

12 HYDROLOGY, FLOODING AND WATER QUALITY

This chapter describes local and regional hydrology, flooding and water quality in and around Novato, as well as the applicable federal, State and local regulations.

A. Regulatory Framework

1. Federal Regulations

a. Federal Water Pollution Control Act

The Federal Water Pollution Control Act (Clean Water Act), also known as the CWA, was enacted in 1972 to restore and maintain the chemical, physical and biological integrity of the waters of the United States.

The two-phase National Stormwater Program was established as part of the CWA. Phase 1 of the program requires discharges from Municipal Separate Storm Sewer Systems (MS4s) serving over 100,000 people to be covered under a National Pollutant Discharge Elimination System (NPDES) permit. The City of Novato is considered a permittee under California's statewide general permit (Water Quality Order No. 2003-0005-DWQ) for MS4s. Permittees must develop and implement a Stormwater Management Plan (SWMP) with the goal of reducing discharged pollutants to the maximum extent. The City of Novato's NPDES Storm Water Program prevents illicit discharges into drains, waterways and wetlands, and is discussed in more detail in Chapter 16, Utilities.

b. National Flood Insurance Program

Congress passed the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 to address the increasing cost of flood-related disaster relief. The intent of National Flood Insurance Program (NFIP) is to reduce the need for large, publicly-funded flood control structures and disaster relief by restricting development on floodplains.

The Federal Emergency Management Agency (FEMA) administers the NFIP to provide subsidized flood insurance to communities that comply with FEMA regulations and limit development on floodplains. FEMA issues Flood Insurance Rate Maps (FIRMs) for communities participating in the NFIP. FIRMs delineate flood hazard zones in the community.

c. Executive Order 11988

Executive Order 11988 (Floodplain Management) addresses floodplain issues related to public safety, conservation and economics. It requires federal agencies constructing, permitting, or funding a project in a floodplain to avoid incompatible floodplain development; maintain consistency with the standards and criteria of the NFIP; and restore and preserve natural and beneficial floodplain values.

2. State and Regional Regulations

a. Assembly Bill 162

Assembly Bill 162 (AB 162) requires cities and counties to address flood-related matters in the land use, conservation, safety and housing elements of their General Plans. AB 162 requires that flood management is addressed in General Plans in the following ways:

- ◆ Require that the land use element identify and annually review areas that are subject to flooding as identified by federal and State floodplain maps.

- ◆ Require the conservation element, upon the next housing element review on or after January 1, 2009, to identify rivers, creeks, streams, flood corridors, riparian habitat and land that may accommodate floodwater for specified purposes.
- ◆ Require the safety element, upon the next housing element review on or after January 1, 2009, to identify flood hazard zones and establish policies to avoid or minimize the unreasonable risks of flooding.
- ◆ Allow the housing element to exclude from the determination of land suitable for urban development those areas where the flood management infrastructure is inadequate and housing development would be impractical.
- ◆ Require the Reclamation Board and local flood protection agencies to review safety element documents for cities and counties in the Sacramento and San Joaquin Drainage District, and report recommendations to the planning agency within specified timeframes. These cities and counties would also be required to submit any proposals to adopt or substantially amend a general plan to the Reclamation Board for review and comment within 45 days.

b. San Francisco Bay Regional Water Quality Control

Per the Porter-Cologne Act, the San Francisco Bay Regional Water Quality Control (RWQCB) is responsible for the development, adoption, and implementation of the Water Quality Control Plan (Basin Plan) for the San Francisco Bay Region. The Basin Plan is the master policy document that contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the San Francisco Bay Region. The Basin Plan identifies beneficial uses of surface waters and groundwater within its region and specifies water quality objectives to maintain the continued beneficial uses of these waters.

c. San Francisco Bay Area Stormwater Management Agency Programs

Discharge of surface runoff generated from the City of Novato contributes to discharges into watercourses which in turn flow into the San Francisco Bay. The San Francisco Bay Area Stormwater Management Agency (BASMA) has a program to assist in the management of stormwater runoff discharged to the San Francisco bay area. The BASMA's program covers a broader area including Marin County, and therefore the City of Novato.

d. Assembly Bill 70

Assembly Bill 70 (AB 70) requires cities and counties that have "unreasonably approved" development in an area with known flood risks to share liability for flood control damage with State entities.

3. City and County Ordinances and Regulations

a. Marin County Flood Control and Water Conservation District

All of Marin County, including Novato, is under the jurisdiction of the Marin County Flood Control and Water Conservation District (MCFCWCD), which is responsible for managing stormwater and flooding problems in the County. MCFCWCD also maintains weather monitoring stations, stream gauges and precipitation gauges throughout the County.

MCFCWCD is staffed by the Marin County Department of Public Works and is responsible for administering the Marin County Stormwater Pollution Prevention Program (MCSTOPPP) and FEMA Flood Insurance programs. The goal of MCSTOPPP is to prevent stormwater pollution, protect and enhance water quality in creeks and wetlands, preserve beneficial uses in waterways and comply with State and federal regulations. MCSTOPPP submitted a county-wide SWMP to the RWQCB and coordinates consistency between individual SWMPs.

MCFCWCD identifies eight “zones” within the County in order to focus on issues in specific watersheds; Novato is in MCFCWCD’s Zone #1. Zone #1 encompasses all of Novato in addition to a sizeable area of unincorporated Marin County. The boundary of Zone #1 is formed by the entire watershed tributary to Rush Creek and Novato Creek.

b. Action Plan 2010

Action Plan 2010 is the five-year SWMP for the member agencies of MCSTOPPP. The County of Marin and each of the cities and towns in the County, including the City of Novato, are member agencies of MCSTOPPP. MCSTOPPP coordinates consistency between individual SMPs. *Action Plan 2010* was submitted to and approved by the State Water Resource Control Board in May 2005.

c. Novato General Plan

Flooding is addressed in the Safety and Noise Chapter of the existing General Plan. NSF Objective 2 calls for the City to “reduce flood hazards.” The General Plan includes policies and programs to implement this objective, including the following:

- ◆ Increase floodwater storage capacity;
- ◆ Use FEMA’s updated FIRMs;
- ◆ Work with Marin County Public Works Department to address flooding issues;
- ◆ Pursue funding sources for improvements to storm drainage facilities;
- ◆ Mitigate flooding hazards associated with new development; and
- ◆ Maintain unobstructed water flow in the storm drainage system and consider potential hazards from sea level rise.

d. Local Drainage Master Plan

To accommodate 25-year flood flows, the City has implemented a Local Drainage Master Plan for improving storm drains. A detention pond has been constructed at Deer Island (located on the northern portion of Deer Creek in eastern Novato), and improvements have also been made to the channels of Novato Creek, Warner Creek, and Arroyo Avichi Creek. The City is currently in the process of updating the Local Drainage Master Plan.

e. Novato Municipal Code Section 5-31: Flood Damage Prevention Requirements.

Municipal Code Section 5-31 establishes regulations for “special flood hazard areas” in Novato. Special flood hazard areas are defined by the flood hazard zones delineated in FEMA’s Flood Insurance Rate Maps. Development, designation and subdivision of land within a special flood hazard area require the review and approval of the City Engineer, who must find the land use proposal consistent with specific use regulations and development standards intended to reduce flooding hazards. Standards include elevating a structure’s lowest level above the base flood elevation and anchoring structures to prevent lateral movement in case of flooding. These rules apply to new structures and to improvements or repairs totaling 50 percent or more of the value of an existing building.

f. Novato Zoning Code Section 19.16.050: Flood Hazard (F) Overlay District

Zoning Code Section 19.16.050 established a Flood Hazard (F) Overlay District in Novato. The purpose of this district is to “protect people and property from flood hazard risks by appropriately regulating development and land uses within an F overlay district.” The boundaries of this district are shown in Chapter 2, Figure 2-3. The (F) Overlay District limits

land uses permitted in primary and secondary floodways and requires studies and mitigation for development proposed within a 100-year flood plain.

g. Novato Zoning Code Section 19.35: Waterway and Riparian Protection

Section 19.35 of the Zoning Code establishes buffer areas along watercourses to protect water quality, minimize flood hazards and maintain or expand storage capacity for flood waters. Section 19.35 establishes a “stream protection zone” that includes the stream bed, the stream banks, all riparian vegetation and a buffer zone at least 50 feet wide, measured from the top of the channel bank. The stream protection zone may be expanded or reduced based on specific site conditions. Any proposed development, grading, fill, planting, or vegetation removal requires a use permit. In order to obtain a use permit, an applicant must submit a Stream Management Plan and incorporate annual maintenance requirements into the project.

B. Regional Surface Hydrology

Novato covers about 28 square miles, of which approximately two percent is water. The topography of Novato ranges from sea level elevation to 1,558 feet above mean sea level (amsl) at the highest point on Burdell Mountain. Downtown is at 18 feet amsl. The annual precipitation level in Novato averages 27.5 inches per year. Ultimately, all surface drainage flows into San Pablo Bay by overland flow, tributary swales (shallow, vegetated ditches), or perennial streams, such as Novato Creek.

1. San Pablo Bay

Novato is located within the San Francisco Bay Area Hydrologic Basin. The San Francisco Bay functions as the drainage outlet for the waters of the Central Valley. San Francisco Bay can be divided into distinct waterbodies that have different physical and chemical properties. The northern reach includes three major embayments: Suisun Bay, San Pablo Bay and Central Bay. Novato is located on the western shore of San Pablo Bay. Areas near San Pablo Bay are largely salt marsh and leaved wetlands.

The physical characteristics (i.e. salinity, temperature, and suspended solids) of the waters of San Pablo Bay vary greatly on a given day due to its location between Suisun Bay and the saltier San Francisco Bay. The interaction of waters of varying salinity has a major influence on the circulation of water in San Pablo Bay itself. When freshwater and saltwater meet, the denser saltwater tends to flow under the freshwater until the waters are mixed by stronger tidal currents and winds.

While the major source of freshwater to San Pablo Bay is inflow from the Delta, other surface water flow, including the Napa and Petaluma Rivers, stormwater runoff, and groundwater are important sources of fresh water to San Pablo Bay. Surface runoff creates the majority of freshwater flows within the rivers and streams. Consequently, stream flow in all of the creeks and rivers varies from season to season depending on precipitation. Most of the water flow during a given year occurs during the rainy season, from November to April. Flows in many of the smaller streams located in the upper reaches of the watershed are intermittent and start to run dry after the end of the rainy season. Major streams intercept some groundwater in their lower reaches, which allows them to flow all year.

2. Natural Drainage Systems

The drainage network in Novato consists of a number of lakes, streams, and creeks, including the Petaluma River, Stafford Lake, Novato Creek, Rush Creek and San Pablo Bay. The Petaluma River begins 20 miles north of the City of Petaluma and borders the eastern edge of Novato. San Pablo Bay borders the eastern edge of the city. Rush Creek flows north and east from Downtown to the Petaluma River. Stafford Lake is a Novato Creek reservoir located approximately 11 miles upstream of San Pablo Bay. The reservoir has a storage capacity of about 4,450 acre-feet and a water surface area of about 230 acres. Novato Creek flows from east to west and bisects the city. The creek and its drainage basin encompass approximately 44 square miles, part of which is shown in Figure 12-1. Several smaller creeks flow into Novato Creek, including Warner Creek (5.1-square mile drainage area), Arroyo Avichi Creek (1.6-square mile drainage area), and Arroyo San Jose Creek (5.7-mile drainage area).

Novato Creek is the dominant perennial stream in the Novato area, extending about 17 miles from its headwaters at Stafford Lake to San Pablo Bay. This creek, along with its numerous tributaries, including Bowman Creek, Simmons Creek, Vineyard Creek, Warner Creek, and Arroyo Avichi Creek, drains a watershed of approximately 27,500 acres.

3. Man-made Drainage Systems

Man-made drainage systems within the City of Novato include earthen drainage swales and concrete ditches, 35 major street culverts and 15 bridges, and drainage facilities and basins that are part of City-owned open spaces.

The City's Street Division staff routinely inspect these man-made drainage facilities to ensure that proper protective devices, such as grates, are in place, and to remove hazardous debris upstream. Most of the man-made drainage system is inspected and cleaned before, during and after each storm occasion, which helps to reduce local flooding.

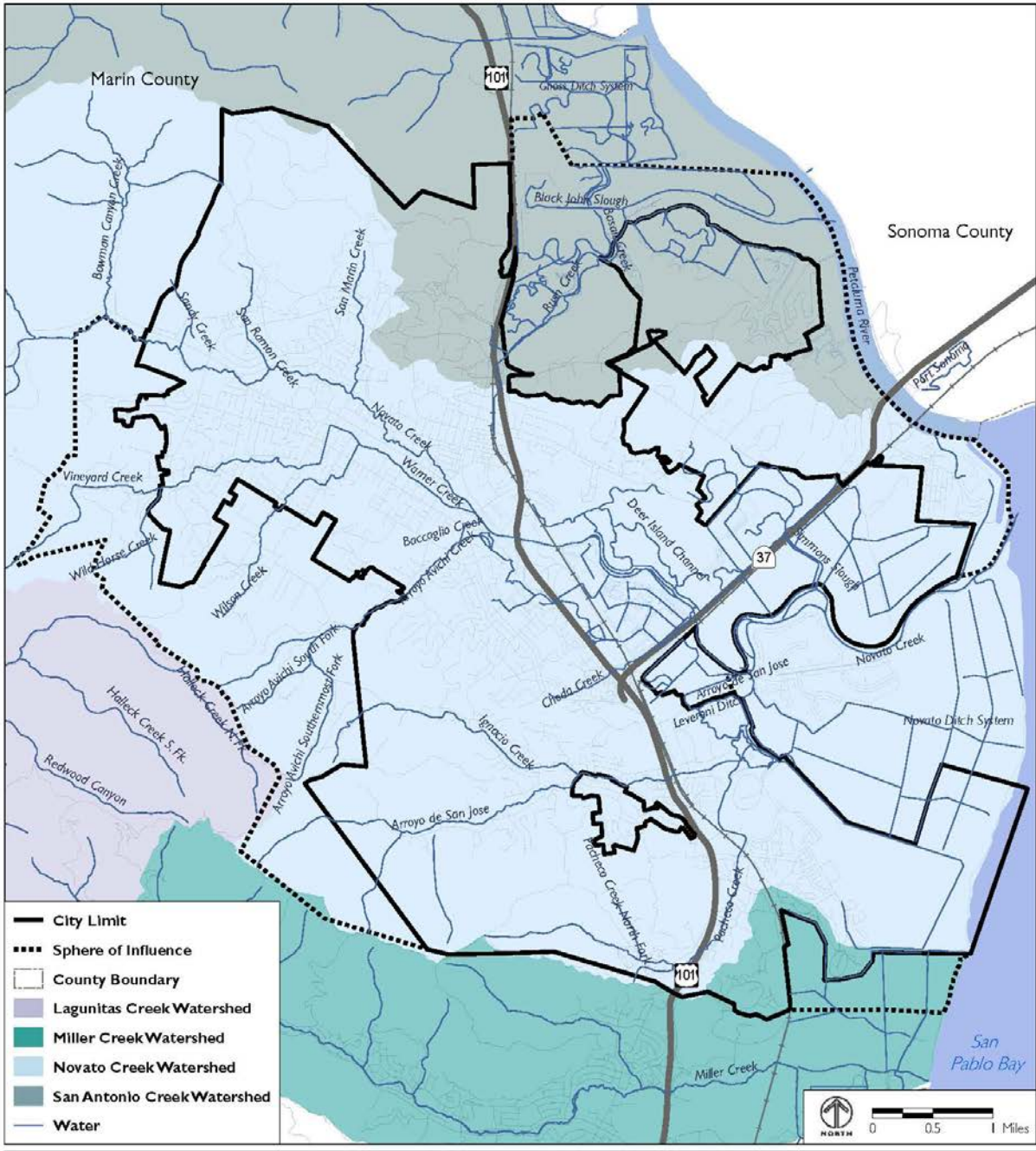
4. Groundwater Quality

Novato does not rely on groundwater for any part of its water supply. As discussed in Chapter 13, Hazardous Materials, while there is groundwater contamination beneath some specific hazardous materials sites in Novato, the contamination is confined to the sites themselves or immediately adjacent properties.

C. Flood Control and Management

Novato Creek, along with its tributaries such as Warner and Arroyo Avichi Creeks, is a major source of flooding in Novato. Heavy rains occasionally cause flood damage in Novato. Properties upstream of the confluence of Novato, Warner, and Arroyo Avichi Creeks have been particularly susceptible to flooding. Heavy rains in 1980, 1982, 1983, 1986, 1989 and 1998 caused flooding and damage to buildings in these areas. Other areas with high flood danger include Ignacio, Arroyo San Jose, and Vineyard Creeks, as well as much of the bayfront, including the Bahia area. Failure of the Novato Creek Dam, located at Stafford Lake, is another potential source of flooding. This section describes the primary strategies by which the City and other agencies seek to control flooding risks in Novato.

**CITY OF NOVATO
EXISTING CONDITIONS REPORT
HYDROLOGY, FLOODING AND WATER QUALITY**



Source: Marin County, GIS

FIGURE 12-1
WATERSHEDS AND WATERBODIES

1. FEMA Flood Hazard Zones

Identified FEMA flood hazard zones in Novato, as mapped in 2007 and shown in Figure 12-2, show that all but the high-lying areas of the city are classified as Zone A, defined as “subject to 100-year flooding with no base flood elevation determined.” The 100-year flood zone is identified as an area that has a 1 percent chance of being flooded in any 4eastern and southern parts of the site are listed as occurring within a 500-year flood zone.

FEMA mapping is a guide for the City in planning for flooding events and regulating development within identified flood hazard areas. However, additional locations within the city could be subject to flooding. For example, while flood control projects and regulations have mitigated many serious flood hazards, some areas could still experience flooding due to breakdowns in the existing systems, such as failed levees. In such cases, empirical information about storm events gathered by staff of the Public Works Department and the State Department of Water Resources (DWR) supplements information provided by FEMA.

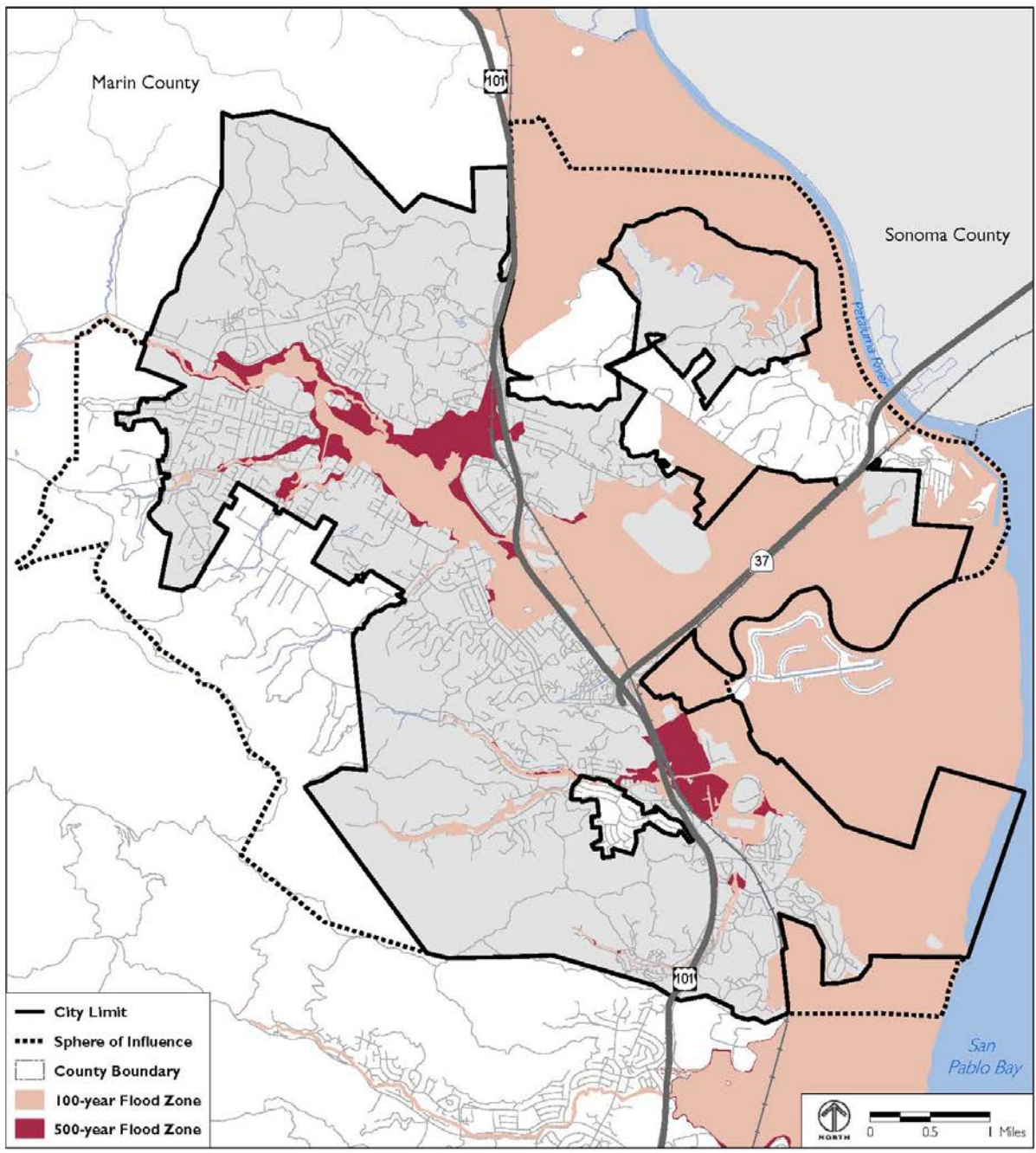
2. Dam Inundation

Novato is subject to potential flooding resulting from the failure of the Novato Creek Dam at Stafford Lake. This earthen dam is designed to withstand an earthquake of a magnitude up to 8.25 on the San Andreas Fault. The area that would be inundated in the hypothetical event of a sudden failure of the dam is shown in Figure 12-3.

3. Tsunami and Mudflows

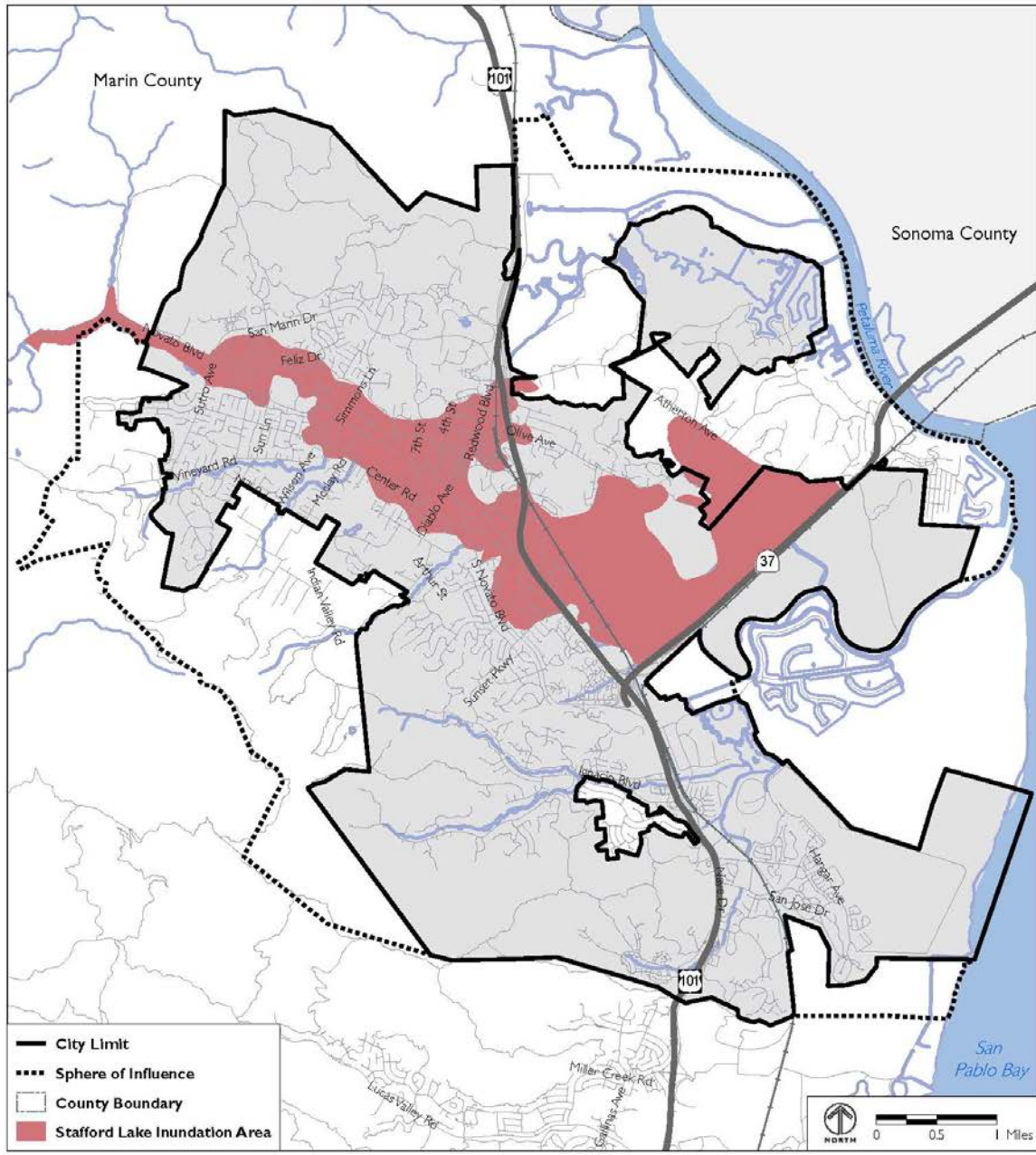
Although an earthquake on the Hayward and Rodgers Creek fault complex, which runs beneath San Pablo Bay, could create a tsunami, there is believed to be little potential for a tsunami to affect Novato.

Mudflows are not considered a significant threat, given the relative lack of steep grades and the requirements of the City’s Hillside Ordinance to prepare a geotechnical study, identify and mitigate any potential mudflow hazards.



Source: Marin County, GIS (original flood hazard data from FEMA)

FIGURE 12-2
FLOOD HAZARD ZONES



Source: Marin County, GIS

FIGURE 12-3
 STAFFORD LAKE DAM INUNDATION AREA