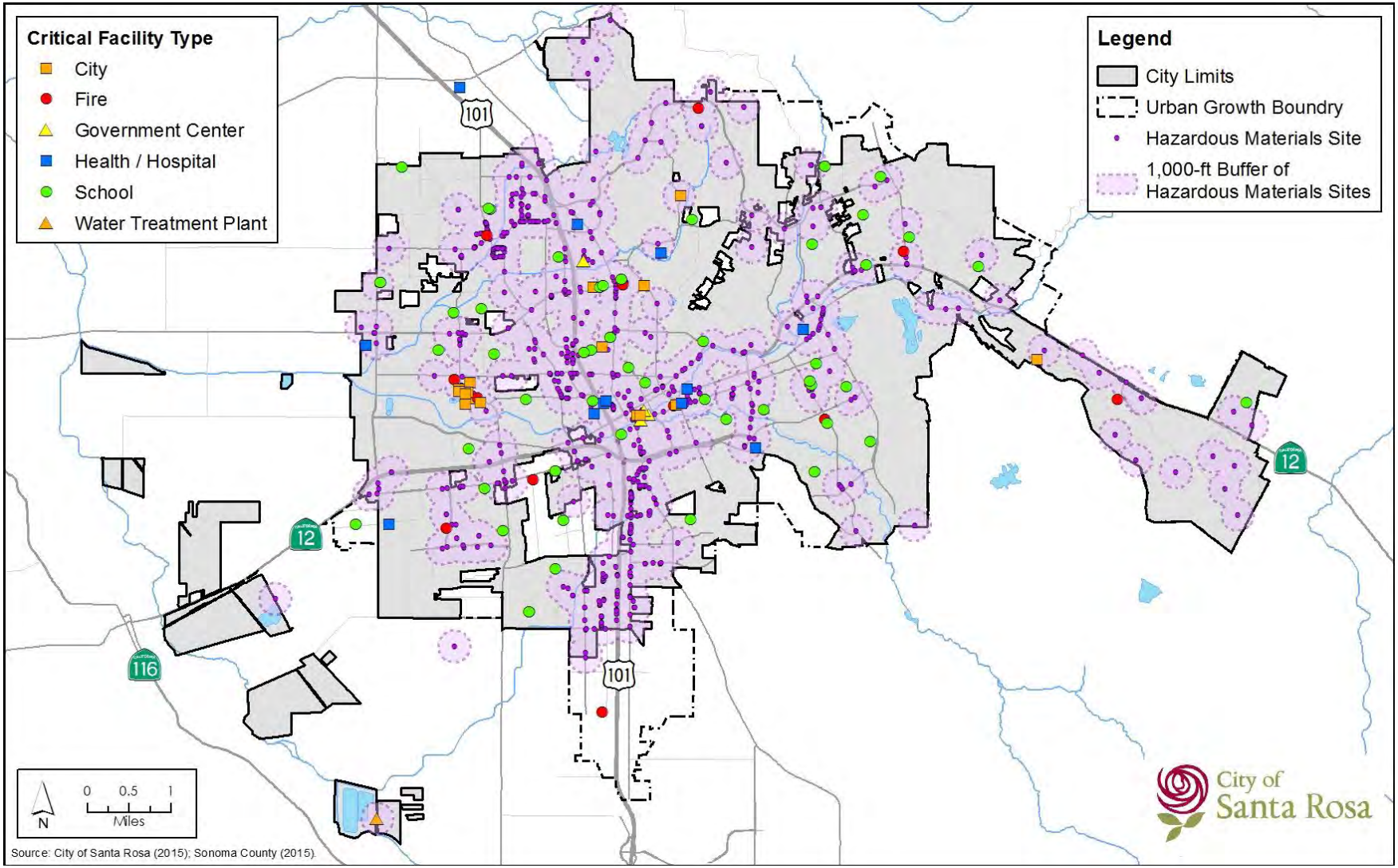

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Table 24: Risk to Critical Facilities from Hazardous Materials

Facility type	Number of facilities not at risk	Number of facilities at risk
City	1	15
Fire	4	8
Government center	0	4
Healthcare/hospital	2	10
School	27	31
Utility	20	58
Total	54	126

Residents of Santa Rosa living within 1,000 feet of a permitted CUPA facility are somewhat more socially vulnerable than the average community resident. People near hazardous materials sites typically have a lower household income, are slightly more likely to be in poverty, and are less likely to have at least a high school degree or be competent in English when compared to the average Santa Rosa resident. **Table 25** shows the social vulnerability metrics for the areas within 1,000 feet of a permitted CUPA facility.

Table 25: Social Vulnerability to Hazardous Materials

Social Vulnerability Risk	Within 1,000 Feet of Hazardous Materials Facility	Total Community
Population	58,799	184,823
Households (HH)	21,992	68,057
Median HH income	$52,900	$59,000
Percentage of HHs in poverty	14%	12%
Percentage of adults with high school degree or higher	80%	84%
Percentage with English competency	80%	92%
Percentage of HHs with a disabled member	24%	23%

Source: ESRI BAU ACS Population Summary, 2013 3-Year Estimates

3.5.6 Wildfire

Hazard Description

The 2010 LHMP Annex identifies wildfire as a potential hazard for the community. The 2016 update discusses wildfire together with other fire hazards. Fire hazards are the occurrence of combustion and conflagration of materials, which can result in destruction of property and loss of life. Fires are typically characterized in three categories: urban fires, wildland-urban interface (WUI) fires, and wildland fires. This categorization reflects the location of the fire event.

- Urban fires occur in a developed area and pose a direct risk to development.
- Wildland-urban interface fires occur where the built environment and natural areas are intermixed (the fringe of urban areas).
- Wildland fires occur in wilderness (open space, undeveloped) land.

Fires in the urban environment and in the WUI can result in direct damage to the built environment and can injure or kill residents. Even if residents escape physically unscathed, economic burden, emotional stress, and displacement all pose significant burdens on recovering communities. Wildland fires can cause damage to infrastructure or other systems that may affect Santa Rosa and the entire Bay Area region. Types of secondary impacts from wildland fires can include power outages from damaged power lines, poor air quality due to smoke and ash, and impacts to water quality in affected watersheds from ash and debris entering water bodies. Additionally, fire can destroy vegetation, including root structures that previously supported sloped soils, increasing the risk of mudslide and landslides. Vegetation management is essential both to reduce the risk of wildland fires and to preserve landscapes and avoid secondary hazards after a fire. Location and Extent

Wildfire

Areas vulnerable to wildfires are present throughout Santa Rosa and Sonoma County. In the greater Bay Area region, fire areas generally fall into two categories – State Responsibility Areas, where the California Department of Forestry and Fire Protection (CalFIRE) is responsible for fire protection,[2] and Local Responsibility Areas, where local fire departments and fire protection districts have responsibility (ABAG 2015). Santa Rosa is located in Sonoma County, and like Sonoma County, much of Santa Rosa has characteristics that support intense and uncontrollable wildfires.

Wildfire risk for a given area reflects several factors. CalFIRE designates levels of wildfire severity based on the amount of vegetation, topography, and weather (temperature, humidity, and wind). Based on these factors, CalFIRE develops maps that depict wildfire hazard areas that represent the likelihood of an area burning over a 30- to 50-year time period. CalFIRE develops these maps for areas under state responsibility with moderate to very high hazard. Classifications are based on a

[2] *CalFIRE is an emergency response and resource protection department in the State of California. CalFIRE protects lives, property and natural resources from fire; responds to emergencies of all types, and protects and preserves timberlands, wildland, and urban forests.*

model prepared by the UC Berkeley Center for Fire Research and Outreach (CalFIRE 2015). Portions of Santa Rosa's UGB are located within a State Responsibility Area (**Figure 10**)

For areas under local responsibility, CalFIRE identifies very high fire hazard severity zones to local agencies (ABAG 2015). According to CalFIRE, classifications are based on flame and ember intrusion from potentially adjacent wildfires and flammable vegetation in the local responsibility area, incorporating hazard ratings from scientists at the UC Berkeley Center for Fire Research and Outreach. However, CalFIRE only provides recommendations for very high hazards to Local Responsibility Areas and does not present recommendations for moderate or high hazard severity zones. In addition, other factors may further influence susceptibility to wildfire, such as the dryness of vegetation and the presence of dead plant matter, which could increase flammability.

Recognizing the vulnerability of wildland-urban interface areas, CalFIRE also produced WUI maps that designate areas with burnable vegetation and residential density greater than one unit per 20 acres. CalFIRE's WUI zones highlight areas of potential fire risks that also have high exposure of people and property (ABAG 2015). On February 24, 2009 the Santa Rosa City Council approved an amendment to Chapter 47 Section 18-44.4702.1 of the 2007 California Fire Code (CFC) defining a Wildland Urban Interface Fire Area as follows:

> *"Wildland-Urban Interface Fire Area is a geographical area in the City of Santa Rosa at significant risk from wildfires as designated on the map titled Wildland-Urban Interface Fire Area, dated January 28, 2009 and retained on file in the City Geographic Information System and in the Office of the City's Fire Marshall. The Wildland-Urban Interface Fire Area shall include Very High Fire Hazard Severity Zones recommended by the Director of the California Department of Forestry and Fire Protection pursuant to Public Resource Code sections 4201 – 4204 and Government Code sections 51175 – 51189."*

At the local level, the City of Santa Rosa created a local Wildland-Urban Interface (WUI) zone to identify and consolidate four types of fire hazard zones in the community: moderate, high, very high, and mutual threat. Approximately 30 percent of the community is located in Santa Rosa's WUI zone. The City's WUI zone is shown in **Figure 11**, alongside the CalFIRE WUI. Note that the CalFIRE WUI is based on federal and state data sets, while the local standard is based on local information and exposure. The City of Santa Rosa created the local WUI zone based on areas of significant risk identified by CalFIRE as Very High Fire Hazard Severity Zone, in addition to other self-defined WUI areas that reflect local knowledge of landscape and site characteristics.

Conflagration

While the primary fire threat in the Bay Area is from wildfire, urban fires are also a risk. Although not evaluated as a primary hazard for the community, Santa Rosa is identifying this hazard to aid with monitoring and elevation of the hazard, as applicable. Commonly referred to as an "urban conflagration," this event entails a large, disastrous fire in an urban area. Urban conflagrations can occur due to many causes such as wildfires, earthquakes, gas leaks, chemical explosions, or arson. They may also occur accidentally as a result of electrical faults, unattended cooking appliances, or combustible or flammable materials left too close to a heat source, among others. As identified by ABAG (2015), the urban fire conflagration that followed the 1906 San Francisco earthquake did more damage than the earthquake itself. A source of danger to cities throughout human history,

urban conflagration has been reduced as a general source of risk to life and property through improvements in community design, construction materials, and fire protection systems. Although the frequency of urban conflagration fires has been reduced, this hazard remains a risk (ABAG 2015). The urbanization and buildout of Santa Rosa will increase the urban density and infill in areas adjacent to the WUI.

Hazard History

Each year, an average of 9,000 wildfires burn approximately half a million acres in California (Cal OES 2013). Wildfires also occurred regularly in the Bay Area region from the 1950 to 2014 period. ABAG (2015) reports large wildfires as having occurred in 1961, 1962, 1964, 1965, 1970, 1981, 1985, 1988, 1991, and 2008. The 1991 fire in the Oakland-Berkeley Hills was the largest urban-wildland fire in the Bay Area and resulted in $1.7 billion in losses. In the fire, 3,354 single-family dwellings and 456 apartments were destroyed, while 25 people were killed and 150 people were injured (ABAG 2015).

Since adoption of the previous 2010 LHMP, no major disasters have occurred in Santa Rosa, but there have been several wildfires. Between 2010 and 2015, there were ten fires that burned over a tenth of an acre in the WUI, summarized in **Table 26**. In addition to these fires, which do not include structure fires, there were 179 vegetation fires ranging in size between one tenth and five acres. A map of historic fire occurrences in the Santa Rosa area is included as **Figure 12**.

The Hanley Fire, which burned 52,700 acres across Santa Rosa in 1964, remains the City's (as well as Sonoma County's) largest wildfire. 108 structures burned in the fire. The fire started the morning of September 19 on the Hanley property off Highway 29 on the slopes of Mt. St. Helena in Napa County. By the end of the day on September 20, the fire was nearly contained. Then, late night winds pushed the flames down and around Calistoga on two sides. At mid-day of the third day, an ember ignited a spot fire on the ridge west of Highway 128 between Calistoga and Kellogg, in Sonoma County. From there, the fire raced into Knights Valley and turned southward into Franz Valley. By nightfall, the fire, driven by 70 mile per hour winds, approached Santa Rosa. To the east, flames burned over the hills and down into the Rincon Valley area. The fire was not brought under control until the morning of the seventh day. Despite the devastating impacts to wildlands and property caused by the Hanley Fire, no human lives were lost (Sonoma County 2011).

The 2003 Lofty Fire on the City's northeast border, was the result of two juveniles playing with "Safe and Sane" fireworks in one of the City's Very High Fire Hazard Severity Zone. The resulting fire consumed 42 acres of open space, destroyed one single family home (estimated at $750,000) and injured multiple firefighters who fought to save other homes in the area. A 2004 ballot measure (Measure F) was passed in Santa Rosa and has been adopted into a local ordinance banning the sale, possession and/or use of any and all fireworks within the City Limits of Santa Rosa.

CalFIRE reports historic CalFIRE statistics by county, with the most current data for calendar year 2013. CalFIRE identifies a total of 196 fires that occurred in the State Responsibility Areas of Sonoma County in 2013, resulting in a total of 4,189 acres burned. On average, since 2010 Sonoma County has experienced approximately 118 wildfires per year.

Figure 10: Fire Responsibility Areas

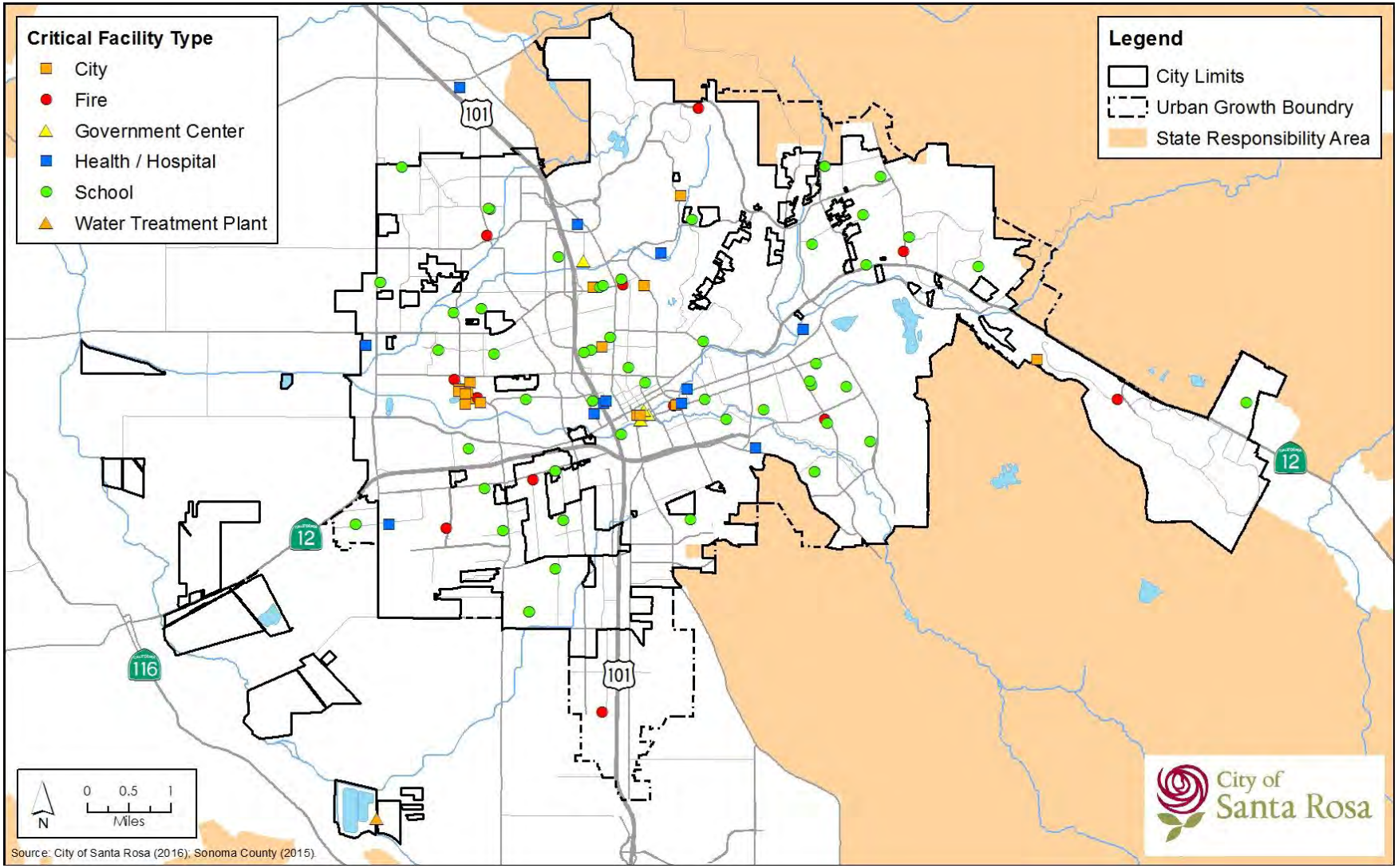


Figure 11: City and CalFIRE Wildland Urban Interface (WUI) Zones

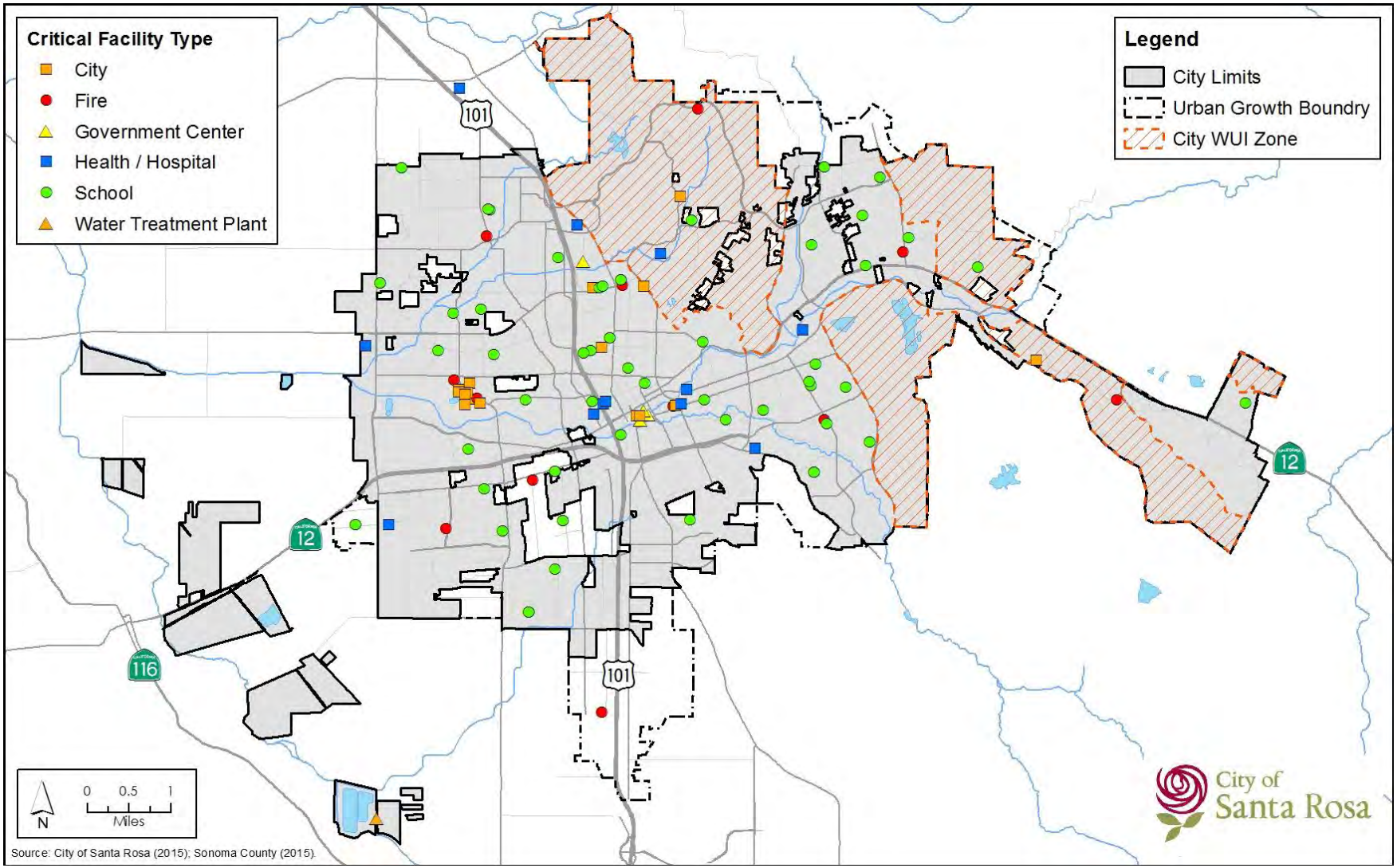


Table 26: Fires in Santa Rosa's WUI, 2010-2015

Date of Fire	Acres Burned	Address
June 26, 2010	0.39	311 Encina Court
August 22, 2010	1.40	7425 Rancho los Guilicos Road
August 2, 2011	0.10	Violetti Road at Bader Road
May 23, 2012	4.00	3680 Kelsey Knolls
May 24, 2012	0.25	4796 Annadel Heights Drive
August 3, 2012	0.10	1301 Brush Creek Road
October 16, 2013	0.10	Bicentennial Way at Lake Park Court
October 28, 2013	0.25	Petalglen Place at Saint Andrews Drive
November 21, 2013	0.25	4807 Newanga Avenue
March 27, 2015	0.10	Fountaingrove Parkway at Round Barn Boulevard

Risk of Future Hazards

According to the California State Multi-Hazard Mitigation Plan, wildfires represent the "third most destructive source of hazard, vulnerability, and risk, both in terms of recent state history and the probability of future destruction of greater magnitudes than previously recorded" (Cal OES 2013). Risk of wildfire is generally the likelihood of a fire occurring at a given site and the impact of damage at the site.

Exposure to future wildfires is expected to increase. Areas in Santa Rosa with higher potential for wildfire risks include hillside residential neighborhoods in the northern and eastern areas of the City with tall grasses and chaparral, which provide fuel for wildfires. With population growth and urbanization, a larger number of people and homes may be located in areas of wildfire risk. However, the General Plan designates the density of homes in Santa Rosa's WUI as primarily low density, including Very Low Density Residential (0.2–2.0 units per acre), Land Low Density Residential (2.0-8.0 units per acre).

Climate Change Considerations

Numerous studies indicate the increased extent and exposure to risk of vegetation fires due to climate change (Fried et al., 2006; Lenihan et al., 2006; Westerling et al., 2009, as cited by Cal OES 2013). Wildfire risk increases due to climate change because of higher temperatures and longer dry periods over a longer fire season. Potential changes in vegetation resulting from climate change can further exacerbate likelihood or extent of wildfire occurrence (California Climate Change Center 2012, as cited by ABAG 2015).

Recent actions of Governor Jerry Brown emphasize the connection between climate change effects and wildfire hazards. On October 30, 2015, Governor Brown proclaimed a state of emergency for the state's tree population, recognizing the increased fire risk that results from massive tree die-offs, citing the US Forest Service's estimate of 22 million trees dead to date, with a potential for millions

more. With the proclamation, the governor ordered state agencies to identify areas of California that represent high hazard zones for wildfires and falling trees and to take actions to mitigate risk.

Research reveals mixed changes in fire risk due to climate change. ABAG notes that research estimates a 150 percent increase in fire risk in the North Bay by 2085. However, across the Bay Area there is fairly limited change in fire risk by the year 2050, with the greatest change occurring between 2050 and 2085. The risk of fire increases most notably under California's high greenhouse gas emissions scenario. While the estimation of increased fire risk is lower under a low greenhouse gas emissions scenario, higher temperatures, potentially decreased annual precipitation, and more intense storm events are all climate impacts that may worsen the risk of fires in Santa Rosa. (ABAG 2015).

Future fire risk modeling analyzes two primary variables: fuel availability and flammability. In California, the change in fire risk is a result of two climate factors. First, fire risk can increase due to a densely forested ecosystem as a result of higher temperatures, less snowpack, and earlier springs. Second, fire risk can decrease when formerly dry climates experience large vegetation growth after a year of above average precipitation. This type of ecosystem will be dominated by grass and low-density shrubs, resulting in a potential for reduced risk due to decreased availability of fuel. Overall, the Bay Area region is expected to experience a lower projected increase in fire risk due to climate change compared to the rest of California (ABAG 2015).

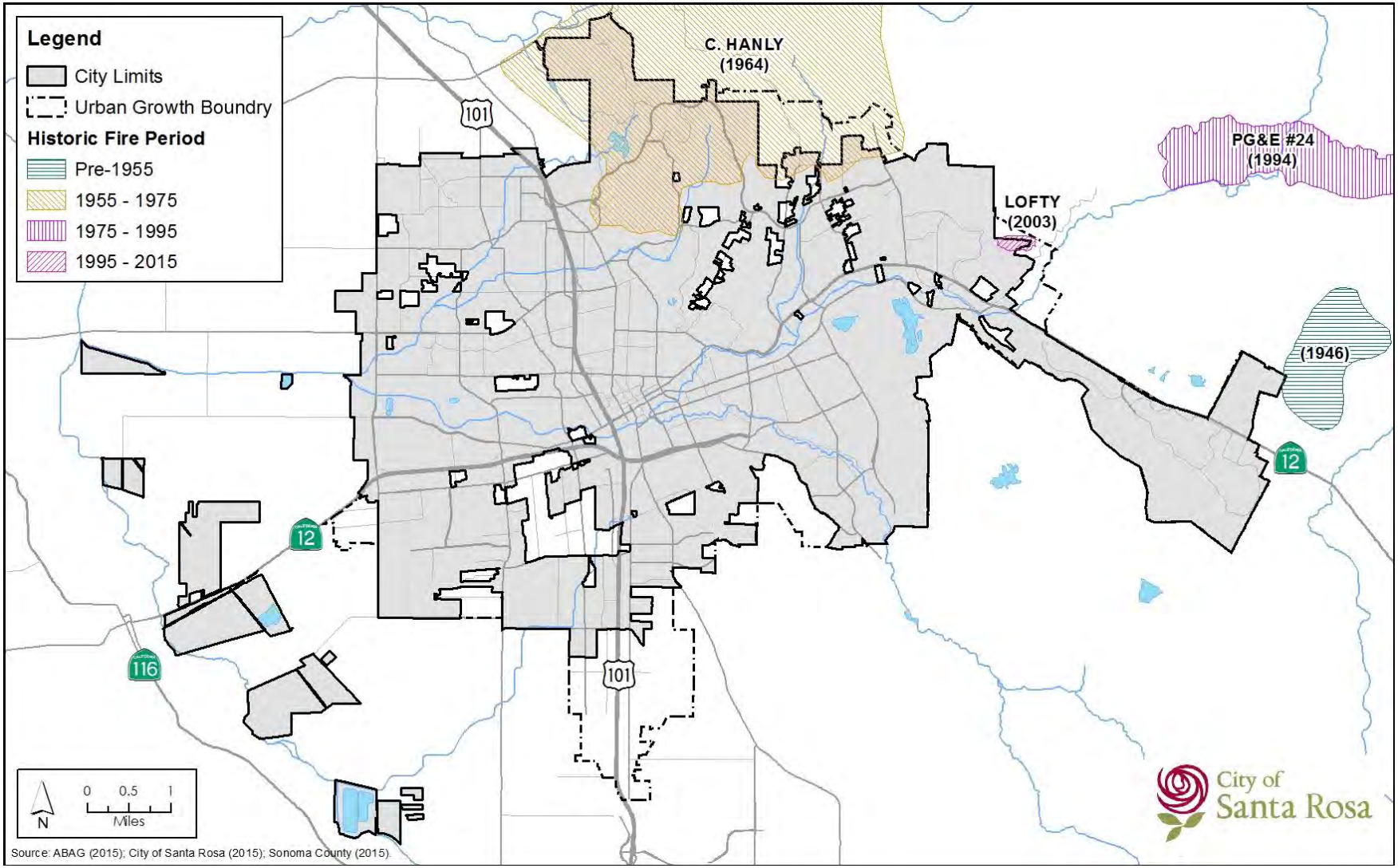
Vulnerability/Risk Assessment

Wildfire risk in Santa Rosa is elevated in the wildland-urban interface, where development is introduced into natural environments such as vegetated areas where the likelihood of wildfires is increased. Locally defined WUI zones that lie within the City's responsibility area (the Local Responsibility Area), as well as areas facing an elevated fire risk that lie within the urban growth boundary but are located in the State Responsibility Area (SRA) are both subject to elevated vulnerability to wildfires. Of the critical facilities identified as at risk of wildfire impacts, utility facilities are the most vulnerable, with over half of all sites located within a WUI area. **Table 27** identifies the types of facilities in the elevated wildfire risk areas.

Table 27: Risk to Critical Facilities from Wildfires

Facility type	Number of facilities not at risk	Number of Facilities at Risk	
		City WUI Zone	SRA (elevated risk)
City	13	2	0
Fire	10	2	0
Government center	4	0	0
Healthcare/hospital	10	1	0
School	56	2	0
Utility	21	47	10
Total	**114**	**54**	**10**

Figure 12: Historic Fire Perimeters



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By most social vulnerability metrics, residents in the City's WUI zone or the elevated risk area of the SRA are more socially resilient than the average Santa Rosa resident. The homes in these areas often command higher prices because of their more natural settings on the outskirts of the urban area, and residents of these homes often have higher incomes and tend to be more socially connected, improving their social resiliency in the event of a wildfire disaster. The one social vulnerability metric where residents of the elevated fire risk areas do not show increased social resiliency relative to the entirety of Santa Rosa is the percentage of households with at least one disabled person, as households in the wildfire risk areas are about as likely to have a disabled member as the average Santa Rosa household. The social vulnerability metrics for the wildfire hazard zones are shown in Table 28.

Table 28: Social Vulnerability to Wildfires

Social Vulnerability Metric	Wildfire Risk		Total Community
	City WUI Zone	SRA (elevated risk)	
Population	20,815	2,960	184,823
Households (HH)	8,793	1,339	68,057
Median HH income	$94,700	$97,800	$59,000
Percentage of HHs in poverty	4%	4%	12%
Percentage of adults with high school degree or higher	97%	97%	84%
Percentage with English competency	99%	100%	92%
Percentage of HHs with a disabled member	22%	22%	23%

Source: ESRI BAU ACS Population Summary, 2013 3-Year Estimates

3.5.7 Drought

Hazard Description

A drought is a long-term shortage of water, usually caused by extended periods with little or no precipitation. Unlike the other hazards discussed here, droughts develop over an extensive period of time. Multiple dry years generally pass prior to development of drought conditions. Similarly, multiple wet years generally pass prior to their alleviation. In urban areas, drought conditions can cause a decrease in available water supplies, which may lead to increases in water rates or restrictions in water use. Communities may need to seek alternative water supplies to meet demand, which can be a costly and lengthy process. Vegetation, including street trees and landscaped areas in public parks, can become water stressed, which may result in plant disease or death. Drought conditions harden the ground, which can lead to increased flooding when rains return because the soil cannot easily absorb water. Prolonged drought can also create increased levels of wildfire risk, with prolonged conflagrations fueled by excessively dry vegetation.

Drought is not localized, but occurs simultaneously across the region, and may extend statewide or across a larger expanse. This has been the case in California since 2012. While the drought exists

in every county, the impacts of the drought are locally unique, based on local and regional water supply systems, soil conditions, and the typical climate and vegetation land covering. The effects of drought are managed in the Bay Area through the importation of water and the storage of water in reservoirs.

Multiple classification systems describe the range of potential drought severity. The US Drought Monitor Classification Scheme combines many of these scales into a single index, shown in **Table 29**.

Table 29: US Drought Monitor Classification Scheme

Category	Description	Possible Impacts
D0	Abnormally dry	Slower growth of crops and pastures compared to normal activities.
D1	Moderate drought	Some damage to crops and pastures. Streams, reservoirs, or wells low. Some water shortages may be developing or imminent.
D2	Severe drought	Likely crop and pasture losses. Water shortages are common, leading to restrictions.
D3	Extreme drought	Major crop and pasture losses. Widespread water shortages.
D4	Exceptional drought	Exceptional and widespread crop and pasture losses. Emergency shortages develop.

Source: US Drought Monitor 2016

Hazard History

Droughts are a relatively frequent event in California, and many native plants and animals have evolved strategies to deal with long-term water shortages. Because of California's extensive water infrastructure networks, a drought in one part of the state may have a relatively small impact if the water supply in the affected area comes from another location that is not under drought conditions. Occasionally the state may experience a widespread drought that lasts for multiple years. A drought from 1928 to 1937 affected all parts of the state and was the longest drought in California's recorded history. Between 1976 and 1977, California experienced one of its most severe droughts, and 1977 was the state's driest year on record. Since 2012, California has been experiencing drought conditions statewide. This drought is among the most severe in the state's history, initiating widespread restrictions on water use. In January 2014, the Governor declared a State of Emergency in California in response to current drought conditions. To date, 2015 is the driest recorded year on record in California, with statewide reservoirs at 18–67 percent of average (California Governor's Office of Emergency Services (2015), as cited in ABAG 2015).

According to ABAG (2015), major droughts occurred in California that affected the Bay Area in 1973, 1976–77, 1987–91, and 2007–09. Drought conditions in 1973 led to a State-declared disaster in Glenn, San Benito, and Santa Clara counties, resulting in $8 million in agricultural loss. During the statewide drought of 1976 to 1977, four Bay Area counties (Contra Costa, Napa, San Mateo, and Marin) were among those where a state disaster was declared. Marin, Solano, and Sonoma counties were affected in the 1987–91 drought, which caused $1.7 billion in crop losses nationwide (Cal OES 2013, as cited by ABAG 2015).

Locally, Sonoma County declared an emergency for drought, the Proclamation of Local Emergency Due to Drought Conditions. The proclamation was first adopted in February 2014, and the County extended the emergency proclamation through the end of 2015. This proclamation was in response to an intensification of the state's ongoing drought in 2014, and was guided by mandatory State emergency conservation regulations issued to all water providers in California. The proclamation applied to the entire Sonoma County Operational Area, including all special districts and incorporated cities (including Santa Rosa). Santa Rosa adopted Stage 1-voluntary reductions in February 2014, and subsequently adopted Stage 1-mandatory 20% reductions in August 2014 to comply with the State regulations mandating a statewide 25% reduction target. The State recognized previous local conservation efforts and set Santa Rosa's individual conservation target at 16%. Because of the drought, water storage for the county remained below average conditions. In April 2015, water supply in Lake Mendocino was only 56 percent of maximum water supply. Similarly, water supply at Lake Sonoma was at 87 percent of maximum water supply (Sonoma County, April 2015).

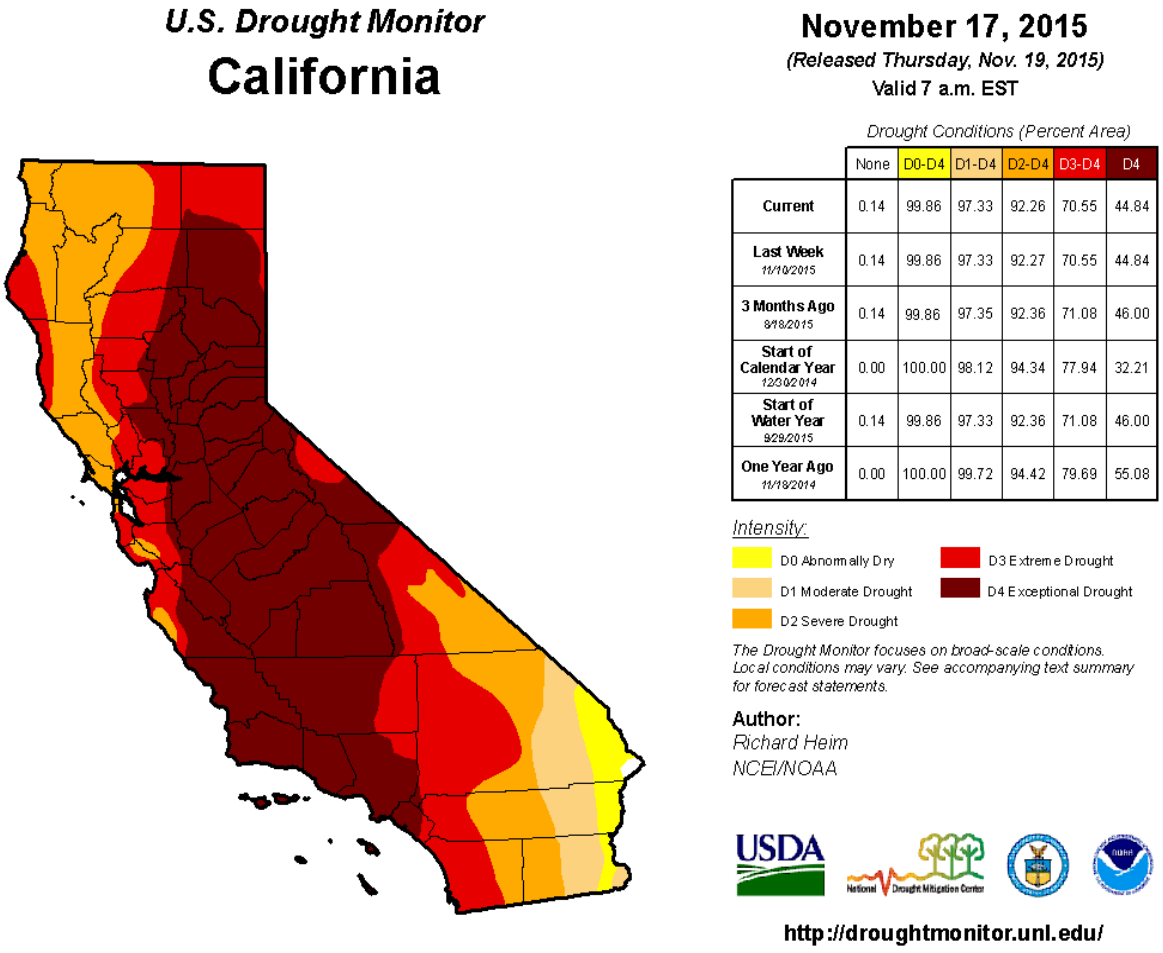
As of November 2015, approximately 9 percent of Sonoma County was classified as level D3 drought conditions (extreme drought), with the remainder of the county classified as level D2 (severe drought). The entire community of Santa Rosa was listed as level D2 (severe drought). Statewide drought severity levels are shown in **Figure 13**.

Risk of Future Hazards

The primary impact of drought conditions in the City is on the local water supply. Unlike the majority of communities in the Bay Area, Santa Rosa meets water demand with local water sources. The Sonoma County Water Agency (SCWA) provides the majority of Santa Rosa's potable water supply. The source of this water supply is the Russian River. The SCWA delivers water through its transmission and delivery system to water contractors for distribution. The City of Santa Rosa is the largest of these water contractors. In total, the City supplies approximately 52,000 residential and commercial accounts. According to the City's Groundwater Master Plan (2013), the City meets approximately 90 percent of customer demand with water from the SCWA, supplemented by groundwater and recycled water. The City maintains two municipal groundwater wells within the Santa Rosa Plain Groundwater Basin. In addition, the SCWA supplements local water supply with three additional groundwater wells in the Santa Rosa Plain.

Because Santa Rosa's water supply comes from local sources such as groundwater or the Russian River, local drought conditions pose the greatest risk to the community. A long-term lack of precipitation reduces the amount of water available in the watershed. A lack of precipitation also reduces the amount of water that filters through the soil and becomes groundwater, potentially reducing available groundwater supplies.

Figure 13: California Drought Conditions (Fall 2015)



Source: US Drought Monitor 2016

Climate Change Considerations

Scientific evidence suggests that precipitation levels in California will decrease as a result of climate change. At the same time, warmer temperatures brought on by climate change are expected to increase the rate of evaporation from bodies of water, further decreasing the amount of available water. It is likely that drought conditions will become more frequent and more severe as a result of climate change. While it is impossible to conclusively link any single event to climate change, sustained drought conditions is a possible impact.

The cumulative impact of climate change will cause drier conditions that also alter the timing of water supply availability. Reduction in the overall regional water supply due to reduced precipitation would only exacerbate the local effects of drought. A reduction in snowpack would limit options for the City and the SCWA to supplement local water supply with external sources.

Ongoing drought would not only reduce local water supply, but would also stress regional supplies and constrict the availability of statewide water sources.

Vulnerability/Risk Assessment

Droughts are unique among the hazards in this LHMP in that they do not have different direct impacts in different parts of the community. Unlike earthquakes, wildfires, or most other hazards, where the risk and severity of impacts varies across Santa Rosa, droughts are a more regional disaster and so will have about the same direct impact throughout the City. As a result, all of Santa Rosa is in the potential hazard zone for droughts, and no single area faces higher direct risks.

While the severity of any drought conditions will be consistent across Santa Rosa, the indirect impacts of a drought can vary depending on residents' socioeconomic factors. Droughts often lead to more stringent water use regulations, which can include increased service rates for households that use higher amounts of water. For example, as of January 2016, Santa Rosa charges $5.25 for every 1,000 gallons of water used, up to the home's "sewer cap," which is the home's average monthly usage from the previous winter. However, homes that exceed the limit of the sewer cap will pay more for each additional 1,000 gallons, up to $6.14 per 1,000 gallons. This progressive rate structure provides a financial incentive for water conservation, although it also disproportionately affects lower-income residents who use large volumes of water. The water rate structure is currently under evaluation to be revised. Droughts may also affect residents who work in economic sectors that are substantially harmed by drought conditions, especially agriculture. Water shortages may lead to farms employing fewer people or reducing the hours of their employees, potentially creating economic hardships for employees and increasing their social vulnerability. Approximately 2 percent of Santa Rosa residents work in the farming, fishing, and forestry industries and may be vulnerable to these impacts.

3.6 Summary of Vulnerability

Table 30 identifies the critical facilities that are at risk of hazard impacts in Santa Rosa. Table 31 shows those facilities that face significant impacts from four or more hazards. The facilities, which are divided into five groups (City, Fire, Government Center, Health & Hospital, and School), each are analyzed for potential hazard impacts, as detailed below. Facilities that intersect with a hazard area are indicated with a red-shaded cell. Facilities that do not fall in a hazard area are designated by a green-shaded cell. The drought risk is consistent across the community and therefore omitted from the table. Table 32 provides an overview of the impacts of the analyzed hazards on the entire population within the urban growth boundary.

Nine hazards were analyzed in this process. The type of hazard and applicability to critical facilities are described below.

- Dam Inundation. This hazard is applied to critical facilities in a yes/no fashion. If the facility is at risk of dam inundation, the column will be marked "Y".
- Earthquake Shaking. This hazard is measured by the moment magnitude ground shaking potential at the facility in the event of an earthquake along the Rodgers Creek fault. The moment magnitude potentials are:

  - 8.5–9.5 (highest shaking potential)
  - 7.5–8.5 (medium shaking potential)
  - 6.5–7.5 (lower shaking potential)
- **Fault Rupture.** This hazard is applied in a yes/no fashion, with facilities within 500 feet of an Alquist-Priolo fault zone marked with "Y".
- **Flooding.** This identifies facilities within a FEMA floodplain, identified by 100-year floodplain or a 500-year floodplain. Other flooding may occur in areas not yet mapped by FEMA.
- **Hazardous Materials.** This hazard is applied in a yes/no fashion, with facilities within 1,000 feet of a critical facility marked with "Y".
- **Landslides.** This identifies the risk different critical facilities face from landslides, categorized as follows:
  - Mostly (highest risk of landslides)
  - Many (lower risk of landslides)
- **Liquefaction.** This identifies the risk different critical facilities face from liquefaction after an earthquake, categorized as follows:
  - Very High (highest risk of liquefaction)
  - High (high risk of liquefaction)
  - Medium (medium risk of liquefaction)
- **WUI Fire Zone.** This identifies the facilities in the City's wildland-urban interface zone. If the facility is in the zone, it is marked with "Y".

Table 30: Hazard Impacts to Critical Facilities

Facility Name	Facility Type	Dam Inundation	Earthquake Shaking	Fault Rupture	Flooding	Hazardous Materials	Landslides	Liquefaction	WUI Fire Zone	Replacement & Content Value
3480 Parker Hill Road (former Fire Station 5)	City		High						Y	$1,195,130
Finley Community Center, Finley Aquatic Center	City		High			Y				$10,032,765
Franklin Clubhouse	City		Very High							$413,370
Oakmont Treatment Plant (decommissioned)	City		High					Medium	Y	N/A
Old Chamber Building	City	Y	High			Y		Medium		$2,800,000
Ridgway Swim Center	City		High					Medium		$1,129,878
Santa Rosa City Hall Annex	City	Y	High			Y		Medium		$7,025,200
Santa Rosa Corporation Yard	City		High					Medium		N/A
Santa Rosa Geysers Operations Center	City		High			Y		Medium		N/A
Santa Rosa Municipal Service Center - North	City		High			Y		Medium		$19,640,682
Santa Rosa Municipal Service Center - South	City		High			Y		Medium		$7,730,800
Santa Rosa Public Safety Building (Fire, Police)	City	Y	High			Y		Medium		$17,313,800
Santa Rosa Transit Operations Building	City		High			Y		Medium		$2,424,800
Santa Rosa Utilities Field Operations	City		High			Y		Medium		N/A
Santa Rosa Wet Weather Storage Facility	City		High					Medium		N/A

Facility Name	Facility Type	Dam Inundation	Earthquake Shaking	Fault Rupture	Flooding	Hazardous Materials	Landslides	Liquefaction	WUI Fire Zone	Replacement & Content Value
Steele Lane Community Center	City		High			Y		Medium		$6,935,797
Santa Rosa Fire Station 1 - Sonoma Ave	Fire	Y	High			Y		Medium		*Cost included in Public Safety Building
Santa Rosa Fire Station 10 - Circadian Way	Fire		High			Y		Medium		$5,192,003
Santa Rosa Fire Station 11 - Lewis Rd.	Fire		Very High			Y		Medium		$1,038,663
Santa Rosa Fire Station 2 - Stony Point Rd	Fire		High					Medium		$1,811,828
Santa Rosa Fire Station 3 - Coffey Ln	Fire	Y	High			Y		Medium		$1,176,522
Santa Rosa Fire Station 4 - Yulupa Ave	Fire		Very High					Medium		$1,069,327
Santa Rosa Fire Station 5 - Newgate Ct	Fire		High			Y			Y	$1,195,130
Santa Rosa Fire Station 6 - Calistoga Rd	Fire		High			Y				$969,733
Santa Rosa Fire Station 7 - Oakmont	Fire		Moderate					Medium	Y	$728,872
Santa Rosa Fire Station 8 - Burbank Ave	Fire		High			Y		Medium		$1,048,360
Santa Rosa Fire Station 9 - Todd Rd	Fire		High							N/A
Santa Rosa Fire Training Tower	Fire		High			Y				$3,672,143
County Administration Center	Gov Center		High			Y		Medium		N/A
Federal Building	Gov Center	Y	High			Y		Medium		N/A
Santa Rosa City Hall	Gov Center	Y	High			Y		Medium		$15,249,920
State Building	Gov Center	Y	High			Y		Medium		N/A

Facility Name	Facility Type	Dam Inundation	Earthquake Shaking	Fault Rupture	Flooding	Hazardous Materials	Landslides	Liquefaction	WUI Fire Zone	Replacement & Content Value
Brookwood Health Center	Health	Y	High			Y		Medium		N/A
Family Support Center	Health		High			Y		Medium		N/A
Homeless Services Center	Health		High			Y		Medium		$4,938,640
Orenda Center	Health		High			Y		Medium		N/A
Psychiatric Emergency Services	Health		Very High	Y		Y			Y	N/A
Redwood Gospel Mission	Health		High					Medium		N/A
Samuel L. Jones Homeless Services Facility	Health		High							N/A
Aurora Santa Rosa Hospital	Hospital		High					Medium		N/A
Kaiser Permanente Hospital	Hospital		Very High			Y		Medium		N/A
Montgomery Convalescent Hospital	Hospital		High			Y		High		N/A
Santa Rosa Memorial Hospital, Sotoyome Campus	Hospital		High			Y		Medium		N/A
Sutter Santa Rosa Regional Hospital	Hospital		Very High					Medium		N/A
Adult Education Center	School		Very High			Y		Medium		N/A
Elsie Allen High	School		High					Medium		N/A
Alternative Education Programs	School		High							N/A
Austin Creek Elementary	School		High						Y	N/A
Bennett Valley Union Elementary Office	School		Very High					Medium		N/A
Biella (Albert F.) Elementary	School		High							N/A

Facility Name	Facility Type	Dam Inundation	Earthquake Shaking	Fault Rupture	Flooding	Hazardous Materials	Landslides	Liquefaction	WUI Fire Zone	Replacement & Content Value
Binkley Elementary	School		High							N/A
Brook Hill Elementary	School	Y	High	Y		Y		Medium		N/A
Burbank (Luther) Elementary	School	Y	High			Y		Medium		N/A
Maria Carrillo High	School		High			Y				N/A
Charter School for the Arts	School		High					Medium		N/A
Cook (Lawrence) Middle	School		High			Y		Medium		N/A
French American Charter School	School	Y	High	Y		Y		Medium		N/A
Grace High (Cont.)	School		High			Y				N/A
Hidden Valley Elementary	School		High					Medium	Y	N/A
Hilliard Comstock Middle	School		High							N/A
Jack London Elementary	School		High							N/A
Kawana Elementary	School		High					Medium		N/A
Kid Street Charter	School		High					Medium		N/A
Helen M. Lehman Elementary	School		High							N/A
Lincoln (Abraham) Elementary	School		High					Medium		N/A
Madrone Elementary	School		High					Medium		N/A
Matanzas Elementary	School		Very High					Medium		N/A
Meadow View Elementary	School		High					Medium		N/A
Mesa High (Cont.)	School		High			Y		Medium		N/A
Midrose High (Cont.)	School		High					Medium		N/A
Monroe (James) Elementary	School		High							N/A
Montgomery High	School	Y	High					Medium		N/A

Facility Name	Facility Type	Dam Inundation	Earthquake Shaking	Fault Rupture	Flooding	Hazardous Materials	Landslides	Liquefaction	WUI Fire Zone	Replacement & Content Value
Nueva Vista High (Cont.)	School		Very High			Y		Medium		N/A
Piner High	School		High			Y				N/A
Piner-Olivet Union Elementary Office	School		High			Y		Medium		N/A
Proctor Terrace Elementary	School		Very High	Y		Y		Medium		N/A
Ridgway High (Cont.)	School		High			Y				N/A
Rincon Valley Middle	School		High			Y		Medium		N/A
Rincon Valley Union Elementary Office	School	Y	Very High		500-Year	Y		Medium		N/A
Roseland Accelerated Middle School	School		High					Medium		N/A
Roseland Charter School	School		High			Y		Medium		N/A
Roseland Elementary	School		High			Y		Medium		N/A
Roseland Elementary Office	School		High			Y		Medium		N/A
Santa Rosa City Schools Business Offices	School		High			Y		Medium		N/A
Santa Rosa High	School		High			Y		Medium		N/A
Santa Rosa Middle	School		Very High			Y		Medium		N/A
Schaefer Elementary	School		High					Medium		N/A
Sequoia Elementary	School		High							N/A
Sheppard Elementary	School	Y	High					Medium		N/A
Slater (Herbert) Middle	School		High					Medium		N/A
Sonoma County Court	School		Moderate					Medium		N/A
Spring Creek Elementary	School		High					Medium		N/A
Steele Lane Elem Annex (Spec Ed)	School		High			Y		Medium		N/A
Steele Lane Elementary	School		High			Y		Medium		N/A

Facility Name	Facility Type	Dam Inundation	Earthquake Shaking	Fault Rupture	Flooding	Hazardous Materials	Landslides	Liquefaction	WUI Fire Zone	Replacement & Content Value
Stevens (Robert L.) Elementary	School		High					Medium		N/A
Strawberry Elementary	School	Y	High					Medium		N/A
Village Elementary	School		Very High		500-Year	Y		Medium		N/A
Whited (Douglas) Elementary	School		High							N/A
J. X. Wilson Elementary	School		High					Medium		N/A
Wright Elementary	School		High							N/A
Wright Elementary Office	School		High							N/A
Yulupa Elementary	School		Very High					Medium		N/A

Table 31: Facilities Most at Risk

Facility Name	Facility Type	Dam Inundation	Earthquake Shaking	Fault Rupture	Flooding	Hazardous Materials	Landslides	Liquefaction	WUI Fire Zone	Replacement & Content Value
Brook Hill Elementary	School	Y	High	Y		Y		Medium		N/A
French American Charter School	School	Y	High	Y		Y		Medium		N/A
Rincon Valley Union Elementary Office	School	Y	Very High		500-Year	Y		Medium		N/A
Old Chamber Building	City	Y	High			Y		Medium		$2,800,000
Santa Rosa City Hall Annex	City	Y	High			Y		Medium		$7,025,200
Santa Rosa Public Safety Building (Fire, Police)	City	Y	High			Y		Medium		$17,313,800

Facility Name	Facility Type	Dam Inundation	Earthquake Shaking	Fault Rupture	Flooding	Hazardous Materials	Landslides	Liquefaction	WUI Fire Zone	Replacement & Content Value
Santa Rosa Fire Station 1 - Sonoma Ave	Fire	Y	High			Y		Medium		*Cost included in Public Safety Building
Santa Rosa Fire Station 3 - Coffey Ln	Fire	Y	High			Y		Medium		$1,176,522
Federal Building	Gov Center	Y	High			Y		Medium		N/A
Santa Rosa City Hall	Gov Center	Y	High			Y		Medium		$15,249,920
State Building	Gov Center	Y	High			Y		Medium		N/A
Brookwood Health Center	Health	Y	High			Y		Medium		N/A
Psychiatric Emergency Services	Health		Very High	Y		Y			Y	N/A
Burbank (Luther) Elementary	School	Y	High			Y		Medium		N/A
Proctor Terrace Elementary	School		Very High	Y		Y		Medium		N/A
Village Elementary	School		Very High		500-Year	Y		Medium		N/A
Laguna Treatment Plant	Utility	Y	Moderate			Y				$227,000,000

Table 32: Hazard Impacts on Population

Hazard	Population Impacted	Percentage of Total Population Affected	Housing Units Impacted	Percentage of Total Housing Units Impacted	Households Impacted with Income Below Poverty Level	Percentage of Households Impacted with Income Below Poverty Level	Square Miles Impacted	Percentage of Total Land Impacted
Dam Inundation	14,807	8%	6,137	9%	477	6%	3.64	8%
Drought	184,823	100%	72,100	100%	8,123	100%	45.51	100%
Earthquake Shaking	184,823	100%	72,100	100%	8,123	100%	45.51	100%
Fault Rupture	5,843	3%	2,610	4%	154	2%	2.26	5%
Flooding	1,408	1%	534	1%	48	1%	0.71	2%
Hazardous Materials	58,799	32%	23,592	33%	3,162	39%	11.74	26%
Landslides	33,726	18%	14,121	20%	767	9%	15.66	34%
Liquefaction	184,379	99%	71,934	99%	8,110	99%	45.19	99%
City WUI Fire Zones	20,815	11%	9,394	13%	322	4%	12.50	27%

Source: ESRI BAU ACS Population Summary, 2013 3-Year Estimates

Mitigation Actions

CHAPTER 4

Outlining specific strategies that can reduce the impacts of hazards on community members and critical infrastructure provides a path for Santa Rosa to achieve the goals of the Local Hazard Mitigation Plan in a streamlined, well-researched manner. This section of the LHMP provides these action recommendations, as well as responsible departments, potential funding sources, and related policy documents. Some of these actions were derived from those established in the 2010 LHMP Annex, while others recognize new projects and an evolved understanding of hazards as they may impact Santa Rosa. The findings of the vulnerability and risk assessments in Chapter 3 were used to develop actions that reduce and/or eliminate potential losses from relevant hazards.

4.1 Hazard Mitigation Overview

FEMA's National Flood Insurance Program

In 1968, the US Congress created the National Flood Insurance Program (NFIP). Participation in the NFIP by a community is voluntary; however, in order to receive funding from FEMA, a community is required to participate in the program. The City of Santa Rosa participates in the NFIP. Development in the floodplain is permitted according to Chapter 18-52, Flood Damage Protection, of the City Code. The City is undergoing updates to its current flood maps, and is focusing specifically on developing Flood Hazard Maps in South Santa Rosa, which focuses on the Naval, Roseland, and Colgan Creek watersheds. These areas have experienced prior flooding, but have never been studied or mapped. The maps are available for public review until November 2016. This indicated that the City seeks to continue and expand its participation in the NFIP and ensure all of Santa Rosa's flood maps are current.

The Community Rating System (CRS) is a voluntary part of the NFIP that seeks to coordinate all flood-related activities, reduce flood losses, facilitate accurate insurance rating, and promote public awareness of flood insurance by creating incentives for a community to go beyond minimum discounts. CRS ratings are on a 10-point scale (from 10 to 1, with 1 being the best rating), with residents of a community who live in FEMA's Special Flood Hazard Areas receiving a 5 percent reduction in flood insurance rates for every class improvement in the community's CRS rating. The City of Santa Rosa does not currently participate in the CRS.

Hazard Mitigation Goals

As presented in Chapter 1, Section 1.5, Mitigation Priorities and Goals, the City of Santa Rosa's hazard mitigation goals outline and guide the development of wise policy choices that protect community members, critical facilities, infrastructure, property, and the area's natural resources from hazards. These goals shape future actions taken by the City and community to reduce risk and

minimize losses from natural disasters. To ensure implementation of the LHMP is completed as planned, the goals serve as checkpoints that responsible departments can use to check progress of mitigation action items.

The City of Santa Rosa will use the hazard mitigation actions outlined in Section 4.2 to reduce the City's risk of potential hazards. These actions were identified through analysis of the City's 2010 LHMP, existing plan actions and Capital Improvement Program projects, data collection, research, and collaboration with Santa Rosa's LHMP team. The actions are separated by hazard addressed, although some may address risk associated with multiple natural hazards.

2010 Hazard Mitigation Priorities and Actions

During the hazard mitigation planning process, City staff reviewed the mitigation priorities and actions previously prepared for the City's 2010 LHMP. Appendix F, provides the previous mitigation actions from the 2010 plan as well as progress notes and status updates on these actions. As part of this process these actions were reviewed and taken into consideration. Because of the regional scale of the 2010 update process, mitigation actions were written generally. With that in mind, the City opted to develop new mitigation actions specific to the update process conducted in 2016. As a result some of the themes and topics addressed in 2010 are still being addressed in 2016, however the wording of the mitigation actions has changed to better suit the City's current needs. Regardless of these wording modifications, the City's mitigation priorities are still in line with the 2010 hazard mitigation plan. As illustrated in Chapter 1, Section 1.5, the goals of this hazard mitigation plan are better integrated with the City's General Plan and Climate Action Plan. In addition, those mitigation actions that closely relate to actions from the 2010 plan are identified with the following symbol (***) in Table 33 – Hazard Mitigation Actions, below.

Hazard Mitigation Prioritization

In the January 6, 2016, meeting of the LHMP team, draft hazard mitigation actions were revised and prioritized using data analysis of risk from each hazard as well as local knowledge about the priorities of community members. Through discussion and self-analysis, the LHMP team discussed the STAPLE/E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria, as described in Table 33, when considering and prioritizing the most appropriate mitigation alternatives for the city. This methodology, as endorsed by FEMA, requires that social, technical, administrative, political, legal, economic, and environmental considerations be taken into account when reviewing potential actions to undertake. This process was used to help ensure that the most equitable and feasible actions would be undertaken based on the City's unique capabilities. The LHMP team did not subject the mitigation measures to a formal STAPLE/E analysis, but discussed how STAPLE/E would be used when applying for grant funding to implement any mitigation measures, and considered how the mitigation measures might be evaluated under the STAPLE/E criteria. It was intended that this analysis would be reserved for submittal of grant applications for mitigation actions proposed within this plan. At the end of the meeting the LHMP team members were then asked to identify their top priority measures through voting, considering the potential social, environmental, and economic impacts. Actions with zero votes were given low priority, actions with one to two votes were given medium priority, and actions with three or more votes were given high priority. Records of voting from this meeting can be found in Appendix A.

Hazard Mitigation Benefit – Cost Review

FEMA requires local governments to analyze the benefits and costs of a range of mitigation actions that can reduce the effects of each hazard within their communities. Benefit-cost analysis is used in hazard mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit-cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. The analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

A hazard mitigation plan must demonstrate that a process was employed that emphasized a review of benefits and costs when prioritizing the mitigation actions. The benefit-cost review must be comprehensive to the extent that it can evaluate the monetary as well as the nonmonetary benefits and costs associated with each action. The benefit-cost review should at least consider the following questions:

- How many people will benefit from the action?
- How large an area is impacted?
- How critical are the facilities that benefit from the action (e.g., which is more beneficial to protect, the fire station or the administrative building)?
- Environmentally, does it make sense to do this project for the overall community?

For the Santa Rosa Hazard Mitigation Plan, the LHMP team used a simple method to determine relative cost of mitigation actions. Table 34 identifies relative cost of High Priority mitigation actions, which use three categories: $ (Low), $$ (Medium), and $$$ (High). Low cost actions are considered actions below $50,000, while high cost actions are those over $100,000. Actions in between these two categories are considered medium cost actions. Relative cost for actions considered medium or low priority were not estimated at this time, however during the City's annual monitoring and implementation activities, actions that increase in priority will be evaluated for relative cost.

4.2 Hazard Mitigation Actions

The Santa Rosa LHMP team used data synthesized in the Hazard Profiles and Vulnerability Assessment (Chapter 3) and Capabilities Assessment (Chapter 4, Section 3), as well as progress on past actions from the 2010 Santa Rosa LHMP Annex to inform these actions. **Table 34** identifies the hazards, proposed mitigation actions, responsible city department for implementation, anticipated or possible funding sources, opportunities for policy integration with other documents, target completion dates, assigned priority (as described above), and relative cost.
The following abbreviations are used in the table:

- PED: Planning and Economic Development
- Fire: Fire Department
- IT: Information Technology
- R&P: Recreation and Parks
- TPW: Transportation and Public Works
- HCS: Housing and Community Services
- Water: Water Department

- Police: Police Department
- CE: Community Engagement
- CMO: City Manager's Office
- HR-Risk: Human Resources Risk Management Division
- HMGP: Hazard Mitigation Grant Program
- FMA: Flood Mitigation Assistance Grant Program
- PDM: Pre-Disaster Mitigation Grant Program
- FMAG: Fire Management Assistance Grant Program

Table 33: STAPLE/E Criteria

Social
• Is the proposed action socially acceptable to the jurisdiction and surrounding community? • Are there equity issues involved that would mean that one segment of the jurisdiction and/or community is treated unfairly? • Will the action cause social disruption?
Technical
• Will the proposed action work? • Will it create more problems than it solves? • Does it solve a problem or only a symptom? • Is it the most useful action in light of other jurisdiction goals?
Administrative
• Can the jurisdiction implement the action? • Is there someone to coordinate and lead the effort? • Is there sufficient funding, staff, and technical support available? • Are there ongoing administrative requirements that need to be met?
Political
• Is the action politically acceptable? • Is there public support both to implement and to maintain the project?
Legal
• Is the jurisdiction authorized to implement the proposed action? • Are there legal side effects? Could the activity be construed as a taking? • Will the jurisdiction be liable for action or lack of action? • Will the activity be challenged?
Economic
• What are the costs and benefits of this action? • Do the benefits exceed the costs? • Are initial, maintenance, and administrative costs taken into account? • Has funding been secured for the proposed action? If not, what are the potential funding sources (public, nonprofit, and private)? • How will this action affect the fiscal capability of the jurisdiction? • What burden will this action place on the tax base or local economy? • What are the budget and revenue effects of this activity? • Does the action contribute to other jurisdiction goals? • What benefits will the action provide?

Environmental
• How will the action affect the environment? • Will the action need environmental regulatory approvals? • Will it meet local and state regulatory requirements? • Are endangered or threatened species likely to be affected?

Table 34: Hazard Mitigation Actions

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
1. Multiple Hazards–Related Actions						
1.1	Continue to apply appropriate development conditions/ restrictions for projects in higher hazard zones to reduce risks.***	PED, Fire	General Fund, HMGP, PDM, Other Grant Sources	Ongoing	Low	TBD
1.2	Evaluate a Zoning Code update to identify vegetation management requirements in the Wildland-Urban Interface zone for existing and new development.	PED, Fire	General Fund, HMGP, PDM, FMAG, Other Grant Sources	2018	Low	TBD
1.3	Continue to analyze and improve emergency response communications. This strategy should include building redundant capacity into public safety alerting and answering points as well as replacing or hardening microwave and simulcast systems.***	Police, Fire, IT	General Fund, HMGP, PDM, Other Grant Sources	2017	High	$$$
1.4	Continue to assess the vulnerability of critical facilities to damage from natural disasters, including the availability of backup power and sufficient supplies to maintain essential functions, and make recommendations for appropriate mitigation.***	R&P, TPW, Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	High	$$

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
1.5	Retrofit, replace, or relocate critical facilities that are shown to be vulnerable to damage in natural disasters.	R&P, TPW, Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	High	$$$
1.6	Continue to participate not only in general mutual-aid agreements but also in agreements with adjoining jurisdictions and special districts for cooperative response to fires, floods, earthquakes, and other disasters.***	Fire, Police	General Fund, HMGP, PDM, Other Grant Sources	Ongoing	Low	TBD
1.7	In accordance with the adaptation strategies of the Climate Action Plan, continue to regularly train, inform, and solicit feedback from City organizations on potential climate change risks and hazards. Emphasize climate change risk and hazards with the Fire Department, Police Department, Transportation and Public Works Department, Water Department, and other City departments as relevant.	PED, TPW, Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	Low	TBD
1.8	In accordance with the adaptation strategies of the Climate Action Plan, revise Santa Rosa's General Plan, Capital Improvement Program, and other applicable documents to better integrate and prioritize climate change issues and best practices during required updates and as funding permits.	PED	General Fund, HMGP, PDM, Other Grant Sources	Ongoing	Low	TBD

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
1.9	In accordance with the adaptation strategies of the Climate Action Plan, assess the possible impacts of climate change on a proposed project or area plan in the development review or policy development process.	PED	General Fund, HMGP, PDM, Other Grant Sources	TBD	Low	TBD
1.10	In accordance with the adaptation strategies of the Climate Action Plan,* integrate climate change adaptation into future updates of the Zoning Code, Building Code, General Plan, Urban Water Management Plan, and other related documents.	PED, Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	Low	TBD
1.11	Continue to coordinate with Sonoma County and surrounding jurisdictions on emergency notifications, including alerts of imminent threats or a need to evacuate. Alerts should be made available through multiple methods, in commonly spoken languages in Santa Rosa, and easily accessible to persons with access and functional needs.***	Fire, Police	General Fund, HMGP, PDM, Other Grant Sources	Ongoing	Medium	TBD
1.12	To the extent possible, avoid locating new critical facilities in areas of elevated hazard risks. Use extensive mitigation measures to reduce vulnerability if no suitable alternative site exists.	CMO, PED	General Fund, HMGP, PDM, Other Grant Sources	Ongoing	Medium	TBD

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
1.13	Continue to work with regional utility companies and service agencies, including energy providers, telecommunication services, and transit operators, to maintain basic services as much as possible during emergency conditions and to restore services as quickly as possible following an emergency event.***	TPW, IT	General Fund, HMGP, PDM, Other Grant Sources	Ongoing	Low	TBD
1.14	Work to improve estimates of potential casualties and property damage as a result of different emergency situations.	HR-Risk	General Fund, HMGP, PDM, Other Grant Sources	TBD	Low	TBD
1.15	Continue to update the City's emergency planning documents every five years to ensure consistency with state and federal law, local conditions, and best practices and the most recent science.***	Fire, Police, PED	General Fund, HMGP, PDM, Other Grant Sources	2020	Medium	TBD
1.16	Continue to improve the reliability of water supply for emergency response purposes through new water main connections and system improvements.***	Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	2018	High	$$$
2. Wildfire						
2.1	Update the City's Wildland-Urban Interface (WUI) overlay designation to reflect up-to-date information on wildfire hazards and WUI exposure to prepare for future fire risk.	Fire, IT	General Fund, HMGP, PDM, FMAG, Other Grant Sources	TBD	Low	TBD

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
2.2	Identify and implement vegetation management programs in the City's WUI zone.	Fire	General Fund, HMGP, PDM, FMAG, Other Grant Sources	2017	High	$$$
2.3	Work with residents and property owners to develop an incentive program to replace shake roofs in the WUI.	Fire	General Fund, HMGP, PDM, FMAG, Other Grant Sources	2019	Medium	TBD
2.4	Continue to implement improvements to water flow capacity in the WUI.***	Fire, Water, TPW	General Fund, HMGP, PDM, FMAG, Other Grant Sources, Water Enterprise Funds	2020	Medium	TBD
2.5	Ensure adequate road or fire road access for fire equipment to developed and open space areas.	Fire, TPW	General Fund, HMGP, PDM, FMAG, Other Grant Sources	Ongoing	Low	TBD
2.6	Continue to tie public education on defensible space and a comprehensive defensible space ordinance to a field program of enforcement.***	Fire	General Fund, HMGP, PDM, FMAG, Other Grant Sources	Ongoing	Low	TBD

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
3. Flooding						
3.1	Sustain the City's participation in FEMA's National Flood Insurance Program (NFIP).***	HR-Risk, PED	General Fund, HMGP, PDM, FMA, Other Grant Sources	2020	Medium	TBD
3.2	When FEMA creates, updates, and publishes flood zone mapping of the 100-year and 500-year floodplains, integrate information from the maps into the City's geographical information system and use flood information in the development review and public project review process. In areas with high flood risk, continue to evaluate and implement flood hazard mitigation projects to reduce potential for property damage, street flooding, and stream erosion.	IT, PED	General Fund, HMGP, PDM, FMA, Other Grant Sources	As Needed	Low	TBD
3.3	Continue to analyze pump station condition and capacity, and upgrade as appropriate. ***	Water	General Fund, HMGP, PDM, FMA, Other Grant Sources, Water Enterprise Funds	2019	Medium	TBD
3.4	Evaluate, monitor, and maintain the City's stormwater drainage system to ensure it can effectively handle anticipated stormwater volumes to the maximum extent possible, and make upgrades and repairs as needed. Coordinate with the Sonoma County Water Agency to clear debris and remove	TPW, Water	General Fund, HMGP, PDM, FMA, Other Grant Sources, Water	Ongoing	High	$$$

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
	vegetation and sediment in flood control channels within the City to protect flow capacity.		Enterprise Funds			
3.5	Continue to pursue grant funding to complete creek restoration projects that result in bank stabilization, enhanced habitat, and flood capacity. ***	Water	General Fund, HMGP, PDM, FMA, Other Grant Sources, Water Enterprise Funds	Ongoing	High	$$$
3.6	Retrofit public areas, including plazas, sidewalks, and parking lots as feasible, to use permeable paving and other low-impact development features that promote infiltration and reduce stormwater runoff.	PED, R&P, TPW, Water	General Fund, HMGP, PDM, FMA, Other Grant Sources, Water Enterprise Funds	2020, and ongoing	Medium	TBD
3.7	Evaluate, prioritize, and implement flood protection measures to protect wastewater treatment facilities from flooding during a predetermined recurrence interval.	Water	General Fund, HMGP, PDM, FMA, Other Grant Sources, Water Enterprise Funds	Ongoing	High	$$$

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
4. Seismic Hazards (fault rupture, shaking, and liquefaction)						
4.1	Replace or retrofit water-retention structures that are determined to be structurally deficient, including levees, dams, reservoirs, and tanks. Continue to analyze and identify needs for future upgrades. Evaluate, reinforce, and/or enhance wastewater treatment facility structures with seismic risk.	Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	2018	High	$$$
4.2	Consider developing funding mechanisms to assist building owners to afford retrofits to unreinforced masonry, soft-story, and/or non-ductile concrete structures.	HCS	General Fund, HMGP, PDM, Other Grant Sources	2019	Medium	TBD
4.3	Require the retrofit of seismically vulnerable structures consistent with City Code. This program should include community education and outreach.	PED	General Fund, HMGP, PDM, Other Grant Sources	Ongoing	Low	TBD
4.4	Identify/analyze sanitary sewer trunk lines that are determined to be structurally deficient where crossing fault zones. Retrofit/replace as necessary.	Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	TBD	Low	TBD
4.5	Conduct seismic evaluations on City-owned leased buildings that contain critical facilities/operations to determine the need for upgrades/retrofitting.	TPW	General Fund, HMGP, PDM, Other Grant Sources	TBD	Low	TBD

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
5. Geologic Hazards (seismic and non-seismic)						
5.1	Require comprehensive geotechnical investigations prior to development approval, where applicable. Investigations shall include evaluation of landslide risk, liquefaction potential, settlement, seismically induced landsliding, or weak and expansive soils, as identified by Noise and Safety Element Policy NS-C-2.**	PED, TPW	General Fund, HMGP, PDM, Other Grant Sources	Ongoing	Low	TBD
5.2	Restrict development from areas where people might be adversely affected by known natural or man-made geologic hazards, including unstable slopes, liquefiable or expansive soils, and poorly engineered fills, as determined by a California-registered geologist or engineer, as identified by Noise and Safety Element Policy NS-C-3.**	PED	General Fund, HMGP, PDM, Other Grant Sources	Ongoing	Low	TBD
5.3	Pursue implementation of regulatory requirements related to erosion and sediment control. As needed, adopt additional, mandatory, minimum sediment and erosion control measures for current properties and those under construction that exhibit high erosion potential, are in areas of steep slopes, or have experienced past erosion problems. Sediment and erosion control measures shall reduce soil erosion from primary erosional agents, including wind, construction operations, and stormwater runoff, as identified by Noise and Safety Element Policy NS-C-8.	PED	General Fund, HMGP, PDM, Other Grant Sources	Ongoing	Low	TBD

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
6. Hazardous Materials						
6.1	Provide reliable water delivery and wastewater collection, treatment, and disposal services during and after disasters to reduce the risk to public health and the environment.	Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	Medium	TBD
6.2	Generate and support public awareness and participation in household waste management, control, and recycling through County programs including the Sonoma County Household Hazardous Waste Management Plan, as identified by Noise and Safety Element Policy NS-F-6.**	Fire, Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	Low	TBD
6.3	Continue to improve the capabilities of the Fire Department to respond to new hazardous materials incidents/emergencies. ***	Fire	General Fund, HMGP, PDM, Other Grant Sources	2017 and ongoing	High	$$
6.4	Update the Hazardous Materials Area Response Plan.	Fire, Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	TBD	Low	TBD

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
6.5	Enhance protection of existing groundwater resources from hazardous material sites.	Fire, Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	Medium	TBD
6.6	Continue to provide and improve outreach to businesses that store, handle, and use hazardous materials over the state threshold or generate hazardous waste. ***	Fire, Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	Low	TBD
7. Drought (water supply)						
7.1	Complete and implement recommendations of the Santa Rosa Emergency Groundwater Supply project, including construction of emergency groundwater wells consistent with the recommendations of the adopted Emergency Groundwater Master Plan.***	Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	High	$$$
7.2	Continue to participate in the Russian River Watershed Association to provide water conservation guidance, encourage drought-tolerant landscaping, and reduce the consumption of potable water.***	Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	Low	TBD

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
7.3	Replace water meters in existing development to allow customers to track real-time water use and support water conservation efforts, consistent with Climate Action Plan Action 7.1.3.*	Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	2017–2022	Medium	TBD
7.4	Implement advanced metering infrastructure to facilitate water conservation, consistent with Climate Action Plan Action 7.1.4.*	Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	TBD	Low	TBD
7.5	Develop a plan for expediting the repair and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies, such as those available through the Water/Wastewater Agency Response Network (WARN). Communicate that plan to local governments and critical facility operators.	Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	TBD	Low	TBD
7.6	Host regular workshops and classes on water conservation strategies, including drought-tolerant landscaping and available rebates for water conservation and water efficiency actions. Continue workshops, classes, and other educational efforts even in the absence of drought conditions.	Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	Medium	TBD

Mitigation Action		Responsible Department	Potential Funding Sources	Target Completion Date	Priority	Relative Cost
8. Dam Inundation						
8.1	Support the State's efforts to conduct periodic inspections of local dams and implement recommended actions to ensure all safety measures are in place, as identified by Noise and Safety Element Policy NS-E-1.	PED, R&P, TPW, Water	General Fund, HMGP, PDM, Other Grant Sources, Water Enterprise Funds	Ongoing	Low	TBD
8.2	Integrate updated dam inundation mapping from the State Office of Emergency Services into the City's geographic information system and utilize the information in the development review process.	IT, PED	General Fund, HMGP, PDM, Other Grant Sources	2020	Medium	TBD

** References to Climate Action Plan actions are not required to be updated within this plan, if changes to the Climate Action Plan occur.*

***References to General Plan policies are not required to be updated within this plan, if changes to the General Plan occur.*

****Indicates sustained implementation of measures started from 2010 LHMP.*

$ Low Cost (<$50,000)

$$ Medium Cost ($50,000-$100,000)

$$$ High Cost (>$100,000)

4.3 Capabilities Assessment

This capabilities assessment is designed to identify existing local agencies, personnel, planning tools, public policy and programs, technology, and funds that have the capability to support hazard mitigation activities and strategies outlined in this plan. To create this capability assessment, the LHMP team collaborated to identify current local capabilities and mechanisms available to the City for reducing damage from future natural hazard events. These plans and resources were reviewed while developing the LHMP and are summarized below.

Key Resources

The City of Santa Rosa has several key departments with resources to support the implementation of mitigation actions. These departments offer a variety of planning, technical, policy, and staffing resources as summarized in Table 35.

Table 35: Santa Rosa Capabilities Assessment

Type of Resource	Resource Name	Ability to Support Mitigation	Web Address
City of Santa Rosa			
Policy Resource	Development Code	The Zoning Code is the main tool to implement the City's General Plan. It sets land use regulations and the zoning map for the City. Mitigation actions outlined in this plan can be adopted in the form of land use/development regulations.	http://qcode.us/codes/santarosa/
Policy Resource	Building Code, Fire Code	Provides guidance that complies with the International Building Code, International Fire Code, both recognized for their ability to mitigate fire hazards.	http://www.iccsafe.org/Pages/default.aspx
Plan Resource	General Plan	Principal policy document that guides conservation, development, and change in the City. Identifies City programs and policies as they pertain to land use, public services, housing, natural resources, and safety. Hazard data and mitigation actions described in this LHMP can be incorporated into the General Plan.	http://ci.santa-rosa.ca.us/doclib/Documents/2035_General_Plan.pdf
Plan Resource	City of Santa Rosa Urban Water Management Plan	This plan provides guidance and analysis of the City's water resources. It helps prioritize actions to address drought, which may help support the goals of the LHMP.	http://www.srcity.org/departments/utilities/conserve/water_policies/Pages/uwmp.aspx
Plan Resource	Climate Action Plan	Policy document that guides the City's response to climate change. While primarily focused on climate change mitigation, the plan includes a section on adaptation that can help develop hazard mitigations to climate change.	http://ci.santa-rosa.ca.us/doclib/Documents/CDP_SR_FINAL_CAP_20120711.pdf

Type of Resource	Resource Name	Ability to Support Mitigation	Web Address
Plan Resource	Capital Improvement Program	This plan identifies essential upgrades to infrastructure and allocates funding to see these improvements through. It is a key vehicle for implementing LHMP.	http://ci.santa-rosa.ca.us/DEPARTMENTS/PUBLICWORKS/CAPITALIMPROVEMENTPROGRAM/Pages/default.aspx
Sonoma County Fire and Emergency Services Department			
Personnel Resource	Emergency Council	The Emergency Council, which includes Santa Rosa, is responsible to study, revise, and recommend to the Board of Supervisors for adoption the Sonoma County Emergency Plan; to review and recommend action on all proposed mutual aid agreements with the United States, the State of California, other political subdivisions, corporations, and groups or individuals; and to review and recommend the adoption of such ordinances, resolutions, rules, and regulations as may be necessary to implement the County Emergency Plan or other mutual aid agreement entered into pursuant to such plan.	http://sonomacounty.ca.gov/Emergency-Council/
Personnel Resource	Fire Prevention Division	The Sonoma County Department of Emergency Services–Fire Prevention Division is primarily responsible for programs, procedures, and projects for preventing the outbreak of fires in the unincorporated areas of the county and for minimizing the danger to persons and damage to property caused by fires that do occur. In addition to code enforcement, Fire Prevention Division staff is responsible for hazardous materials incident response, fire investigations, and emergency scene management support at emergencies in unincorporated areas within the City's urban growth boundary.	http://sonomacounty.ca.gov/FES/Fire-Prevention/
Sonoma County Water Agency (SCWA)			
Technical Resource	Flood Protection	The SCWA is responsible for maintaining over 75 miles of streams throughout Sonoma County and provides flood protection facilities for the county. The SCWA is also the controlling agency for the county's water supply system and is Santa Rosa's water provider.	http://www.scwa.ca.gov/

Type of Resource	Resource Name	Ability to Support Mitigation	Web Address
Plan Resource	Sonoma County Water Agency Urban Water Management Plan (UWMP)	Updated in 2010, the UWMP is a long-range planning document to aid cities in Sonoma County, including Santa Rosa, to help plan for services and emergencies through 2035. The plan includes projections for water demands and supplies available over the next 25 years, including analysis of different hydrological assumptions, such as sustained drought conditions.	http://www.scwa.ca.gov/uwmp/
Plan Resource	Sonoma County Water Agency Hazard Mitigation Plan	The Sonoma County Water Agency, much like the City of Santa Rosa, must develop and publish a hazard mitigation plan, to be updated every five years. The SCWA's latest update, released in 2012, helped to identify the agency's priority hazard mitigation projects.	http://www.scwa.ca.gov/secureourwater/
Sonoma County			
Plan Resource	Sonoma County Hazard Mitigation Plan	The plan identifies high hazard areas and assesses vulnerabilities from earthquakes, floods, wildland fires, and landslides. The plan identifies mitigation strategies the County can take as part of a five-year implementation plan to reduce the level of injury, property loss, and community disruption resulting from such hazards.	http://www.sonoma-county.org/prmd/docs/hmp_2011/
Plan Resource	Sonoma County General Plan 2020	The County's General Plan includes policies intended to reduce hazards and disasters in Sonoma County.	http://www.sonoma-county.org/PRMD/gp2020/index.htm
State and Federal Agencies			
Technical Resource	National Weather Service (NWS)	Decision Support Program (improved forecast interpretations for making informed decisions).	http://www.weather.gov/
Technical Resource	California Office of Emergency Services (Cal OES)	Hazard Mitigation Web Portal provides guidance and examples of hazard mitigation planning as well as notifications regarding available funding.	http://hazardmitigation.calema.ca.gov/
Technical Resource	Federal Emergency Management Agency (FEMA)	Guidance for hazard mitigation planning processes and resources.	http://www.fema.gov/multi-hazard-mitigation-planning

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Plan Maintenance and Capabilities

CHAPTER 5

It is critical that this Local Hazard Mitigation Plan remain up to date to help continue to protect Santa Rosa against hazards and to ensure that the community remains eligible for federal and state funding. To this end, this chapter describes the process for updating this plan to ensure it remains actively used, relevant and appropriate, and in compliance with applicable state and federal requirements. The plan's structure allows the City to update individual sections as information becomes available and as needs arise, making it easier for the City to keep the plan current.

This chapter describes how the City of Santa Rosa will make public participation an integral component of the plan maintenance, implementation, and update process. It also describes how the City will incorporate the mitigation actions in this plan into existing programs and planning mechanisms. These programs and mechanisms include Santa Rosa's General Plan and Zoning Code, Capital Improvement Program, and code enforcement and plan implementation efforts.

5.1 Monitoring, Evaluating, and Updating the Plan

5.1.1 Coordinating Body

Maintaining and updating this plan is the responsibility of the Santa Rosa LHMP team. The primary departments to oversee this process are the Planning and Economic Development Department and the Fire Department, under the direction of their appointed LHMP project manager. This individual will coordinate maintenance of this plan, conduct the formal review process, and prepare updates to the plan. The key City departments in the LHMP team are listed below.

- Finance
- Fire
- Housing and Community Services
- Information Technology
- Planning and Economic Development
- Police
- Recreation and Parks
- Risk Management
- Transportation and Public Works
- Water

The LHMP project manager will facilitate the LHMP team meetings. This staff member will assign tasks, which may include collecting data, developing new mitigation actions, updating sections of the plan, and presenting the plan to other departments, stakeholders, and elected

officials. Responsibility for implementation and evaluation of the plan will be shared among all LHMP team members as appropriate.

5.1.2 Evaluation

When the plan is not being updated, the LHMP team should meet at least once annually. During this period, the team should focus on timing of plan implementation, evaluating the actions identified in this plan being implemented, determining whether they are successful, revising priorities, if necessary, and helping to incorporate the plan's mitigation actions into other planning documents. These annual meetings will commence in 2017 and should be timed with overall departmental planning and budgeting that occurs leading up to the City's Annual Budget development.

As part of this evaluation and integration process, the members of the LHMP team should look at the following:

- Any hazard events that occurred during the previous year and the impact of these hazards on the community.
- Mitigation actions in the plan that have been successfully implemented.
- Mitigation actions in the plan that were scheduled for implementation but have not begun.
- The schedule of future mitigation actions, and whether it is feasible or appropriate to adjust the timeline.
- Issues not covered by existing mitigation actions that could be addressed by new mitigation actions.
- Potential or actual changes in new funding opportunities, including grants, which may be used on mitigation-related activities.
- New scientific or mapping data that could inform updates to the plan.
- Any other planning programs or initiatives in the community that involve hazard mitigation.

The LHMP team will summarize the information from this review into an annual progress report, which will be distributed to City department heads for review as well as to the Santa Rosa City Council. The progress report will also be posted on the City's website, with the ability for members of the public to provide comments, and will be distributed to local media as appropriate.

5.2 Method and Schedule for Updating the Plan within Five Years

Under the Code of Federal Regulations, Title 24 Section 201.6(d)(3), local hazard mitigation plans must be reviewed, revised as needed, and resubmitted for approval in order to remain eligible for benefits under the Disaster Mitigation Act. The City of Santa Rosa intends to

update this LHMP on a five-year cycle from the date of adoption to maintain eligibility for these benefits. This update process should begin one year prior to expiration of the existing plan. The update cycle may be accelerated under specific conditions:

- A Presidential Disaster Declaration that impacts Santa Rosa.
- A hazard event that causes loss of life in Santa Rosa.

The update process for this plan will add new planning methods, community demographics and data, hazard data and events, vulnerability analyses, mitigation actions, and goals. This process will help keep the plan current. While the specific needs for the update will be determined by the LHMP team's annual review and recommendations, the update should meet the following criteria:

- The update process should be convened through a committee comprising at least one staff member from each City department. The City should also contact local agencies at the onset of the update process to involve any interested and relevant external agencies. This update process will begin in 2020, one year prior to the expiration of this Plan.
- The hazard risk assessment will be reviewed and updated using the best available information, technologies, and practices.
- Mapping and critical structure evaluation will be updated and should be improved upon as funding for these activities becomes available.
- The mitigation actions will be reviewed and revised to account for any actions that have been completed, deferred, or changed as a result of an updated risk assessment or new City policies identified in other planning documents.
- The draft update will be sent to appropriate external agencies for comment.
- The draft update will be made available for public comment prior to adoption.
- The draft update will be transmitted to Cal OES and FEMA for review and approval.
- The Santa Rosa City Council will adopt the final updated Local Hazard Mitigation Plan within one year of the commencement of the update process.

5.3 Adoption

The Santa Rosa City Council is responsible for adopting the updated plan. Adoption should occur every five years and after the City has received notification from FEMA that the plan is Approved Pending Adoption (APA). After the plan has been updated by the City Council, the Santa Rosa Planning and Economic Development and Fire Departments will be responsible for transmitting the adopted version to FEMA for its records.

5.4 Implementation through Existing Programs

The effectiveness of this plan depends on how the mitigation actions it contains are implemented, including incorporation of the mitigation actions into existing City plans,

policies, and programs. The mitigation actions in this plan are intended to reduce the loss and damage caused by hazard events, and provide a framework for hazard mitigation activities the City can carry out over the plan's five-year period. The City has prioritized the plan's goals and identified actions that will be implemented through existing plans, programs, and policies as the resources to do so become available.

The LHMP project manager has responsibility for overseeing this plan's implementation, coordination, promotion, and maintenance through the City's existing plans, programs, and policies, and is responsible for facilitating implementation of the plan and meetings related to plan maintenance. Implementation and evaluation of this LHMP and the mitigation actions it contains are the shared responsibility of all departments identified as lead departments in the plan.

The information this plan contains, including the hazard profiles, the risk and vulnerability assessments, and mitigation actions, are based on the best available information, technology, methods, and practices available to the plan authors at the time this LHMP was prepared. The Santa Rosa General Plan is an integral part of this plan, particularly the Noise and Safety Element of the General Plan, which provides a high-level structure for the City's hazard mitigation and preparation activities. This LHMP allows the City to review and expand upon the policies contained in the Noise and Safety Element. The City views the General Plan and this LHMP as planning documents that work together to help reduce the risk of hazard exposure to the residents, businesses, and visitors of Santa Rosa. Many of the mitigation actions follow programs recommended by the General Plan and other adopted plans. The City will also coordinate the implementation of the LHMP with other city planning processes and programs, including the following:

- Santa Rosa Capital Improvement Program
  - Include mitigation considerations for vulnerable infrastructure from this plan into the CIP.
- Santa Rosa City Code, including the Building and Safety Code
  - Target vulnerable building types identified in this plan, including soft-story buildings, through the integration of mitigation actions into development of the building and safety code.
- Santa Rosa Emergency Operations Plan
  - Mitigation actions targeted at improving internal and external communications should be included in future update of the EOP.

5.5 Continued Public Involvement

Members of the public will continue to be apprised of the actions of the LHMP team and the LHMP review and update processes through the City's website and through distribution of annual progress reports to the media. Copies of this plan will also be distributed to appropriate offices/facilities (libraries, community centers, etc.). When the LHMP update

process begins, the LHMP team will guide the development of a new public involvement strategy, which will reflect the City's needs and capabilities at the time. This strategy will, at a minimum, include directions on the use of the City of Santa Rosa's website and local media outlets.

5.6 Point of Contact

Preparation of future updates of the City of Santa Rosa LHMP is the responsibility of the City's Planning and Economic Development Department and Fire Department.

- Erin Morris, LHMP Project Manager (Planning and Economic Development)
  - emorris@srcity.org
- Matt Dahl, LHMP Project Manager (Fire Department)
  - mdahl@srcity.org

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LHMP Team Meeting Materials

APPENDIX A

1. LHMP Team Meeting Materials

Disclaimer: These materials were used in the introductory stages of LHMP development by the planning team to analyze hazards and assess the most appropriate path forward for Santa Rosa. The materials contained in the following sections are for informational purposes only. Only the information contained in Chapter 1-5 of this plan are meant to inform hazard mitigation actions in Santa Rosa.

Meeting Materials

Santa Rosa Local Hazard Mitigation Plan Update

Planning Team

Kickoff Meeting: November 19, 2015

Included Materials

- Agenda
- Project Overview
- Hazard Mitigation Planning Team Overview
- Schedule
- Sign-In Sheet
- Presentation

City of Santa Rosa

Local Hazard Mitigation Plan

Kickoff Meeting

Thursday, November 19, 2015 (10:00–12:00)

35 Stony Point Road, Santa Rosa, CA

Santa Rosa Utilities Field Office (UFO) in Room F

Agenda

- Introductions (2–3 minutes)
- Project Goals & Expectations (10 minutes)
- Staffing & Communication Protocols (2–3 minutes)
- Local Hazard Mitigation Plan (LHMP) Overview (15 minutes)
- Engagement & Outreach (30 minutes)
- LHMP Planning Team
- Public Outreach Approach
- Data Collection & Critical Facilities
- Hazards of Concern (20 minutes)
- Critical Facilities (15 minutes)
- Mitigation Strategies (15 minutes)
- Work Plan & Schedule Review (10 minutes)
- Overview of Work Program, Key Tasks, and Schedule
- Wrap-Up and Next Steps

Project Overview

The City of Santa Rosa is initiating a planning effort to prepare a Local Hazard Mitigation Plan (LHMP). This plan serves as the City's five-year strategic plan to analyze and mitigate natural hazards in the community. Preparation of the LHMP increases the City's eligibility for future disaster mitigation and post-disaster grant funding from FEMA.

Local Hazard Mitigation Plan

DMA 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for state, local, and Indian Tribal governments as a condition of mitigation grant

assistance. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions and replacing them with a new set of requirements that emphasize the need for state, local, and Indian Tribal entities to closely coordinate mitigation planning and implementation efforts. The requirement for a state mitigation plan is continued as a condition of disaster assistance, adding incentives for increased coordination and integration of mitigation activities at the state level through the establishment of requirements for two different levels of state plans. DMA 2000 also established a new requirement for local mitigation plans and authorized up to 7 percent of HMGP funds available to a state for development of state, local, and Indian Tribal mitigation plans.

Completion and acceptance of the City's LHMP by FEMA opens up access to the following competitive FEMA grant programs for the next five years:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)

Under these programs, up to 75 percent of the cost of an implementation project could be covered by a FEMA grant.

Preliminary Goals of the Project

At the kickoff meeting, the project team will have the opportunity to discuss and confirm project goals. Based on guidance from the General Plan, preliminary goals to consider include the following:

1. Implement the Local Hazard Mitigation Plan to better prepare Santa Rosa for disaster (City of Santa Rosa General Plan, Noise and Safety Element, Objective NS-A-4).
2. Prohibit development in high-risk geologic and seismic hazard areas to avoid exposure to seismic and geologic hazards (City of Santa Rosa General Plan, Noise and Safety Element, Objective NS-C).
3. Minimize hazards associated with storm flooding (City of Santa Rosa General Plan, Noise and Safety Element, Objective NS-D).
4. Minimize the potential for wildland fires (City of Santa Rosa General Plan, Noise and Safety Element, Objective NS-G).
5. Prepare for climate changes (City of Santa Rosa General Plan, Noise and Safety Element, Objective NS-H).
6. Provide for the safety of Santa Rosa citizens by maintaining efficient, well-trained, and adequately equipped police and fire personnel (City of Santa Rosa General Plan, Public Services and Facilities Element, Objective PSF-E-3).
7. Require erosion and sedimentation control measures to maintain an operational drainage system, preserve drainage capacity, and protect water quality (City of Santa Rosa General Plan, Public Services and Facilities Element, Objective PSF-I-3).

8. Maintain and enhance a disaster-resistant region by reducing the potential for loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters (2010 LHMP).
9. Reduce the number of public and private buildings within the city that are vulnerable to the effects of earthquakes, flooding, wildfire, and landslides (2010 LHMP).

Project Objectives

Drawn from the preliminary goals identified above, the following project objectives have been drafted. Each objective has a corresponding question that will help refine the plan's approach.

A. Continued coordination with key stakeholders and other agencies.
    a. Who are key stakeholders to contact?
B. A flexible and engaging public outreach campaign.
    a. What are the lessons learned from previous outreach events?
C. Foster better communication and coordination within the city and surrounding areas.
    a. What cities/agencies should be contacted regarding this project?
D. Address aging infrastructure issues to reduce/minimize future hazards and disasters.
    a. What infrastructure is at risk in your opinion?

Hazard Mitigation Planning Team Overview

This core team of City staff members will participate in actively reviewing and commenting on the City's Local Hazard Mitigation Plan. The following is a listing of City departments that should be involved. At least one staff member from each department should be in attendance for any meetings scheduled for the project.

- General Services
- Public Works
- Utilities
- Recreation and Parks
- Community Development
- Risk Management
- Police
- Fire

APPENDIX A

Schedule

Task	Anticipated Deadline
1. Community Engagement Strategy Development	
a. Draft Strategy Development	November 19, 2015
b. Online Survey Development	November 19, 2015
c. Community Partner & Stakeholder Identification	November 19–30, 2015
d. Community Engagement Workshop	November 30–December 4, 2015
2. Hazards Assessment Development	November 19–December 11, 2015
3. Development of Mitigation and Adaptation Goals and Implementation Program	December 4, 2015–January 15, 2016
4. Local Hazard Mitigation Plan Preparation	
a. Administrative Draft LHMP	January 22, 2016
b. Public Review Draft LHMP	February 8, 2016
c. Cal OES/FEMA Review Draft LHMP	March 1, 2016
d. Final Draft LHMP	*June 2016**
5. Meetings/Coordination	
a. Project Kickoff Meeting	November 19, 2015
b. LHMP Team Meeting #1	November 30–December 4, 2015
c. LHMP Team Meeting #2	December 14–18, 2015
d. LHMP Team Meeting #3	January 4–8, 2016
6. City Council Adoption	*June 2016**

* City Council adoption will be dependent on Cal OES/FEMA review time frames

APPENDIX A

LHMP Team Kickoff Meeting Sign-In Sheet

November 19, 2015

Kick-off Meeting Attendee Sign-In Sheet

Name	Department/Company	Telephone	Email
Lisa Kranz	PED	543 3259	Lkranz@srcity.org
RITA MILLER	CITY - WATER	543-3879	rmiller@srcity.org
Neil Bregman	SRFD - Emergency prep	543 3525	nbregman@srcity.org
Mike Enright	PED	543-3264	menright@srcity.org
Mark Armstrong	Rec & Parks	543-3717	marmstrong@srcity.org
Ron Sims	Public Works	543-3899	RSims@srcity.org
JOHN CREGAN	SANTA ROSA POLICE	543-4070	JCREGAN@SRCITY.ORG
Nathan Barnette	Risk Mgmt	543-3028	nbarnette@srcity.org

November 19, 2015

Name	Department/Company	Telephone	Email
Chris Greene / Mike Hargreaves	IT - GIS		cgreene@srcity mhargreaves@srcity.org
Erin Morris	PED - Adv. Planning		
Nancy Garnowicz	HCS		
Alan Alton	Finance	x3093	aalton@srcity.org
LORI URBANEK	WATER	3854	lurbanek@srcity.org
MATT DAHL	FIRE DEPT	543-3534	MDAHL@SRCITY.ORG

Michael Baker
INTERNATIONAL

We Make a Difference

City of Santa Rosa

Hazard Mitigation Plan
Project Kickoff

Meeting Objectives

- Project goals and expectations
- Staffing and communication protocols
- Hazard mitigation plan development overview
- Review public engagement and outreach process
- Finalize critical facilities and hazards of concerns list
- Identify mitigation strategies
- Discuss past hazard events
- Review work plan and schedule

Project Goal and Objectives

Goals for Hazard Mitigation Planning

LHMP Goals

- Implement the Local Hazard Mitigation Plan to better prepare Santa Rosa for disaster (City of Santa Rosa General Plan, Noise and Safety Element, Objective NS-A-4).
- Prohibit development in high-risk geologic and seismic hazard areas to avoid exposure to seismic and geologic hazards (City of Santa Rosa General Plan, Noise and Safety Element, Objective NS-C).
- Minimize hazards associated with storm flooding (City of Santa Rosa General Plan, Noise and Safety Element, Objective NS-D).
- Minimize the potential for wildland fires (City of Santa Rosa General Plan, Noise and Safety Element, Objective NS-G).
- Prepare for climate changes (City of Santa Rosa General Plan, Noise and Safety Element, Objective NS-H).

LHMP Goals

- Provide for the safety of Santa Rosa citizens by maintaining efficient, well-trained, and adequately equipped police and fire personnel (City of Santa Rosa General Plan, Public Services and Facilities Element, Objective PSF-E-3).
- Require erosion and sedimentation control measures to maintain an operational drainage system, preserve drainage capacity, and protect water quality(City of Santa Rosa General Plan, Public Services and Facilities Element, Objective PSF-I-3).
- Maintain and enhance a disaster-resistant region by reducing the potential for loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters (2010 LHMP).
- Reduce the number of public and private buildings within the City that are vulnerable to the effects of earthquakes, flooding, wildfire, and landslides (2010 LHMP).

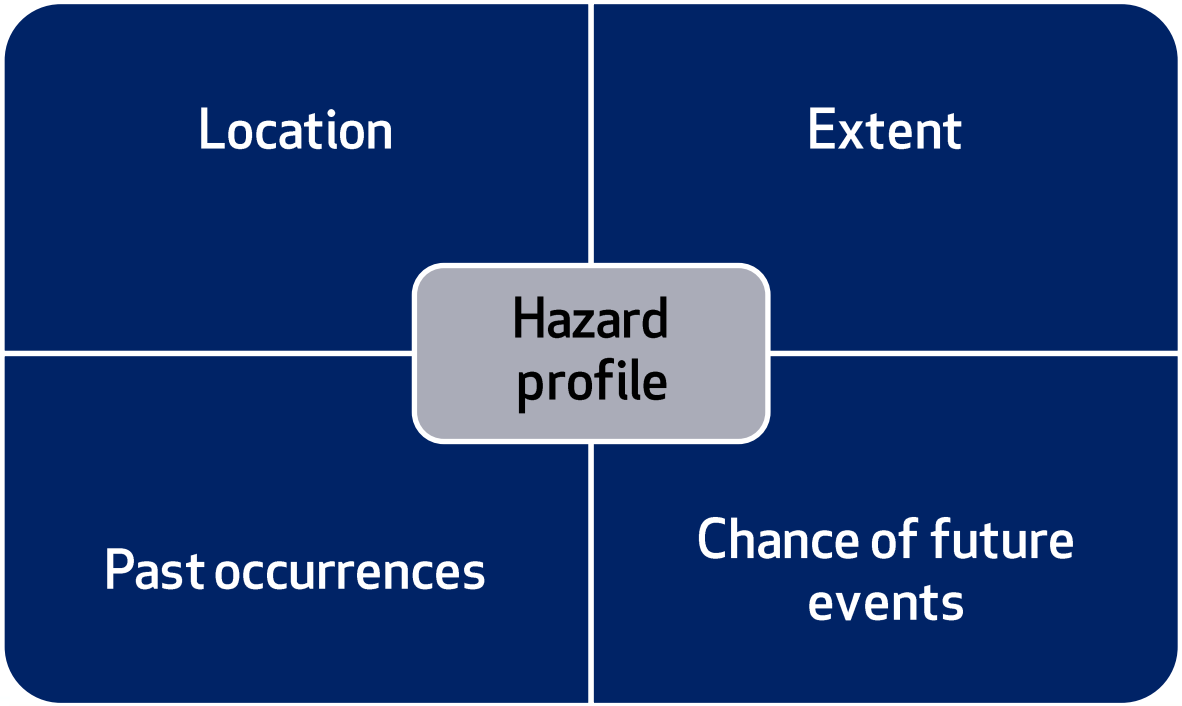
LHMP Project Objectives

- Continued coordination with key stakeholders and other agencies.
  - Who are key stakeholders to contact?
- A flexible and engaging public outreach campaign.
  - What are the lessons learned from previous outreach events?
- Foster better communication and coordination within the City and surrounding areas.
  - What Cities/Agencies should be contacted regarding this project?
- Address aging infrastructure issues to reduce/minimize future hazards and disasters.
  - What infrastructure is at risk in your opinion?

Local Hazard Mitigation Plan (LHMP) Development

Plan Requirements – Hazard Identification and Risk Assessment

- Describe all hazards that affect the community.
- Provide rationale for excluding recognized hazards.



Plan Requirements – Hazard Identification and Risk Assessment

Vulnerability Assessment

- City's vulnerability to each hazard
- Potential impacts of each hazard (number and importance of affected structures and areas)
- Identifies repetitive loss properties
- Includes potential dollar losses

Plan Requirements – Mitigation Strategy

- Goals
- Identification and analysis of mitigation actions
  - Comprehensive
  - Focus on built environment
- Action Plan
  - Prioritizes actions
  - Describes implementation and administration
  - Includes cost-benefit review

Plan Requirements – Planning Process

- Describe:
  - How the plan was prepared
  - Who was involved
  - Opportunities for public and stakeholder involvement
  - Review and inclusion of existing plans, reports, studies, etc.
  - Continual public participation
  - Monitoring and updating of the plan
- Stakeholders must include:
  - Local and regional agencies involved in hazard mitigation
  - Agencies that regulate development
  - Neighborhood communities

LHMP Planning Team

- Agency representatives to advise and contribute to plan preparation
- Four LHMP Planning Team meetings:
  - Kick Off Meeting - Today
  - Meeting 1 – Review and discuss hazard mitigation process, and identification and ranking of hazards
  - Meeting 2 – Review and discussion of the hazard profiles and risk assessment
  - Meeting 3 – Review and prioritize of the draft mitigation actions and provide training on monitoring and implementation.

Plan Requirements – Planning Process
LHMP Planning Team

- General Services
- Public Works
- Utilities
- Recreation & Parks
- Community Development
- Risk Management
- Police
- Fire

Responsibilities

Our job

- Facilitate the process
- Provide technical expertise
- Do the heavy work

Your job

- Participate
- Make final decisions
- Ensure plan is feasible and meets needs
- Groundtruthing the plan

Data Needs

- Every person can provide vital data
  - GIS data
  - Information and experience about past events
  - Institutional knowledge
- If you have useful data, please contact *Erin Morris*
  (707) 543-3273
  emorris@srcity.org

Engagement and Outreach

Critical Facilities

Critical Facilities

- Schools
- Healthcare facilities
- City facilities (government buildings, pump stations, reservoirs, etc.)

Hazard Identification and Prioritization

FEMA-Suggested Hazards

Avalanche	Flood	Seismic hazards
Climate change	Geological hazards	Severe winter storm
Coastal erosion	Hailstorm	Tornado
Coastal storm	Hazardous materials	Tsunami
Dam failure	Human-caused hazards	Volcano
Disease/pest management	Hurricane	Wildfire
Drought	Land subsidence	Wind
Earthquake fault rupture	Landslide and mudflow	Windstorm
Expansive soils	Liquefaction	
Extreme heat	Sea level rise	

Relevant Hazards

Avalanche	Flood	Seismic hazards
Climate change	Geological hazards	Severe winter storm
Coastal erosion	Hailstorm	Tornado
Coastal storm	Hazardous materials	Tsunami
Dam failure	Human-caused hazards	Volcano
Disease/pest management	Hurricane	Wildfire
Drought	Land subsidence	Wind
Earthquake fault rupture	Landslide and mudflow	Windstorm
Expansive soils	Liquefaction	
Extreme heat	Sea level rise	

Timeline

Task	Timeframe
Kick-off meeting	November 18, 2015
Data Collection, Hazards Profiles, and Risk Assessment	November – December 2015
Initiate LHMP Planning Team and Public Outreach	November – December 2015
Administrative Draft LHMP complete	January 2016
Public Review Draft LHMP	February 2016
Draft LHMP submitted to FEMA	March 2016
FEMA review	To be determined
City Council adoption	By June 2016, following FEMA review

Questions/Comments?

Erin Morris: *emorris@srcity.org*

Aaron Pfannenstiel: apfannenstiel@mbakerintl.com

APPENDIX A

Meeting Materials

Santa Rosa Local Hazard Mitigation Plan Update

Planning Team

Meeting 2: December 4, 2015

Included Materials

- Hazards Worksheet
- Sign-In Sheet
- Presentation

APPENDIX A

Hazards Worksheet

HAZARD RANKING WORKSHEET - City of Santa Rosa					DATE: 1/14/2016	
Hazard Type	Probability	Impact			Total Score	Hazard Planning Consideration
		Location	Primary Impact	Secondary Impacts		
Wildfire	4	3	4	3	53.60	High
Flood	4	3	4	4	57.60	High
Seismic hazards (fault rupture, shaking, liquefaction)	4	4	4	4	64.00	High
Landslide (seismic and non-seismic)	2	3	2	2	19.20	Medium
Hazardous materials	2.5	3	2	2	24.00	Medium
Drought	4	4	3	3	54.40	High
Dam inundation	1	3	3	2	11.00	Low
Hazard 8					0.00	Low
Hazard 9					0.00	Low
Hazard 10					0.00	Low
Hazard 11					0.00	Low
Hazard 12					0.00	Low
Hazard 13					0.00	Low
Hazard 14					0.00	Low
Hazard 15					0.00	Low
Hazard 16					0.00	Low
Hazard 17					0.00	Low
Hazard 18					0.00	Low

APPENDIX A

Probability	Importance
Based on estimated likelihood of occurrence from historical data	2.0
Probability	Score
Unlikely	1
Occasional	2
Likely	3
Highly Likely	4

Location	Importance
Based on size of geographical area of community affected by hazard	0.8
Affected Area	Score
Negligible	1
Limited	2
Significant	3
Extensive	4

Maximum Probable Extent (Primary Impact)	Importance
Based on percentage of damage to typical facility in community	0.7
Impact	Score
Weak - little to no damage	1
Moderate - some damage, loss of service for days	2
Severe - devastating damage, loss of service for months	3
Extreme- catastrophic damage, uninhabitable conditions	4

Secondary Impacts	Importance
Based on estimated secondary impacts to community at large	0.5
Impact	Score
Negligible - no loss of function, downtime, and/or evacuations	1
Limited - minimal loss of function, downtime, and/or evacuations	2
Moderate - some loss of function, downtime, and/or evacuations	3
High - major loss of function, downtime, and/or evacuations	4

Total Score = Probability x Impact, where:

Probability = (Probability Score x Importance)
Impact = (Affected Area + Primary Impact + Secondary Impacts), where:
Affected Area = Affected Area Score x Importance
Primary Impact = Primary Impact Score x Importance
Secondary Impacts = Secondary Impacts Score x Importance

Hazard Planning Consideration

Total Score	Range	Distribution	Hazard Level
0.0	12.0	12	Low
12.1	42.0	2	Medium
42.1	64.0	4	High

The probability of each hazard is determined by assigning a level, from unlikely to highly likely, based on the likelihood of occurrence from historical data. The total impact value includes the affected area, primary impact and secondary impact levels of each hazard. Each level's score is reflected in the matrix. The total score for each hazard is the probability score multiplied by it's importance factor times the sum of the impact level scores multiplied by their importance factors . Based on this total score, the hazards are separated into three categories based on the hazard level they pose to the communities: High, Medium, Low.

LHMP Team Meeting 2 Sign-In Sheet

City of Santa Rosa: Local Hazard Mitigation Plan

Name	Department/Company	Please Check if in Attendance	Telephone (if new or changed)	Email (if new or changed)
Nancy Gornowicz	Housing and Community Services			
Nathan Barnett	Risk Management	✓		
Neil Bergman	SRFD – Emergency Prep	✓		
Rita Miller	City - Water			
Ron Simi	Public Works			
Jessica Sutton	Finance	✓		
Molly Dillon	CAO	✓		

Page 2 of 2

City of Santa Rosa

Local Hazard Mitigation Planning Team

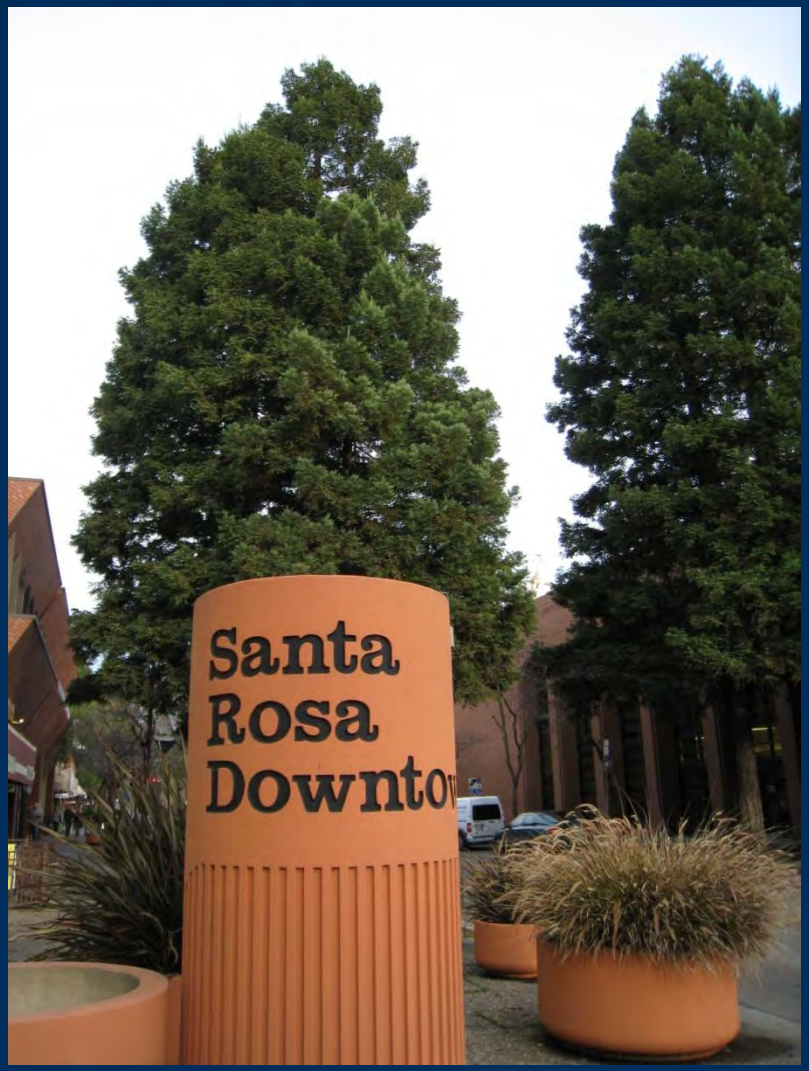
Meeting # 2 - December 4, 2015

Sign-In Sheet

Name	Department/Company	Please Check if in Attendance	Telephone (if new or changed)	Email (if new or changed)
Alan Alton	Finance			
Chris Greene	IT - GIS			
Erin Morris	Planning and Economic Development	✓		
John Cregan	Santa Rosa Police	✓		
Lisa Kranz	Planning and Economic Development	✓		
Lori Urbanek	Water	✓		
Mark Armstrong	Rec & Parks			
Matt Dahl	Fire Department	✓		
Mike Enright	Planning and Economic Development	✓		
Mike Hargreaves	IT – GIS	✓		

Michael Baker
INTERNATIONAL

We Make a Difference



City of Santa Rosa

Local Hazard Mitigation Plan Team Meeting #2

December 4, 2015

Meeting Objectives

- Present draft hazard profiles
- Prioritize hazards
- Confirm additional data needs

City of Santa Rosa Hazard Profiles

Hazard Profile Components

- Identification of the Hazard
- Profile of the Hazard
  - Location
  - Extent
- Past Occurrences
- Probability of Future Occurrences
- Climate Change Considerations
- Vulnerabilities / Risk Assessment

FEMA-Suggested Hazards

Avalanche	Flood	Seismic hazards
Climate change	Geological hazards	Severe winter storm
Coastal erosion	Hailstorm	Tornado
Coastal storm	Hazardous materials	Tsunami
Dam failure	Human-caused hazards	Volcano
Disease/pest management	Hurricane	Wildfire
Drought	Land subsidence	Wind
Earthquake fault rupture	Landslide and mudflow	Windstorm
Expansive soils	Liquefaction	
Extreme heat	Sea level rise	

Santa Rosa – Identified Hazards

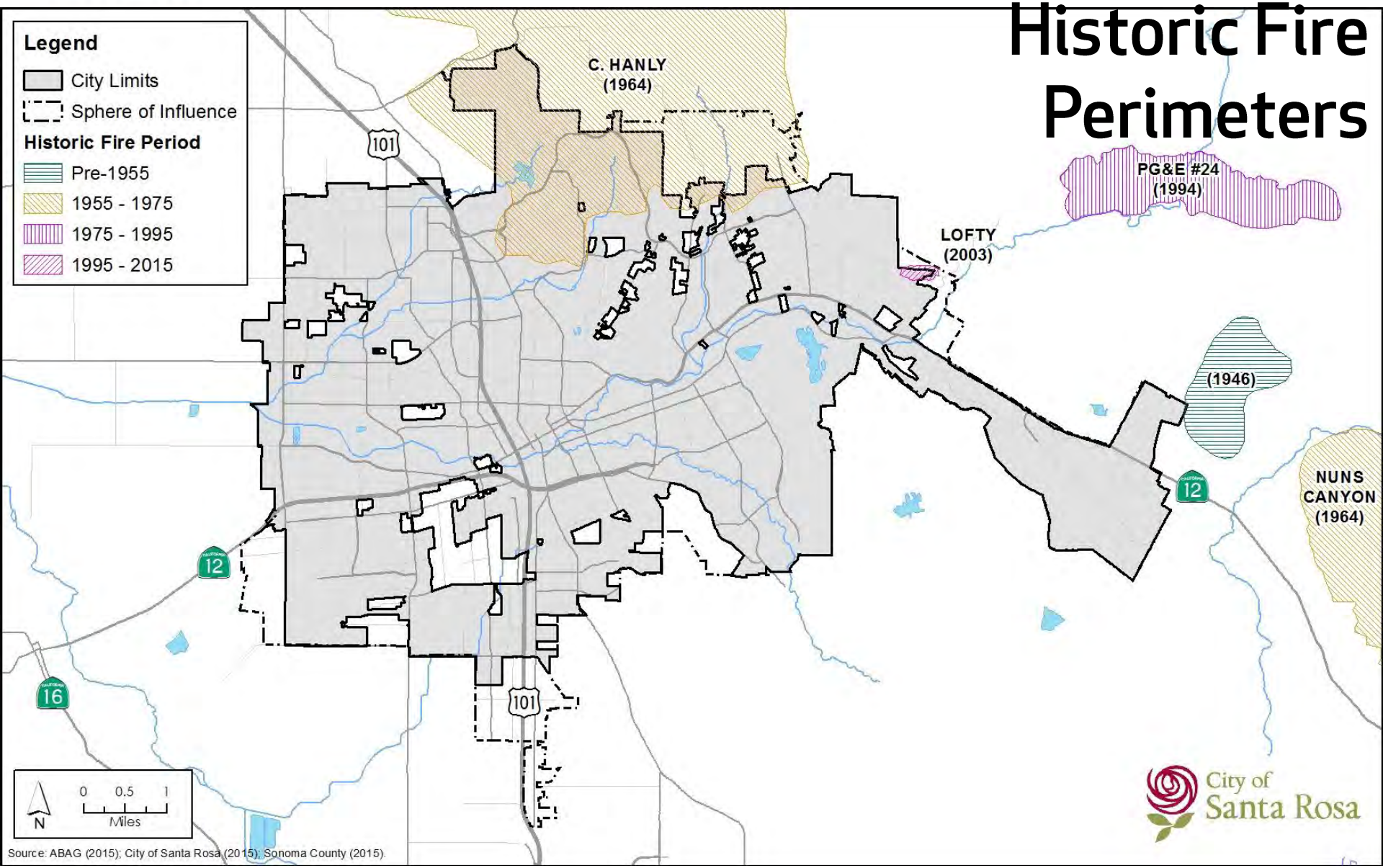
1. Wildfire
2. Flooding
3. Seismic hazards (fault rupture, shaking, liquefaction)
4. Landslides (seismic and non-seismic)
5. Hazardous materials
6. Drought
7. Dam inundation

* Climate Change Considerations discussed under each profile

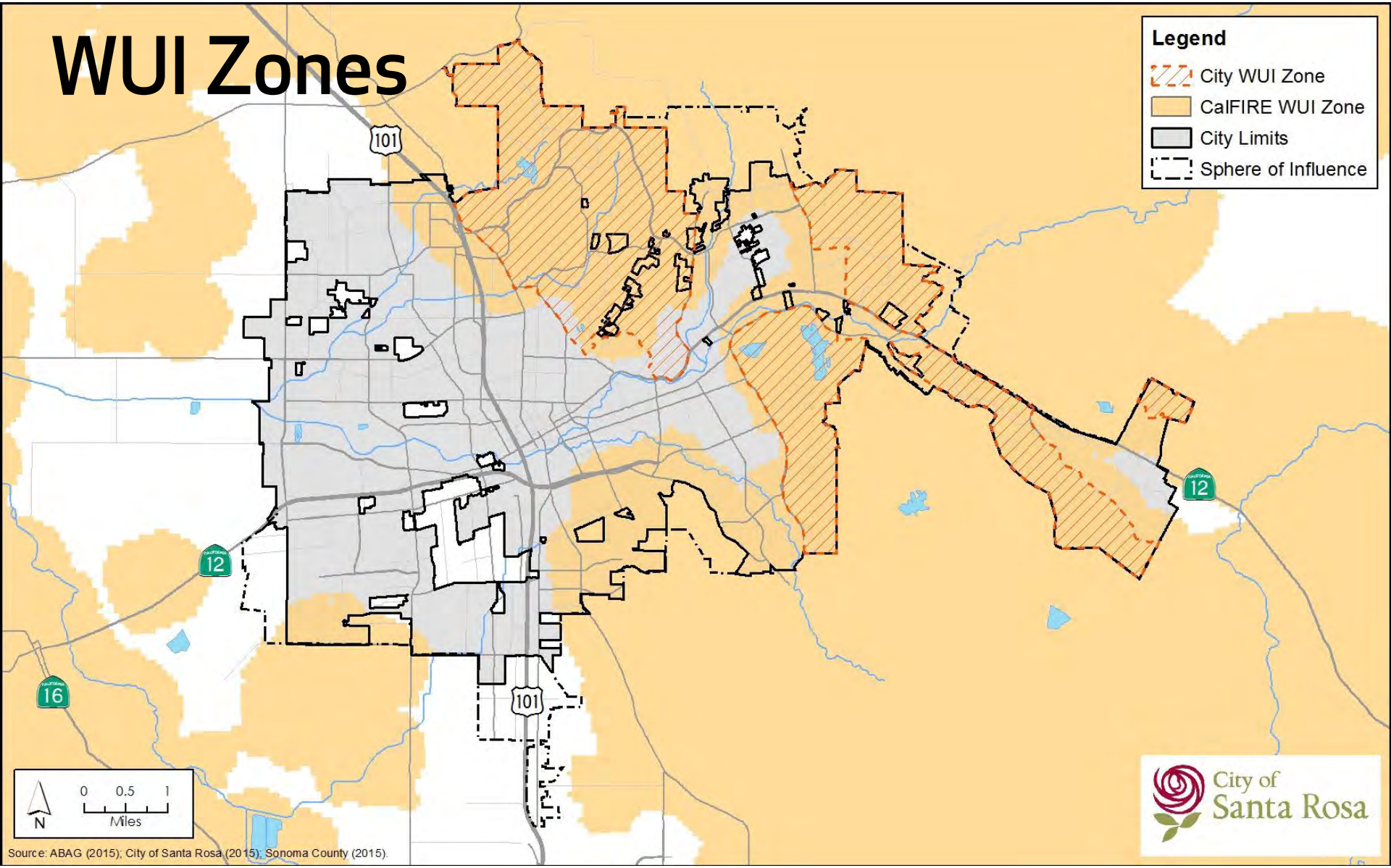
Wildfire

- Location and Extent
  - ~30% of the city, primarily in hillside northeastern residential areas
- Past Occurrences
  - On average 118 wildfires per year in Sonoma County
  - Only 5 local fires recorded since mid-century
- Risk of Future Occurrences
  - High risk within the City Wildland Urban Interface (WUI)
- Climate Change Considerations
  - Higher rates of tree mortality and vegetation changes may increase risk

Historic Fire Perimeters

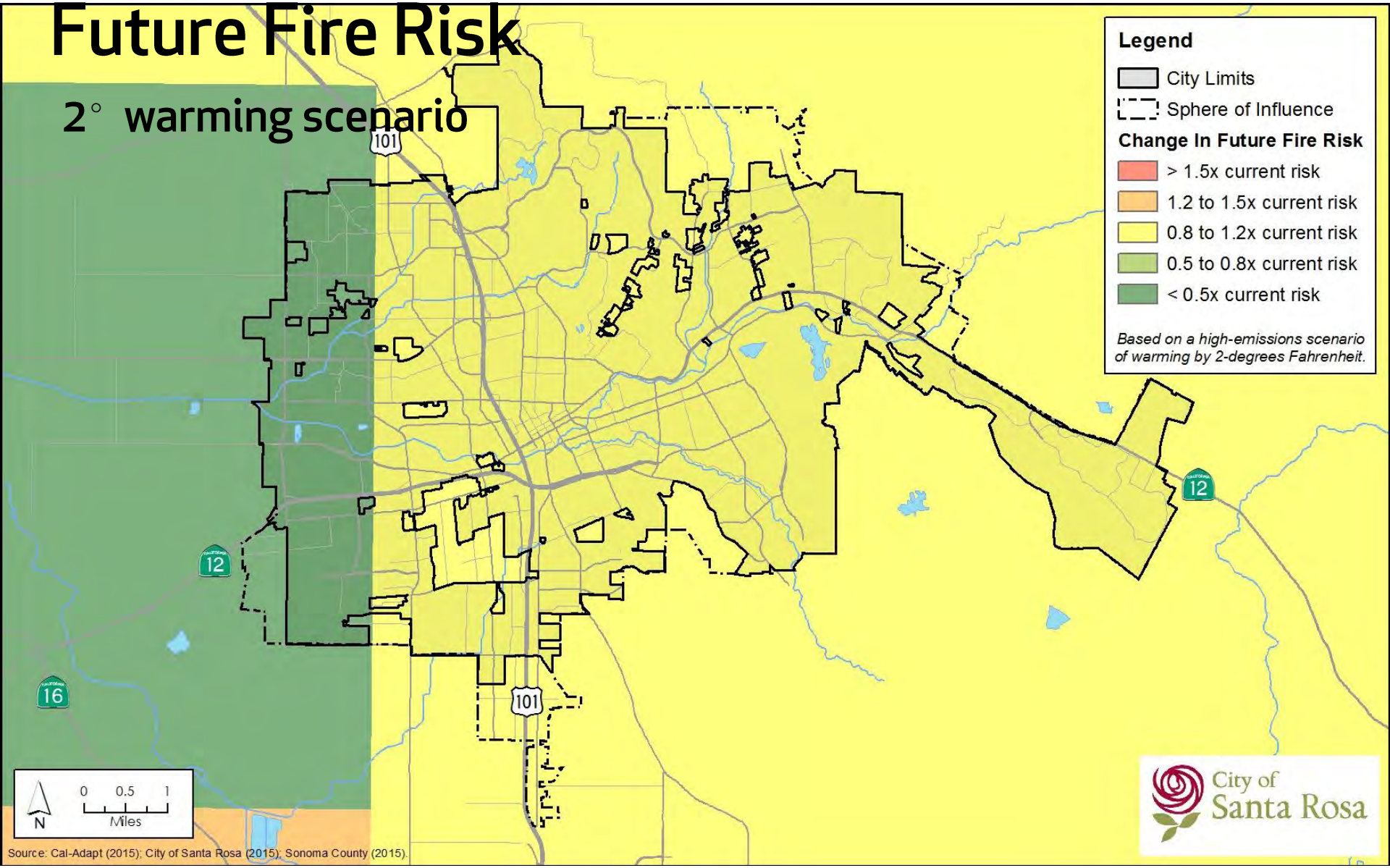


WUI Zones


Legend
City WUI Zone
CalFIRE WUI Zone
City Limits
Sphere of Influence
101
12
16
N
0 0.5 1
Miles
City of
Santa Rosa
Source: ABAG (2015); City of Santa Rosa (2015); Sonoma County (2015).

Future Fire Risk

2° warming scenario

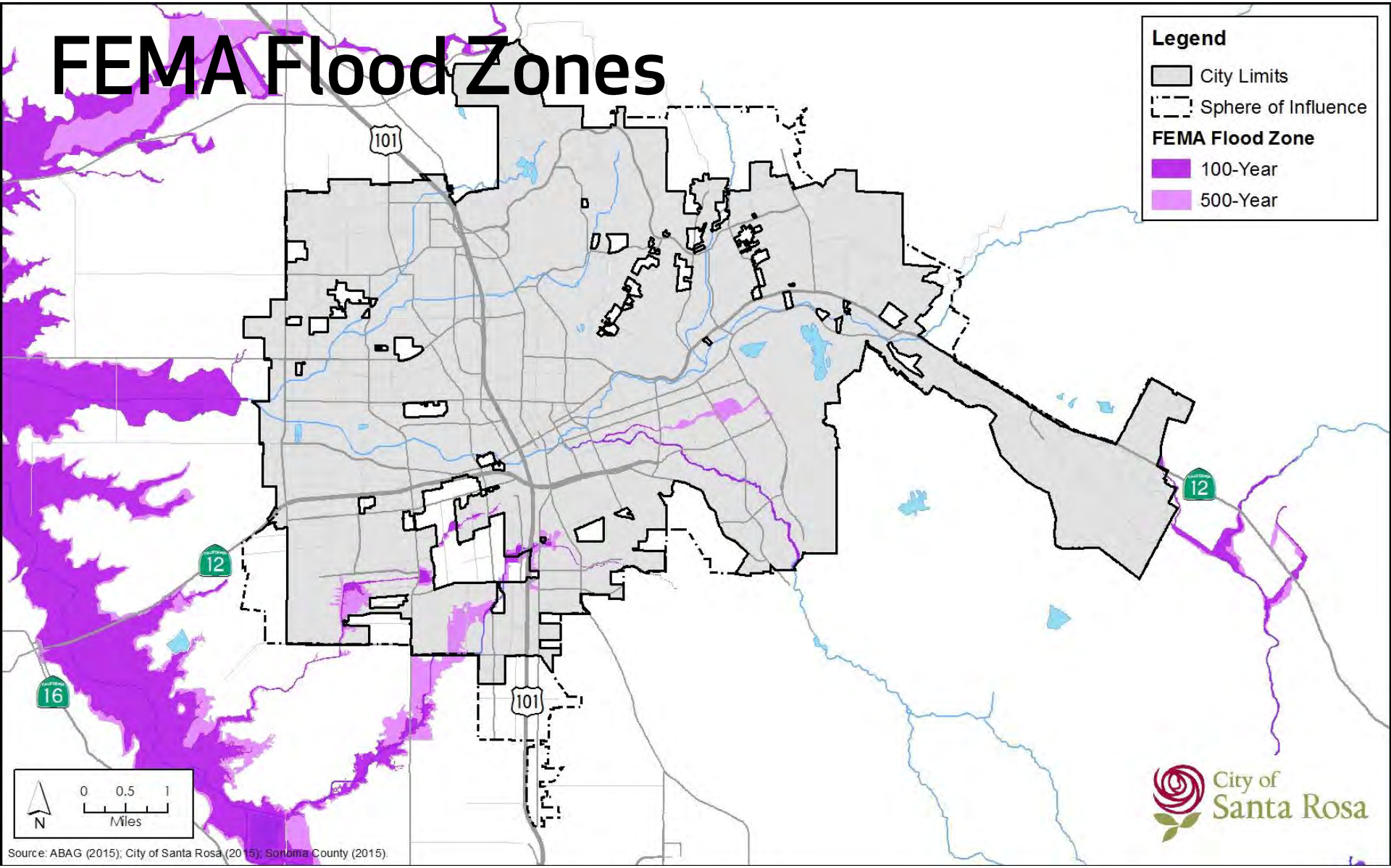


Source: Cal-Adapt (2015); City of Santa Rosa (2015); Sonoma County (2015).

Flooding

- Location and Extent
  - 100- and 500-year flood zones along creeks throughout city
- Past Occurrences
  - 2006 flooding and landslide events in Santa Rosa, with full evacuation of the City's Emergency Operations Center (local data needed)
- Risk of Future Occurrences
  - Flooding can occur during storm events, and more severe storms bring an increased risk
- Climate Change Considerations
  - Higher likelihood of extreme storm events may exacerbate existing flood risk

FEMA Flood Zones

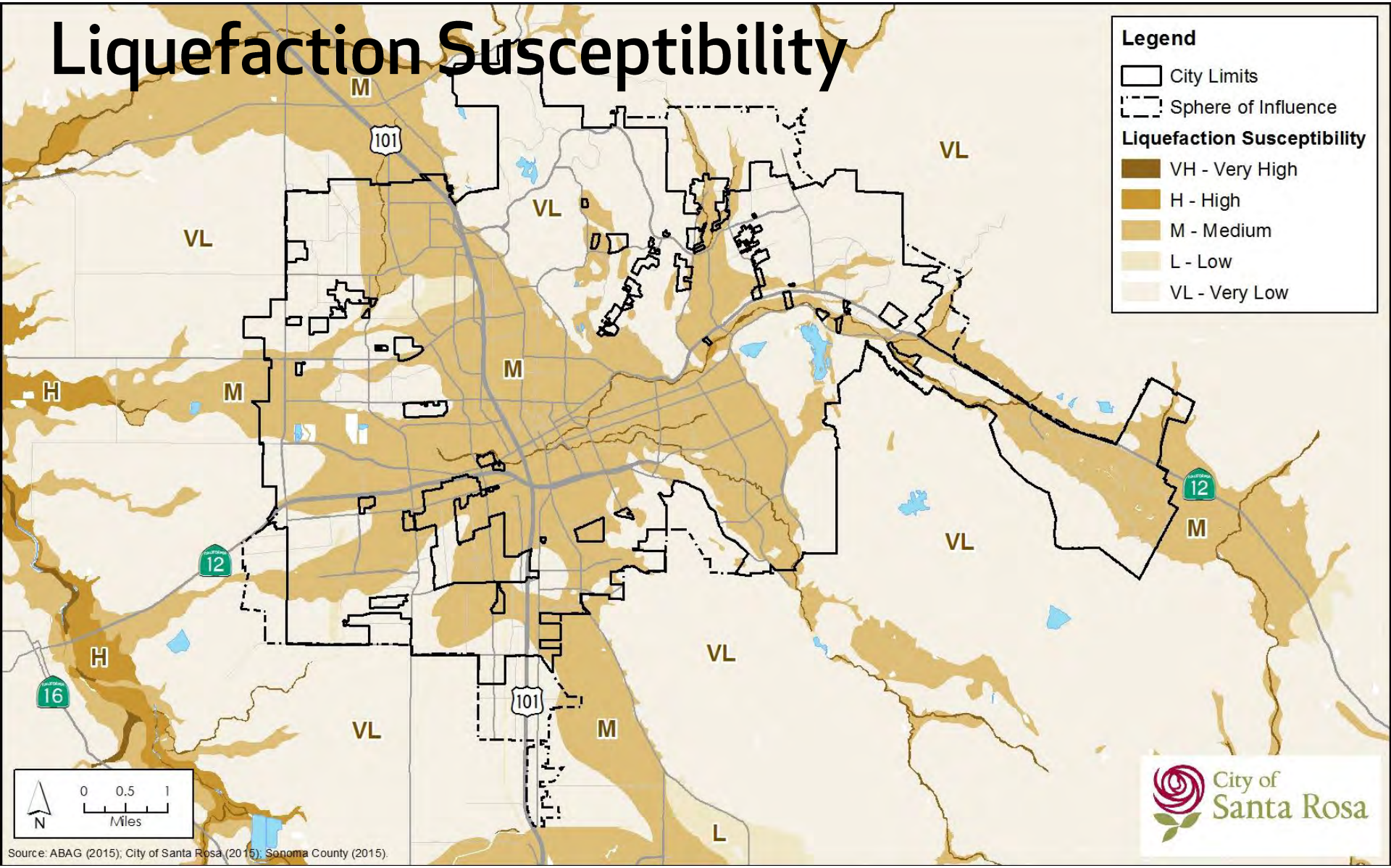


Source: ABAG (2015); City of Santa Rosa (2015); Sonoma County (2015).

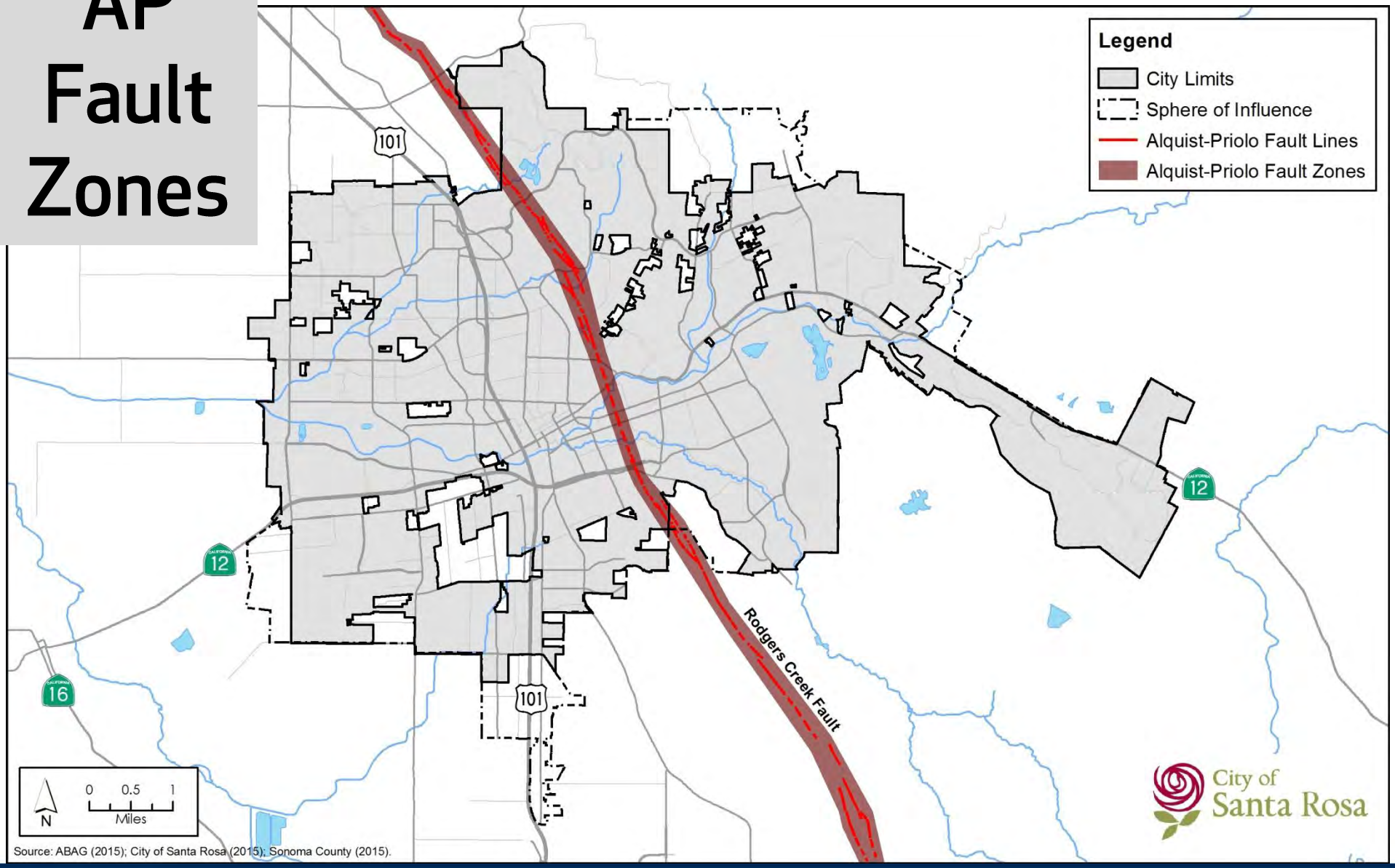
Seismic Hazards

- Location and Extent
  - Active faults run through the city; portions of city are vulnerable to liquefaction
- Past Occurrences
  - No significant occurrences in Sonoma County since 1950
- Risk of Future Occurrences
  - Risk of ground shaking, fault rupture from faults in the area
  - Medium risk of liquefaction
- Climate Change Considerations
  - Not expected to directly impact seismic risks; relationship to liquefaction is unknown at this time

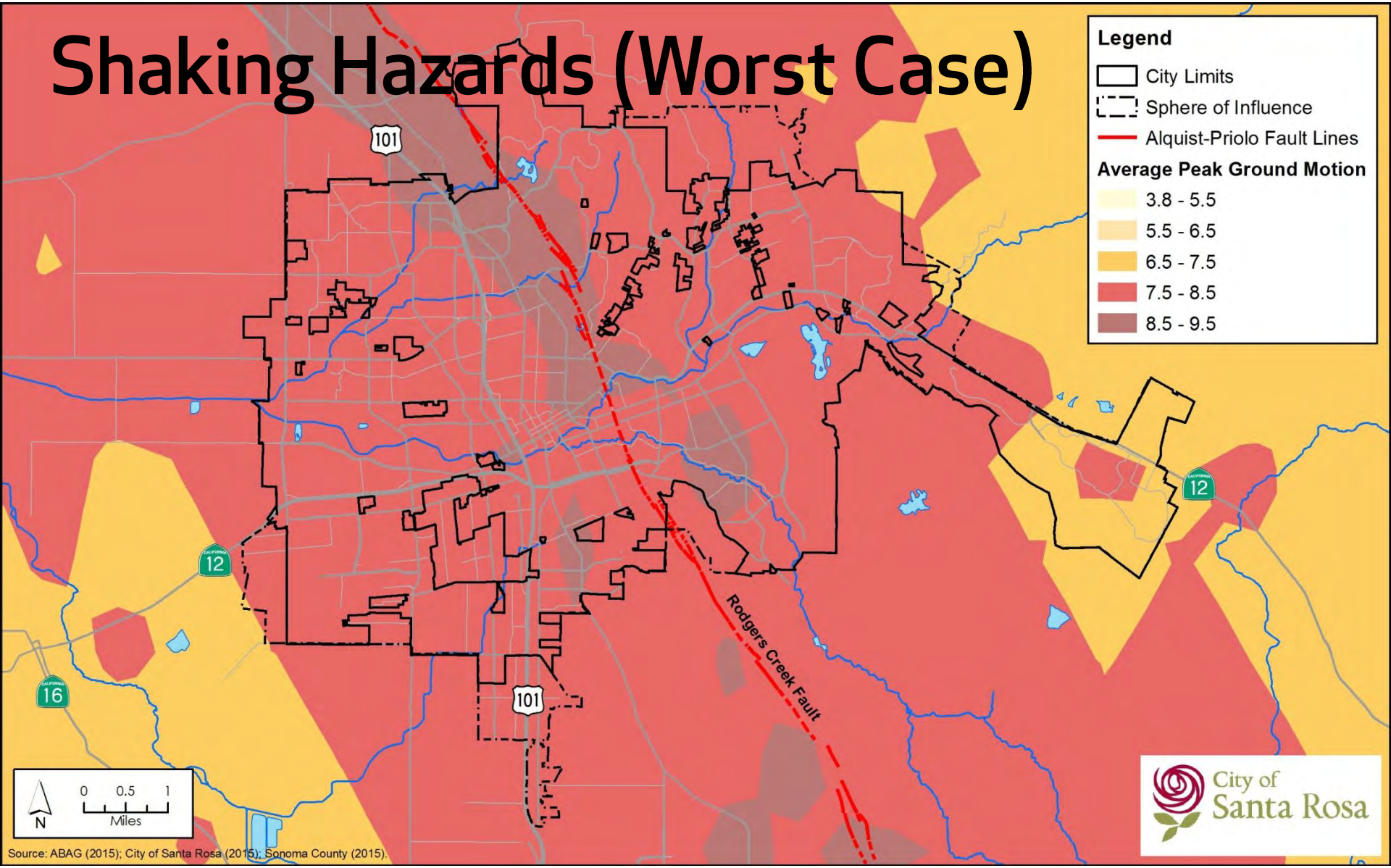
Liquefaction Susceptibility



AP Fault Zones



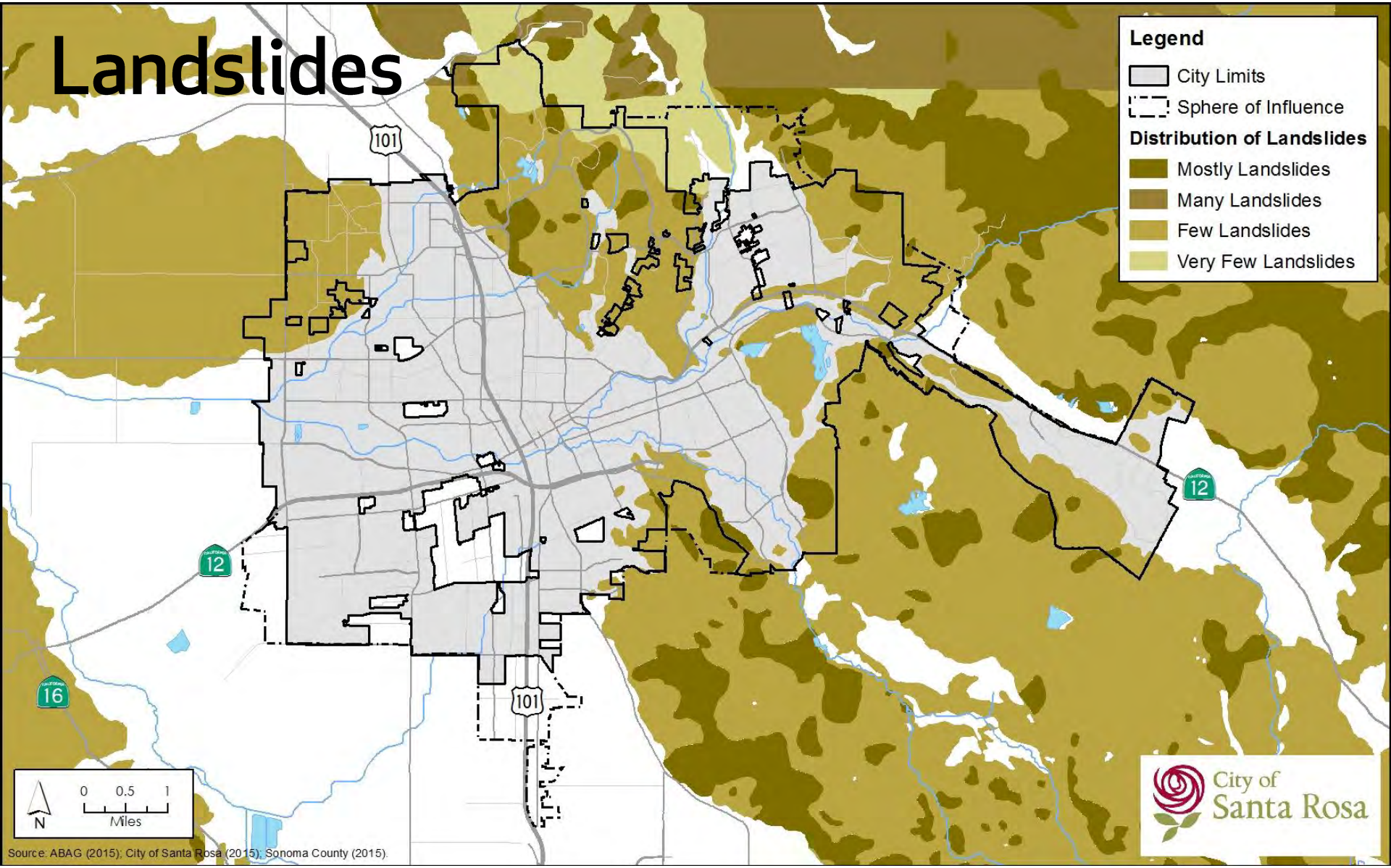
Shaking Hazards (Worst Case)



Landslides

- Location and Extent
  - Majority of city is flat, but potential for events along steep slopes
- Past Occurrences
  - No history of significant occurrences in Santa Rosa, but past events occurred in the Fountaingrove neighborhood and Bennett Valley area, as well as an active slow moving slide in County areas where critical infrastructure is located.
- Risk of Future Occurrences
  - Higher risk in northeastern areas of city and southwestern portions of the County
- Climate Change Considerations
  - Expected to increase frequency and intensity of storms, which could increase risk of rainfall-induced landslides

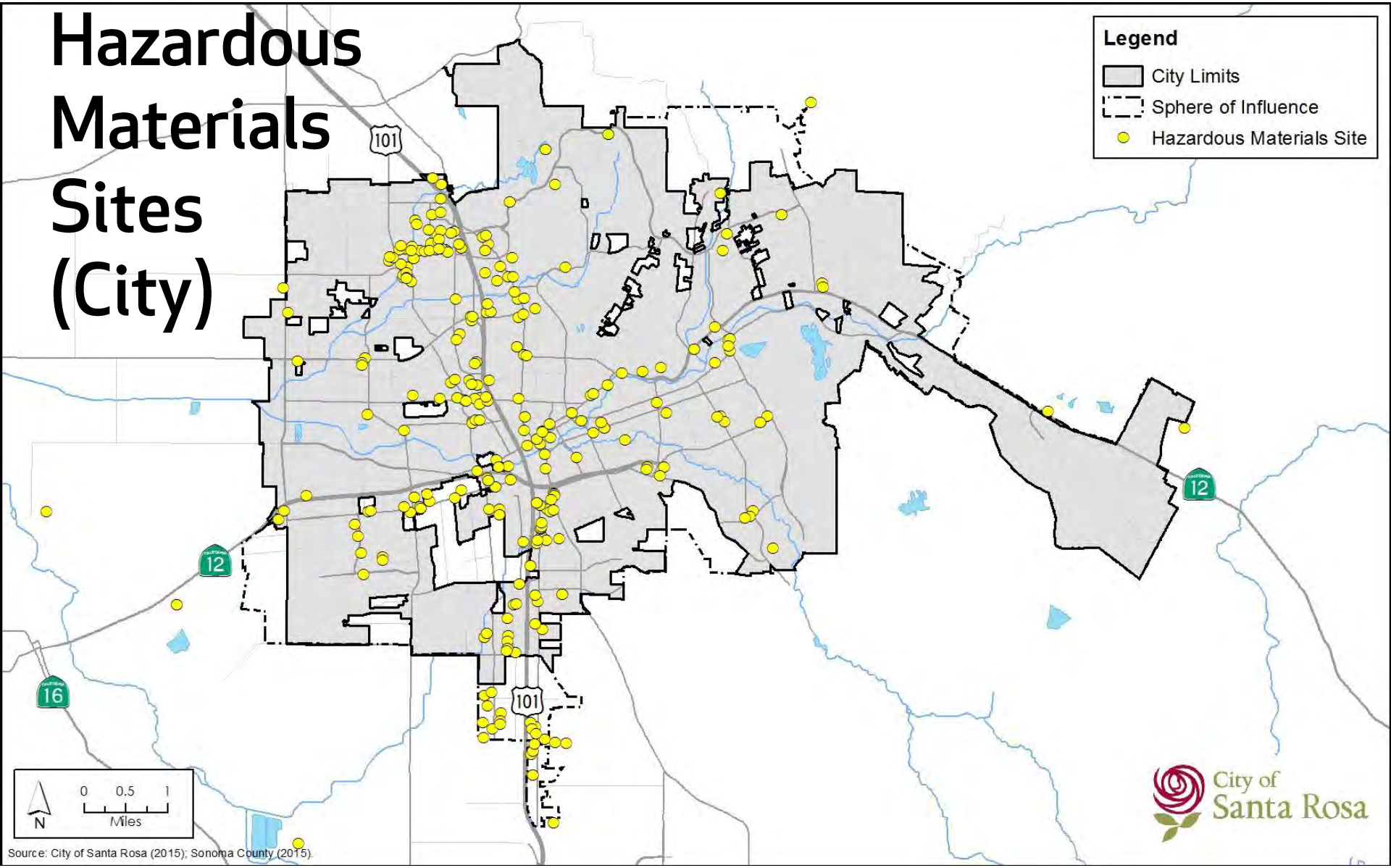
Landslides


Legend
City Limits
Sphere of Influence
Distribution of Landslides
Mostly Landslides
Many Landslides
Few Landslides
Very Few Landslides
101
12
16
N
0 0.5 1
Miles
City of Santa Rosa
Source: ABAG (2015); City of Santa Rosa (2015); Sonoma County (2015).

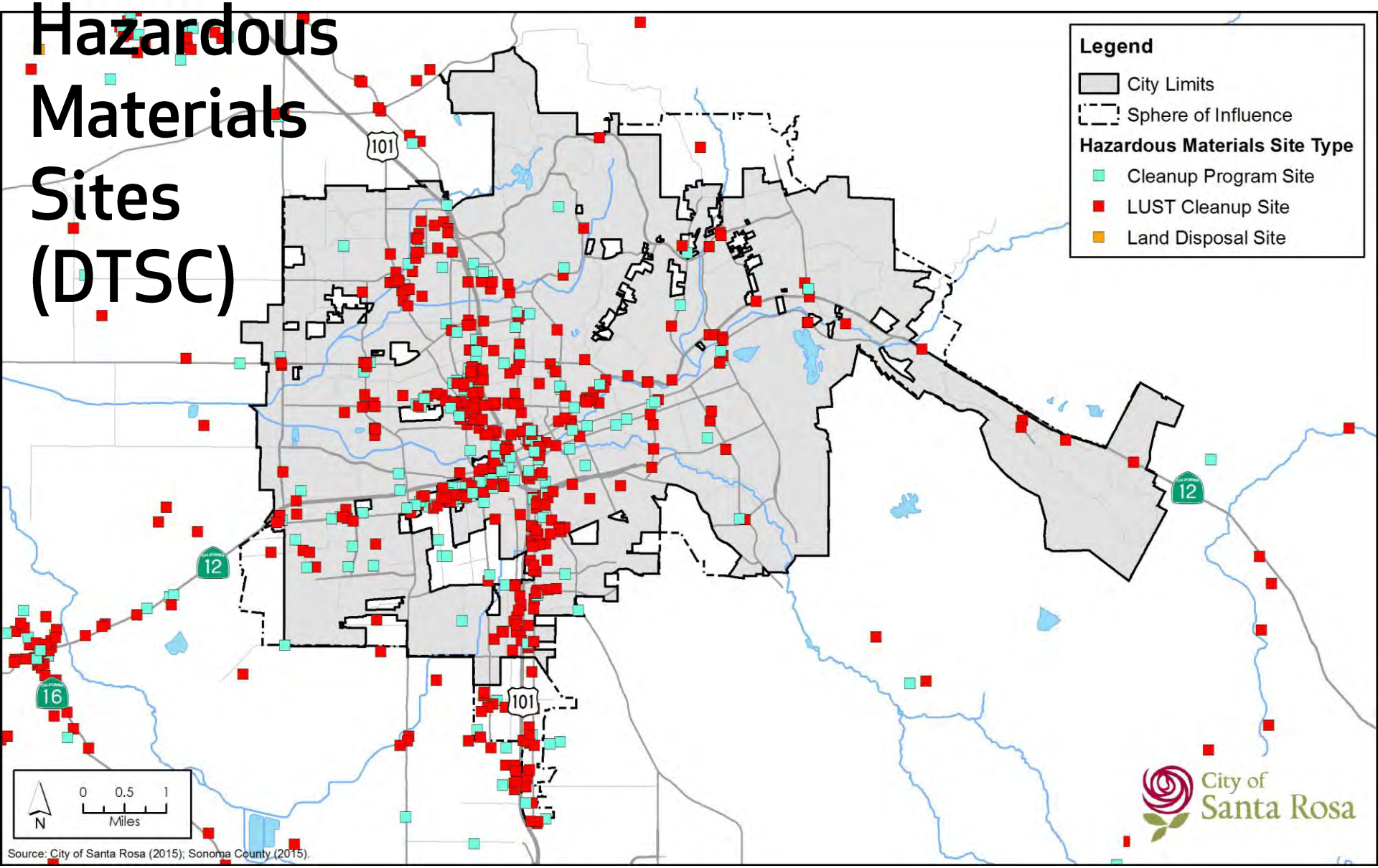
Hazardous Materials

- Location and Extent
  - Potential exposure from small facilities, Highway 101, and railway activity
  - 650 sites in the city with underground storage tanks or similar, although majority have been remediated
- Past Occurrences
  - No history of significant occurrences in Santa Rosa
- Risk of Future Occurrences
  - Potential for transportation-related hazardous material releases from freight or Highway 101
  - Potential for contaminated soil or groundwater from underground storage tanks
- Climate Change Considerations
  - No direct impact, but may increase potential for accidental hazardous material release due to increased frequency and intensity of severe storms or wildfires

Hazardous Materials Sites (City)



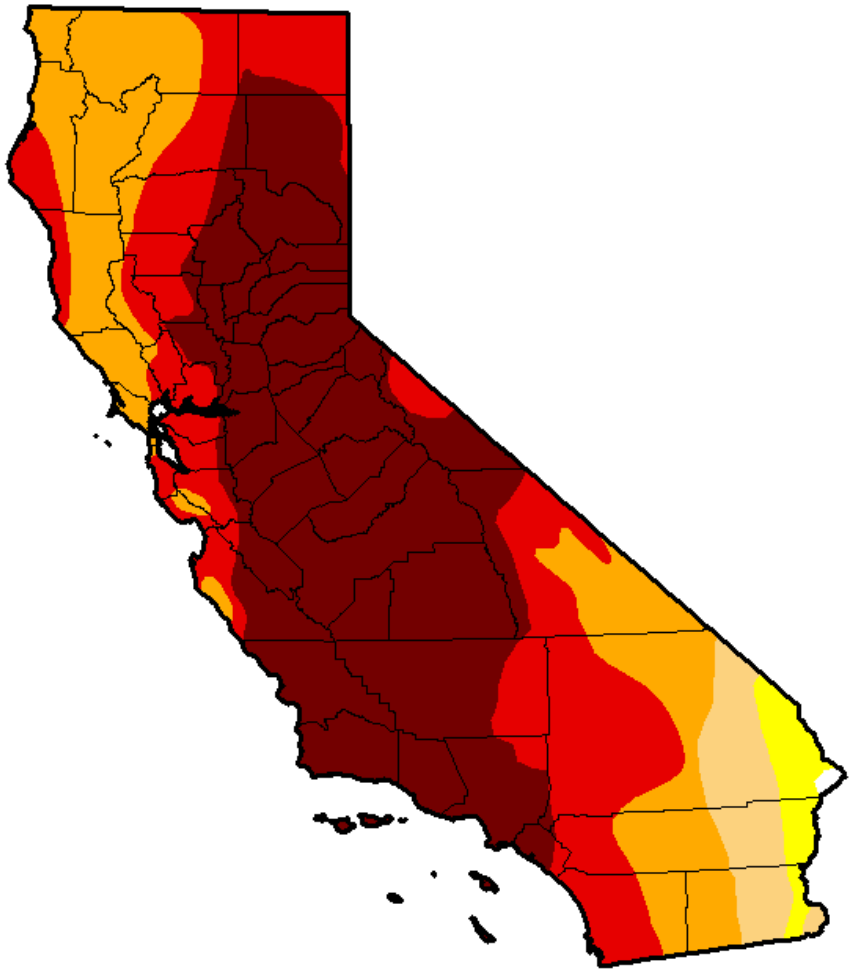
Hazardous Materials Sites (DTSC)



Drought

- Location and Extent
  - Entire city is in severe drought, with 17% of city in extreme drought conditions
- Past Occurrences
  - Three severe multi-year droughts in California since early 1900s, with current drought beginning in 2012
- Risk of Future Occurrences
  - High probability based on prevalence of statewide drought conditions
- Climate Change Considerations
  - City is served entirely by local water sources, and anticipated changes in precipitation may affect availability of water supply from Russian River watershed and groundwater

U.S. Drought Monitor
California



November 17, 2015
(Released Thursday, Nov. 19, 2015)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.14	99.86	97.33	92.26	70.55	44.84
Last Week 11/10/2015	0.14	99.86	97.33	92.27	70.55	44.84
3 Months Ago 8/18/2015	0.14	99.86	97.35	92.36	71.08	46.00
Start of Calendar Year 12/30/2014	0.00	100.00	98.12	94.34	77.94	32.21
Start of Water Year 9/29/2015	0.14	99.86	97.33	92.36	71.08	46.00
One Year Ago 11/18/2014	0.00	100.00	99.72	94.42	79.69	55.08

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Richard Heim
NCEI/NOAA

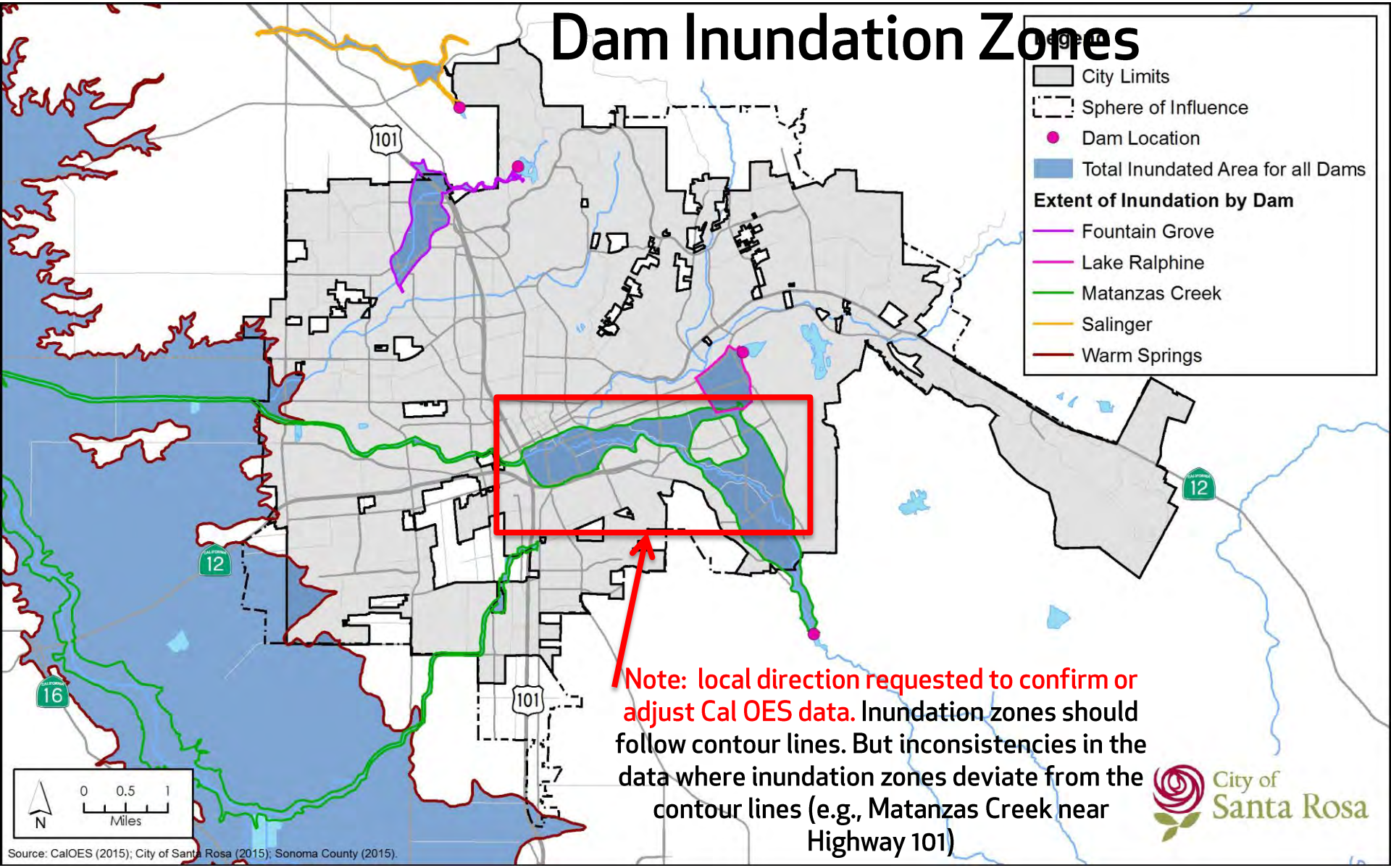
USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

Dam Inundation

- Location and Extent
  - Areas in city are exposed to inundation in event of dam failure
- Past Occurrences
  - No history of dam failure in Santa Rosa or Bay Area
- Risk of Future Occurrences
  - Low probability, but high impact if dam failure occurs
- Climate Change Considerations
  - Indirect impacts on dam inundation may result from increased intensity and frequency of severe storm events and flood occurrences

Dam Inundation Zones



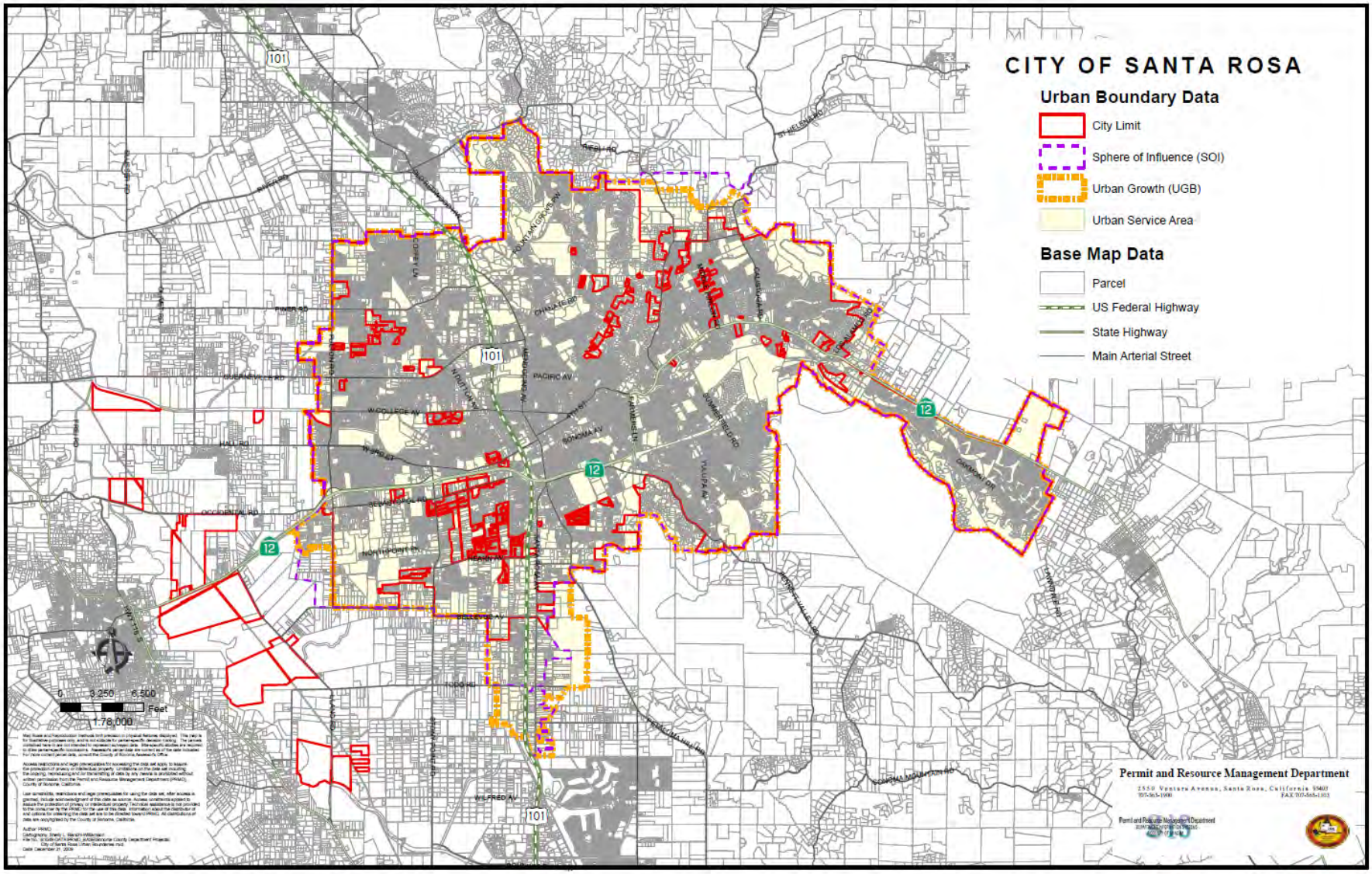
Note: local direction requested to confirm or adjust Cal OES data. Inundation zones should follow contour lines. But inconsistencies in the data where inundation zones deviate from the contour lines (e.g., Matanzas Creek near Highway 101)

City of Santa Rosa

Confirmation of Project Area

- Southwestern parcels are in jurisdictional city boundary, but:
  - Not included in the approved Urban Growth Boundary (UGB)
  - Not included in the approved Urban Service Area
- Considerations for inclusion or exclusion of this area in project analysis?

Sonoma LAFCO – Urban Boundary Data for Santa Rosa



Hazard Prioritization

Hazard Prioritization

- Four criteria [Weightings]
  - Probability (likelihood of occurrence) [2.0]
  - Location (size of potentially affected area) [0.8]
  - Maximum Probable Extent (intensity of damage) [0.7]
  - Secondary Impacts (severity of impacts to community) [0.5]
- A value of 1-4 is assigned for each criteria
- Every criteria has an Importance Score
  - Can be used to weigh the influence of an individual criterion
  - Criteria and Importance values are combined to calculate a Total Score

Hazard Prioritization Example

- Four criteria [Weightings]
  - 3 Probability (likelihood of occurrence) [2.0]
  - 4 Location (size of potentially affected area) [0.8]
  - 2 Maximum Probable Extent (intensity of damage) [0.7]
  - 1 Secondary Impacts (severity of impacts to community) [0.5]

Score Example: Seismic Hazards

Impact

Affected Area Score	Primary Impact Score	Secondary Impact Score
4 (3.2)	2 (1.4)	1 (0.5)

Impact score: 3.2 + 1.4 + 0.5 = 5.1

Total Score

Impact Score	Probability Score
(5.1)	3 (6)

Total Score: 5.1 x 6 = 30.6

Low:	Medium:	High:
0-12	12.1-42	42.1 and up

Next Steps

Timeline

Meeting # 3 - December 17th 11:00am - 1:00pm (Lunch Provided)
Meeting #4 (Service Providers Roundtable) – January 6th 1:00-3:00pm
Meeting #4 (LHMP Team Meeting) – January 6th 3:00-5:00pm

Task	Time Frame
Data Collection, Hazards Profiles, and Risk Assessment	Ongoing - December 2015
Initiate LHMP Planning Team and Public Outreach	December 2015
Administrative Draft LHMP complete	January 2016
Public Review Draft LHMP	February 2016
Draft LHMP submitted to FEMA	March 2016
FEMA review	To be determined
City Council adoption	By June 2016, following FEMA review

Questions/Comments?

Erin Morris: emorris@srcity.org
Matt Dahl: mdahl@srcity.org

Aaron Pfannenstiel: apfannenstiel@mbakerintl.com

Meeting Materials

Santa Rosa Local Hazard Mitigation Plan Update

Planning Team

Meeting 3: December 17, 2015

Included Materials

- Sign-In Sheet
- Presentation

LHMP Team Meeting 3 Sign-In Sheet

City of Santa Rosa

Local Hazard Mitigation Planning Team

Meeting # 3 - December 17, 2015

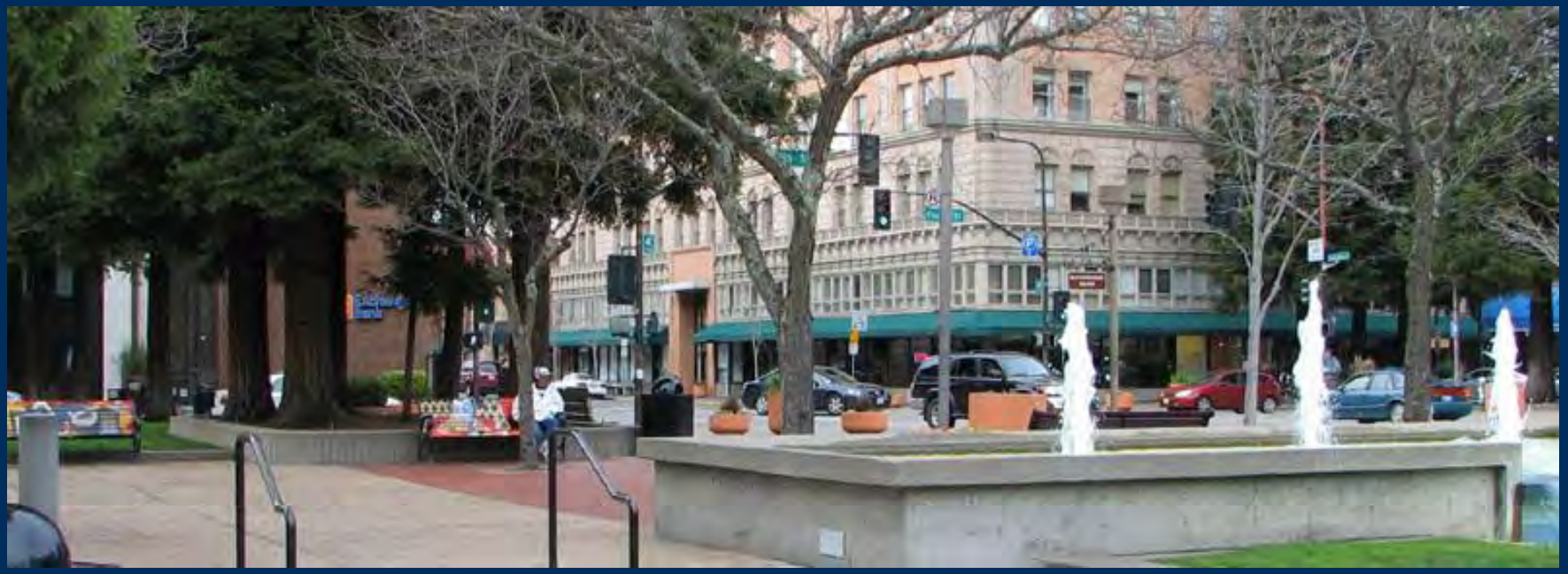
Sign-In Sheet

Name	Department/Company	Please Check if in Attendance	Telephone (if new or changed)	Email (if new or changed)
Alan Alton	Finance			
Erin Morris	Planning and Economic Development	✓		
John Cregan	Santa Rosa Police	✓		
Lisa Kranz	Planning and Economic Development			
Lori Urbanek	Water	✓		
Mark Armstrong	Rec & Parks			
Matt Dahl	Fire Department	✓		
Mike Enright	Planning and Economic Development	✓		

Name	Department/Company	Please Check if in Attendance	Telephone (if new or changed)	Email (if new or changed)
Mike Hargreaves	IT – GIS	✓		
Nancy Gornowicz	Housing and Community Services	✓		
Nathan Barnett	Risk Management			
Neil Bergman	SRFD – Emergency Prep	✓		
Rita Miller	City - Water			
Ron Simi	Public Works	✓		
Rocky Vogler	Water	✓		
Paul Lowenthal	Fire	✓		

Michael Baker
INTERNATIONAL

We Make a Difference



City of Santa Rosa

Local Hazard Mitigation Plan Team Meeting #3

December 17, 2015

Meeting Objectives

- Review draft vulnerability/risk assessment
- Reiterate mitigation goals for project
- Discuss potential mitigation activities

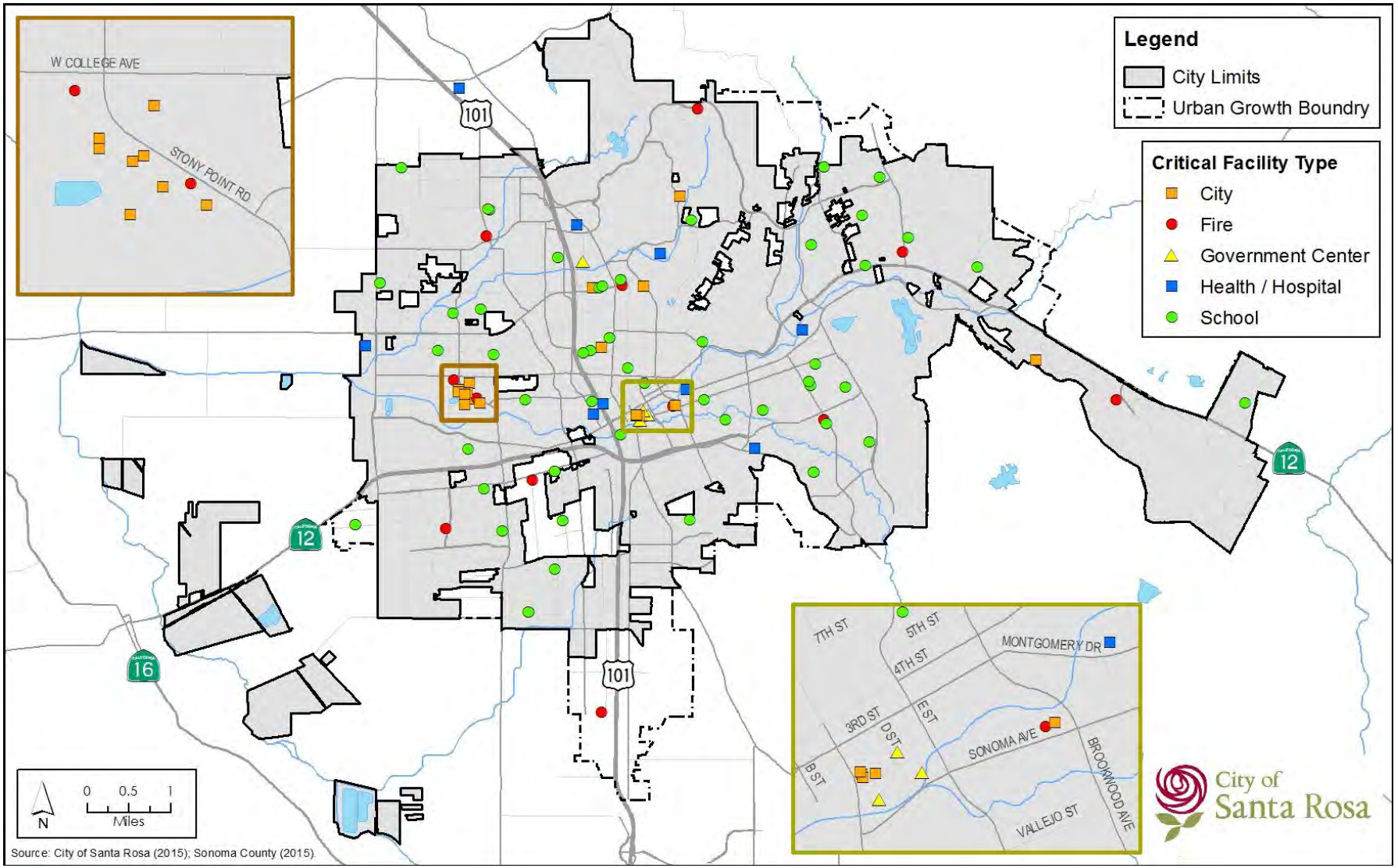
Michael Baker
INTERNATIONAL

City of Santa Rosa
Vulnerability & Risk Assessment

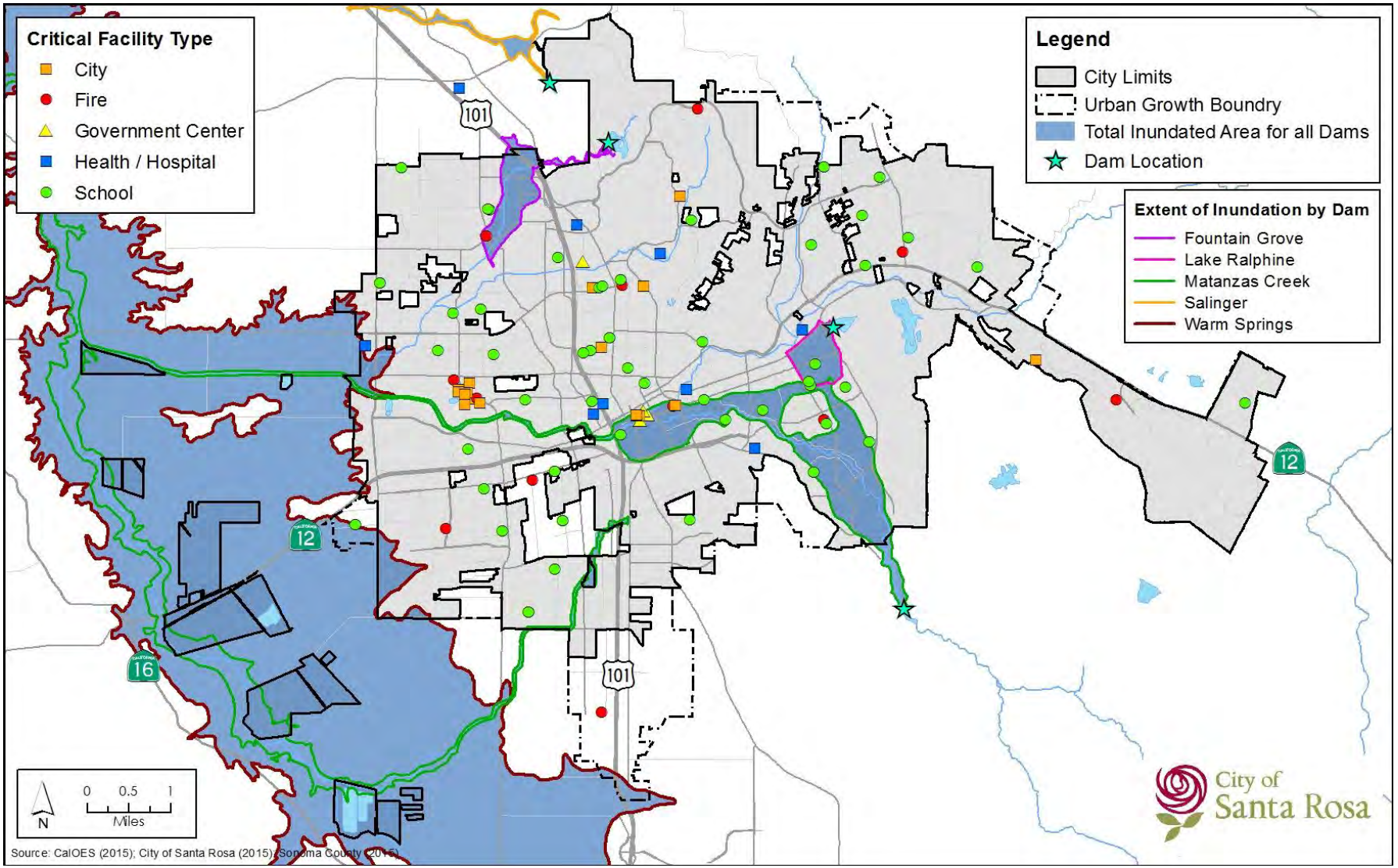
Vulnerability & Risk Assessment Method

- Quantitative assessment of how each hazard affects the city.
- Identifies the following for each hazard area:
  - Land area (portion of city affected by hazard)
  - Critical facilities

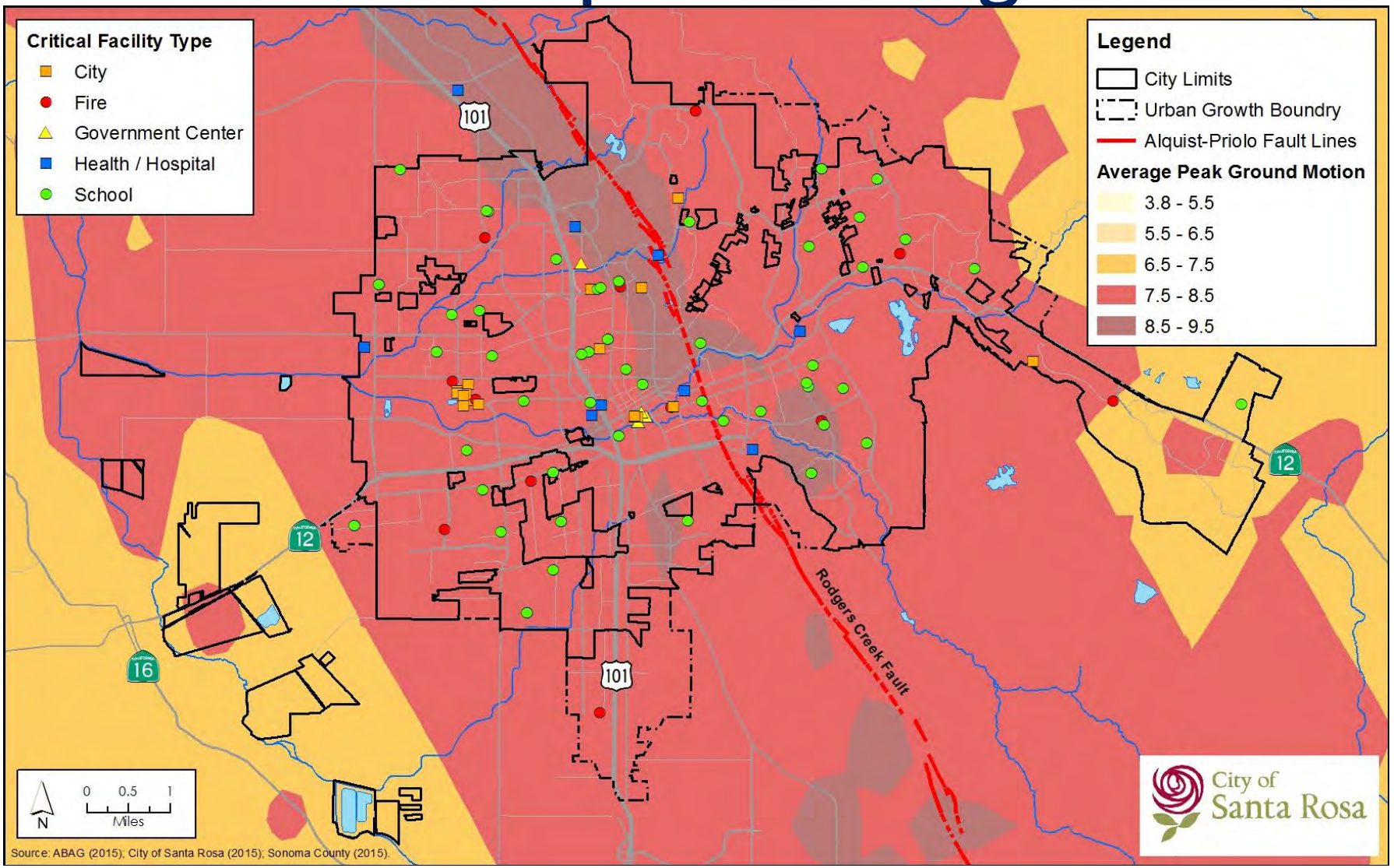
Critical Facilities



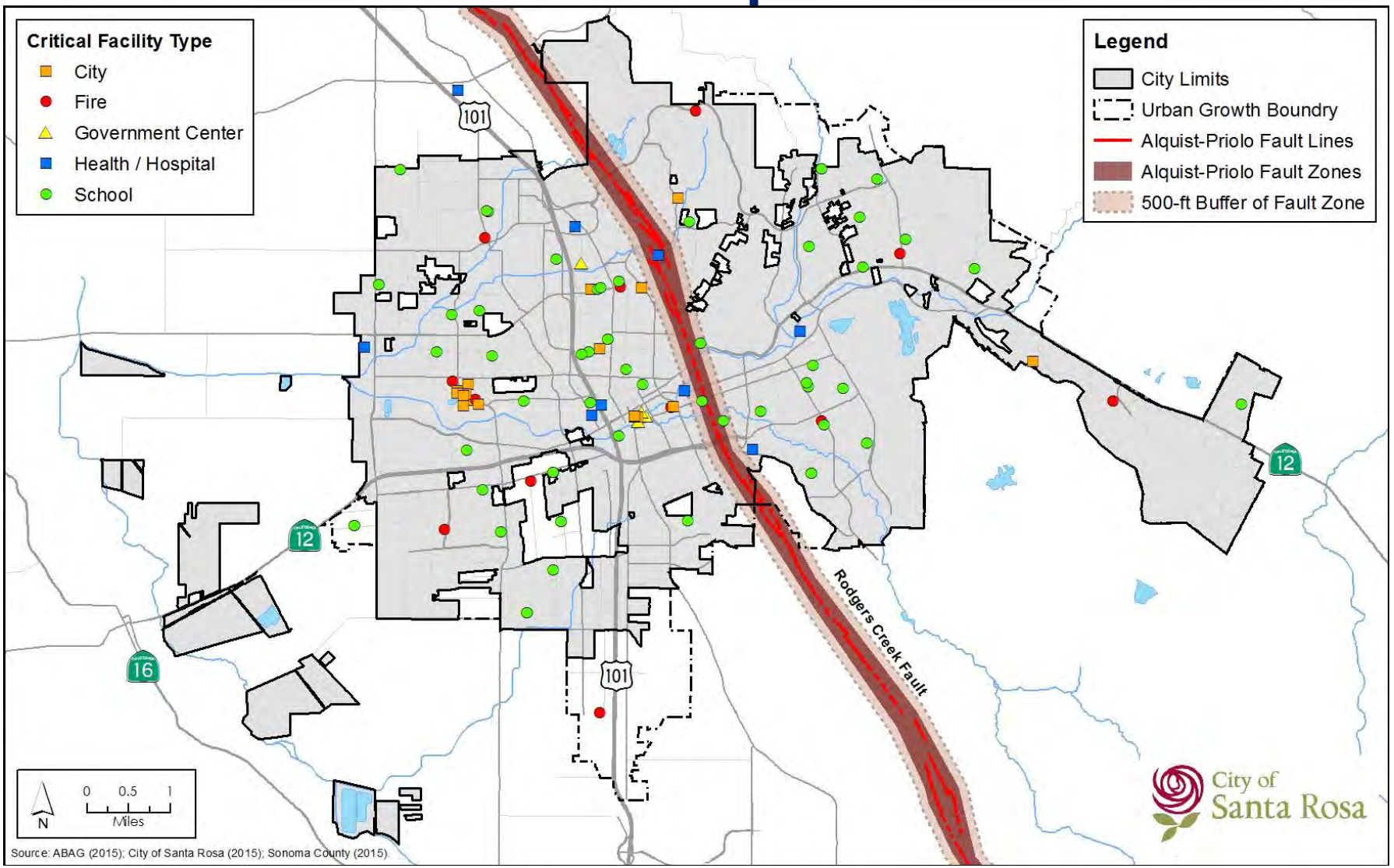
Dam Inundation



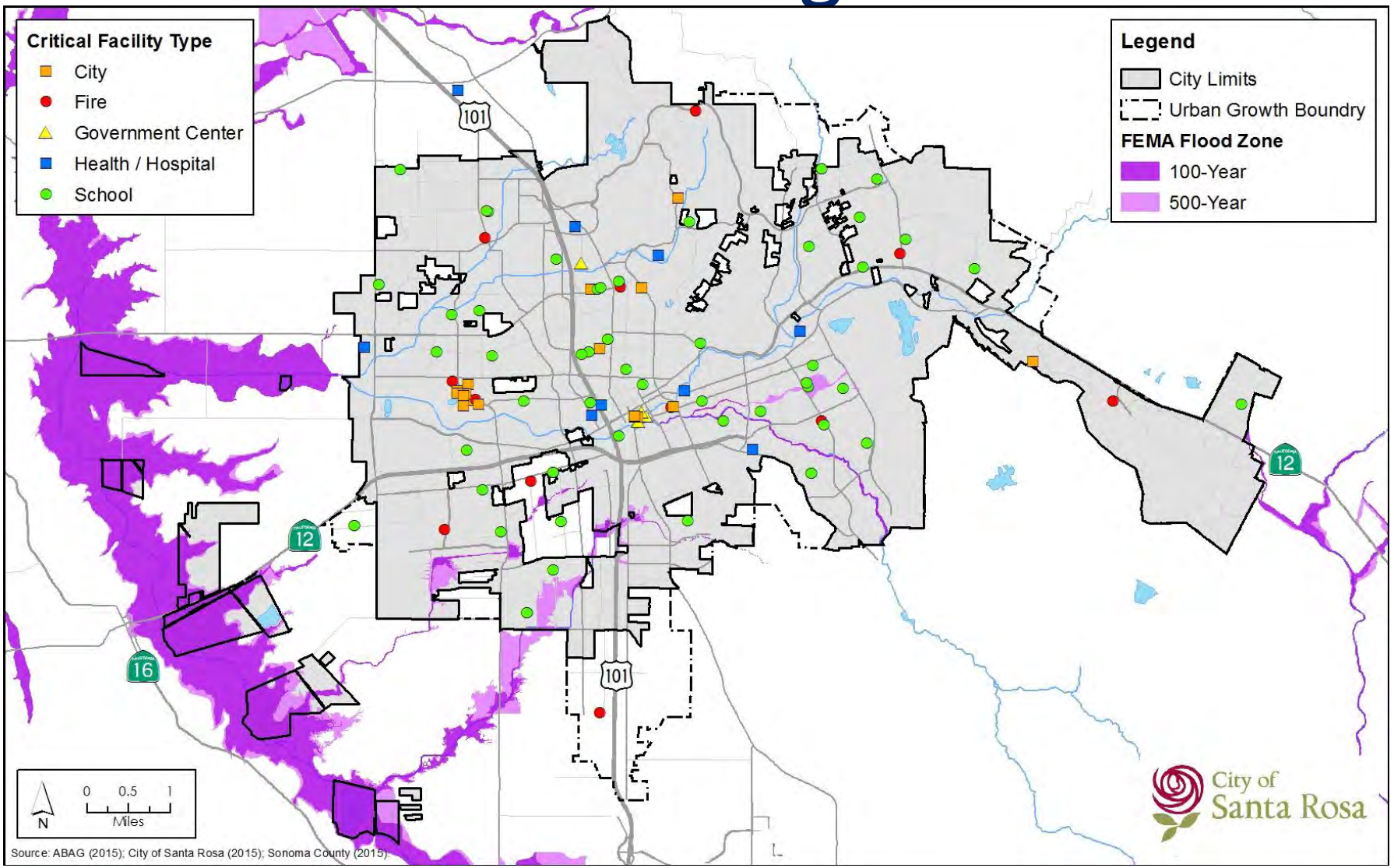
Earthquake Shaking



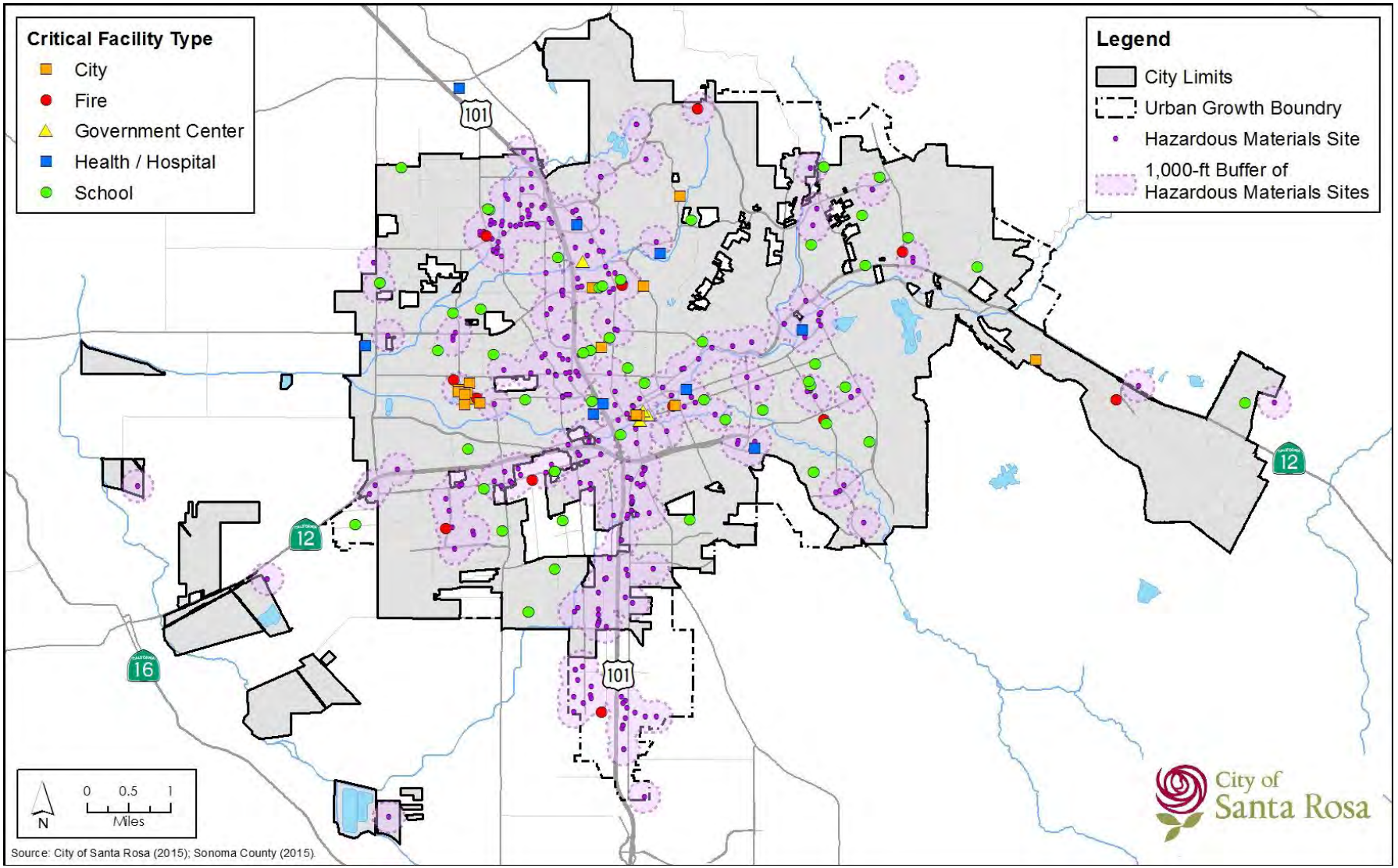
Fault Rupture



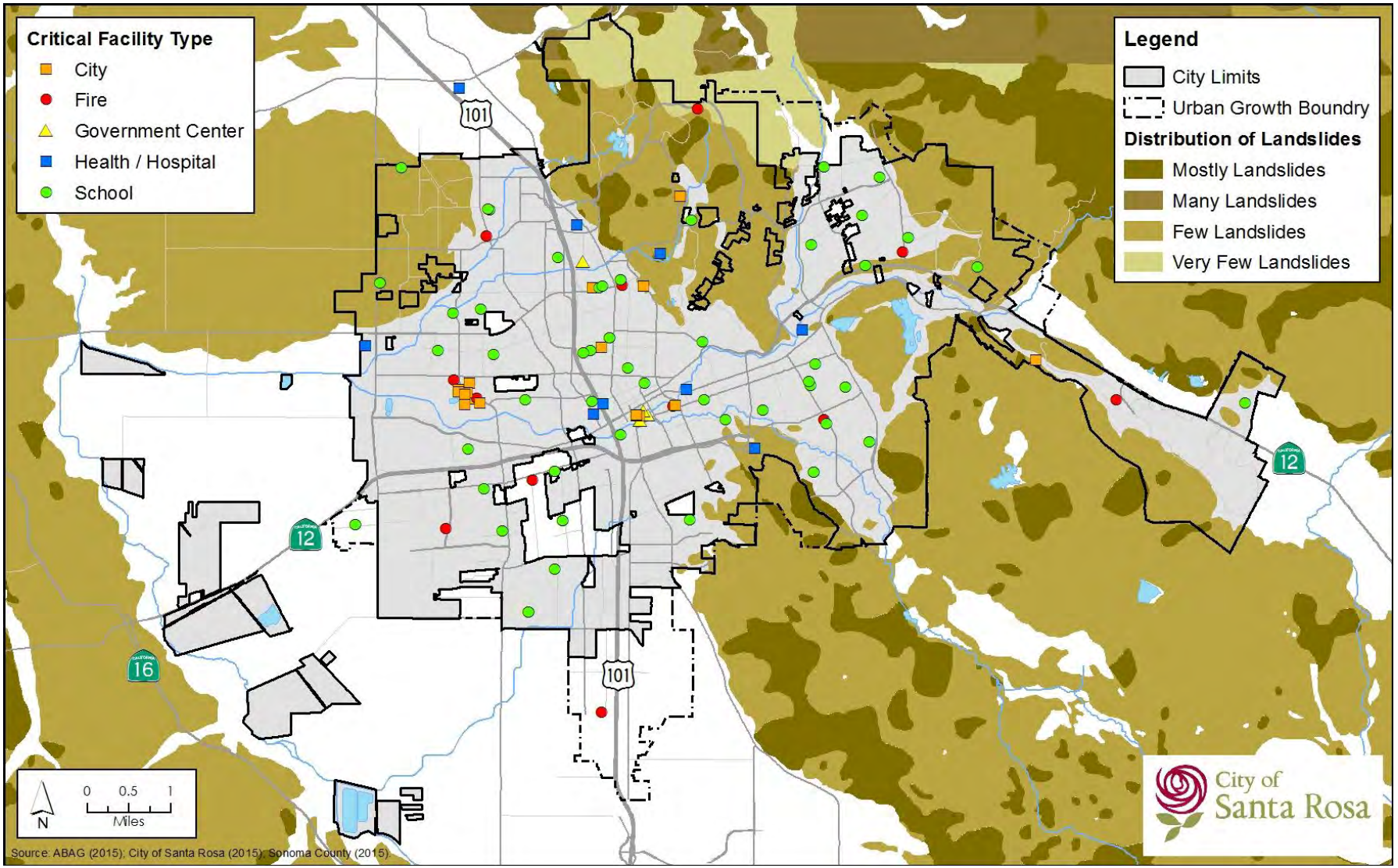
Flooding


Critical Facility Type
City
Fire
Government Center
Health / Hospital
School
Legend
City Limits
Urban Growth Boundry
FEMA Flood Zone
100-Year
500-Year
101
12
16
N
0 0.5 1
Miles
Source: ABAG (2015); City of Santa Rosa (2015); Sonoma County (2015)
City of Santa Rosa

Hazardous Materials



Landslides


Critical Facility Type
City
Fire
Government Center
Health / Hospital
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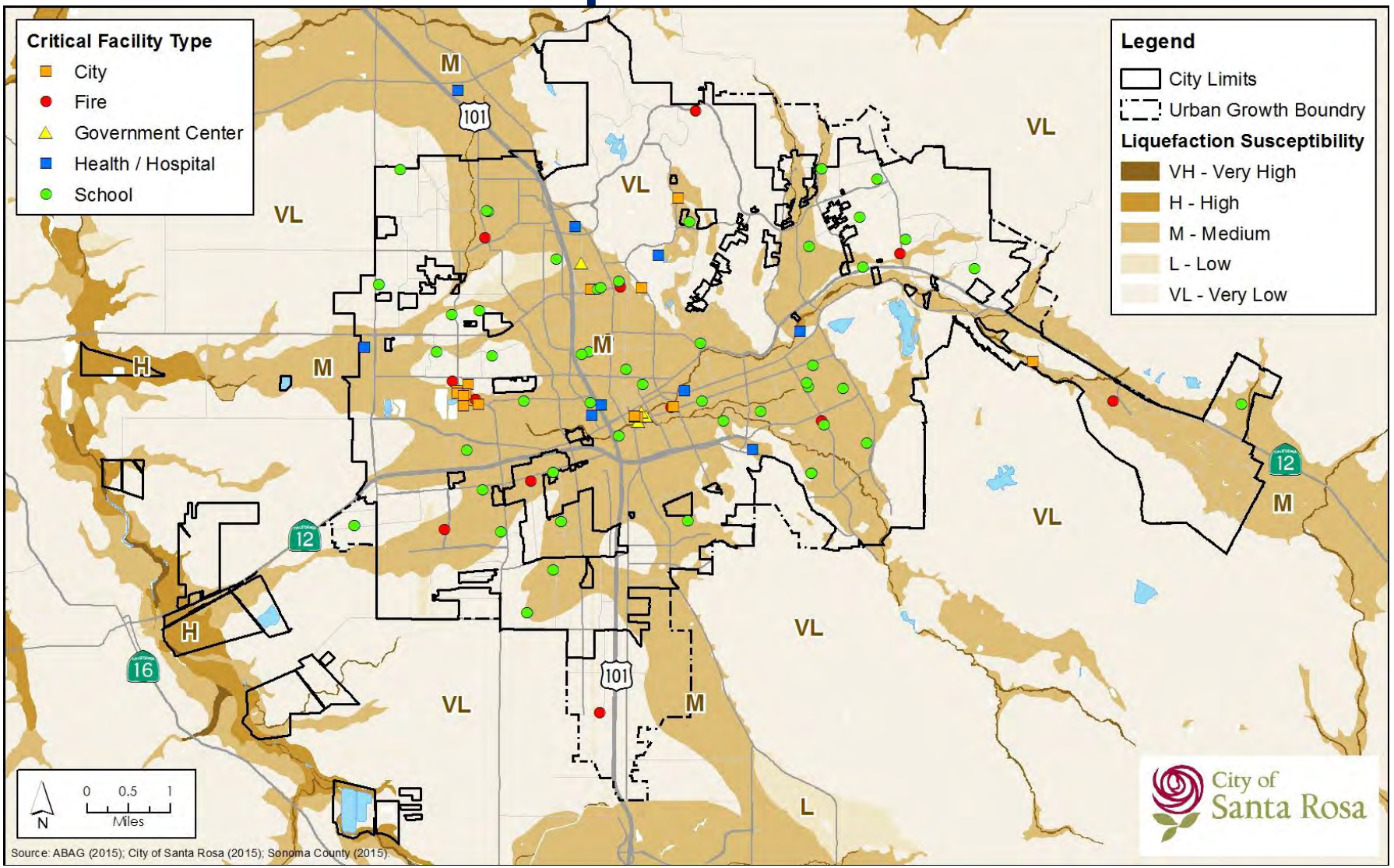
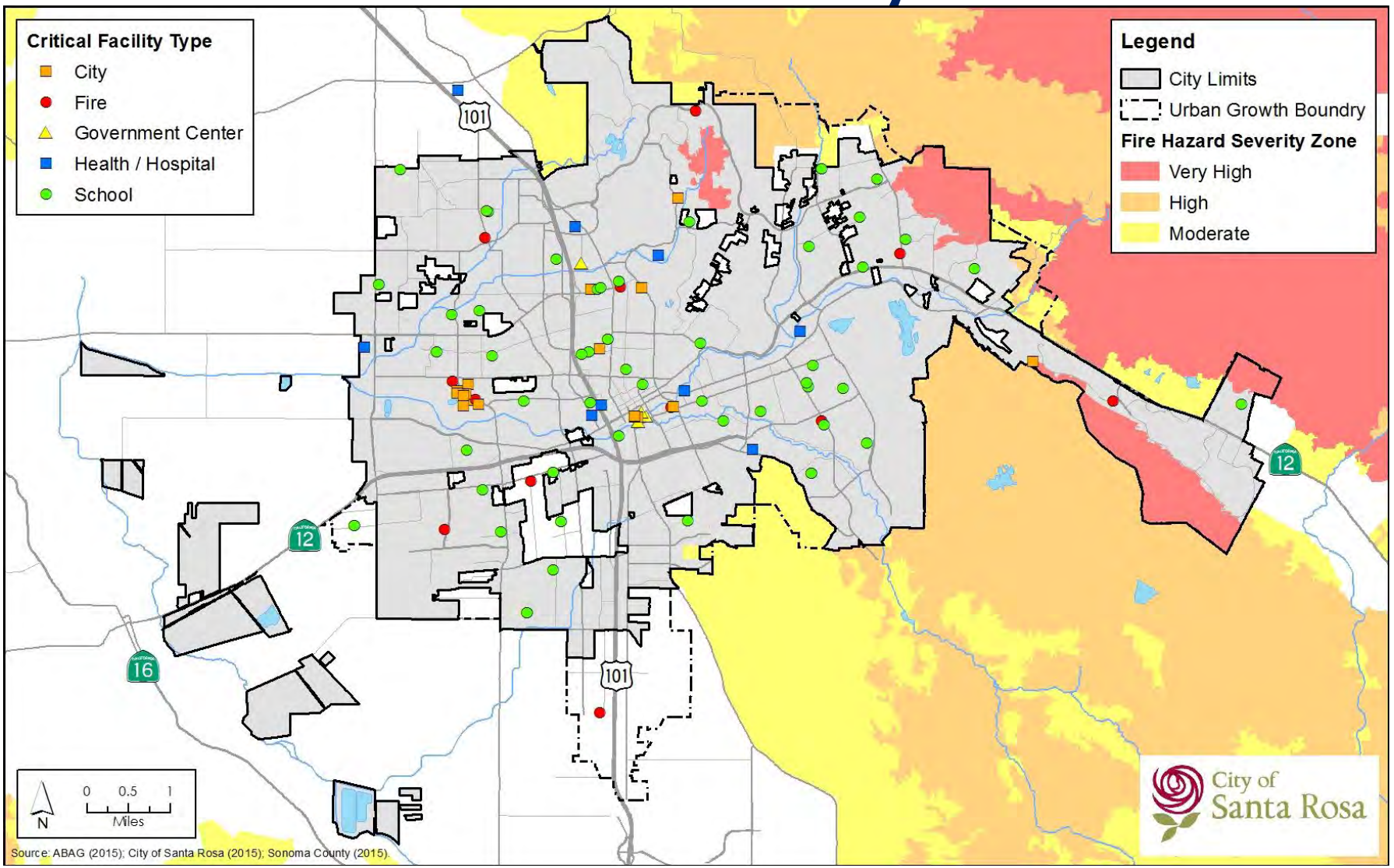
Legend
City Limits
Urban Growth Boundry
Distribution of Landslides
Mostly Landslides
Many Landslides
Few Landslides
Very Few Landslides
101
12
16
N
0 0.5 1
Miles
City of Santa Rosa
Source: ABAG (2015); City of Santa Rosa (2015); Sonoma County (2015)

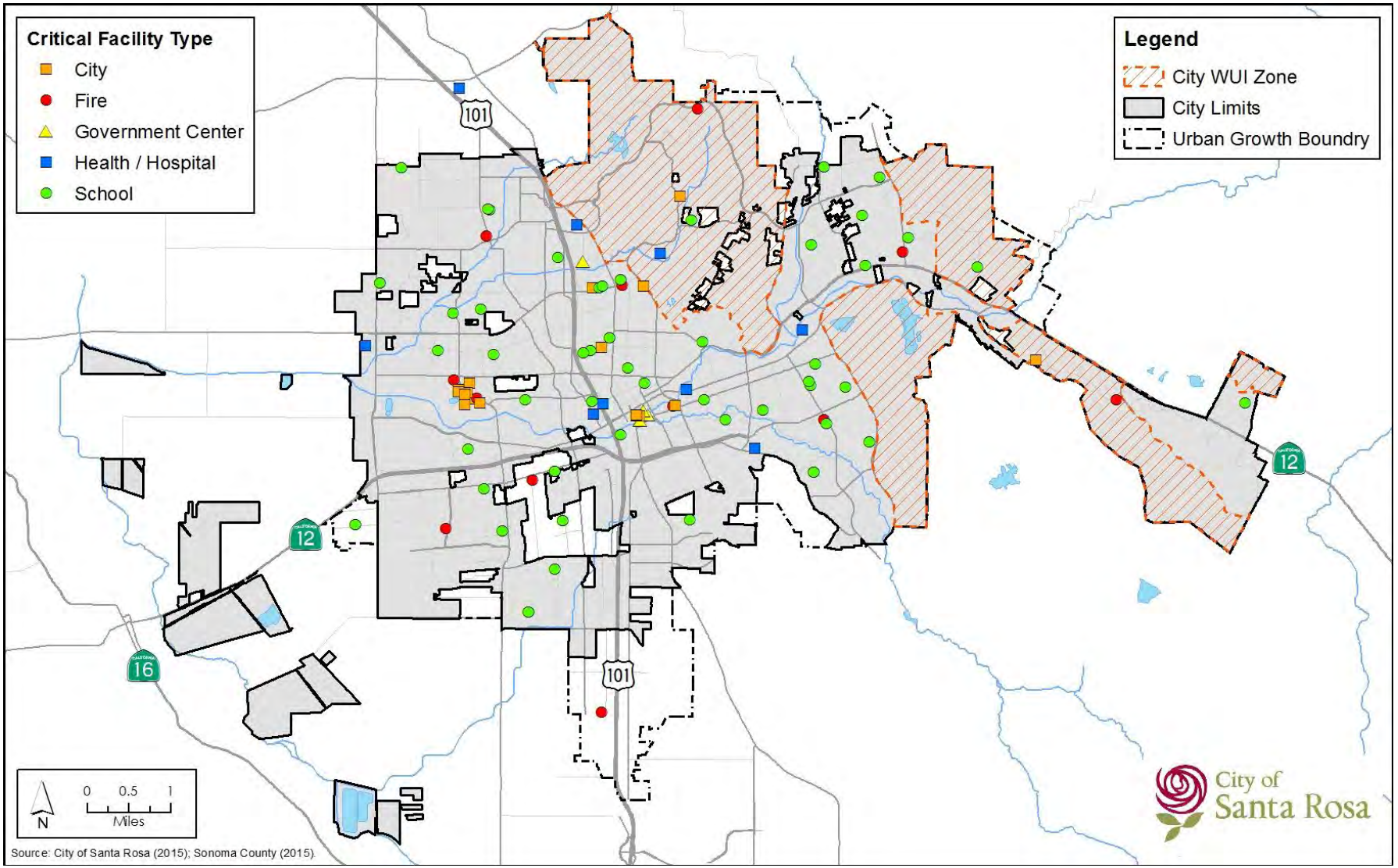
Liquefaction



Fire Hazard Severity Zones



City of Santa Rosa Wildland-Urban Interface



Risk Assessment Findings

Hazard	Number of Critical Facilities Impacted	% of Critical Facilities Impacted
Dam Inundation	17	15%
Earthquake Shaking	101	90%
Fault Rupture	4	4%
Flooding	2	2%
Hazardous Materials	56	50%
Landslides	12	11%
Liquefaction	101	90%
Fire Hazard Severity Zones	0	0%
City WUI Fire Zones	7	6%

Risk Assessment Findings (continued)

Hazard	Population Impacted	% of Total Population Affected	Households impacted with income below poverty level	% Households impacted with income below poverty level
Dam Inundation	14,807	8%	477	6%
Earthquake Shaking	184,823	100%	8,123	100%
Fault Rupture	5,843	3%	154	2%
Flooding	1,408	1%	48	1%
Hazardous Materials	58,799	32%	3,162	39%
Landslides	33,726	18%	767	9%
Liquefaction	184,379	100%	8,110	100%
Fire Hazard Severity Zones	2,960	2%	53	1%
City WUI Fire Zones	20,815	11%	322	4%

Risk Assessment Findings (continued)

Hazard	Housing Units Impacted	% of Total Housing Units Impacted	Square Miles Impacted	% of Total Land Impacted
Dam Inundation	6,137	9%	3.64	8%
Earthquake Shaking	72,100	100%	45.51	100%
Fault Rupture	2,610	4%	2.26	5%
Flooding	534	1%	0.71	2%
Hazardous Materials	23,592	33%	11.74	26%
Landslides	14,121	20%	15.66	34%
Liquefaction	71,934	100%	45.19	99%
Fire Hazard Severity Zones	1,450	2%	2.58	6%
City WUI Fire Zones	9,394	13%	12.50	27%

City of Santa Rosa Mitigation Goals

Mitigation Goals

- Provides a desired end state that occurs as a result of the plan
- Provides a framework to organize and identify hazard mitigation projects

Mitigation Goals

1. Implement the Local Hazard Mitigation Plan to better prepare Santa Rosa for disaster
2. Prohibit development in high-risk geologic and seismic hazard areas to avoid exposure to seismic and geologic hazards
3. Minimize hazards associated with storm flooding
4. Minimize the potential for wildland fires.
5. Prepare for climate changes.

Mitigation Goals

6. Provide for the safety of Santa Rosa citizens by maintaining efficient, well-trained, and adequately equipped police and fire personnel
7. Require erosion and sedimentation control measures to maintain an operational drainage system, preserve drainage capacity, and protect water quality
8. Maintain and enhance a disaster-resistant region by reducing the potential for loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters
9. Reduce the number of public and private buildings within the City that are vulnerable to the effects of earthquakes, flooding, wildfire, and landslides

City of Santa Rosa
Draft Mitigation Actions

Draft Mitigation Actions

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

Sample Mitigation Action Organization

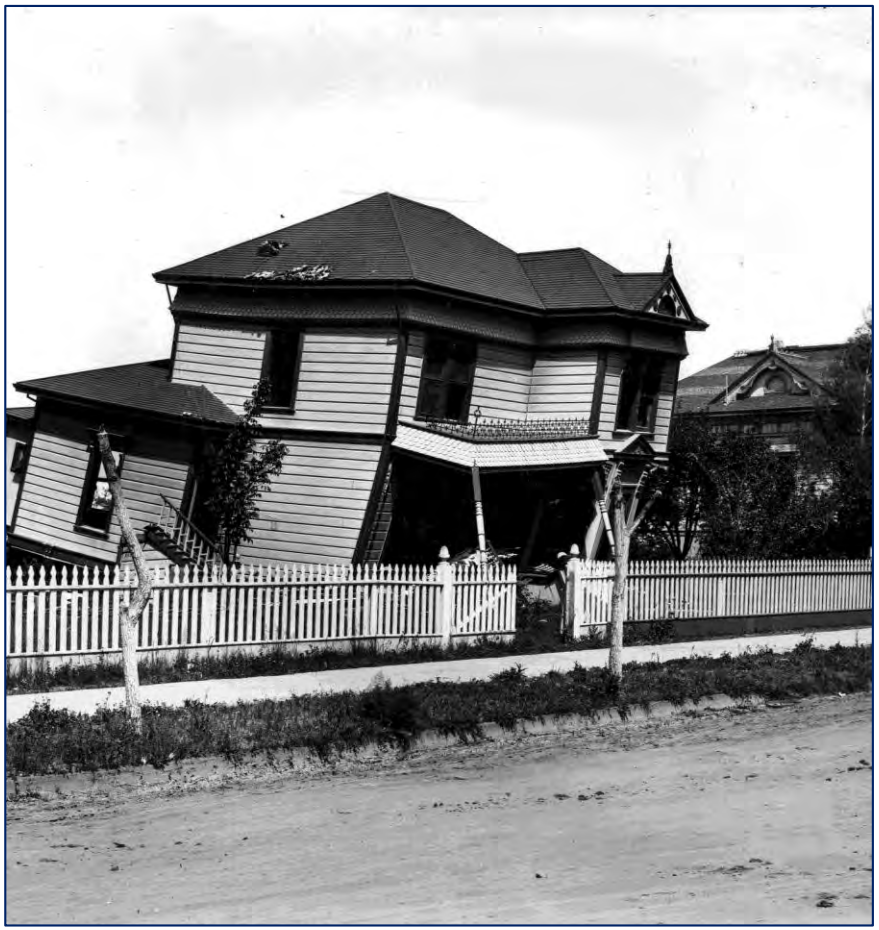
Mitigation Action	Responsible Department	Potential Funding Source(s)	Policy Integration Opportunities	Target Completion Date	Priority
1. Multiple Hazards-Related Actions					
1.1					
1.2					
2. Drought					
2.1					
2.2					
2.3					
Etc.					

Dam Inundation Issues

- Evacuation Routes
- Public Awareness and Education
- Local Flood Control Infrastructure
- Other:

Earthquake Shaking Issues

- Vulnerable Public Structures
- Vulnerable Private Structures
- Awareness and Outreach
- Soft Story Retrofits/ Building Code Compliance
- Other:



Fault Rupture Issues

- Vulnerable Public Structures
- Vulnerable Private Structures
- Awareness and Outreach
- Other:

Flooding Issues

- Flood Infrastructure
- Stormwater Infrastructure
- Water Quality
- Non-Flood Zone Ponding
- Other:

Hazardous Materials Issues

- Education and Awareness
- Sensitive Uses
- Other:

Landslide Issues

- Vulnerable Public Structures
- Vulnerable Private Structures
- Awareness and Outreach
- Other:

Liquefaction Issues

- Vulnerable Public Structures
- Vulnerable Private Structures
- Awareness and Outreach
- Building Code Compliance
- Other:

Fire Issues

- Vulnerable Public Structures
- Vulnerable Private Structures
- Awareness and Outreach
- Brush Clearance programs
- Other:

Drought Issues

- Water Supply
- Water Demand
- Water Quality
- Landscaping and Agriculture
- Other:

Next Steps

Timeline

Meeting #4 (Service Providers Roundtable) – January 6th 1:00-3:00pm
Meeting #4 (LHMP Team Meeting) – January 6th 3:00-5:00pm

Task	Time Frame
Data Collection, Hazards Profiles, and Risk Assessment	Ongoing - December 2015
Initiate LHMP Planning Team and Public Outreach	December 2015
Administrative Draft LHMP complete	January 2016
Public Review Draft LHMP	February 2016
Draft LHMP submitted to FEMA	March 2016
FEMA review	To be determined
City Council adoption	By June 2016, following FEMA review

Questions/Comments?

Erin Morris: emorris@srcity.org
Matt Dahl: mdahl@srcity.org

Aaron Pfannenstiel: apfannenstiel@mbakerintl.com

APPENDIX A

Meeting Materials

Santa Rosa Local Hazard Mitigation Plan Update

Planning Team

Meeting 4: January 6, 2016

Included Materials

- Mitigation Action Priorities Posters
- Sign-In Sheet

Mitigation Goals

1. Implement the Local Hazard Mitigation Plan to better prepare Santa Rosa for disaster and minimize impacts associated with natural and man-made hazards.
2. Provide for the safety of Santa Rosa citizens by maintaining efficient, well-trained, and adequately equipped City personnel.
3. Maintain and enhance an operational drainage system, preserve drainage capacity, and protect water quality.
4. Maintain and enhance a disaster-resistant region by reducing the potential for loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters.
5. Reduce the vulnerability of public and private buildings to the effects of earthquakes, flooding, wildfire, and landslides.

Mitigation Actions

	Mitigation Action	Responsible Department	Potential Funding Sources	Policy Integration Opportunities	Target Completion Date	Priority
1.	**Multiple Hazards-Related Actions**					
1.1	Establish overlay zoning districts for areas at higher risk of hazards, and establish appropriate development conditions/ restrictions for projects in higher hazard zones to reduce risks.					
1.2	Continue to analyze and improve emergency response communications. This strategy should include building redundant capacity into public safety alerting and answering points as well as replacing or hardening microwave and simulcast systems.					3
~~1.3~~	~~Work with real estate agents to improve enforcement of real estate disclosure requirements for sold properties, and encourage property managers and landlords to make similar disclosures prior to renting or leasing property, with regard to six official natural hazard zones:~~ ~~1) Special Flood Hazard Areas (designated by FEMA)~~ ~~2) Areas of Potential Flooding from dam failure inundation~~ ~~3) Very High Fire Hazard Severity Zones~~					

	Mitigation Action	Responsible Department	Potential Funding Sources	Policy Integration Opportunities	Target Completion Date	Priority
	~~4) Wildland Urban Interface Zones~~ ~~5) Earthquake Fault Zones (designated under the Alquist Priolo Earthquake Fault Zoning Act)~~ ~~6) Liquefaction and Landslide Hazard Zones (designated under the Seismic Hazard Mapping Act)~~ ~~Explore encouraging or requiring the disclosure of additional relevant information, including whether the property is listed on a fragile housing inventory.~~					
~~1.4~~1.3	Continue to assess the vulnerability of critical facilities to damage from natural disasters, including the availability of backup power and sufficient supplies to maintain essential functions, and make recommendations for appropriate mitigation.					7
~~1.5~~1.4	Retrofit, ~~or~~ replace, or relocate critical facilities that are shown to be vulnerable to damage in natural disasters. ~~If appropriate, organize a managed retreat from very high risk areas.~~					5
~~1.6~~	~~Continue to enforce state mandated requirements (e.g., the California Environmental Quality Act) to ensure that mitigation activities for hazards, such as seismic retrofits and vegetation clearance programs for fire threat, are conducted in a way that reduces environmental degradation, such as air quality impacts, noise during construction, and loss of sensitive habitats and species, while respecting the community value of historic preservation.~~					
~~1.7~~1.5	Continue to participate not only in general mutual-aid agreements, but also in agreements with adjoining jurisdictions and special districts for cooperative response to fires, floods, earthquakes, and other disasters.					
~~1.8~~1.6	In accordance with Climate Action Plan Action 2.1*, continue to regularly train, inform, and solicit feedback from City organizations on potential climate change risks and hazards. Emphasize climate change					

	Mitigation Action	Responsible Department	Potential Funding Sources	Policy Integration Opportunities	Target Completion Date	Priority
	risk and hazards with the Fire Department, Police Department, Public Works Department, and other City organizations as relevant.					
~~1.9~~1.7	In accordance with Climate Action Plan Action 2.2*, revise Santa Rosa's General Plan, Capital Improvement Program, and other applicable documents to prioritize climate change issues and best practices during required updates and as funding permits.					
~~1.10~~1.	In accordance with Climate Action Plan Action 3.1*, incorporate the possible impacts of climate change on a proposed project or plan area into the development review process.					
~~1.11~~1.	In accordance with Climate Action Plan Action 3.2*, integrate climate change adaptation into future updates of the Zoning Code, Building Code, General Plan, Urban Water Management Plan, and other related documents.					
~~1.12~~1.	Continue to coordinate with Sonoma County and surrounding jurisdictions on emergency notifications, including alerts of imminent threats or a need to evacuate. Alerts should be made available through multiple methods, in all commonly spoken languages in Santa Rosa, and easily accessible to persons with disabilities.					1
~~1.13~~1.	To the extent possible, avoid locating new critical facilities in areas of elevated hazard risks. Use extensive mitigation measures to reduce vulnerability if no suitable alternative site exists.					1
~~1.14~~1.	Continue to work with regional utility companies and service agencies, including energy providers, telecommunication services, and transit operators, to maintain basic services as much as possible during emergency conditions, and to restore services as quickly as possible following an emergency event.					
~~1.15~~1.	Work to improve estimates of potential casualties and property damage as a result of different emergency situations. Incorporate					

	Mitigation Action	Responsible Department	Potential Funding Sources	Policy Integration Opportunities	Target Completion Date	Priority
	findings as appropriate into City planning efforts.					
~~1.16~~1.	Continue to update the City's emergency planning documents every five years to ensure consistency with state and federal law, local conditions, and best practices and the most recent science.					2
~~1.17~~1.	Continue to improve the reliability of water supply for emergency response purposes through new water main connections and system improvements.					5
2.	**Wildfire**					
2.1	Update the City's Wildland Urban Interface (WUI) overlay designation to reflect up-to-date information on wildfire hazards and WUI exposure to prepare for future fire risk.					
~~2.2~~	~~Continue to maintain and implement the City's Municipal Code to require that new construction in the WUI zone meet Phase I and Phase II standards of the California Building Code (CBC) to mitigate potential fire risk, including but not limited to measures such as exterior protection measures in project design and flammable vegetation clearance.~~					
~~2.3~~2.2	Identify and implement brush-clearing programs in the City's WUI zone.					5
~~2.4~~2.3	Work with residents and property owners to develop an incentive program to replace shake roofs in the WUI.					2
~~2.5~~2.4	Continue to implement improvements to water flow capacity in the Very High Fire Hazard Severity Zone.					1
~~2.6~~	~~Continue to implement citywide water main improvements to increase community wide fire water flow.~~					
~~2.7~~	~~Collaborate with Sonoma County to implement consistent standards for development in the Urban Growth Boundary that falls in the WUI~~					

	Mitigation Action	Responsible Department	Potential Funding Sources	Policy Integration Opportunities	Target Completion Date	Priority
	~~or state responsibility areas. **[Question for LHMP team: what level of collaboration and coordination has occurred to date? Are there additional actions from the County ordinance to incorporate into City standards?]**~~					
~~2.8~~2.5	Ensure adequate road or fire road access for fire equipment to developed and open space areas.					
~~2.9~~2.6	Continue to tie public education on defensible space and a comprehensive defensible space ordinance to a field program of enforcement.					
3.	**Flooding**					
3.1	Sustain the City's participation in FEMA's National Flood Insurance Program (NFIP). Additionally, investigate participation in FEMA's Community Rating System (CRS), a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements resulting in reduced local flood insurance rates.					1
3.2	When FEMA Flood Zones are updated, create and publish updated mapping of the 100-year and 500-year floodplains that represent the most recent available data.					
3.3	Continue to analyze pump station health and capacity, and upgrade as appropriate.					2
3.4	Evaluate and monitor the City's stormwater drainage system to ensure it can effectively handle anticipated stormwater volumes, and make upgrades and repairs as needed.					4

	Mitigation Action	Responsible Department	Potential Funding Sources	Policy Integration Opportunities	Target Completion Date	Priority
~~3.5~~	~~Encourage the use of low impact development features in new and retrofitted properties, particularly for flood prone areas. Consider requiring low impact development features as a condition of approval for major new developments.~~					
~~3.6~~3.5	Retrofit public areas, including plazas, sidewalks, and parking lots as feasible, to use permeable paving and other low-impact development features.					2
4.	**Seismic hazards (fault rupture, shaking, and liquefaction)**					
4.1	Replace or retrofit water-retention structures that are determined to be structurally deficient, including levees, dams, reservoirs, and tanks. Continue to analyze and identify needs for future upgrades.					4
~~4.2~~	~~Continue to enforce and comply with the state mandated requirement that site specific geologic reports be prepared for development proposals within Alquist-Priolo Earthquake Fault Zones, and restrict the placement of structures for human occupancy.~~					
~~4.3~~4.2	~~Create and maintain a database that includes the type and location of fragile housing by building type and housing tenure (owner versus renter), and the property's retrofit status. This would include developing and sustaining standardized, transferrable procedures for collecting and managing data. The inventory should contain, at a minimum, unreinforced masonry buildings, soft story buildings, and nonductile concrete buildings.~~ Develop funding mechanisms to assist building owners to afford retrofits to un-reinforced masonry, soft-story, and/or non-ductile concrete structures, and consider requiring the retrofit of seismically vulnerable structures as appropriate. This program should include community education and outreach.					1
5.	~~**Landslides**~~**Geologic Hazards** **(seismic and non-seismic)**					
5.1	Require comprehensive geotechnical investigations prior to					

	Mitigation Action	Responsible Department	Potential Funding Sources	Policy Integration Opportunities	Target Completion Date	Priority
	development approval, where applicable. Investigations shall include evaluation of landslide risk, liquefaction potential, settlement, seismically induced landsliding, or weak and expansive soils, as identified by Noise and Safety Element Policy NS-C-2**.					
5.2	Restrict development in areas where people might be adversely affected by known natural or man-made geologic hazards, including unstable slopes, liquefiable or expansive soils, and poorly engineered fills, as determined by a California-registered geologist or engineer, as identified by Noise and Safety Element Policy NS-C-3**.					
5.3	Adopt mandatory, minimum erosion control measures for current properties and those under construction that exhibit high erosion potential, are in areas of steep slopes, or have experienced past erosion problems. Control measures shall reduce soil erosion from primary erosional agents, including wind, construction operations, and stormwater runoff, as identified by Noise and Safety Element Policy NS-C-8**.					
6.	**Hazardous materials**					
~~6.1~~	~~Restrict siting of businesses, including hazardous waste repositories, incinerators, or other hazardous waste disposal facilities, that use, store, process, or dispose of large quantities of hazardous materials or wastes in areas subject to seismic fault rupture or very violent ground shaking (moment magnitude of 8.5 to 9.5), as identified by Noise and Safety Element Policy NS-F-3. To the extent possible, avoid siting such facilities in areas subject to an increased risk of other hazards.~~					
~~6.2~~	~~Continue to require commercial and industrial compliance with the Sonoma County Hazardous Materials and Waste Management Plan, as identified by Noise and Safety Element Policy NS-F-5.~~					
~~6.3~~6.1	Generate and support public awareness and participation in household waste management, control, and recycling through county programs including the Sonoma County Household Hazardous Waste					

	Mitigation Action	Responsible Department	Potential Funding Sources	Policy Integration Opportunities	Target Completion Date	Priority
	Management Plan, as identified by Noise and Safety Element Policy NS-F-6**.					
6.2	Continue to Improve the capabilities of the Fire Department to respond to new hazardous materials incidents/emergencies.					4
6.3	Update the Hazardous Materials Area Response Plan.					
6.4	Enhance protection of existing groundwater resources from hazardous material sites.					1
6.5	Continue to provide and improve outreach to businesses that store, handle and use hazardous materials over state threshold or generate hazardous waste.					
7.	**Drought (water supply)**					
7.1	Complete and implement recommendations of the Santa Rosa Emergency Groundwater Supply project, including construction of ~~four~~ emergency groundwater wells consistent with the recommendations of the ~~2013~~ adopted Emergency Groundwater Supply Plan. ~~**[Note for the City: is the City committed to complete construction of wells by 2020? What is project status?]**~~					7
~~7.2~~	~~Continue implementation of the Santa Rosa Urban Reuse project to expand recycled water supply in the city. To support this expansion, continue to identify developments that are most appropriate for dual piping, as identified in the City's Urban Reuse Plan.~~					
~~7.3~~	~~Continue to provide financial incentives for existing irrigation customers to switch to recycled water, including rebates for dual piping and connections to the recycled water supply system.~~ ~~**[Question to the City: is the City still providing rebates? Is there willingness to continue or consider?]**~~					
~~7.4~~	~~Continue enforcement of the City of Santa Rosa Potable Water and Recycled Water Service Ordinance, Chapter 14-04 of the Municipal~~					

	Mitigation Action	Responsible Department	Potential Funding Sources	Policy Integration Opportunities	Target Completion Date	Priority
	~~Code, including discounted rates for recycled water irrigation customers.~~					
~~7.5~~7.2	Continue to participate in the Russian River Watershed Association to provide water conservation guidance, encourage drought-tolerant landscaping, and reduce the consumption of potable water use.					
~~7.6~~	~~Require new development to reduce potable water use in accordance with Tier 1 standards of CALGreen, as identified by Climate Action Plan Action 7.1.1. **[Question to City staff: has the City implemented this CAP measure? Is there still commitment to consider Tier 1 standards for water?]**~~					
~~7.7~~7.3	Replace water meters in existing development to allow customers to track real-time water use and support water conservation efforts, consistent with Climate Action Plan Action 7.1.3*. ~~**[Question to City staff: what is the status of this effort?]**~~					1
~~7.8~~7.4	Require new development to install advanced metering infrastructure ~~smart water meters~~ to facilitate water conservation, consistent with Climate Action Plan Action 7.1.4*. ~~**[Question to he City: has this been enforced?]**~~					
~~7.9~~	~~Include "areas subject to ground failure" in the list of criteria used for determining a replacement schedule (along with importance, age, type of construction material, size, condition, and maintenance or repair history) for pipelines.~~					
~~7.10~~7.	Develop a plan for expediting the repair and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies, such as those available through the Water /Wastewater Agency Response Network (WARN). Communicate that plan to local governments and critical facility operators.					

	Mitigation Action	Responsible Department	Potential Funding Sources	Policy Integration Opportunities	Target Completion Date	Priority
~~7.11~~7.	Host regular workshops and classes on water conservation strategies, including drought-tolerant landscaping and available rebates for water conservation and water efficiency actions. Continue workshops, classes, and other educational efforts even in the absence of drought conditions.					
8.	**Dam inundation**					
8.1	Support efforts to conduct periodic inspections of local dams to ensure all safety measures are in place, as identified by Noise and Safety Element Policy NS-E-1.					
8.2	Update dam inundation mapping for facilities with existing mapping and develop new inundation mapping for recent facilities that could pose a hazard to the community.					1

*** References to Climate Action Plan actions are not required to be updated within this plan, if changes to the Climate Action Plan occur.**

**** References to General Plan policies are not required to be updated within this plan, if changes to the General Plan occur.**

LHMP Team Meeting 4 Sign-In Sheet

City of Santa Rosa

Local Hazard Mitigation Planning Team

Meeting ~~#3~~ 4 ~~December 17~~, 2015

Sign-In Sheet January 06

Name	Department/Company	Please Check if in Attendance	Telephone (if new or changed)	Email (if new or changed)
Alan Alton	Finance			
Erin Morris	Planning and Economic Development	✓		
John Cregan	Santa Rosa Police	✓		
Lisa Kranz	Planning and Economic Development	✓		
Lori Urbanek	Water			
Mark Armstrong	Rec & Parks	✓		
Matt Dahl	Fire Department	✓		
Mike Enright	Planning and Economic Development	✓		
Mike Hargreaves	IT – GIS			
Nancy Gornowicz	Housing and Community Services	✓		

City of Santa Rosa: Local Hazard Mitigation Plan

Name	Department/Company	Please Check if in Attendance	Telephone (if new or changed)	Email (if new or changed)
Nathan Barnetta	Risk Management	✓		
Neil Bergman	SRFD – Emergency Prep	✓		
Rita Miller	City - Water			
Ron Simi	Public Works	✓		
Paul Lowenthal	Fire	✓		
Molly Dillon	CAO	✓		
Rocky Vogler	Water	✓		

Public Outreach Materials

APPENDIX **B**

1. LHMP Stakeholder Roundtable Workshop Materials

APPENDIX **B**

Meeting Materials

Santa Rosa Local Hazard Mitigation Plan Update

Stakeholder Roundtable Workshop: January 6, 2016

Included Materials

- Meeting Flyer
- Sign-In Sheet
- Presentation

APPENDIX **B**

Stakeholder Roundtable Workshop Flyers

City of Santa Rosa

A SAFE & PREPARED SANTA ROSA
LOCAL HAZARD MITIGATION PLAN UPDATE

Join us for a Community Workshop

WHEN: Wednesday, January 6, 2016
1:00 to 3:00 PM

WHERE: 35 Stony Point Road, Santa Rosa, CA
Santa Rosa Utilities Field Office (UFO) in Room F

Share your thoughts and ideas about the City's strategies to prepare for natural and human-caused hazards. The City is currently undertaking an important effort to update the Local Hazard Mitigation Plan and increase the resiliency of the community.

The event will include:
- Project background information
- Interactive discussion stations
- Refreshments

Please take a few minutes to learn more and complete a brief hazards survey online:**www.srcity.org/lhmp**

You can use the survey to tell the City about your readiness for disasters. Share the survey with your friends and family to help the City understand community readiness for disasters.

Are you ready for disasters? Your input is critical to the hazard planning process.

City of Santa Rosa

UNA SANTA ROSA SEGURA Y PREPARADA
PLAN DE MITIGACIÓN DE RIESGO LOCAL

Acompáñenos para un Taller Comunitario

CUANDO: Miércoles, 6 de enero del 2016
1:00 a 3:00 PM

DONDE: 35 Stony Point Road, Santa Rosa, CA
Oficina de Utilidades de Santa Rosa
(Utilities Field Office) en el Salón F

Comparta sus pensamientos e ideas acerca de las estrategias de la Ciudad para prepararse para los riesgos naturales y causadas por los humanos. La Ciudad está realizando un esfuerzo importante para actualizar el Plan de Mitigación de Riesgo Local y aumentar la resiliencia de la comunidad.

El evento incluirá:
- Información a fondo sobre el proyecto
- Estaciones Interactivas de Discusión
- Refrescos

Por favor tome unos minutos para aprender más y completar una breve encuesta sobre peligros en línea: **www.srcity.org/lhmp**.

Puede utilizar la encuesta para decirle a la Ciudad sobre su nivel de preparación para desastres. Comparta la encuesta con sus amigos y familiares para ayudar a la Ciudad a entender la preparación comunitaria para desastres:

¿Está listo(a) para desastres? Su aportación es crítica para el proceso de planificación sobre riesgos.

APPENDIX **B**

Stakeholder Roundtable Workshop Sign-In Sheet

City of Santa Rosa

A SAFE & PREPARED SANTA ROSA
LOCAL HAZARD MITIGATION PLAN UPDATE

Please leave your name and e-mail if you would like to be notified of future opportunities to participate in natural disaster and public planning.

Name *Nombre*	**Email** *Correo electrónico*
Chris Helgren	
MATT DAHL	MDAHL@SACITY.ORG
Bill Stirnus	bsexpress47@yahoo.com
MIKE MORTENSSON	HANDLEBARSMIKE1367@SBCGLOBAL.NET
ZACH HAMIL	
Jen Arent	jarent@jtm-esc.org
John Shazo	JO19@pge.com (zero)
BRENT BLASER	BRENT.BLASER@SONOMA-COUNTY.ORG
Bill Willenchik	~~KH6GJV@ARRL.ORG~~
Mark Wheeler	mwheeler@refb.org
BARBARA RIVERA	Barbara.rivera@scihp.org
Edie MARTIN	EDIE.MARTIN@SCIHP.ORG
James Salvante	James.Salvante@SONOMACOUNTY.GOV
Deanna Contreras	dcontreras@retirement.org

City of Santa Rosa

A SAFE & PREPARED SANTA ROSA
LOCAL HAZARD MITIGATION PLAN UPDATE

Please leave your name and e-mail if you would like to be notified of future opportunities to participate in natural disaster and public planning.

Name *Nombre*	**Email** *Correo electrónico*
Neil Bregman	nbregman@srcity.org
Luigi Lozano	JLozano@SCHSD.org

City of Santa Rosa

LOCAL HAZARD MITIGATION PLAN UPDATE
PLAN DE MITIGACIÓN DE RIESGO LOCAL

Stakeholder Roundtable Workshop

January 6, 2016

35 Stony Point Road, Santa Rosa, CA

Meeting Agenda

- Overview of the Hazard Mitigation Plan Update Process
- Summary of Santa Rosa's Hazard Profiles
- Community Input
- Next Steps

What is a Local Hazard Mitigation Plan?

The Local Hazard Mitigation Plan (**LHMP**) is a five-year strategic plan that studies natural hazards which could affect the city and identifies actions to reduce their impacts.

The plan will foster a safer Santa Rosa.

Overview of the Planning Process

1) Assemble the planning team
2) Identify project goals
3) Identify critical facilities
4) Identify and prioritize hazards of concern
5) Assess risks
6) Identity potential mitigation actions

Community Outreach Period

7) Develop the Draft LHMP
8) Distribute the Draft LHMP for public comment
9) Submit the Draft Plan to the California Office of Emergency Services and FEMA

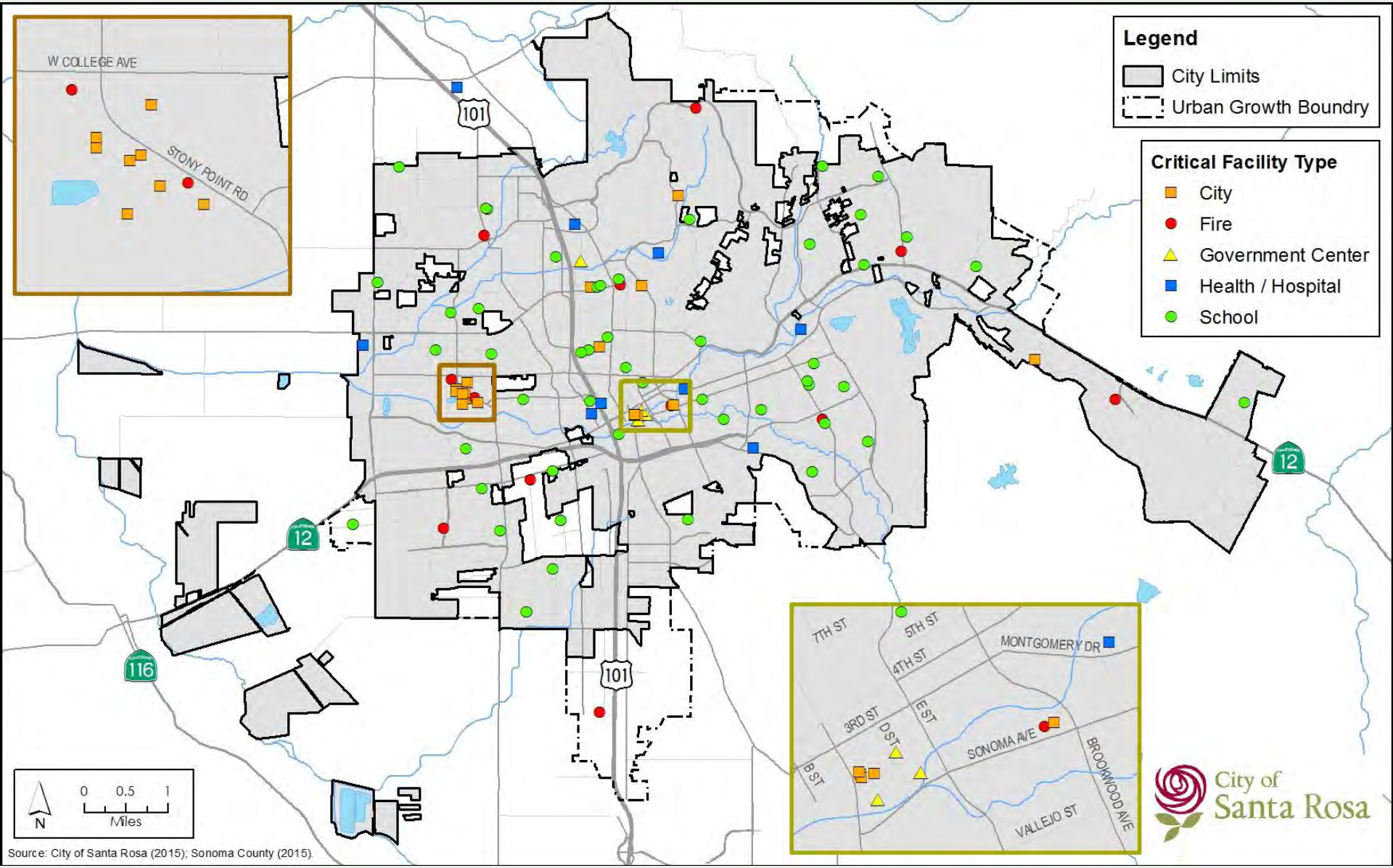
City of Santa Rosa
Hazard Mitigation Planning Team

- Finance
- Fire
- Housing & Community Services
- Information Technology
- Planning & Economic Development
- Public Works
- Recreation & Parks
- Risk Management
- Police
- Water

City of Santa Rosa Hazard Mitigation Planning Goals

1. Implement the Local Hazard Mitigation Plan to better prepare Santa Rosa for disaster and minimize impacts associated with natural and man-made hazards.
2. Provide for the safety of Santa Rosa citizens by maintaining efficient, well-trained, and adequately equipped City personnel.
3. Require erosion and sedimentation control measures to maintain an operational drainage system, preserve drainage capacity, and protect water quality.
4. Maintain and enhance a disaster-resistant region by reducing the potential for loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters.
5. Reduce the number of public and private buildings in the city that are vulnerable to the effects of earthquakes, flooding, wildfire, and landslides.

City of Santa Rosa Critical Facilities



Source: City of Santa Rosa (2015); Sonoma County (2015).

Hazard Profiles

- Identification of the hazard
- Profile of the hazard, including:
  - Location
  - Extent
- Past occurrences
- Likelihood of future occurrences
- Climate change considerations
- Vulnerabilities and risk assessment

Relevant Hazards

Avalanche	Flood	Seismic hazards
Climate change	Geological hazards	Severe winter storm
Coastal erosion	Hailstorm	Tornado
Coastal storm	Hazardous materials	Tsunami
Dam failure	Human-caused hazards	Volcano
Disease/pest management	Hurricane	Wildfire
Drought	Land subsidence	Wind
Earthquake fault rupture	Landslide and mudflow	Windstorm
Expansive soils	Liquefaction	
Extreme heat	Sea level rise	

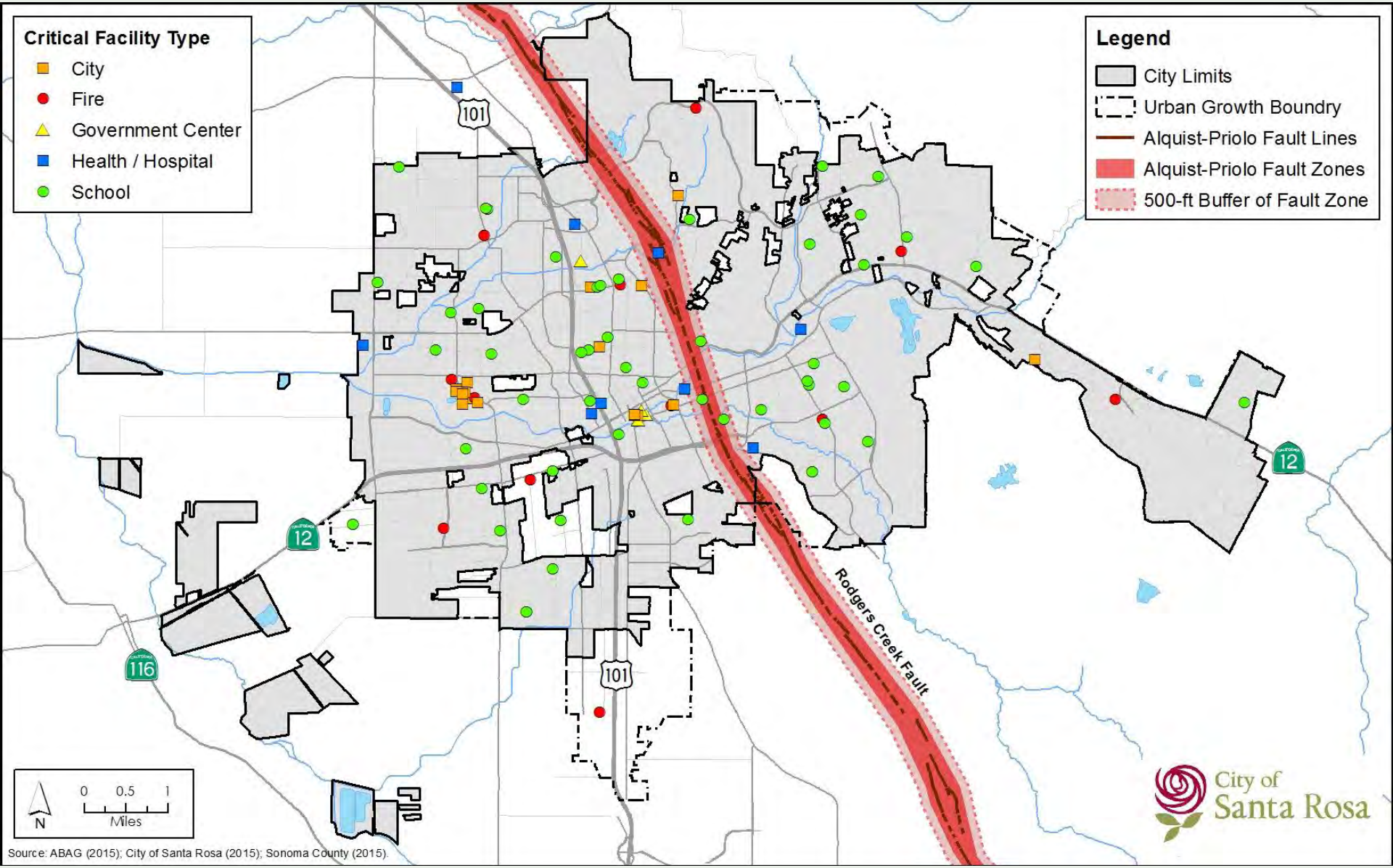
Hazard Ranking

Hazard Type	Probability	Impact			Total Score	Hazard Planning Consideration
		Affected Area	Primary Impact	Secondary Impacts		
Seismic hazards (fault rupture, shaking, liquefaction)	4	4	4	4	64.00	High
Flood	4	3	4	4	57.60	High
Drought	4	4	3	3	54.40	High
Wildfire	4	3	4	3	53.60	High
Hazardous materials	2.5	3	2	2	24.00	Medium
Landslide (seismic and non-seismic)	2	3	2	2	19.20	Medium
Dam inundation	1	3	3	2	11.00	Low

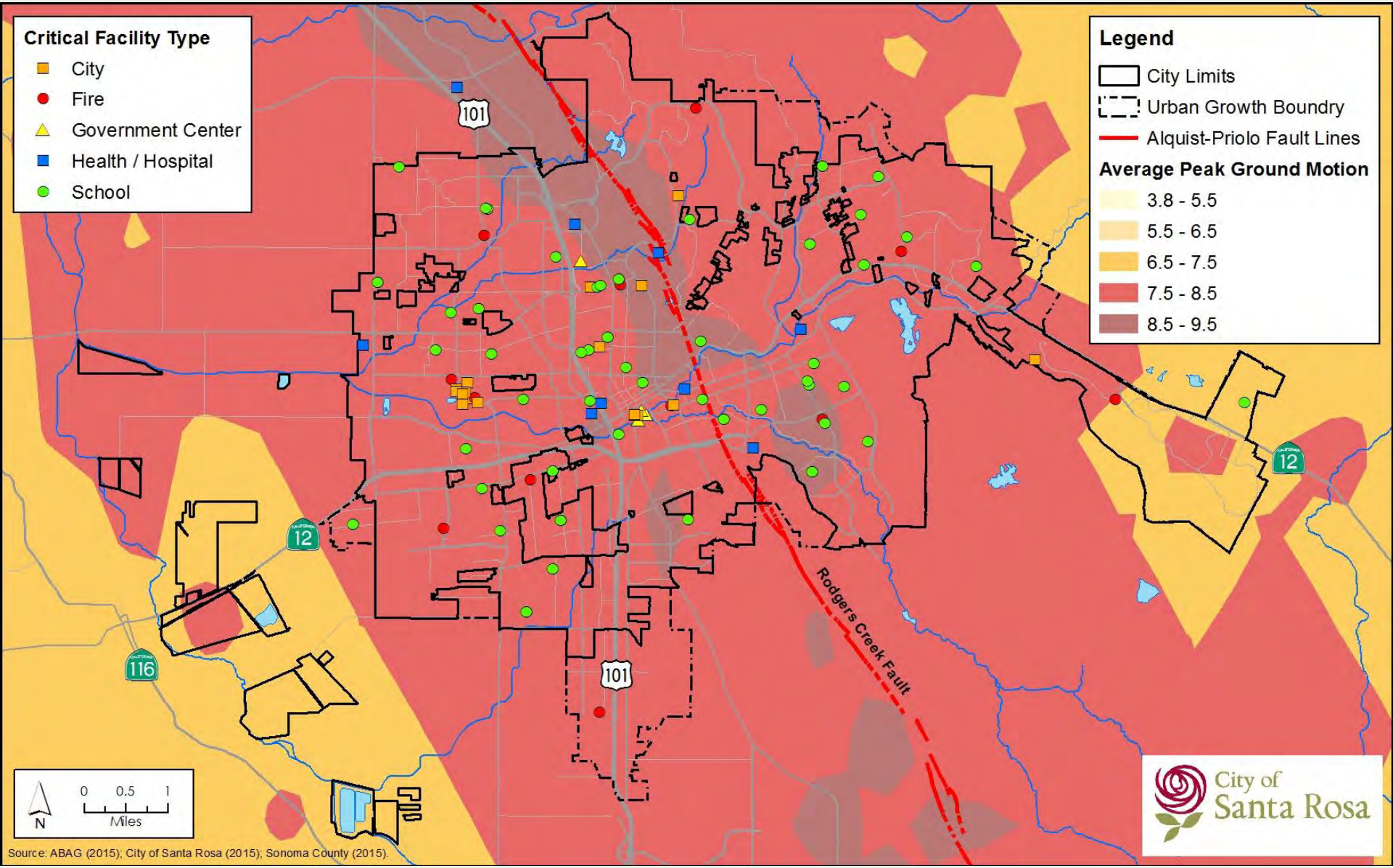
Note: Scores are based on a scale of 1 to 4, where 4 is the highest score, and 1 is the lowest score.

Note: Total score is based on an equation that weights categories by importance.

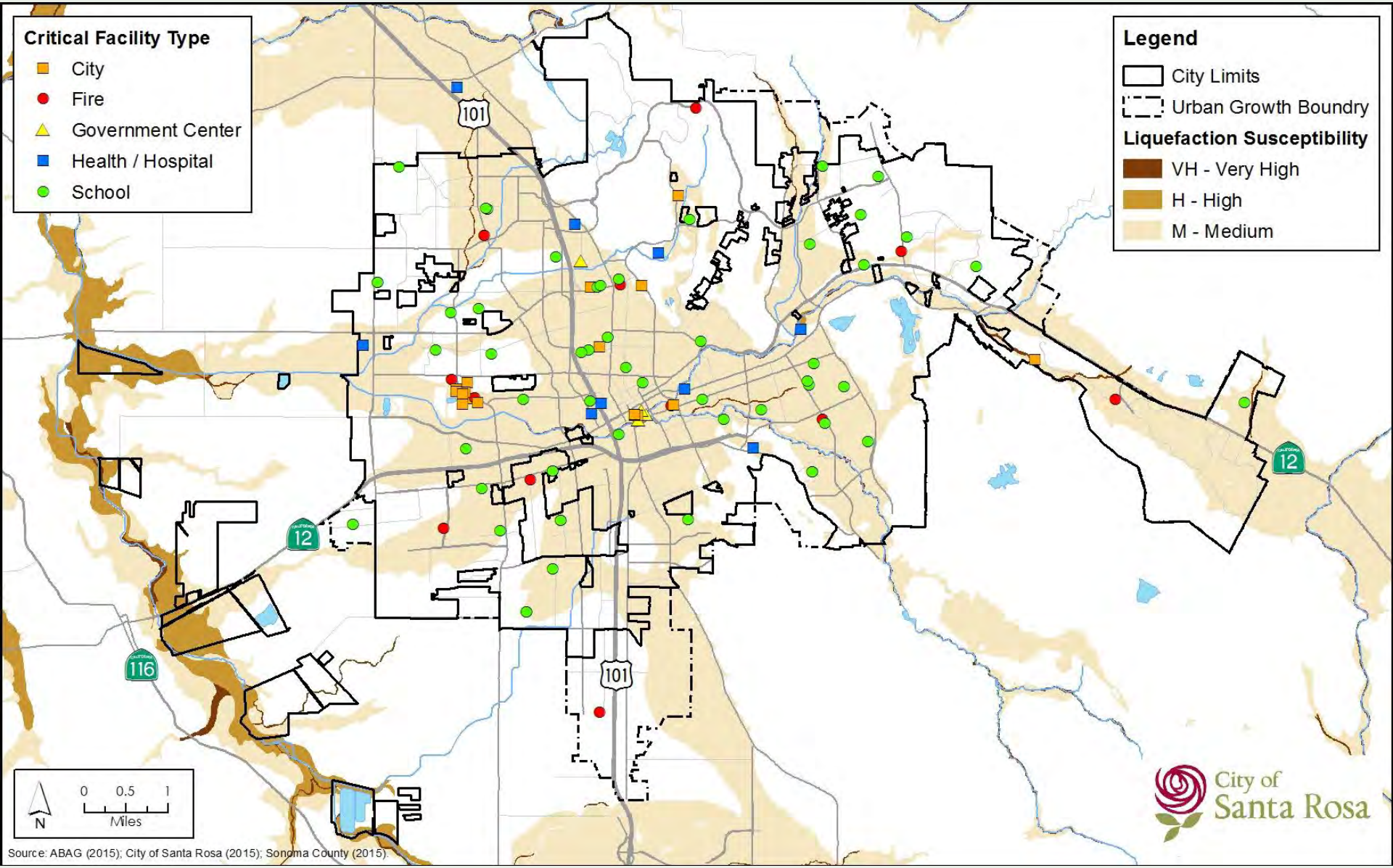
Hazard Profile: Fault Rupture



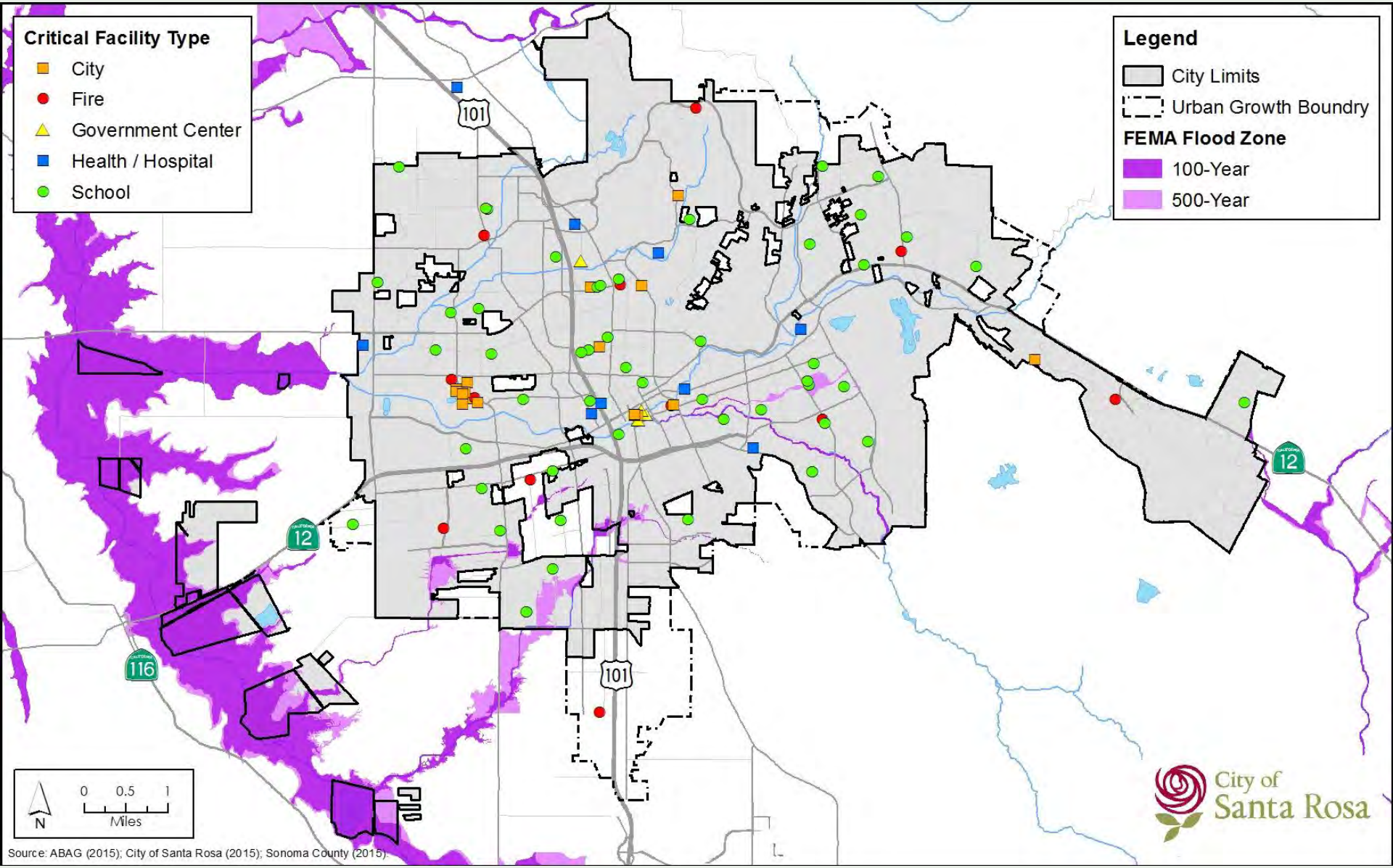
Hazard Profile: Ground Shaking



Hazard Profile: Liquefaction



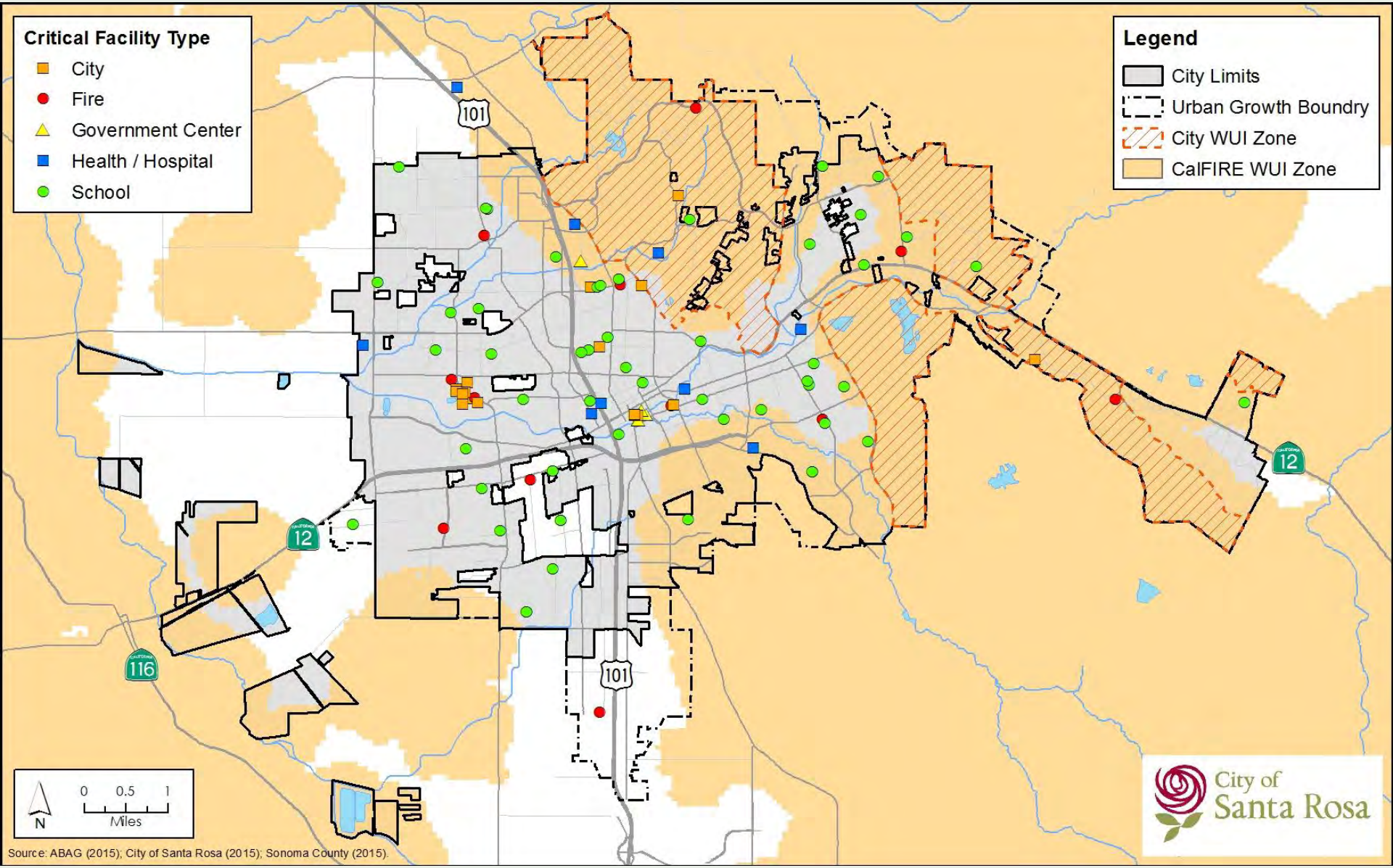
Hazard Profile: Flood



Hazard Profile: Drought

- Location and Extent
  - Across Santa Rosa
- Past occurrences
  - 4 major events since 1973, with average durations between 1-4 years.
- Likelihood of future occurrences
  - High probability, given the prevalence of drought throughout the state over the last 100 years. Because Santa Rosa's water supply comes from local sources such as groundwater or the Russian River Watershed, local drought conditions pose the greatest risk to the community.
- Climate change considerations
  - Anticipated changes in precipitation regimes may reduce ground and surface water resources, exacerbating drought conditions.

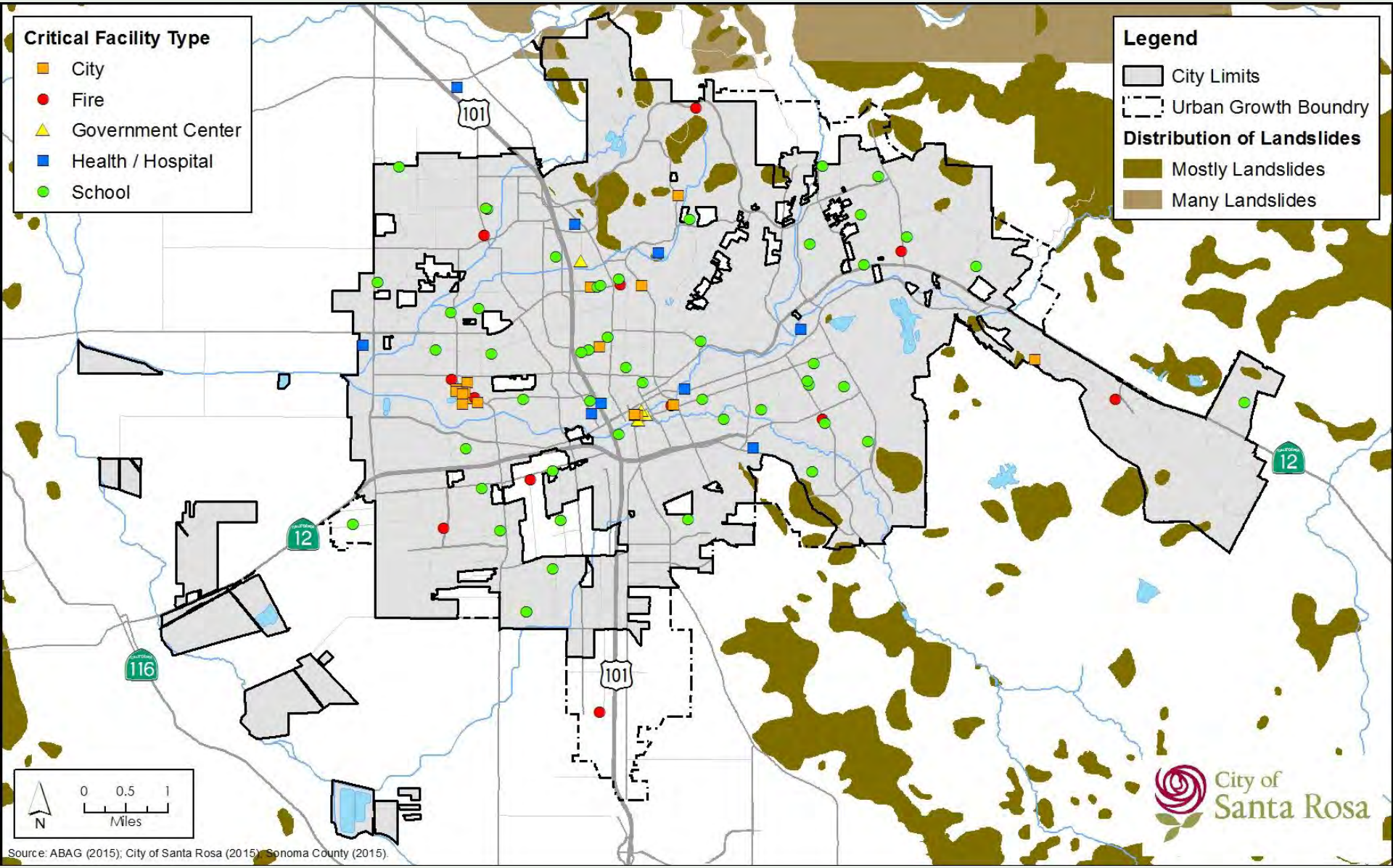
Hazard Profile: Fire



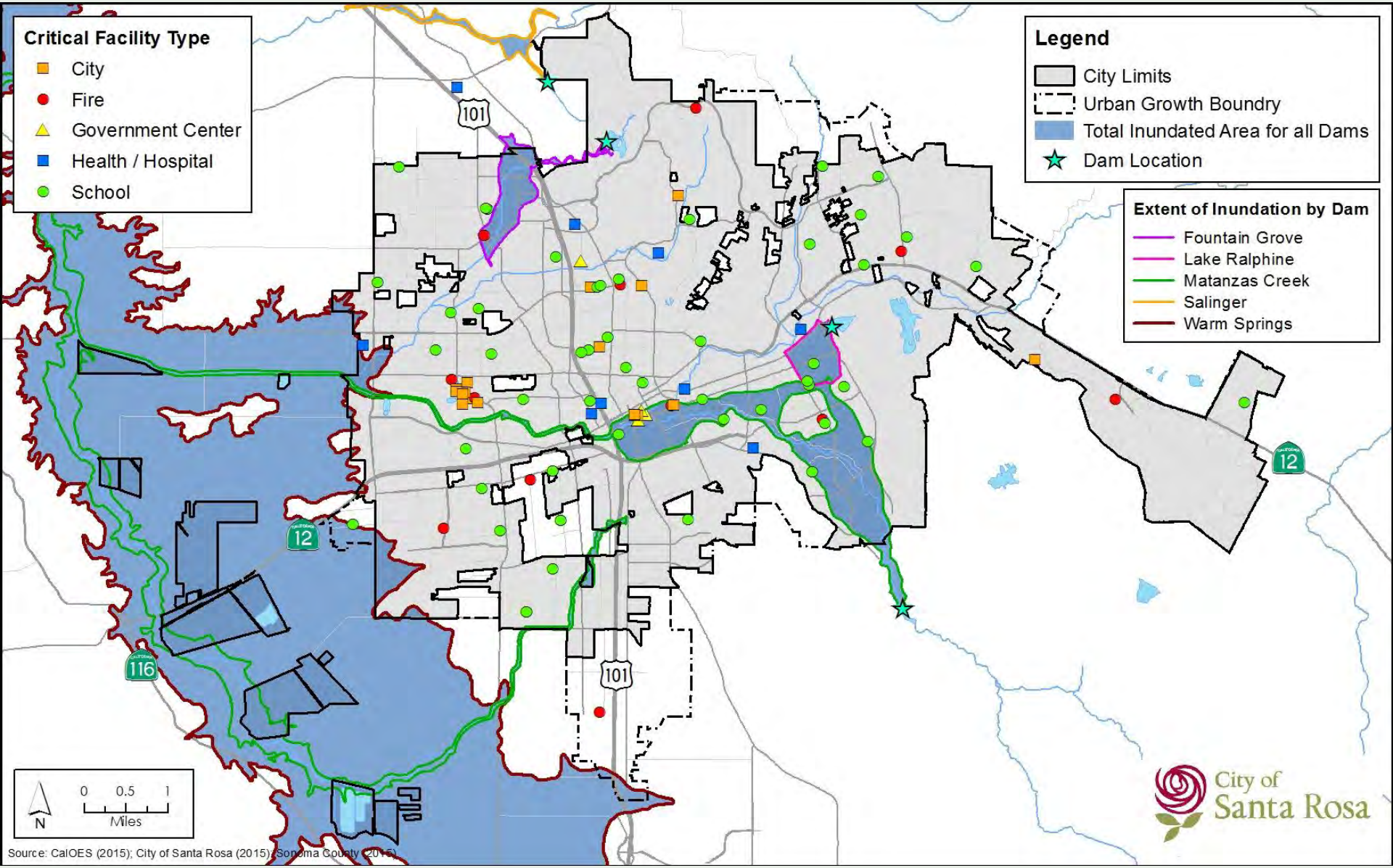
Hazard Profile: Hazardous Materials

- Location and Extent
  - Across Santa Rosa – 650 total identified sites
- Past occurrences
  - No history of significant hazardous material releases
- Likelihood of future occurrences
  - Low probability
- Climate change considerations
  - Climate change is not directly linked to the risk of hazardous material releases

Hazard Profile: Landslide



Hazard Profile: Dam Inundation



Community Feedback

- 2015 Hazard Mitigation Plan SurveyMonkey
  - Participate at https://www.surveymonkey.com/r/PMPN63H
  - Over 400 responses have been submitted
  - Helps Santa Rosa understand the needs and concerns of local residents, employees, and businesses.

Next Steps

January 2016
- Continued collection of community input

February 2016
- Draft LHMP released for Public Review

March 2016
- Draft LHMP submitted to California Office of Emergency Services and FEMA

June 2016
- City Council Adoption (pending FEMA review)

Questions & Comments

Additional thoughts, questions, and suggestions can be directed to:

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Thank you!

APPENDIX **B**

2. LHMP Public Outreach Survey Results

APPENDIX **B**

Online Survey

In order to reach a broader range of community members than could be reached at a single meeting, the City developed a page for the LHMP update on the City's website. This page provided an overview of the project, relevant project documents, contact information for City staff, and a link to the online survey. The survey, which was posted on December 2, 2015, and closed on January 14, 2016, received 407 responses. Below is a summary of the questions and results of the online questionnaire.

Existing and Potential Hazards

Community members were asked about hazards that had already impacted their homes, as well as which potential hazards were of the most concern to them. Nearly 95 percent of community members had not been impacted by a disaster at their current residence. Of the 6 percent that had been impacted, seismic shaking from earthquakes, drought, and flooding were the most common hazards experienced. Impacts from earthquakes (seismic shaking and fault rupture), drought, and flooding were the potential hazards that concerned community members the most. The potential of dam inundation was of lowest concern to participants.

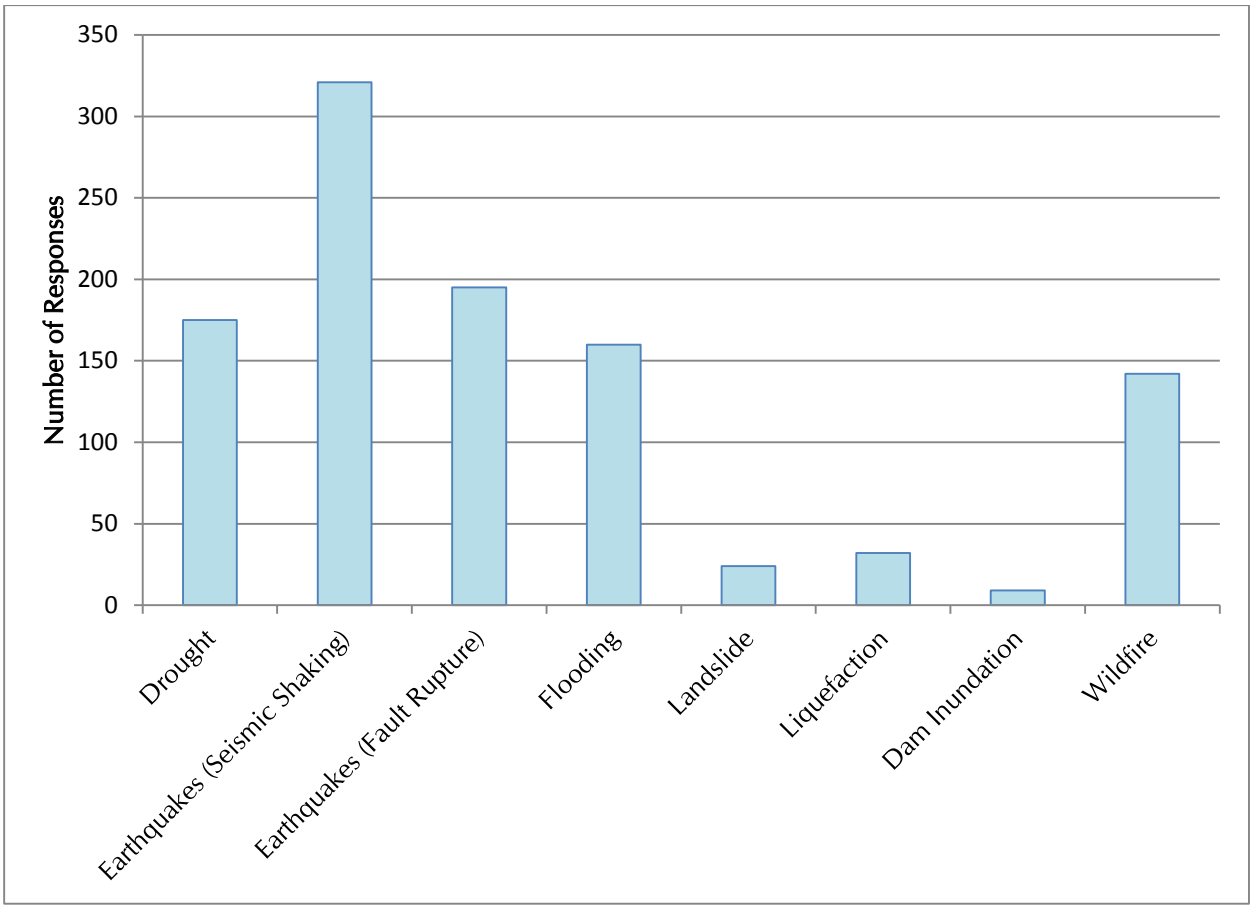
Question 1: Have you been impacted by a disaster in your current residence?

	Total	Percentage
Yes	17	6%
No	264	94%

Question 2: Select the disasters that you have been impacted by in your current residence

	Total	Percentage
Drought	7	47%
Earthquakes (Seismic Shaking)	12	80%
Earthquakes (Fault Rupture)	1	7%
Flooding	5	33%
Landslide	1	7%
Liquefaction	0	0%
Dam Inundation	0	0%
Wildfire	1	7%
Total Responses	15	100%

Question 3: Hazards of most concern to your neighborhood



Question 3: Hazard of most concern to your neighborhood

	Total	Percentage
Drought	175	49%
Earthquakes (Seismic Shaking)	321	89%
Earthquakes (Fault Rupture)	195	54%
Flooding	160	45%
Landslide	24	7%
Liquefaction	32	9%
Dam Inundation	9	3%
Wildfire	142	40%

Personal Preparedness

In addition to identifying hazards of concern, participants were asked to explain individual steps they have taken toward increasing their individual preparedness for disaster. This understanding, while limited to the survey sample, can indicate the ability of the community

to respond and recover from disaster. When asked about insurance, over half felt that theirs was adequate to cover the hazards that could impact their home. Of community members who rented their homes, those with and without renters insurance were nearly split. Seventy-seven percent of renters and homeowners did not have flood insurance.

Question 4: If you are a homeowner, do you have adequate homeowners insurance to cover the hazards that could impact your home?

	Total	Percentage
Yes, my insurance coverage should be adequate.	136	53%
No, I don't believe my insurance coverage would be adequate for a major disaster.	95	37%
Unsure.	26	10%
I do not have an insurance policy.	1	0%

Question 5: If you rent your residence, do you have renters insurance

	Total	Percentage
Yes	48	52%
No	45	48%

Question 6: Do you have flood insurance for your home?

	Total	Percentage
Yes	68	23%
No	225	77%

Over half of respondents had most of the 18 items recommended for the 72 hours immediately after a disaster. Of the 18 items recommended, only 6 were owned by over half of the 143 respondents. Five of the items were held by less than 50 percent of respondents: handheld "walkie-talkie" radios (with batteries), important family photos/documentation in a water- and fireproof container, cash, gasoline, and a secondary source of heat.

Question 7: If a severe hazard event occurred today such that all services were cut off from your home (power, gas, water, sewer) and you were unable to leave or access a store for 72 hours, which of these items do you have readily available?

	Total	Percentage
Potable water (3 gallons per person)	205	61%
Cooking and eating utensils	318	94%
Can opener	326	96%
Canned/nonperishable foods (ready to eat)	293	87%
Gas grill/camping stove	253	75%
Extra medications	204	60%
First aid kit/supplies	286	85%
Portable AM/FM radio (solar powered, hand crank, or batteries)	216	64%
Handheld "walkie-talkie" radios (with batteries)	79	23%
Important family photos/documentation in a water- and fireproof container	81	24%
Extra clothes and shoes	260	77%
Blanket(s)/sleeping bags	289	86%
Cash	158	47%
Flashlight (with batteries)	308	91%
Gasoline	83	25%
Telephone (with batteries)	187	55%
Pet supplies	183	54%
Secondary source of heat	107	32%

Employer Preparedness

In addition to identifying personal preparedness actions taken, respondents were asked to identify the steps their employers had taken to mitigate the impacts of natural hazards on their businesses and employees. A majority of survey takers confirmed that their employers have a plan for disaster recovery in place and a workforce communications plan.

Question 8: Does your employer have a plan for disaster recovery in place?

	Total	Percentage
Yes	178	69%
No	17	7%
I don't know	64	25%

Question 9: Does your employer have a workforce communications plan to implement following a disaster so they are able to contact you?

	Total	Percentage
Yes	210	83%
No	44	17%

Community Preparedness

A connected community builds resiliency by allowing neighbors to lend a helping hand on a short-term basis until emergency response personnel or supplies arrive. Identifying and understanding the needs of vulnerable neighbors (including the elderly, very, young, or disabled) allows community members to adequately assist those around them. In the survey, the City found that less than a third of respondents felt as though they were familiar with the special needs of their neighbors in the event of a disaster.

Question 10: Are you familiar with the special needs of your neighbors in the event of a disaster situation? (Special needs may include limited mobility, severe medical conditions, memory impairments.)

	Total	Percentage
Yes	110	33%
No	226	67%

Another way to improve community preparedness is to encourage community members to participate in local or national emergency preparedness programs, such as training through Citizens Organized to Prepare for Emergencies (COPE), the Community Emergency Response Team (CERT), or the American Red Cross. Volunteers in these programs are trained in basic emergency response skills, including search and rescue, team organization, and evacuation safety procedures. During an emergency, community members who are certified can care for and protect others and assist and supplement emergency response professionals.

Question 11: Have you participated in local or national emergency preparedness programs, such as Citizens Organized to Prepare for Emergencies (COPE), Community Emergency Response Team (CERT), or the American Red Cross?

	Total	Percentage
Yes	114	34%
No, but I would like to learn more about these programs	141	42%
No, I am not interested in learning more about emergency preparedness programs.	80	24%

Community members were also asked to identify what avenues they would like to see the City pursue to improve resiliency and community engagement in future emergencies. Of the 322 participants who responded, over half preferred all of the measures, with "provide effective emergency notifications and communication" as the most popular.

Question 12: How can the City help you become more prepared for a disaster?

	Total	Percentage
Provide effective emergency notifications and communication.	273	85%
Provide training and education to residents and business owners on how to reduce future damage.	202	63%
Provide community outreach regarding emergency preparedness.	229	71%
Create awareness of special needs and vulnerable populations.	168	52%

Master Facilities List

APPENDIX C

The table below provides a master list of critical facilities of concerns in Santa Rosa. All of these facilities are mapped in **Figure 14**. Addresses, replacement values, and content values were not available for all critical facilities. For future plan updates, it is recommended that the City maintain a current list of the geographic coordinates, addresses, replacement values, and content values of each critical facility in Santa Rosa.

Facility Name	Facility Type	Replacement & Content Value	Address
3480 Parker Hill Road (former Fire Station 5)	City	$1,195,130	N/A
Finley Community Center, Finley Aquatic Center	City	$10,032,765	N/A
Franklin Clubhouse	City	$413,370	N/A
Oakmont Treatment Plant (decommissioned)	City	N/A	N/A
Old Chamber Building	City	$2,800,000	N/A
Ridgway Swim Center	City	$1,129,878	N/A
Santa Rosa City Hall Annex	City	$7,025,200	N/A
Santa Rosa Corporation Yard	City	N/A	N/A
Santa Rosa Geysers Operations Center	City	N/A	N/A
Santa Rosa Municipal Service Center - North	City	$19,640,682	55 Stony Point Road, Santa Rosa, CA, 95401
Santa Rosa Municipal Service Center - South	City	$7,730,800	69 Stony Circle, Santa Rosa, CA, 95401
Santa Rosa Public Safety Building (Fire, Police)	City	$17,313,800	N/A
Santa Rosa Transit Operations Building	City	$2,424,800	N/A
Santa Rosa Utilities Field Operations	City	$11,200,000	35 Stony Point Road 95401
Santa Rosa Wet Weather Storage Facility	City	N/A	N/A
Steele Lane Community Center	City	$6,935,797	N/A
Santa Rosa Fire Station 1 - Sonoma Ave	Fire	*Cost included in Public Safety Building	N/A
Santa Rosa Fire Station 10 - Circadian Way	Fire	$5,192,003	N/A
Santa Rosa Fire Station 11 - Lewis Rd.	Fire	$1,038,663	N/A

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Facility Name	Facility Type	Replacement & Content Value	Address
Santa Rosa Fire Station 2 - Stony Point Rd	Fire	$1,811,828	N/A
Santa Rosa Fire Station 3 - Coffey Ln	Fire	$1,176,522	N/A
Santa Rosa Fire Station 4 - Yulupa Ave	Fire	$1,069,327	N/A
Santa Rosa Fire Station 5 - Newgate Ct	Fire	$1,195,130	N/A
Santa Rosa Fire Station 6 - Calistoga Rd	Fire	$969,733	N/A
Santa Rosa Fire Station 7 - Oakmont	Fire	$728,872	N/A
Santa Rosa Fire Station 8 - Burbank Ave	Fire	$1,048,360	N/A
Santa Rosa Fire Station 9 - Todd Rd	Fire	N/A	N/A
Santa Rosa Fire Training Tower	Fire	$3,672,143	N/A
County Administration Center	Gov Center	N/A	N/A
Federal Building	Gov Center	N/A	N/A
Santa Rosa City Hall	Gov Center	$15,249,920	N/A
State Building	Gov Center	N/A	N/A
Brookwood Health Center	Health	N/A	938 Sonoma Ave.
Family Support Center	Health	N/A	465 A St.
Homeless Service Center	Health	N/A	N/A
Orenda Center	Health	N/A	N/A
Psychiatric Emergency Services	Health	N/A	N/A
Redwood Gospel Mission	Health	N/A	N/A
Samuel L. Jones Homeless Services Facility	Health	N/A	4020 Finley Ave.
Aurora Santa Rosa Hospital	Hospital	N/A	N/A
Kaiser Permanente Hospital	Hospital	N/A	N/A
Montgomery Convalescent Hospital	Hospital	N/A	N/A
Santa Rosa Memorial Hospital, Sotoyome Campus	Hospital	N/A	N/A
Sutter Santa Rosa Regional Hospital	Hospital	N/A	N/A
Adult Education Center	School	N/A	N/A
Allen (Elsie) High	School	N/A	599 Bellevue Ave.
Alternative Education Programs	School	N/A	2934 McBride Ln.
Austin Creek Elementary	School	N/A	1480 Snowy Egret Dr.
Bennett Valley Union Elementary Office	School	N/A	2250 Mesquite Dr.
Biella (Albert F.) Elementary	School	N/A	2140 Jennings Ave.
Binkley Elementary	School	N/A	4965 Canyon Dr.
Brook Hill Elementary	School	N/A	1850 Vallejo St.
Burbank (Luther) Elementary	School	N/A	203 A St.
Carrillo (Maria) High	School	N/A	6975 Montecito Boulevard

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Facility Name	Facility Type	Replacement & Content Value	Address
Charter School for the Arts	School	N/A	756 Humboldt St.
Cook (Lawrence) Middle	School	N/A	2480 Sebastopol Road
French American Charter School	School	N/A	1350 Sonoma Ave.
Grace High (Cont.)	School	N/A	1700 Fulton Road
Hidden Valley Elementary	School	N/A	3435 Bonita Vista Dr.
Hilliard Comstock Middle	School	N/A	2750 W Steele Lane
Jack London Elementary	School	N/A	2707 Francisco Avenue
Kawana Elementary	School	N/A	2121 Moraga Dr.
Kid Street Charter	School	N/A	54 W. Sixth St.
Lehman (Helen M.) Elementary	School	N/A	1700 Jennings Ave.
Lincoln (Abraham) Elementary	School	N/A	850 W. Ninth St.
Madrone Elementary	School	N/A	4550 Rinconada Dr.
Matanzas Elementary	School	N/A	1687 Yulupa Ave.
Meadow View Elementary	School	N/A	2665 Dutton Meadow Ave.
Mesa High (Cont.)	School	N/A	1235 Mendocino Ave.
Midrose High (Cont.)	School	N/A	599 Bellevue
Monroe (James) Elementary	School	N/A	2567 Marlow Road
Montgomery High	School	N/A	1250 Hahman Dr.
Nueva Vista High (Cont.)	School	N/A	2230 Lomitas Ave.
Piner High	School	N/A	1700 Fulton Road
Piner-Olivet Union Elementary Office	School	N/A	3450 Coffey Lane
Proctor Terrace Elementary	School	N/A	1711 Bryden Lane
Ridgway High (Cont.)	School	N/A	325 Ridgway Ave.
Rincon Valley Middle	School	N/A	950 Middle Rincon Road
Rincon Valley Union Elementary Office	School	N/A	1000 Yulupa Ave.
Roseland Accelerated Middle School	School	N/A	1777 West Avenue
Roseland Charter School	School	N/A	950 Sebastopol Road
Roseland Elementary	School	N/A	950 Sebastopol Road
Roseland Elementary Office	School	N/A	950 Sebastopol Road
Santa Rosa City Schools Business Offices	School	N/A	211 Ridgway Ave.
Santa Rosa High	School	N/A	1235 Mendocino Ave.
Santa Rosa Middle	School	N/A	211 Ridgway Ave.
Schaefer Elementary	School	N/A	500 E St.
Sequoia Elementary	School	N/A	1370 San Miguel Ave.
Sheppard Elementary	School	N/A	5305 Dupont Dr.
Slater (Herbert) Middle	School	N/A	1777 West Ave.
Sonoma County Court	School	N/A	3500 Sonoma Ave.
Spring Creek Elementary	School	N/A	155 Pythian Rd North

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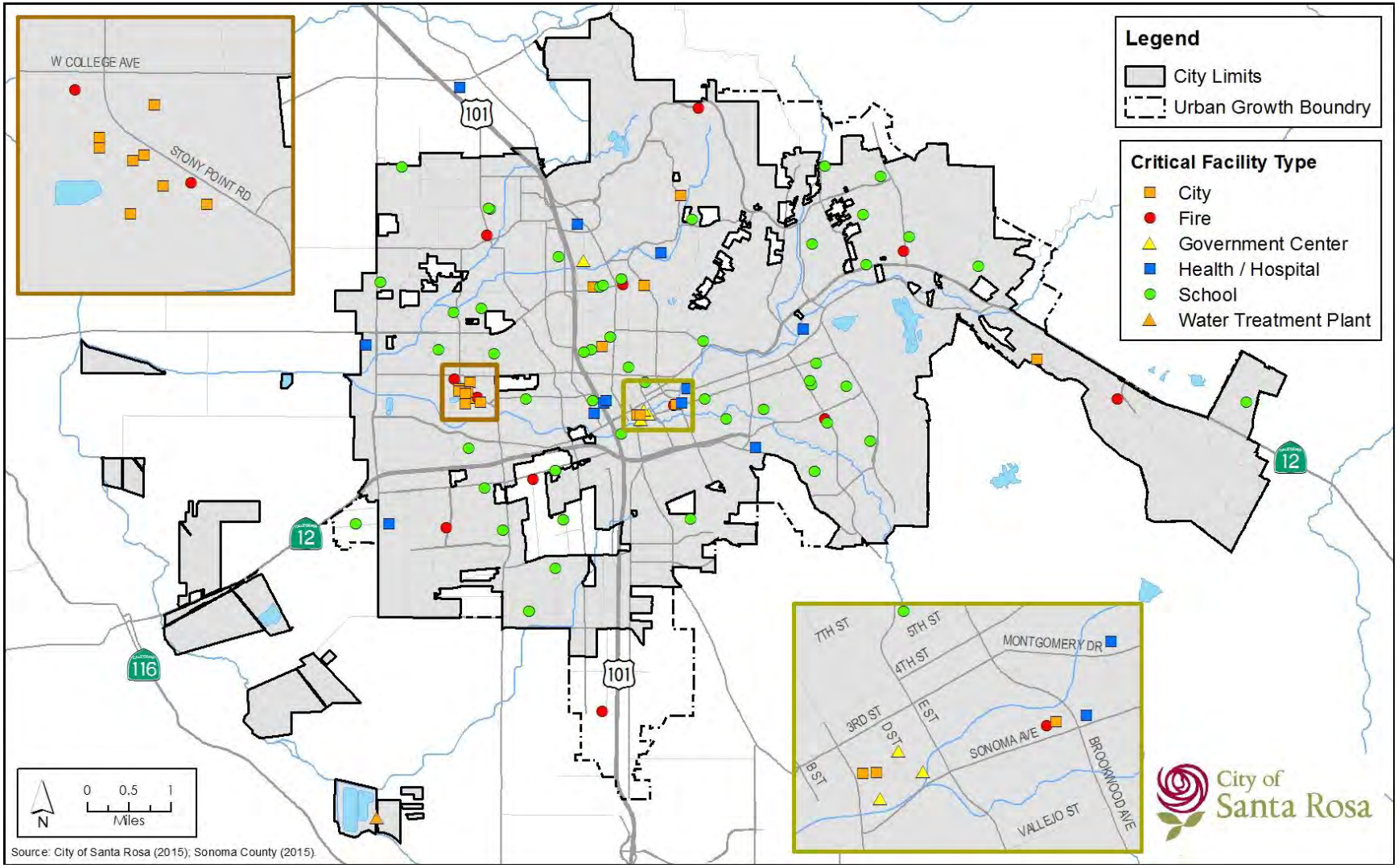
Facility Name	Facility Type	Replacement & Content Value	Address
Steele Lane Elem Annex (Spec Ed)	School	N/A	4675 Mayette Ave.
Steele Lane Elementary	School	N/A	249 Steele Lane
Stevens (Robert L.) Elementary	School	N/A	301 Steele Lane
Strawberry Elementary	School	N/A	2345 Giffen Ave.
Village Elementary	School	N/A	2311 Horseshoe Dr.
Whited (Douglas) Elementary	School	N/A	900 Yulupa Ave.
Wilson (J. X.) Elementary	School	N/A	4995 Sonoma Hwy.
Wright Elementary	School	N/A	246 Brittain Lane
Wright Elementary Office	School	N/A	4389 Price Ave.
Yulupa Elementary	School	N/A	4385 Price Ave.
Laguna Wastewater Treatment Plant	Utility	$227,000,000	4300 Llano Road

Figure 14: Santa Rosa Critical Facilities



Adoption Resolution

APPENDIX **D**

To be completed post-adoption.

Sources

APPENDIX E

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2010 LHMP Mitigation Actions

APPENDIX F

Mitigation Actions Tracker

Policies and policy numbers are from the ABAG 2010 LHMP.

Matrix only retains applicable policies for the jurisdiction, as identified in the local annex to the 2010 ABAG LHMP. Inapplicable policies have been excluded from this matrix.

#	Mitigation Action Language	Notes from 2010 LHMP	Status	If completed or in progress, what has been completed?	If not started or abandoned, why?
INFRA b-5	Replace or retrofit water-retention structures that are determined to be structurally deficient, including levees, dams, reservoirs and tanks.	Seismic upgrade of existing water reservoirs R3, R7, and R12b. This project is the next series of reservoir upgrades based on most critical facilities, and in most need of retrofit, and is under the Utilities Department direction. The cost analysis of seismic retrofit versus reservoir failure made the project an easy choice. The funding will come from the Utilities water rates and is slated to receive funding in the 2011-2012 fiscal year.	In Progress	Construction documents are at 100% and projects have been submitted to the Building Division for permitting. Projects expected to go out to bid in Spring 2016 with construction completed during FY 2016-2017.	N/A
INFRA b-5		Emergency Aqueduct Zone Storage project. This project is designed to provide water to the City if water supply from a regional water supply line is cut due to earthquakes. The City's Master Water Plan identified the need to have this emergency storage. The funding comes from the Utilities water rate-payers and is partially funded in the 2011-2012 fiscal year, and will receive additional funding as rates and time allows. Current estimates for full funding is fiscal year 2014-2015.	Abandoned		This project was identified in earlier Water Master Plans as an approach to providing emergency water supply. The City completed various engineering studies evaluating the feasiblity of the project and found that there were technical and practical difficulties with implementation. In 2013, the City adopted the Groundwater Master Plan which identified emergency supply wells as the main approach to providing emergency water. Projects identified in the GWMP are in progress. In 2014, the Water Master Plan was updated and the Emergency Aqueduct Storage project is no longer planned due to the shift toward emergency groundwater wells.

#	Mitigation Action Language	Notes from 2010 LHMP	Status	If completed or in progress, what has been completed?	If not started or abandoned, why?
GOVT c-6	Ensure that fire, police, and other emergency personnel have adequate radios, breathing apparatuses, protective gear, and other equipment to respond to a major disaster.	Completion of radio communications upgrade and 2-way radio upgrade projects This project improves the City's public safety and local government radio communications capacity, which is vital during emergencies when other forms of communication are down. This project is mostly complete with funding coming from the general fund, the Department of Justice (grant), and a Workforce Housing grant. The project will be complete in the 2010-2011 fiscal year.	Completed/Existing	Auxiliary Emergency Communications: City of Santa Rosa created the City of Santa Rosa Auxiliary Emergency Communications Service (AECS – www.srcity.org/AECS) to provide as-needed emergency communications services within the City and with Sonoma County's Auxiliary Communications Service. Both groups are structured as a local government program created to supplement governmental emergency communications with professional, unpaid volunteer staff. The City AECS operates under the joint authority of the City of Santa Rosa Fire Department and the City of Santa Rosa Information Technology Department. The County ACS operates under the authority of the Sonoma County Fire and Emergency Services Department. (http://sonomacounty.ca.gov/FES/Emergency-Management/Auxiliary-Communications-Service/) Breathing Apparatuses: In December 2015, the Fire Department anticipates submitting a grant to FEMA's Assistance to Firefighters program for new breathing apparatus, in coordination with the Rincon Valley Fire Department.	
GOVT c-7	Participate in developing and maintaining a system of interoperable communications for first responders from cities, counties, special districts, state, and federal agencies.		In Progress	Coordination with County, State, and Federal Agencies is ongoing regarding interoperability.	
GOVT c-8	Harden emergency response communications, including, for example, building redundant capacity into public safety alerting and/or answering points, replacing or hardening microwave and simulcast systems, adding digital encryption for programmable radios, and ensuring a plug-and-play capability for amateur radio.		Completed/Existing	As part of creating AECS, the City installed upgraded radio equipment at each fire station and upgraded the City's amateur radio repeaters. The City's Emergency Operations Center, which was relocated to the Utilities Field Operations Building in November 2011, includes a radio room for AECS and ACS use. Radios were purchased and installed in the radio room, with operational support from ACS. While the radios are primarily intended for AECS and ACS use, they can also be used by public safety personnel.	

#	Mitigation Action Language	Notes from 2010 LHMP	Status	If completed or in progress, what has been completed?	If not started or abandoned, why?
HSNG a-1	Assist in ensuring adequate hazard disclosure by working with real estate agents to improve enforcement of real estate disclosure requirements for residential properties with regard to seven official natural hazard zones: 1) Special Flood Hazard Areas (designated by FEMA), 2) Areas of Potential Flooding from dam failure inundation, 3) Very High Fire Hazard Severity Zones, 4) Wildland Fire Zones, 5) Earthquake Fault Zones (designated under the Alquist-Priolo Earthquake Fault Zoning Act), and the 6) Liquefaction and Landslide Hazard Zones (designated under the Seismic Hazard Mapping Act).	An on-going flooding impact reduction strategy is outlined wherein the City is working with real estate agents to improve enforcement of real estate disclosure requirements for residential properties with regard to Special Flood Hazard Areas (designated by FEMA), and Areas of Potential Flooding from dam failure inundation.	In Progress	City staff does not have a good understanding of the progress made over the previous implementation period. As a result this action item was modified in the 2016 LHMP.	
HSNG g-2	Tie public education on defensible space and a comprehensive defensible space ordinance to a field program of enforcement.	An additional on-going strategy defending reducing the impact of wildfires is described, where we tie public education on defensible space and a comprehensive defensible space ordinance to a field program of enforcement.	In Progress	Santa Rosa Fire was awarded FEMA's Assistance to Firefighters Grant in 2014. Grant funds were utilized to develop and implement an education program in 2014. Three community meetings were held in 2015 to educate residents who live in the wildland urban interface on steps that can be taken to reduce fuels and create defensible space through vegetation management.	
On-Going Mitigation Strategy Programs					
GOVT-a-1	Assess the vulnerability of critical facilities (such as city halls, fire stations, operations and communications headquarters, community service centers, seaports, and airports) to damage in natural disasters and make recommendations for appropriate mitigation.		In Progress	LTP is under evaluation for potential flood protection due to previous flooding (verify with Water). Sent email to Mark Armstrong on 12/2/2015 requesting information about other City facilities.	
GOVT-a-2	Retrofit or replace critical facilities that are shown to be vulnerable to damage in natural disasters.		In Progress	These activities are ongoing activities that are performed by each City department. During the 2016 LHMP update, City Departments began discussing these needs and determined the critical facilities list for the 2016 LHMP Update would be a good starting point for discussing and documenting these types of issues City-wide.	
GOVT-c-8	Ensure adequate fire equipment road or fire road access to developed and open space areas.		In Progress	The City ensures that new development provides adequate fire department access.	
GOVT-d-13	Establish a framework and process for pre-event planning for post-event recovery that specifies roles, priorities, and responsibilities of various departments within the local government organization, and that outlines a structure and process for policy-making involving elected officials and appointed advisory committees.		In Progress	This activity was determined to be best addressed in the City's Emergency Operations Plan. As a result, this action would be better suited as a preparedness activity for the City.	

#	Mitigation Action Language	Notes from 2010 LHMP	Status	If completed or in progress, what has been completed?	If not started or abandoned, why?
GOVT-c-13	Continue to participate not only in general mutual-aid agreements, but also in agreements with adjoining jurisdictions for cooperative response to fires, floods, earthquakes, and other disasters.		Completed/Existing	The City participates in mutual aid agreements for cooperative responses to disasters.	
GOVT-d-5	Participate in FEMA's National Flood Insurance Program.		Completed/Existing	The City participates in this program.	
INFR-a-6	Develop a plan for speeding the repair and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies, such as those available through the Water /Wastewater Agency Response Network (WARN). Communicate that plan to local governments and critical facility operators.		In Progress	While the City's water department works on these types of preparation actions on an annual basis, the LHMP Team determined that this was a preparedness activity and not something that needed to be included in the 2016 update.	
INFR-e-1	Include "areas subject to ground failure" in the list of criteria used for determining a replacement schedule (along with importance, age, type of construction material, size, condition, and maintenance or repair history) for pipelines.		Not Started	The City has not incorporated ground failure related to earthquake fault lines as evaluation criteria for water and sewer line replacement. A seismic upgrade of the largest water pipeline in Santa Rosa, the SCWA pipeline that crosses the Rodgers Creek fault, was recently completed by SCWA. the City is in the process of seismically upgrading all reservoirs. Ground subsidence has not been an issue for water and sewer lines.	
ENVI-a-1	Continue to enforce State-mandated requirements, such as the California Environmental Quality Act, to ensure that mitigation activities for hazards, such as seismic retrofits and vegetation clearance programs for fire threat, are conducted in a way that reduces environmental degradation such as air quality impacts, noise during construction, and loss of sensitive habitats and species, while respecting the community value of historic preservation.		Completed/Existing	The City implements CEQA for all public and private projects.	
LAND-a-1	Enforce and/or comply with the State-mandated requirement that site-specific geologic reports be prepared for development proposals within Alquist-Priolo Earthquake Fault Zones, and restrict the placement of structures for human occupancy. (This Act is intended to deal with the specific hazard of active faults that extend to the earth's surface, creating a surface rupture hazard.)		Completed/Existing	The City's Building Division enforces these requirements for all building permits, consistent with City Code 17-08 Seismic Safety	