THE CITY OF
NOVATO
CALIFORNIA

City of Novato

Hazard Mitigation Plan

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Section 1 - Introduction

1.1 Mission Statement

The mission of the City of Novato Hazard Mitigation Plan is to establish and promote a comprehensive mitigation policy and program to protect the citizens, city (private and public facilities), the infrastructure and the environment from natural and man-made hazards.

1.2 Executive Summary

1.2.1 Purpose of the Plan

This Plan analyses the risks posed to people and property in Novato by hazards, and presents a list of mitigation strategies that the City can implement prior to such events occurring. This Plan also represents the City's commitment to pre-disaster mitigation, prevention and preparation.

The plan fulfills the City's regulatory obligations as established by federal and state laws. It also serves as the basis for the State and/or Federal government to provide technical and financial assistance for mitigation programs and projects.

The plan integrates hazard mitigation strategies into the day-to-day activities and programs of the City of Novato, its citizens and its stakeholders. It offers a City-wide support document as well as a planning support tool for those strategies developed by the City's departments, agencies, special districts and organizations.

Upon acceptance by the California Emergency Management Agency (Cal EMA) and the Federal Emergency Management Agency (FEMA), selected strategies and actions will be further developed for funding and implementation by the City. The Implementation Plan describes the potential sources of hazard mitigation strategy funding. All strategies identified in this plan can only be implemented when it is financially feasible.

It is understood that the mitigation strategies adopted in this plan are recommendations only, and must be approved and funded by the City Council in order to be implemented as official Hazard Mitigation Strategies.

1.2.2 Hazard and Risk Assessment

A variety of potential hazards pose a risk of injury, loss of life or damage to property in the Novato area. This Plan focuses on the highest risk priority hazards to Novato: earthquakes, floods, wildland urban interface fires, and landslides. Other hazards, rated as moderate or low risk are listed in the hazard matrix rating list. These other hazards are either subsets of the major hazards and are not discussed in this plan. For the highest rated hazards the following information is included:

- Physical characteristics,
- Event history of occurrence,
- Likelihood of future occurrence,
- Vulnerability of the people, structures and critical facilities, and
- Potential impact and potential losses.

1.2.3 Capability Assessment

The City of Novato helps to protect and maintain the health, safety and welfare of the community by working to reduce the City's level of risk to natural and man-made hazards. The City uses a variety of assets and authorities to reduce or mitigate impacts of natural disasters. These tools include voluntary and mandatory actions, individual and community efforts and preventive methods. The capabilities available to City of Novato are divided into: Departments and Agencies, Codes and Regulations, Plans, and Fiscal Resources.

1.2.4 Mitigation Strategy

The City of Novato mitigation strategy is developed from the analysis of the Hazard Vulnerability Assessment as outlined in this plan. This section presents mitigation goals and objectives to reduce or avoid long-term vulnerabilities to the identified hazards. These goals and objectives were developed by the committee through careful consideration of the risk assessment findings, localized hazard identification and loss/exposure estimates, based on input from participating stakeholders, the public and an analysis of Novato's current capabilities assessment.

In addition, through many meetings, the planning committee representatives met with the consultant staff and various department representatives to specifically discuss these hazard-related goals, objectives and actions as they relate to the overall Plan. Representatives of numerous departments were involved in this process.

1.2.5 Implementation Plan

An implementation plan is the key to any successful planning effort. Evaluating the plan annually and producing a plan revision every five years will ensure the document remains active and current.

The implementation plan identifies who has responsibility for the action, the estimated timeframe for completion, and estimated funding and/or funding sources to support implementation. The mitigation objectives and actions are designed to be carried out through the normal governmental activities as much as possible. Therefore, the City will strive to fully incorporate the mitigation strategies into existing programs and procedures.

1.3 Community Profile

1.3.1 History

The hills and valleys of Novato were once the hunting grounds of Miwok Indians who had a village north of Novato at Olompali which is now a State Historic Park (Olompali State Historical Park.) In 1843, Olompali was granted to a Native American, Camilo Ynitia, who raised wheat and became a successful cattle breeder. The area that now includes Ignacio, Hamilton Field, and Bel Marin Keys was once part of land granted to Ignacio Pacheco. Most of the present City of Novato was known as Rancho de Novato in 1839 when it was granted to Fernando Feliz who served in the Mexican Army. The Rancho had a number of owners before Francis DeLong and Joseph Sweetser formed a partnership and bought the property about 1856.

When Marin County was organized in 1850, there were 4 townships: San Rafael, Novato, Sausalito and Bolinas. The City of Novato was incorporated in January of 1960 as a general law city.

Hamilton Field: in the late 1920's the local citizens learned the War Department was considering new West Coast defense facilities including a new airbase in California. The Citizens of the City of Novato worked to bring that airbase to Novato in order to provide jobs during the Depression and were successful in their efforts. On May 12, 1935 Hamilton Air Field was dedicated in honor of Lt. Lloyd Hamilton, the first American pilot to fly with the Royal Flying Corps during W.W.I. This airfield was a

prime World War II bomber, pursuit and transport aircraft facility. The Base was decommissioned in 1974 and was designated a Historic District in 1998.

The former Hamilton Airfield has been closed in phases over the course of two decades, and the second phase of its redevelopment is nearing completion. Through the dedication of both the City and private developers, Hamilton has become one of the most successful military base conversions in the entire nation. Over a seven-year period, over 2,100 new homes have been constructed, providing a vibrant, well-balanced community that attracts new residents and businesses from throughout the Bay Area. The Hamilton Airfield is home to a number of recreation areas and tracts of open space, in addition to one of the largest wetlands restoration projects in the country. In addition, up to 552,000 sq ft of office/technology space is being developed in renovated airplane hangers at Hamilton Landing, offering state-of-the-art office opportunities that can also be used for technology and/or lab space for the biotech sector.

The Hamilton Army Airfield is located in southeast Novato, approximately four (4) miles southeast of the Novato central business district. It encompasses approximately 1,605 acres in a beautiful setting, bordered on the north and east by tidal flats and marshlands, on the southeast by San Pablo Bay, and on the west by rolling, oak-studded hills.

1.3.2 Description

The City of Novato is the northernmost city in Marin County, located 29 miles north of San Francisco on Highway 101 across the Golden Gate Bridge, and 37 miles northwest of Oakland. Incorporated in 1960, Novato has the distinction of being the area's newest and largest city in land area, covering 28 square miles. Novato's population in 2009 was 52,921 according to the Department of Finance and is California's 153rd largest city. The Novato Fire Protection District covers an area of 71 square miles, which includes 15,000 acres of open and park space. The highest point in Novato is Mt. Burdell at 1,558 feet. The elevation in downtown Novato is 18 feet (NGVD29).

Novato has a rural atmosphere largely because of its low population density and the high amount of open space and parks in and near the city. Novato's population density is about one-half that of San Rafael, and is nearly one-third that of Petaluma and Vallejo. Novato's sphere of influence contains seven county-maintained open space preserves with more than 2,600 acres of open space-including 1,600 acres surrounding Mt. Burdell in Northern Novato. Including Olompali State Historical Park, just north of Novato, the total is nearly 3,500 acres. The city itself is home to a total of twenty-seven parks, including three major city parks. The North Marin Water District also maintains an open space preserve near Loma Verdi.

There are several modes of transportation within the Novato area including roadways, a general aviation municipal airport (Gnoss Field), bus service, and a deactivated rail line (NWPRR) now operated by the Sonoma Marin Area Rail Transit (SMART). Primary access to the City of Novato is US Highway 101, the main north-south corridor in the West Bay Area. Novato is 12 miles north of Interstate Highway 580, a major east-west corridor serving the Bay Area. State Highway 37 joins US 101 at Novato making this area a hub for North Bay travel. State Highway 116 is ten miles north of Novato.

1.3.3 Government

The City of Novato is a general law city. The City Council consists of five members elected at large, each serving a four-year term. The mayor is selected for a one-year term from among the members of the City Council. The City operates under a council-manager form of government. The City Council appoints the City Manager, City Attorney and City Clerk and delivers municipal services.
Other public services provided to the citizens of Novato are: Fire services by Novato by the Novato Fire Protection District; refuse, recycling services and sewage systems by the Novato Sanitary District;

water services provided by the North Marin Water District; public transit services by the Golden Gate Bridge, Highway and Transportation District and Marin Transit; animal control services by the Marin Humane Society; and library services by the Marin County Free Library.

Pacific Gas and Electric provides gas and electric services in Novato. Telephone service in Novato is provided by Verizon in the northern and central sections of Novato and by SBC in the southern section. Cable television service is provided by Comcast Cable Corporation throughout most of Novato and by Horizon Cable TV Inc. in certain areas of Hamilton.

1.3.4 Continuity of Government

A major disaster or an enemy attack could result in loss of life and property, including the death or injury of key government officials. At the same time, there could be partial or complete destruction of established seats of government, and the destruction of public and private records essential to continued operations of government and industry. Applicable portions of the California Government Code and the State Constitution provide authority of the continuity and preservation of state and local government.

1.3.5 Business & Industry

The City of Novato successfully mixes corporate headquarters, state-of-the art technology companies and a variety of retail centers in its business community. Fireman's Fund Insurance Company is the City's (and Marin County's) largest employer. Founded in 1863, Fireman's Fund has been providing premier business and personal insurance for over 147 years. The City is also home to the Buck Institute for Age Research, and to The Republic of Tea, one of the largest tea distributors in the United States. Several technology companies are based in Novato, including Drive Savers data recovery, and Sonic Solutions.

Retail businesses in Novato take many forms. The Vintage Oaks Shopping Center is a regional mall that serves as home to Costco, Target, Macy's Furniture Center, Novato Toyota and Silveira Pontiac Buick GMC of Novato. Novato is also home to Travel Smith, a successful company that sells travel clothing and accessories throughout the world through its catalogue business and on the Internet. There is an active retail area in downtown Novato with shops and restaurants as well as other shopping areas located throughout the City.

1.3.6 Climate

The Northern California coast, just north of San Francisco, is a mild climate region of warm days and cool nights. Right along the coast, summers are cool and foggy and the further inland you go, the sunnier and warmer it gets. Coastal low clouds and fog usually burns off by early afternoon. There is little or no rain May through September, with the rainy season beginning in late October or November. Flooding is a problem in winter when rains are heavy within a short period of time. There is an occasional light frost in the area, but generally temperatures stay above the freezing mark. Fall is usually the sunniest season along the northern California coast without the fog of summer or the clouds and rain of winter.

Table 1-1
Monthly Weather Summary

Month	High Temp	Low Temp	Rainfall	Ocean Temp
January	56°F	41°F	7.38 in.	52°F
February	61°F	43°F	7.14 in.	52°F
March	64°F	45°F	4.89 in.	52°F

April	68°F	46°F	1.75 in.	50°F
May	72°F	49°F	0.70 in.	50°F
June	77°F	53°F	0.12 in.	51°F
July	80°F	54°F	0.06 in.	52°F
August	81°F	54°F	0.08 in.	54°F
September	79°F	53°F	0.34 in.	55°F
October	74°F	50°F	1.65 in.	54°F
November	63°F	45°F	4.86 in.	54°F
December	56°F	41°F	5.32 in.	53°F

Weather

- Winter temperatures range from 48 to 62
- Spring temperatures range from 64 to 81
- Summer temperatures range from 74 to 98
- Fall temperatures range from 73 to 95
- Rainfall 57 – 65 days per year Precipitation 40 inches per year

1.3.7 Geography

The Novato area contains some bodies of water, including:

The Petaluma River, which originates approximately 20 miles north of the City of Petaluma, forms the northeast border of the Novato area and the Marin/Sonoma County line. Petroleum and gravel products are transported from Petaluma to San Pablo Bay via the river.
San Pablo Bay borders the eastern edge of the area. This shoreline extends for approximately seven miles. San Pablo Bay is a navigable waterway that provides access to San Francisco Bay and the Pacific Ocean.

Novato Creek flows from west to east and bisects the area. The watershed of Novato Creek encompasses the majority of the area, and its drainage basin encompasses 44 square miles. Numerous streams flow into Novato Creek, including Warner Creek, with a 5.1-square-mile drainage area; Arroyo Avichi, with a 1.6-square-mile drainage area; and Arroyo San Jose, with a 5.7-squaremile drainage area. In addition to these major waterways, numerous local drainage channels and storm drains discharge into Novato Creek and its tributaries. Pacheco Creek flows through the southern part of Novato.

Rush Creek, which flows in a north easterly eastward from Highway 101 to the Petaluma River, north of the City limits.

Stafford Lake, a reservoir and headwater for Novato Creek is approximately 11 miles upstream from San Pablo Bay. The reservoir, which was established in 1951, stores water for domestic use. The reservoir has a storage capacity of 4,430 acre-feet and a water surface area of 245 acres. The North Marin Water District (NMWD) supplies about 95 percent of Novato with potable water. The Marin Municipal Water District (MMWD) supplies an area including Hamilton Field. NMWD receives most of its water from the Russian River, via the North Marin Aqueduct. NMWD has an agreement with the Sonoma County Water Agency that provides an annual entitlement of 12,360 acre-feet (4 billion gallons) of Russian River water.

1.3.8 Wetlands

Wetlands in the area include saltwater and brackish water-marshland, and freshwater wetland. The marshes and much of the freshwater wetlands habitat are part of the San Francisco Bay Estuary.

Saltwater marsh communities occur in the upper inter-tidal zone of protected shallow bays, estuaries, and coastal lagoons. Brackish-water marshes occur at the mouth of large streams, which enter northern San Pablo Bay, creating a gradual transition zone between salt marsh and riparian vegetation communities.

1.3.9 Ridgelines and Other Scenic Resources

Ridgelines surrounding Novato generally enhance the community's visual resources. Mt. Burdell, located north of the City of Novato, is a significant landmark in the open space network surrounding the District. Pinheiro Ridge functions as a ridge and upland greenbelt separator between the Atherton area and Gnoss Field. Big Rock Ridge, with a high point of about 1,400 feet, forms the western and southern edge of the Area of Interest, with an eastward extension to San Pablo Bay separating Hamilton Field from the St. Vincent's Silveira property

1.3.10 Open Space for Environmental Protection

In 1972, Marin County voters established the Marin County Open Space and Water Conservation District and approved the assessment of a property tax for the purpose of acquiring and managing open space in the County. The District works cooperatively with federal agencies, the State Parks Department, and local communities to acquire open space in the eastern part of the County. The City of Novato also owns approximately 200 acres of open space, obtained through acquisition or dedication, and located throughout the City. There is approximately 4,000 acres of open space land in public ownership (state, county, and city) in the City limits with another 1,000 acres in the Sphere of Influence.

Section 2 - Planning Process

2.1 Organization of Planning Process

The Police department is the lead agency responsible for the City of Novato Hazard Mitigation Plan (HMP). Financial support for the development of the plan was received from the Federal Emergency Management Agency through the Pre-disaster Mitigation Grant program in 2005. The City developed a planning committee to provide management oversight and technical assistance to develop the plan. To supplement staff resources and secure technical expertise the City hired a consultant firm to provide assistance in developing the plan.

The planning committee includes representatives from various City departments, and other local public agencies. These committee members (listed later in this section) have an understanding of how the community is structured and how residents, businesses and the environment may be affected by natural hazard events. The planning committee guided the development of the plan, and assisted in developing plan goals, objectives and action items, identifying stakeholders, and sharing local expertise to create a comprehensive plan.

This plan was originally submitted to FEMA as a Multi-Jurisdictional Plan with the Novato Sanitary District. This original version was not approved by FEMA. Due to some difficulties, the plan is resubmitted to FEMA as a Single Agency Hazard Mitigation Plan.

2.2 Planning Process Phases

The City of Novato followed the four-step hazard mitigation planning process recommended by the Federal Emergency Management Agency in its State and Local Hazard Mitigation Planning "How to Guides."

2.2.1 Organize Resources

At the inception of the project, the planning committee and consultant identified potential stakeholders, technical resources and existing information sources to support the planning effort. This included developing mailing lists and notifying public stakeholders, local jurisdictions, public agencies, citizens and organizations, holding public workshops, public organization meetings and collecting all available hazard information related plans and documents from internal and external agency sources.

2.2.2 Assess Risks

The City reviewed the list of potential hazards that could pose a threat to the people and property in Novato. The committee determined that the hazard mitigation plan should focus on the key hazards in the City with the highest risk level. These risks were determined by taking into consideration:

- Potential for causing significant physical and economic damage to the community
- The size of the physical area affected
- The historic rate of recurrence of the risk
- How vulnerable the population, housing and infrastructure is to the risk
- How important the risk is to the community and the citizens

As a result of this assessment the plan will focus on the four highest rated risk hazards: Earthquake, Flood, Wildland Urban Interface Fires and Landslides. The public, through the questionnaire rated these hazards (earthquake, fires, and floods) as their highest concern.

Some hazards are included as subsets of the four key hazards: hazardous materials releases, dam failure, severe weather, transportation loss and radiological incident are included in the plan as secondary hazards. Although rated high in the public questionnaire, terrorism and national security events are thoroughly addressed by other emergency related city, county, state or national plans and is therefore not addressed in this mitigation plan. Other possible hazards rated as moderate to low risk and are included in the hazard matrix rating list.

A starting point in developing the hazard identification and analysis section of the plan was a thorough review of the existing policies contained in the City's General Plan, specifically the Noise and Safety Element and the Flood Mitigation Plan. This information was supplemented by studies, data and plans produced by federal, state and local agencies, including, but not limited to: Federal Emergency Management Agency, California Emergency Management Agency (Cal EMA), California Seismic Safety Commission, California Geological Survey, Department of Water Resources, Association of Bay Area Governments, and County of Marin, plus others. A description of each hazard was developed, including physical characteristics, event history, and the potential for future occurrence. The vulnerability of population, structures and assets was conducted and impact and loss estimates were also developed.

2.2.3 Mitigation Planning

Based on the hazard identification performed in the previous step, and reviewing current City mitigation abilities such as: codes and regulations, current mitigation programs, constraints, fiscal resources and development trends, the City identified mitigation goals and objectives and a wide range of potential mitigation strategies and actions to mitigate the effects of future hazards. Following an in-depth review by the committee, interested stakeholders, and the public, the list of mitigation actions was refined based on an assessment of the administrative, political, legal, economic and environmental factors that either could contribute to or impede successful implementation. The resulting list of mitigation actions was then prioritized.

2.2.4 Implementation Plan and Plan Maintenance

An implementation plan was developed with input from the committee, interested stakeholders and the public for the highest priority mitigation actions developed in the precious steps. To ensure the Plan remains an active and relevant document, the City will follow the schedule described in the Plan Maintenance section for monitoring and evaluating the Plan annually and producing a plan revision every five years.

2.2.5 Public Participation Process

The City is committed to an open and public process and followed this philosophy throughout the development of the plan. The committee established the following goals to guide its public outreach and participation efforts.

1. Inform the public through different means of communication that the City is seeking input on the Plan.

2. Provide multiple opportunities for public input and review.

3. Conduct outreach to stakeholders, citizens, first responders, public utility, media, schools, neighboring jurisdictions, chamber of commerce, historic preservation organization, federal and state agencies, and non-profit organizations.

4. Provide ongoing outreach to increase public awareness of hazards and how the public can minimize and/or avoid losses from disasters.

2.2.6 Public Outreach Activities

The Planning Committee followed the established public outreach goals above to engage the public in the process, including: the media, public noticing, stakeholder invitation letter, City website, public workshops, questionnaire, mailings, committee meetings, and council meetings. In addition, copies of the plan were distributed throughout Novato, including: city offices and public counters, Chamber of Commerce, County library, local public agencies and other locations. Committee members attended hazard mitigation meetings of other public agencies including several held by ABAG and other community organizations. Mailing notices, questionnaires and invitation letters regarding development of the Hazard Mitigation Plan were sent to the following groups:

- Individuals and organizations including citizens who may be affected by disasters, or first responders
- Public utility service providers
- Schools
- Neighboring jurisdictions
- Businesses
- Historic preservation organizations
- professional organizations
- local community groups and non-profit organizations
- homeowners associations

2.2.6.a General public

To solicit public opinion regarding concerns about hazards and to better understand community needs in reducing risk and loss from such hazards the committee developed the following questionnaire. In addition to being posted on the City's website, the questionnaire and cover letter was sent to the following list of civic, community and non-profit organizations and the community at large. The responses provided valuable input for the committee including which hazards should be rated highest and further developed in the plan. Several goals, objectives and actions were designed as a result of public input including the two examples below:

- Goal One: promotes disaster-resistant future development to minimize losses to existing and future structures within hazard areas.
- Action item 3.1.3: identifies specific facilities, which are critical to effective emergency/disaster response, and evaluate their abilities to survive and operate efficiently immediately after a disaster.

In addition, several representatives from homeowners associations attended committee meetings and provided input to the process. Staff and the consultant presented the Hazard Mitigation process at a monthly meeting of the Novato Historical Guild. Their response is listed in Appendix 1. Some of the Historical Guild's concerns are addressed in this plan, including the mitigation actions that include inspecting the levees and flood control pumps at Hamilton for seismic safety. The City's owned historic structures on Sherman Avenue the former City hall facility was remodeled and is now open to the public and is the home to the City Council meetings.

The public input questionnaire, cover letter, questionnaire results and the web posting are provided in Appendix 2. The specific groups and organizations to receive the public cover letter and questionnaire are:

- Boy Scouts of America – Marin Council

- City of Novato employees (Novato residents)
- Community Resources of Marin
- Digital Village
- Girl Scouts of San Francisco Bay Area
- Hamilton Field of Marin Association
- Indian Valley Artists
- Marin Arts Council
- Marin Community Food Bank
- Marin Community Foundation
- Marin Humane Society
- Marin Museum of the American Indian
- Marin.Org
- Novato Business Roundtable
- Novato Community Hospital
- Novato Community Players
- Novato City Council
- Novato Historical Guild
- Novato home owners associations (more than 50)
- Novato Human Needs Center
- Novato Mothers Club
- Novato Public Access Television
- Novato Youth Center
- Rotary Club of Ignacio
- Rotary Club of Novato
- Rotary Club of Novato – Sunrise
- Terwilliger Nature Education and Wildlife Rehabilitation

2.2.6.b Hazard Mitigation Plan Stakeholders

Stakeholders in the Novato plan were identified and included throughout the process by how they may be affected by a local disaster; some are first responders or may provide an important public service to the citizens. Some stakeholders provided valuable input to the plan through attending committee meetings, sharing opinions, data studies and/or their agency policies and documents. The sample jurisdictional letter below was sent to the stakeholders during the planning process with an invitation to attend committee meetings and share ideas or concerns. The invitation letter (sample below) was sent to the following stakeholders:

Public Agencies

- Army Corp of Engineers
- Association of Bay Area Governments
- California Highway Patrol
- City of Petaluma
- City of San Rafael
- College of Marin
- County of Marin OES
- Marin County Flood Control District
- Marin/Sonoma Mosquito and Vector Control District
- Metro Link Transportation
- Marin Consortium for Pollution Control
- Marin County Free Library

- Marin County Public Works Managers
- North Marin Water District
- Novato Fire Protection District
- Novato Sanitary District
- Novato Unified School District
- Pacific Gas & Electric
- Sonoma Marin Area Rail Transit (SMART)

Business Organizations

- Novato Chamber of Commerce
- Downtown Business Association
- Marin County Convention and Visitors Bureau
- Kaiser Permanente Hospital
- Buck Institute

SAMPLE: Jurisdiction & Stakeholder Invitation Letter

City of Novato

(Addressee)(Surrounding Cities , the County and public agencies)

Dear "City Manager" or To Whom It may Concern

The City of Novato is currently involved in writing a Disaster Hazard Mitigation Plan under the 2002 amendment to the Robert Stafford Act (PL 93-288) for reduction of damage from both natural and man caused risks that can affect our City. City of Novato shares common borders with your jurisdiction and our jurisdiction may share some mutual corresponding risks, such as earthquake, flood, dam failure, wildland/urban interface fire, and other disaster hazards.

We are inviting your comments and input into the City of Novato Hazard Mitigation Plan. The Hazard Mitigation Planning Committee will consider projects that you may want the City to participate in for the reduction of risks between our two cities. Attached for your consideration is the list of Disaster Risk priorities in the order they were ranked by the Planning Committee and are being considered for mitigation strategies by the City.

Nancy Andrews, of the City of Novato Police Department, is the Chairperson for the City of Novato Hazard Mitigation Planning Committee. The committee meets April 5 and April 19, 2005. Your concerns and Hazard Mitigation Strategy input would be both helpful and welcome. Thank you for your consideration.

Sincerely,

Nancy Andrews, Chairperson

In addition to the regularly scheduled planning committee meetings, specific meetings and workshops were held during the process to allow the public and stakeholders to participate.

Stakeholders and Public Meetings:

January, 2005	Agency Stakeholders meeting
January 11, 2005	Committee Kick-Off meeting
February, 2005	Marin County Public Works Managers
February 8, 2005	Historical Guild meeting
April 5, 2005	Public Committee meeting
May 5, 2005	Public Committee meeting
May 17, 2005	Public Workshop
June 19, 2007	City Council Work Session
June 26, 2007	City Council Public Hearing
July 10, 2007	City Council adopted plan by resolution

2.3 Plan Review and Adoption

Public review of the proposed plan was available during the month of May, 2007. The following actions were taken to ensure all interested parties had an opportunity to review and comment on the plan.

1. Public notices and newspaper advertisements, television announcements were issued announcing a public workshop where presentations of the plan would be given.
2. Plan was posted on the website where comments could be submitted.
3. Copies of the draft plan were distributed to public buildings: County library, City Hall offices, Police Department, and other public agency offices.
4. Presentations were given to Novato and Marin County professional and community organizations.
5. A public presentation for Novato citizens was held on May 17, 2005 with an opportunity for comments and questions. The public meeting was advertised in the local newspaper. Although a presentation of the proposed Hazard Mitigation Plan was given at the public workshop, no public comments were received and the meeting was not well attended.
6. A City Council work session was held on June 19, and a public hearing held on June 26, 2007. The Hazard Mitigation Plan was than adopted by the City Council by resolution on July 10, 2007.

2.4 Team members

This document was developed and guided by the members of the Hazard Mitigation Planning Committee, whom guided the process of developing the plan for its inception.

Mary Neilan	Assistant City Manager
Nancy Andrews	Senior Management Analyst, Police Department
Scott Sibbald	Captain, Police Department

Steve Wallace	Director, Public Works
Richard Scott	GIS Coordinator, Public Works
Hans Grunt	Senior Planner, Community Development Department
Ron Averiette	Chief Building Official, Community Development Department
Bill Philbrick	Superintendent of Maintenance Public Works Department
Dan Weakley	Human Resources Manager
Rich Hill	Sergeant, Police Department
Forrest Craig	Division Chief, Novato Fire Protection District
Drew McIntyre	Chief Engineer, North Marin Water District
Carmela Chandrasekera	Assistant Engineer, North Marin Water District
Bill Northcroft	Staff Engineer, Novato Sanitary District
Deborah Smith	Citizen Representative
Janice Rogala	Consultant
Ursula E. Hanks	Assistant ES Coordinator, Marin County Office of Emergency Services
Jan Rogala	Consultant, Dimensions Unlimited

Section 3 – Hazard Vulnerability Analysis

3.1 Introduction

A risk assessment or vulnerability analysis is the process of evaluating the degree of harm a hazard presents. Risk assessments are utilized in developing emergency response plans and procedures, designing and modifying safety systems, identifying needed resources, conducting training and exercises, and minimizing damage and liability.

A hazard can be defined as a condition that has the potential to result in equipment or system failure that can result in human injury or death or damage to the environment. Hazards are divided into two categories: natural or technological. Natural hazards include earthquakes, wild fires, landslides, and floods; while technological hazards include transportation accidents, hazard materials incidents, and dam failure.

A variety of hazards pose a risk of injury, loss of life or damage to property in the Novato area.
This plan focuses on the most significant and the highest rated hazards to Novato, specifically, earthquakes, landslides, and floods and wildland urban interface fires. Other hazards, rated as moderate or low risk are listed in the hazard matrix rating list. These other hazards are either subsets of the major hazards or not further discussed in this plan. Terrorism/WMD is addressed in other local state and national plans and are, therefore, not included in this plan. For the highest rated hazards the following information is included:

- Physical characteristics
- Event history of occurrences
- Likelihood of future occurrence
- Vulnerability of the population, structures and critical facilities
- Potential impact and losses

The information in this section provides the framework necessary to form solid disaster mitigation goals, objectives and actions.

A simple overview of the exposure of some elements to Novato from these hazards appears in Table 3-1 below.

Table 3-1
Summary of City Exposure to Hazards

	Earthquakes	Landslides	Floods	Wildland Fires
Frequency of Hazards	Probability of a major earthquake (M6.7 or greater) before 2032: On N. San Andreas Fault – 21% ON Rodger's Creek Fault – 27%	One to two landslides can occur within a 5 year period	The impact from flooding in the City of Novato is high. The City has a long history of repetitive flood damage which affects approximately 35% of the City.	Potential for wildland fires is high based on the history of California and the indirect impact to the City is high due to the surrounding dense vegetation and trees. Wildland and structure fires burned a yearly average of 18 acres over a 5 year period.
Population	51,000	10,000	14,500	Unknown
Properties	Residential: Liquefaction: 6,500 Shaking: 14,500 Commercial /Industrial: Liquefaction: 1,600 Shaking: 1,600	The potential impact from landslides is high according to the Marin County Landslide map. The vulnerable area is the hillside terrains.	There are 22 houses located in high repetitive fold areas and approximately 300 homes vulnerable from the impact of flooding.	Wildland and structure fires burned a yearly average of 50 structures over a 5 year period.

The history of Novato hazard events highlights the need to mitigate disaster risk as listed in Table 3-2 below. More information on State and Federally declared disasters in and near Novato can be found at: http://quake.abag.ca.gov/mitigation/ThePlan-D-Version-December09.pdf

Table 3-2
History of Novato Hazard Events

Year	Event Number	Event Dates	Event Type	County Declaration	Gubernatorial Declaration	Presidential Declaration
1995	DR 1044	December, 1995 to January, 1996	Winter Storms	Yes	Yes	Yes
1995	DR 1046	February, 1995	Late Winter Storms	Yes	Yes	Yes
1997	DR 1155	December, 1996 to January, 1997	Floods	Yes	Yes	Yes
1998	DR 1203	February 2, 1998	El Nino	Yes	Yes	Yes
2006	DR 1628	December 17, 2005 to January 12, 2006	Winter Storms	Yes	Yes	Yes
2006	DR 1646	March 29 - April 1, 2006	Spring Storms	Yes	Yes	Yes
2006	---	May 10, 2006	Roadway Damage from Storms	Yes	---	---

Source: FEMA: California State Disaster History and CALEMA: Emergency & Disaster Proclamations and Executive Orders by Date (November 2003-Current)

3.2 Hazard Ratings

Earthquake, landslide, flood, and wildland fires are discussed in detail in this plan and were rated as high risk hazards because of their potential of causing significant damage, size of physical area affected, disaster history, the potential for future occurrences and the concern among the community.

The prioritization of hazard matrix rating list below identifies the potential hazards reviewed for the possibility of being included in this plan, the STAPLEE FEMA process was used to rate the hazards.

Each hazard was rated in one of the following categories:

0= No Risk in accordance with the definitions for hazard prioritization definitions listed below
1= Low Risk in accordance with the hazard prioritization definitions listed below
2= Moderate Risk in accordance with the hazard prioritization definitions listed below
3= High Risk in accordance with the hazard risk definitions listed below

Definitions for hazard prioritization:

Magnitude – consider the physical and economic greatness of a risk-caused event and the:

- Size of Event

- Threat to life
- Threat to Property

Duration – consider the length of time the effects of a risk-caused event would last and the:
- Physical duration during emergency phase
- Length of time of threat to life and property
- Physical duration during recovery phase
- Length of time of effects on individual citizens and community recovery
- Length of time of effects on economy, tax base, business and manufacturing, tourism, and employment

Distribution – consider the depth of impact of a risk-caused event among all sectors of the community and the:
- Across the jurisdiction, how wide spread are the effects of the disaster
- Are all sectors of the community affected equally or disproportionately

Area Affected – consider the physical area threatened or potentially impaired by a risk-caused event and the:
- Geographic area affected by primary event.
- Geographic, physical, economic areas affected by potential secondary effects.

Frequency – consider the historic and predicted rate of recurrence of a risk-caused event (generally expressed in years such as the 100-year flood) and the:
- Historic events and recurrences of events in a measured time frame.

Probability – consider the degree of likelihood that a risk-caused event would occur (such as a 62% chance of a magnitude 6.7 earthquake along a given fault within a 30 year period) and the:
- Scientifically-based predictions for occurrence of an event in a given period of time.

Degree of Vulnerability – consider how susceptible the population, community infrastructure and state resources are to the effects of a risk-caused event and:
- History of the impact of similar events.
- Mitigation steps taken to lessen impact.
- Community preparedness to respond to and recover from the event.

Community Priorities – consider the importance place on a particular risk by the citizens and their elected officials and:
- Willingness to prepare for and respond to a particular risk.
- More widespread concerns over a particular risk than other risks.
- Cultural significance of the threat associated with a risk.

3.3 Prioritization of Hazard Matrix Rating

Hazards	History	Frequency	Probability	Impact	Rating	Comment
Earthquake	Yes	Low	High	High	High	Included in plan
Flood	Yes	High	High	High	High	Included in plan
WIldland Urban Interface Fire	Yes	Medium	High	High	High	Included in plan, mention in earthquake
Severe Weather/Winter Storm	Yes	Medium	Medium	Medium	Medium	Subset of flood
Drought	Yes	Low	Low	Medium	Low	Private sector loss
Tsunami	No	Low	Low	Low	Low	Not common
Landslide	Yes	Medium	Medium	High	High	Included in plan, mention in earthquake
Public Health Crisis	No	Low	Unknown	Low	Low	Managed by County Health Department
Hazardous Materials	Yes	Medium	Low	Medium	Medium	Single Incidents; subset of earthquake
Transportation Loss	Yes	Medium	Low	Medium	Medium	Single Incidents; subset of earthquake and floods
Dam Failure	No	Low	Low	High	Medium	Subset of flood
Utility Loss	No	Low	Low	Low	Low	Government Controlled
Radiological Incident	No	Low	Low	Low	Low	Single Incident; subset of earthquake
Terrorism	No	Low	Unknown	Unknown	Low	Included in government plans
Gas transmission pipelines incident	No	Low	Unknown	High	Low	To be future developed in next update

3.4 Earthquake

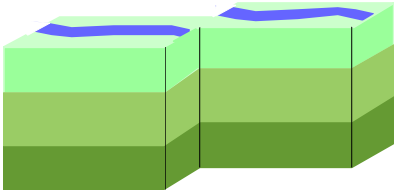
3.4.1 Hazard Identification

According to the Novato General Plan Safety Element the City recognizes that it is located in one of the most seismically active areas of the nation. The severity of damage to buildings from earthquakes is related to the intensity of ground shaking, shills and geologic characteristics, the type of building construction used and other potential hazards listed such as:

- Rupture of the Ground Surface by displacement faults.
- Shaking of the ground caused by the passage of seismic waves through the earth.
- Ground failure induced by shaking such as landslides, liquefaction, and subsidence of unstable ground, with associated effects, including fire and disruption of utilities and transportation routes.
- Tsunamis and seiches which occur in enclosed bodies of water such as reservoirs or lakes, an insignificant risk in Novato.

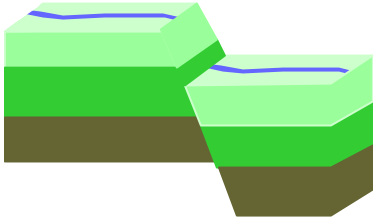
Causes and characteristics of Earthquakes in California:

Fault



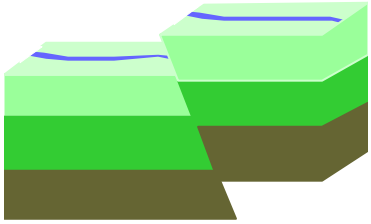
A fault is a fracture along between blocks of the earth's crust where either side moves relative to the other along a parallel plane to the fracture.

Strike-slip



Strike-slip faults are vertical or almost vertical rifts where the earth's plates move mostly horizontally. From the observer's perspective, if the opposite block looking across the fault moves to the right, the slip style is called a right lateral fault ; if the block moves left, the shift is called a left lateral fault.

Dip-slip



Dip-slip faults are slanted fractures where the blocks mostly shift vertically. If the earth above an inclined fault moves down, the fault is called a normal fault, but when the rock above the fault moves up, the fault is called a reverse fault. Thrust faults have a reverse fault with a dip of 45 ° or less.

The earthquakes of California are caused by the movement of huge blocks of the earth's crust. Southern California straddles the boundary between the Pacific and North American plates. These large sections of the earth's crust (the North American plate extends east to Iceland while the Pacific plate extends west to Japan) are moving past each other. The Pacific plate is moving northwest, scraping horizontally past North America at a rate of about 50 millimeters (2 inches) per year.

Ground shaking, landslides, liquefaction, and amplification are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake.

Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. It is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault, and distance from the epicenter (where the earthquake originates). Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.

These regions are near major, active faults and will on average experience stronger earthquake shaking more frequently. This intense shaking can damage even strong, modern buildings. The regions distant from known, active faults will experience lower levels of shaking.

Hazard curves show the probability of exceeding different ground motion values at a site. For example, the 10% probability of exceeding in 50 years is one point on a hazard curve. The hazard curves are important for comparing the hazard at different sites. Some sites may have a high probability of exceeding small ground motions, but a very small probability of exceeding large ground motions. These curves are important for understanding the types of ground motions that one can expect to exceed at a site. Also the hazard curve is important for determining the expected losses. Losses can be caused by frequent smaller events or from less frequent large events.

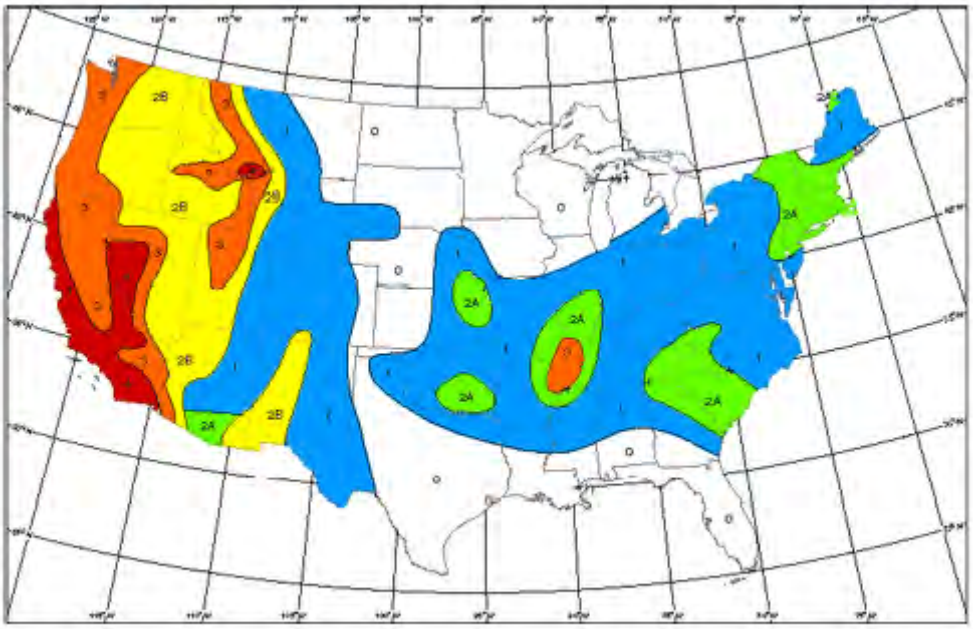
About two-thirds of these 50 millimeters per year occurs on the San Andreas Fault.

In California, many agencies are focused on seismic safety issues: the State's Seismic Safety Commission, the Applied Technology Council, Association of Bay Area Governments (ABAG) Governor's Office of Emergency Services, United States Geological Survey, Cal Tech, the California Geological Survey as well as a number of universities and private foundations.

These organizations, in partnership with other state and federal agencies, have undertaken a rigorous program in California to identify seismic hazards and risks including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake induced landslides. Seismic hazard maps have been published and are available for many communities in California through the State Division of Mines and Geology and ABAG.

The City of Novato is in a seismic Zone 4 (USGS.) The seismic zones are in order of magnitude with Seismic Zone 4 being in an area of greatest risk.

Figure 3-1 US Seismic Zones

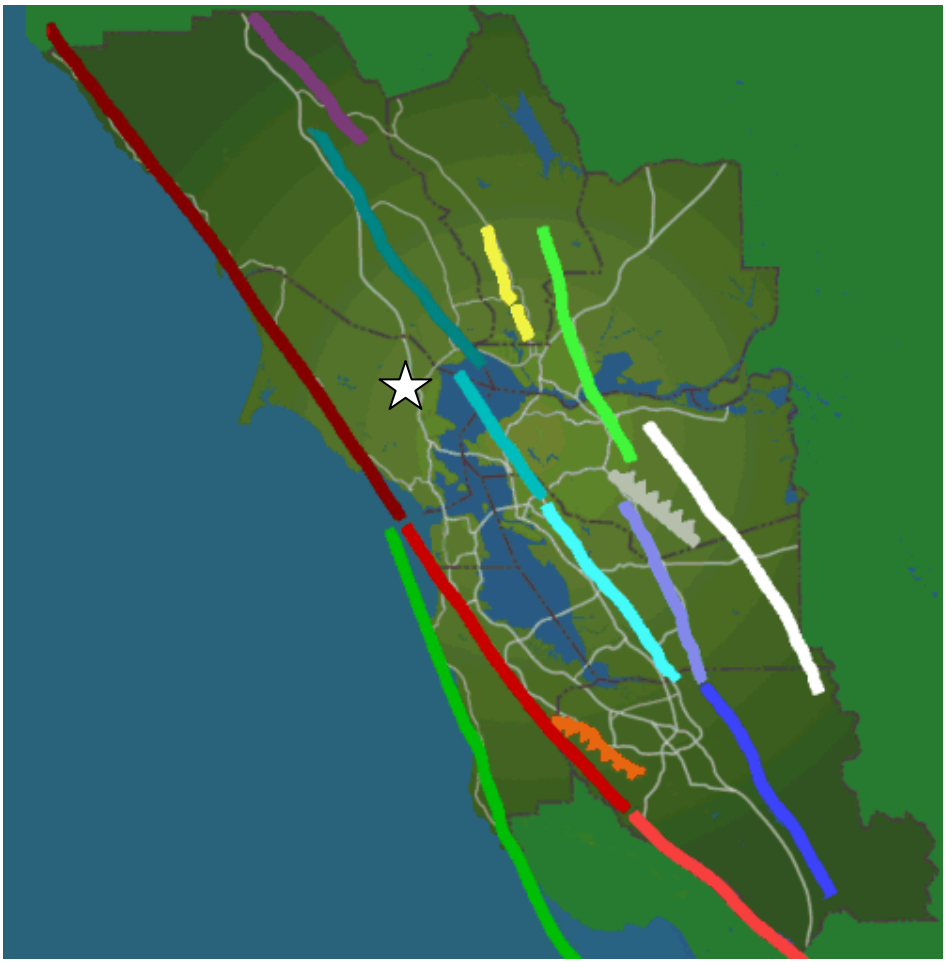


Map Key: Red, Zone 4; Orange, Zone 3; Yellow, Zone 2B; Green, Zone 2A; Blue, Zone 1

The western edges of the continental plates run along the California shoreline and the resulting stresses have produced a complex network of faults. The City of Novato is traversed by several faults as shown in the map below. The San Andreas Fault traverses Marin County running north and south is located 12-14 miles west of the City It enters Marin on the Pacific Coast near Bolinas, follows the path of Highway 1, and Tomales Bay, exiting Marin at sea just west of Dillon Beach. The San Andreas Fault is subject to a maximum credible earthquake of 8.3 on the Richter Scale. ABAG concludes the chance of a major earthquake on the Northern Segment of the San Andreas Fault in the next 30 years is 2 percent.

In addition, on the eastern side of Novato less than ten miles is away lies the Hayward Rodgers Creek fault. The Hayward Fault and the Healdsburg-Rodgers Creek Fault located northeast of the City are both active faults with maximum credible earthquakes of 7.5 and 7.2 respectively. The ABAG report predicts the probability of an earthquake on the Healdsburg-Rodgers Creek fault as being 22 percent and on the Hayward Fault as being 28 percent chance. An inactive fault the Burdell Mountain Fault, crosses the northeastern portion of the City.

Figure 3-2 Seismic Faults in Vicinity of Novato



Color Codes:

San Andreas-North Golden Gate
San Andreas -- Peninsula
San Andreas -- Santa Cruz
Entire San Andreas (1906 Quake)
Rodgers Creek
Rodgers Ck + North Hayward
North Hayward
South Hayward
North + South Hayward
Northern Calaveras
Central Calaveras
Maacama
West Napa
Concord/Green Valley
Greenville (White
Mount Diablo (thrust fault)
Northern San Gregorio
Monte Vista (thrust fault)

☆ Novato Location

The bay front and marshland areas of Novato are potentially hazardous to buildings. Some of these lands have been reclaimed through construction of levees and drainage channels and used for urban development. During an earthquake, the sandy soils fail though liquefaction, greatly increasing the potential damage to buildings. The severity of damage to buildings from earthquakes is related to the intensity of ground shaking, soils and geologic characteristics, the type of building construction used, and other potential hazards listed above.

3.4.2 Secondary Hazards

A moderate earthquake occurring in or near these faults could result in deaths, casualties, property and environmental damage, and disruption of normal government, community services and activities. The effects could be aggravated by secondary hazards such as: fires, flooding, hazardous material releases utility disruptions, landslides, transportation emergencies and possible dam failures.

3.4.2.a Fire

Breaks in natural gas lines, damaged electrical systems, or toppled appliances with pilot lights create fires following earthquakes. This circumstance can be difficult to suppress due to numerous simultaneous ignitions, broken water mains, blocked or damaged routes for evacuation and firefighter access, and other demands on fire personnel. This threat occurred in the 1906 earthquake in both San Francisco and Santa Rosa, the 1989 Loma Prieta earthquake in the San Francisco Marina District, and the 1995 Kobe, Japan earthquake.

3.4.2.b Hazardous Materials Releases

A hazardous material release or spill can also be caused by earthquakes. Releases can occur at fixed locations, such as manufacturing plants or storage facilities, or during transport. There is also the potential for numerous hazardous materials releases that can create additional hazards.

The City of Novato has prepared a Safety Element to the General Plan which provides an encompassing overview of the City's industrial locations and the potential involvement of hazardous material incidents. Hazardous materials are any substance or combination of substances which because of quantity, concentration, or characteristics may cause or significantly contribute to an increase in death or serious injury, or pose substantial hazards to humans and/or the environment. The production and use of these hazardous materials is a part of our society over which local governments have little control.

Hazardous material incidents differ from other emergency response situations because of the wide diversity of causative factors and the pervasiveness of the potential threat. Circumstances such as the prevailing wind and geographic features in vicinity of emergency incidents are relevant factors which may greatly increase the hazardous chemical dangers. Incidents may occur at fixed facilities where, most likely, the occupants have filed site specific emergency response contingency and evacuation plans. However, incidents may also occur at any place along any land, water or air chemicals and /or illegal dumping these may occur in unpredictable areas, relatively inaccessible by ground transportation.

Transport of hazardous materials by truck or rail is regulated by the U.S. Department of Transportation through national safety standards. The federal safety standards are also included in the California Administrative Code, Environmental Health Division. The California Health Services Department regulates hazardous waste haulers.

Chemicals are often transported through the city on surface street truck routes when serving local commercial and/or industrial businesses.

Because of the volume of transportation (commercial and private) into and out of Marin County, the potential for a disastrous transportation-related event exists. Generally, transportation accidents are incidents that are handled by local jurisdictions or by jurisdictional mutual aid responses. A transportation accident, combined with a volatile hazardous substance or a large number of people, has the potential for becoming an event that requires a major mobilization of local, county, state and federal agencies.

Highway 101 and State Route 37 through the City of Novato is the primary and major truck route that affects the City. They are also the main vehicular arteries through Novato for commute traffic. Any other truck traffic would be thought of as local delivery services and does not pose a major threat to the City.

The transportation and storage of hazardous materials is clearly a regional issue. Large quantities of hazardous products are transported on highways and railways where the potential for release of this material into the environment represents a potentially significant public health risk. The policies and programs dealing with hazardous materials incorporate and build on the relevant portions of the Safety Element of the Marin Countywide Plan. The County is responsible for:

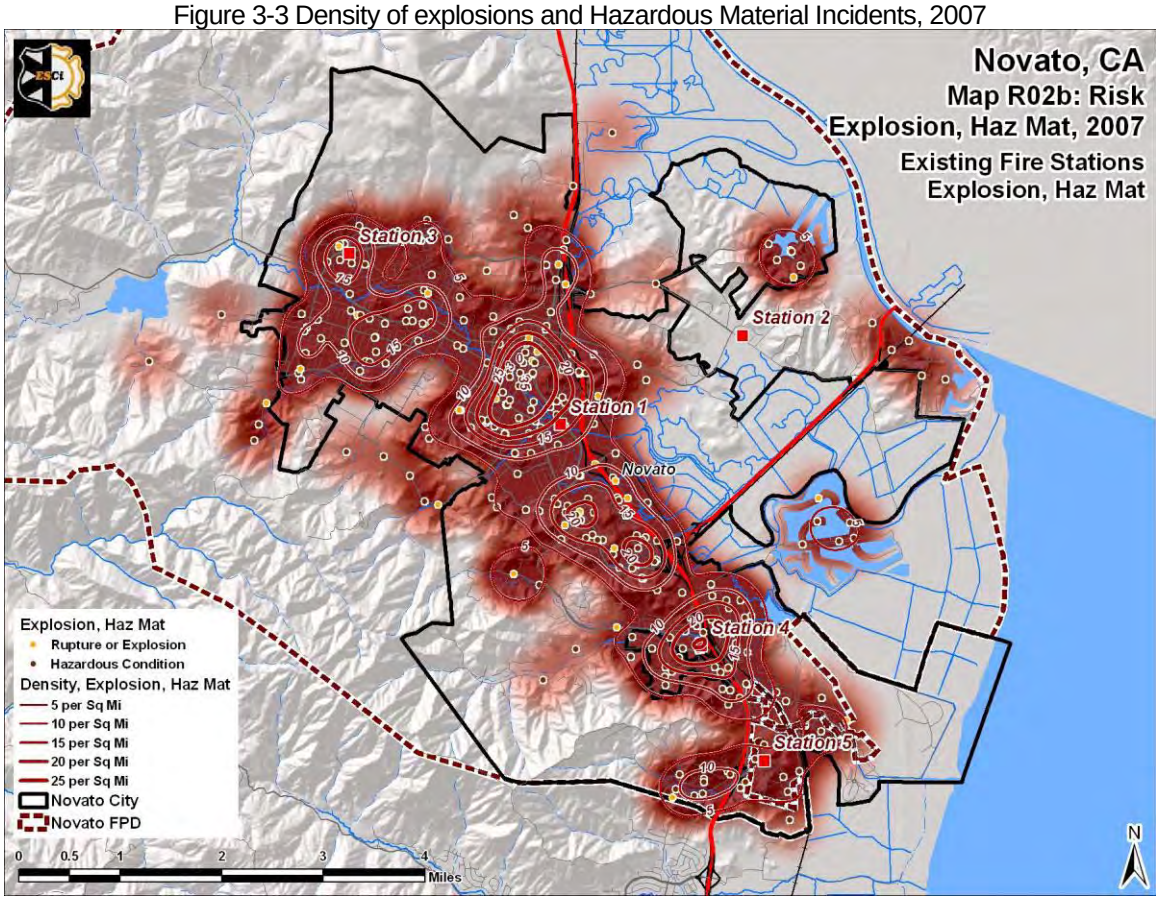
- Regulating hazardous materials over specified quantities
- Developing and implementing Area Plans for emergency response of hazardous materials spills
- Implementing risk management and prevention programs, business plans and inventories of hazardous waste storage and transportation, and implementing procedures for handling hazardous substances

The principal potential danger to Novato residents from these materials is related to the possibility of a truck accident resulting in rupture of containers holding radioactive materials. A Hazardous Material Incident occurred July, 1999 when a tanker truck rolled on its side traveling Northbound 101 at Hwy 37. Initially it was reported that a green gaseous cloud was observed across all lanes of the freeway. It was later confirmed the actual chemicals on board the truck were Muriatic Acid and Sodium Hypochlorite, the combination of the two producing Chlorine gas. Highway 101 was closed to all traffic in both North and southbound directions and Highway 37 was closed to traffic in the westbound direction. This caused problems with traffic and the moving of resources from one side of the incident to another, (from Novato Fire Protection District Standards of Cover).

3.4.2.c Radiological Incident

Radioactive materials are distinguished from other hazardous materials and specific federal and state regulations address handling and transportation of these substances. The use and storage of radioactive materials in Novato is limited to medical facilities and the Buck Center for Research in Aging, since no other primary users of radioactive materials, such as research laboratories, nuclear power plants or active military facilities are located within the area of interest.

Figure 3-3 Density of explosions and Hazardous Material Incidents, 2007



3.4.2.d Landslides

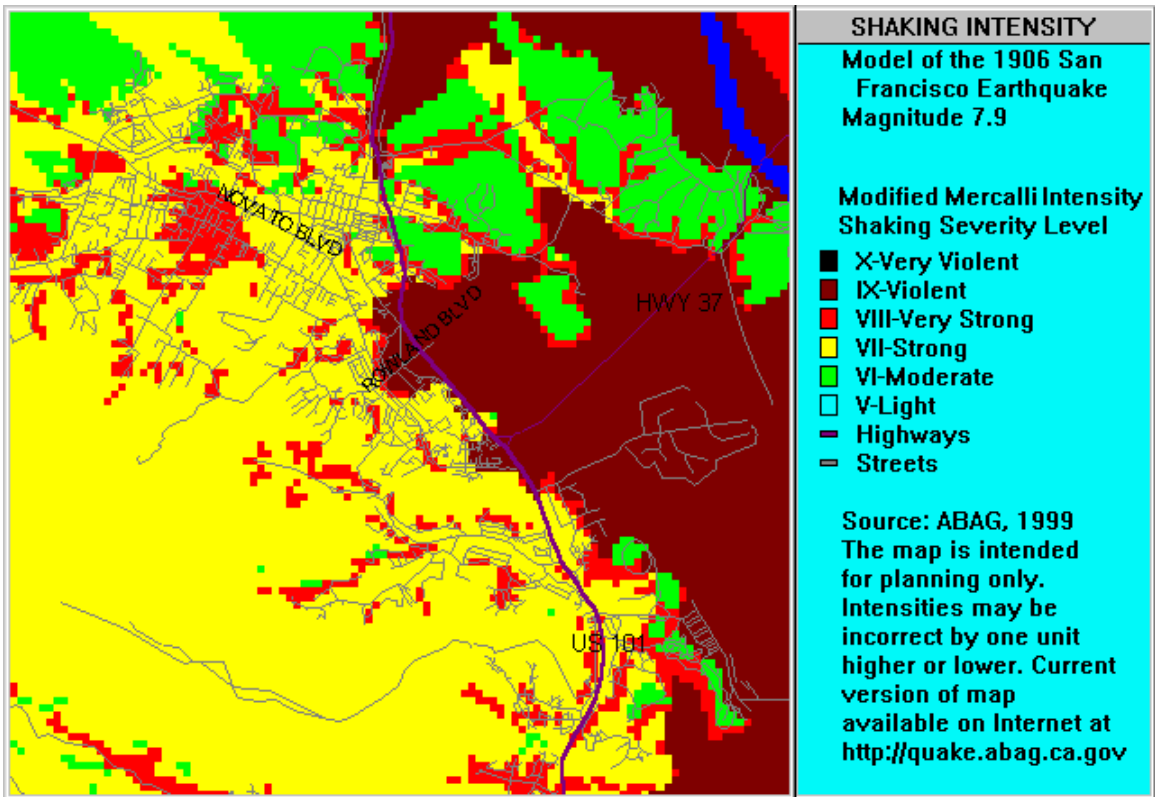
Earthquake induced landslides are secondary earthquake hazards that occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond and recover from an earthquake.

3.4.3 Event History

The San Andreas Fault was the source of the 1906 earthquake with a magnitude of 7.8. Marin County was sparsely inhabited at that time and experienced relatively moderate property loss and only two deaths. Although the epicenter for the 1906 earthquake was south of San Francisco, West Marin experienced some pronounced natural earthquake phenomena. This included a horizontal earth displacement of 21 feet near the head of Tomales Bay.

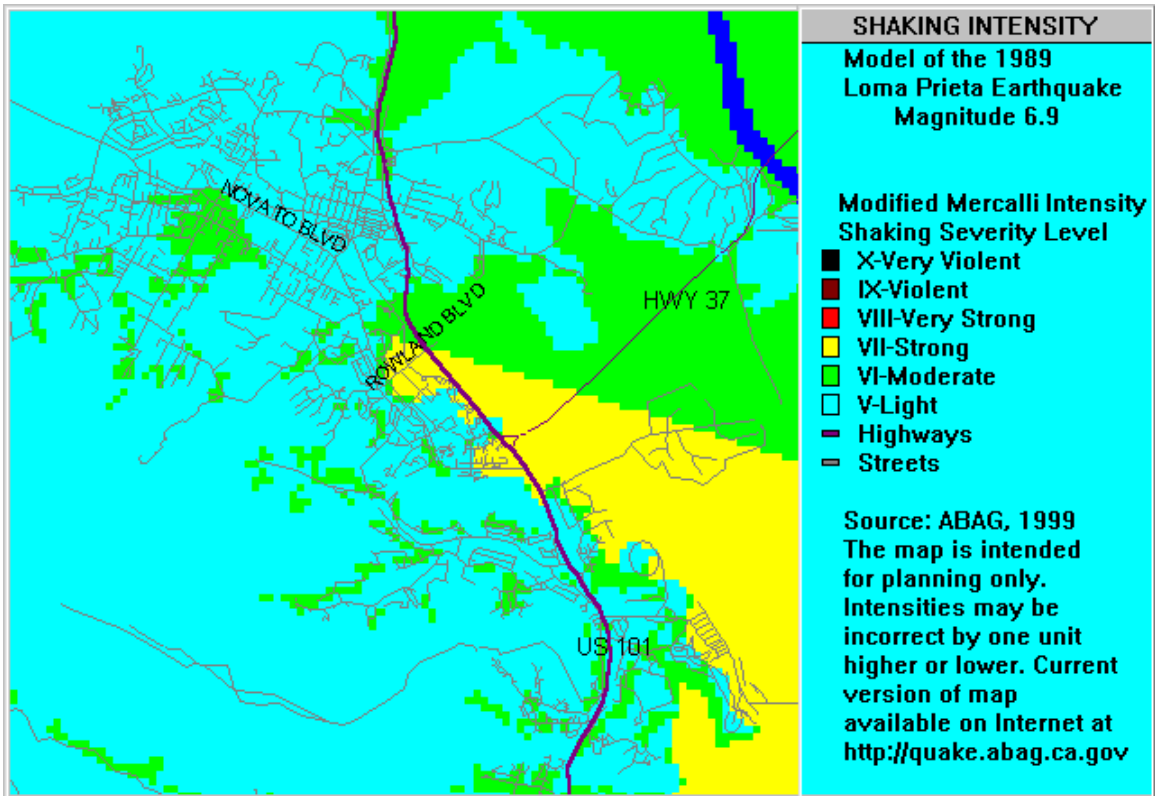
The Modeled Shaking Intensity Maps for Novato below, prepared by ABAG, are not intended to be site-specific. Rather, they depict the general risk within neighborhoods and the relative risk from community to community.

Figure 3-4 Scenario: 1906 San Francisco Earthquake



On October 17, 1989, a magnitude 7.1 earthquake occurred on the San Andreas Fault, the largest earthquake to occur in the San Francisco Bay Area since 1906, (Marin County Hazard mitigation plan).

Figure 3-5 Scenario: 1989 Loma Prieta Earthquake



According to ABAG, there have been only three earthquake-related natural disasters in the Bay Area since 1950:

- September 3, 2000 Napa earthquake (declared a disaster in only Napa County)
- 1989 Loma Prieta earthquake (declared a disaster in Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Solano counties),
- April 1984 Morgan Hill earthquake (declared a disaster in Santa Clara County).

3.4.4 Future Potential

A major earthquake would be expected to cause considerable damage to transportation systems. Roads, bridges and highway overpasses are susceptible to damage or failure in the event of a major earthquake. Landslides would be intensified as a result of ground shaking and could affect portions of the roadway system located in landslide areas. Seismic damage could also occur to treated water and sewage pipelines, gas pipeline and to telephone and utility systems.

A study of earthquake probabilities prepared by the Working Group on California Earthquake Probabilities and published by the U.S. Geological Survey, the chances are 62% of a major (6.7 or greater magnitude) earthquake occurring in the Bay Area before 2032. For the San Andreas Fault, the probability is 11 percent. See Figure 3-6 below, San Francisco Bay Region Earthquake Probability Diagram.

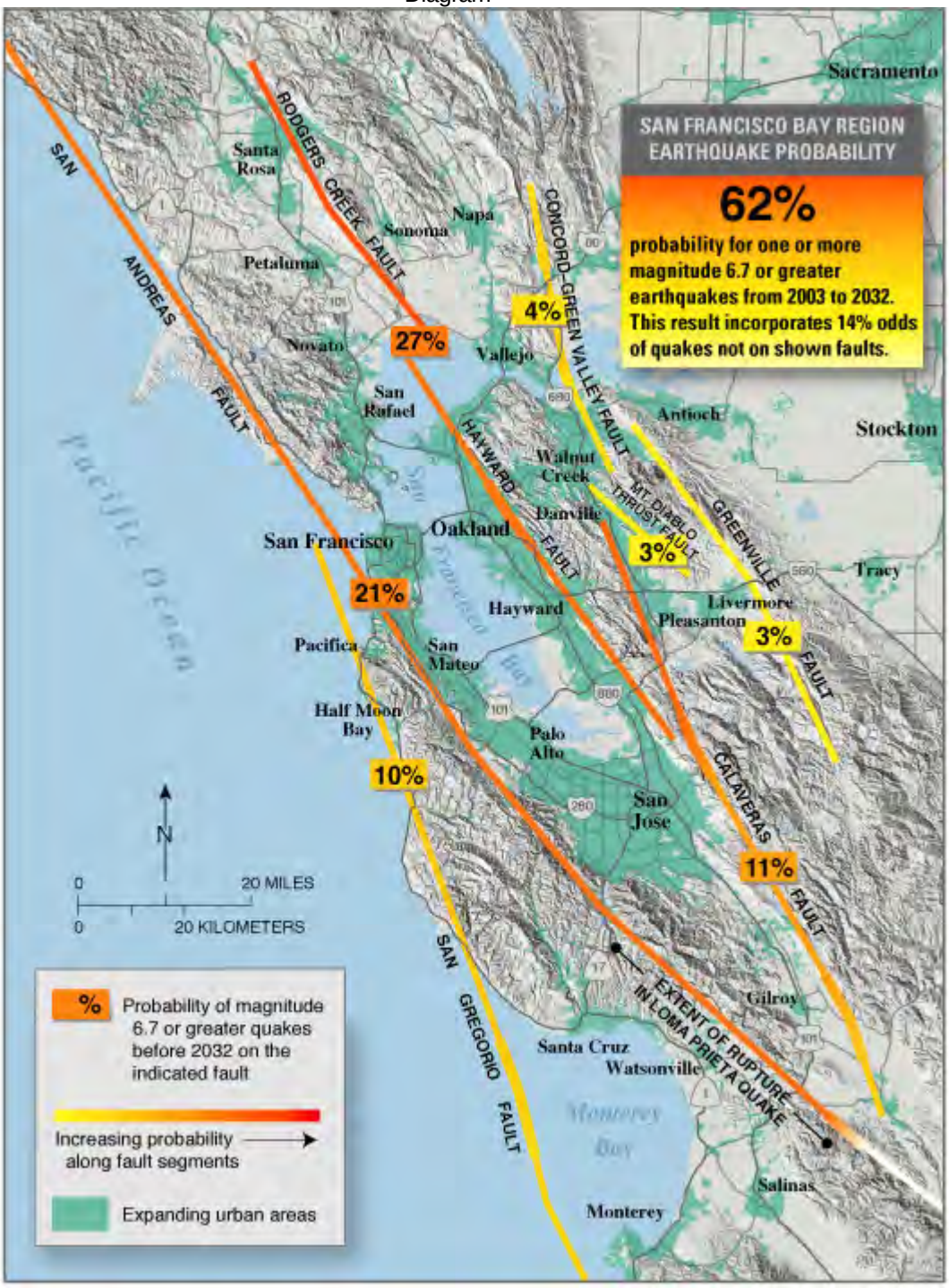
In addition, the report also states that other faults in the area pose a major threat with potential magnitudes of 7.0 for the Rodgers Creek Fault and a magnitude of 6.7 to 6.9 for the Hayward Fault.

Potential slippage of the San Andreas Fault could severely impact the communities west of Novato like Bolinas, Point Reyes Station, Stinson Beach and Muir Beach.

The impact of the Loma Prieta Earthquake on October 17, 1989 was most apparent in the northeast area of Santa Cruz. Depending on fault rupture location, a strong shaking such as this would cause severe damage within Marin County, including life-line damages. The Loma Prieta earthquake was not "the big one," which is a common reference to an event of magnitude around 8 or larger (such as the 1906 San Francisco quake). Earthquake aftershocks often occur with additional and unforeseen damage to our infrastructure.

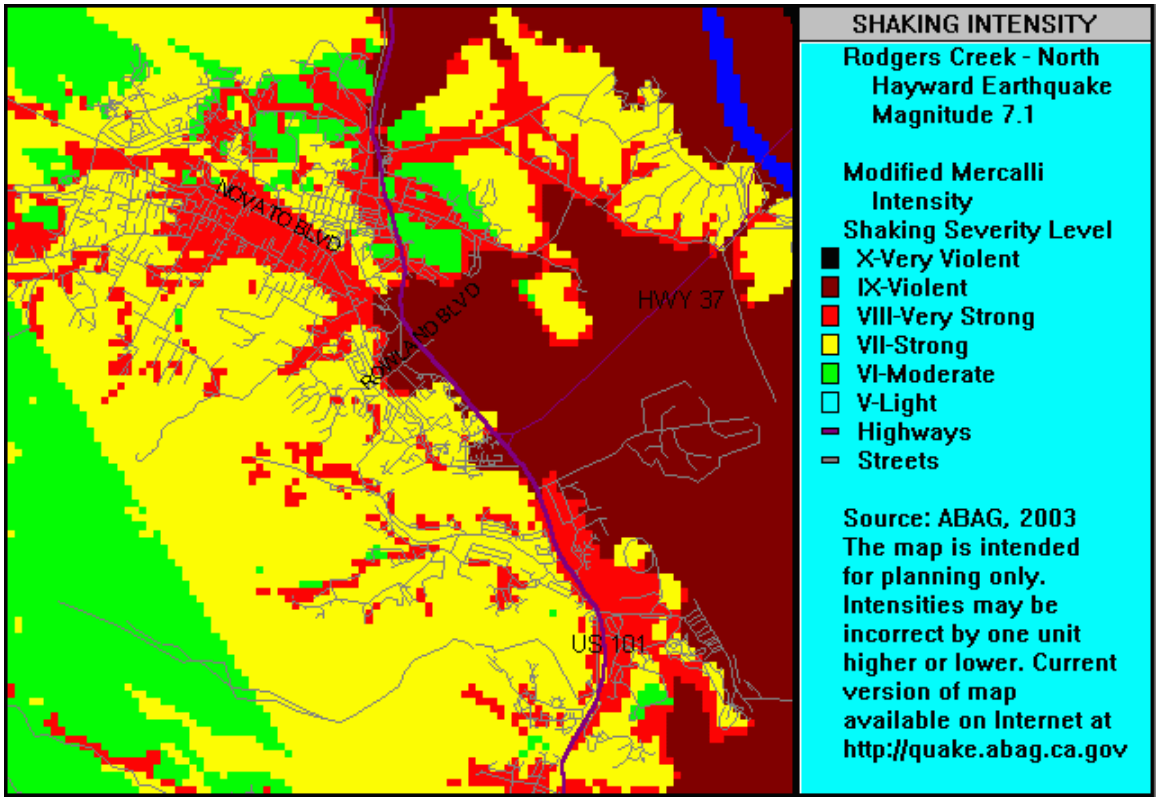
An earthquake occurring in or near these faults could result in significant deaths, casualties, damage to property and environment, and disruption of normal government and community services and activities. Ground failures (fissuring, settlement, and permanent horizontal and vertical shifting of the ground such as surface breaks caused by faulting) that often accompany earthquakes could cause significant damage to network infrastructure such as water, power, communication, and transportation lines in Marin County. These effects could be aggravated by secondary emergencies such as fires, flooding, tsunami, hazardous material spills, utility disruptions, landslides, (From Marin County Hazard Mitigation Plan).

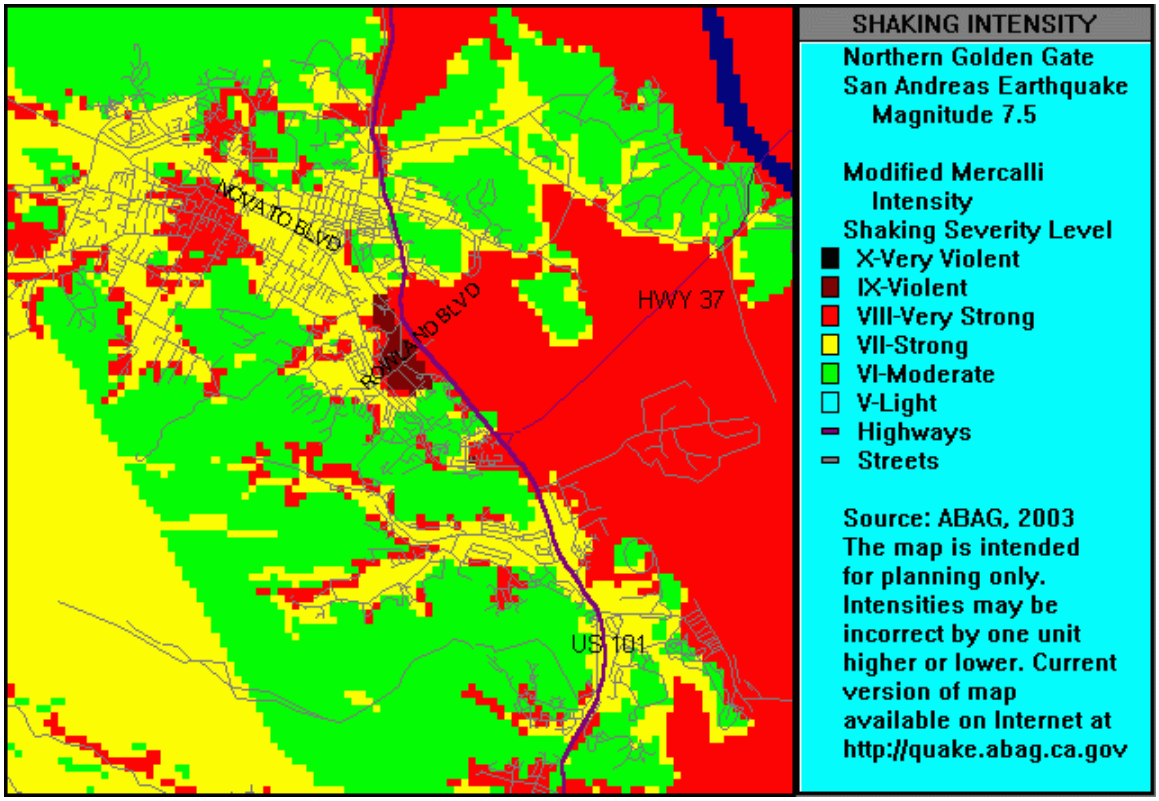
Figure 3-6 San Francisco Bay Region Earthquake Probability Diagram

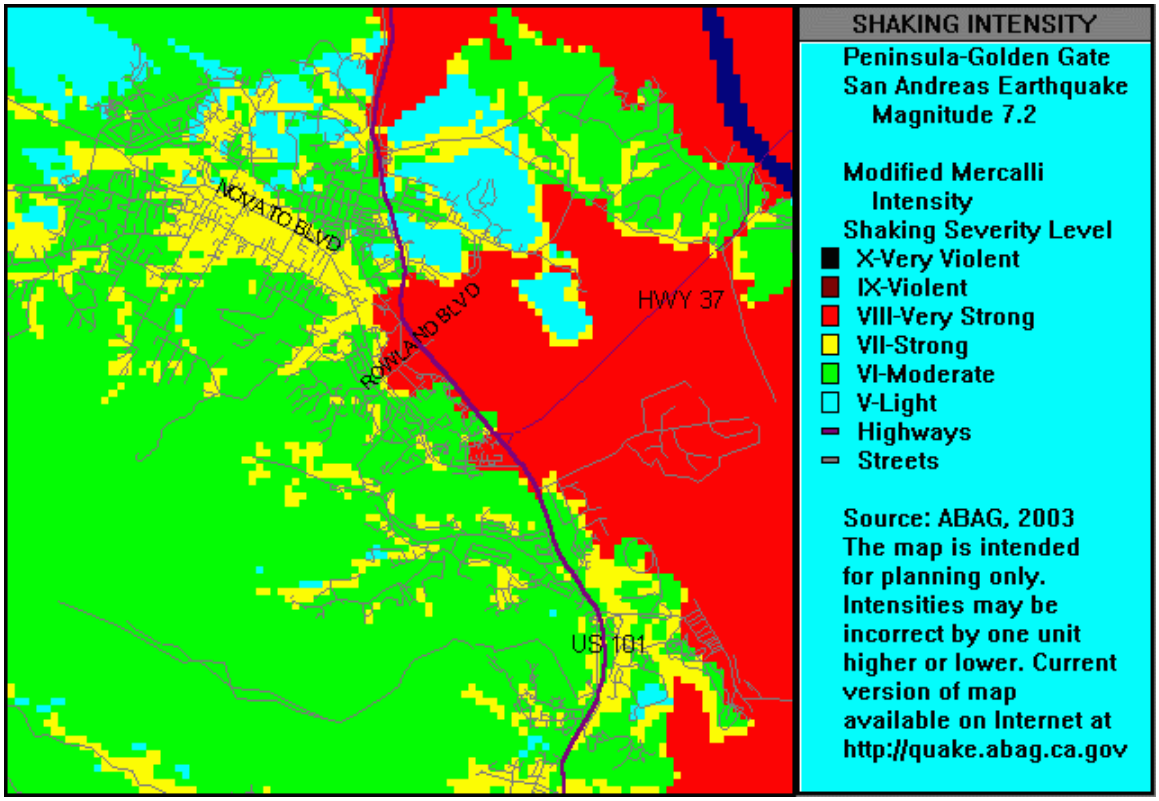


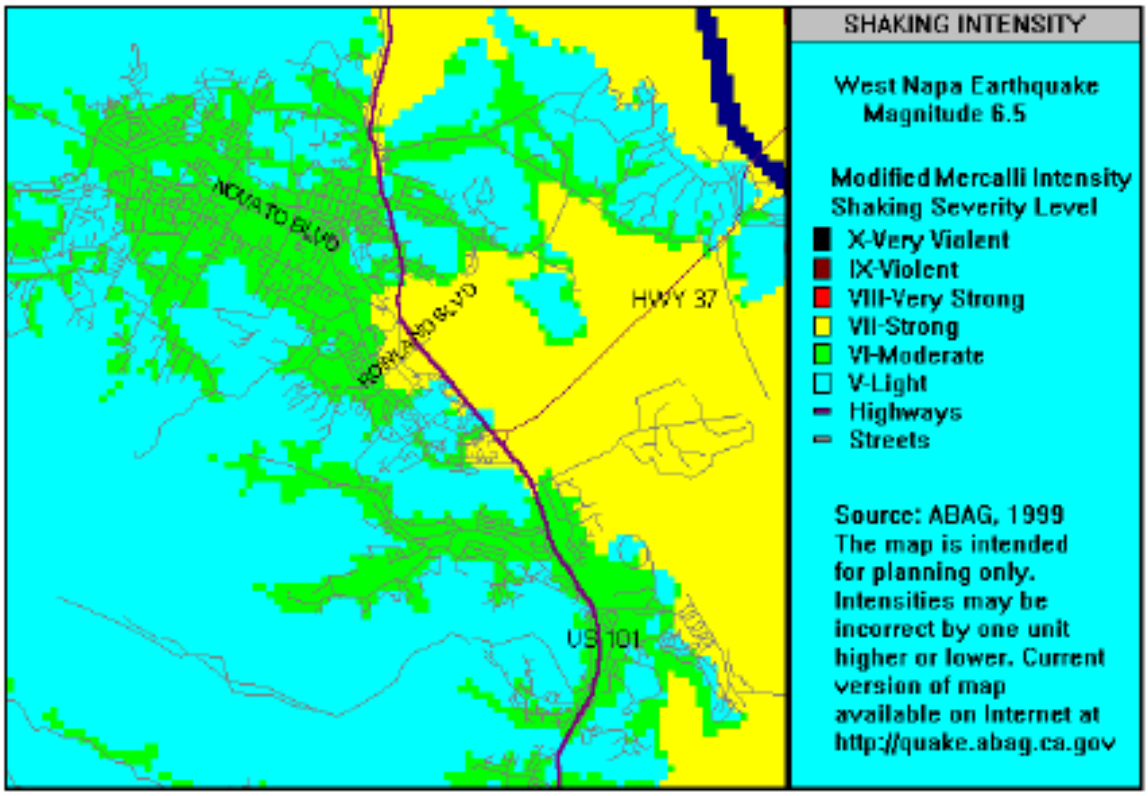
Association of Bay Area Governments (ABAG)

Figure 3-7 Shake Intensities Scenarios






NOVATO BLVD
ROWLAND BLVD
HWY 37
US 101
SHAKING INTENSITY
Peninsula-Golden Gate
San Andreas Earthquake
Magnitude 7.2
Modified Mercalli
Intensity
Shaking Severity Level
X-Very Violent
IX-Violent
VIII-Very Strong
VII-Strong
VI-Moderate
V-Light
Highways
Streets
Source: ABAG, 2003
The map is intended
for planning only.
Intensities may be
incorrect by one unit
higher or lower. Current
version of map
available on Internet at
http://quake.abag.ca.gov



3.4.5 Exposure and Vulnerability

Community needs would most likely exceed the response capability of Novato's emergency management organization, requiring mutual assistance from volunteer and private agencies, the Governor's Office of Emergency Services and the Federal Government. In any earthquake, the primary consideration is saving lives. Time and effort must also be given to providing for people's mental health by reuniting families, providing shelter to the displaced persons and restoring basic needs and services. A major effort will be needed to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities and provide continuing care and temporary housing for affected citizens.

After any earthquake there will be a loss of income. Individuals can lose wages due to businesses inability to function because of damaged goods or facilities. Due to business losses, the City of Novato and the cities in the Marin Operational Area will lose revenue. Economic recovery from even a minor earthquake is critical to these communities.

3.4.5.a Buildings

The Uniform Building Code (UBC) is one of three major codes used by local and state jurisdictions throughout the United States to regulate building construction. The UBC is a consensus-based document that is updated annually and published every third year by the International Conference of Building Officials (ICBO). The principal issues the code addresses are those related to fire resistance, occupant safety, accessibility, energy conservation and structural adequacy.

All buildings located in Novato are exposed to high risk of damage just by being located in this seismically active part of the county. The seismic status of buildings by their seismic classification as summarized in the City of Novato General Plan Safety Element.

1. Many of the high priority buildings, (City buildings, schools, limited care facilities) are mostly of recent construction. Many are steel or wood-frame buildings which are the least susceptible to earthquake damage.

2. The majority of high use buildings (commercial and office buildings, apartment buildings of 50 or more units and churches) are of recent construction and were designed to Seismic Risk Zone 4 Standards.

3. Duplexes and the majority of housing in Novato have been built with one and two-story wood-frame construction which has a high survivability in the event of an earthquake.

A preliminary seismic study has been done by the firm, of Weir Anderson for city facilities. The study lists all of the buildings that did not at that time meet current codes and standards.

- Sherman House was built in the 1800's and has been declared an unsafe building and is now closed to the public and requires seismic upgrades. The Community House is the same, closed to the public and requires seismic upgrades to be usable again. To move and rebuild the Community House is estimated at $6 million.

- The church building was remodeled and opened to the public in November, 2009 with current building and seismic building standards.

- Historic Community House has been declared unsafe and is now closed to the public and requires seismic upgrades.

- Fire Station at Hamilton and Bldg 500, the Old Hamilton Headquarters was remodeled and is open for use.

The California Building Code (CBC) requires a higher safety factor for construction in Seismic Zone 4. The Unreinforced Masonry Law passed by the State Legislature in 1986 (SB 547), requires all cities and counties to identify potentially hazardous unreinforced masonry buildings. The City has complied with this legislation and reported to the State Seismic Commission that one unreinforced masonry building exists. That building has since been seismically upgraded.

3.4.5.b Critical facilities

Critical facilities are those facilities identified that, if damaged or destroyed, could severely hinder a jurisdiction's ability to respond or provide vital services in the event of a catastrophic disaster. Such facilities could be: emergency operations centers, police and fire stations, hospitals; transportation systems; lifeline utility systems dams; and facilities housing hazardous materials. Some of these facilities are owned and operated by the City, while others are operated by other government jurisdictions or private entities. The City of Novato does not have any critical facilities such as high occupancy buildings located in high-risk areas.

Police, Fire District and Emergency Operations Center

It is essential that fire and police be functional after an earthquake. Police and fire fighters are a major part of emergency rescue and response team. In addition, earthquakes frequently start fires. Buildings housing firefighting equipment and police vehicles must be resistant to seismic shaking so that equipment remains undamaged. The fire stations and the police stations have been constructed recently and have been built with earthquake damage mitigation features. The Novato Fire Protection District has five fire stations and an administration building, with adequate equipment to meet local needs. A map of the Fire District stations is below.

Fire station locations

Administration (Rowland Way)
Station 1 (Redwood)
Station 2 (Atherton)
Station 3 (San Marin)
Station 4 (Ignacio)
Station 5 (Hamilton)

Figure 3-8 Novato Fire District Stations Map

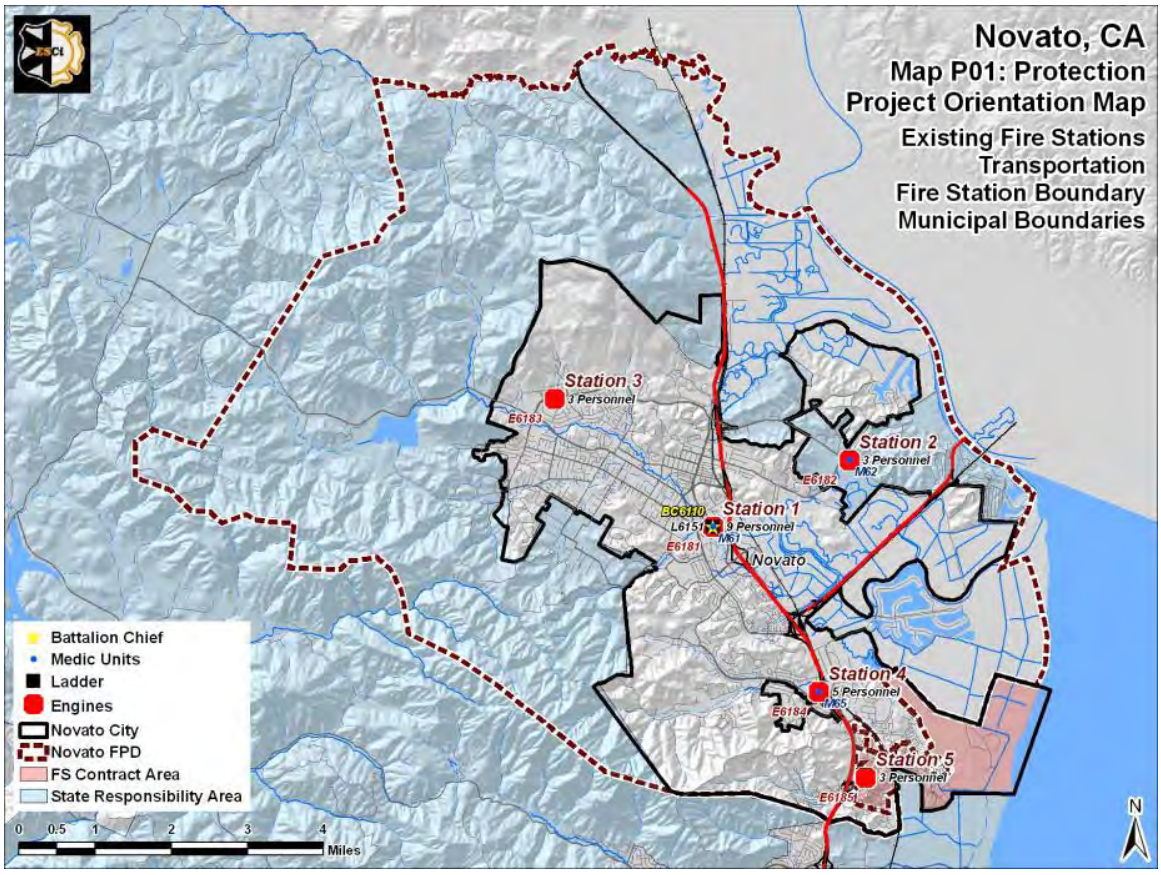
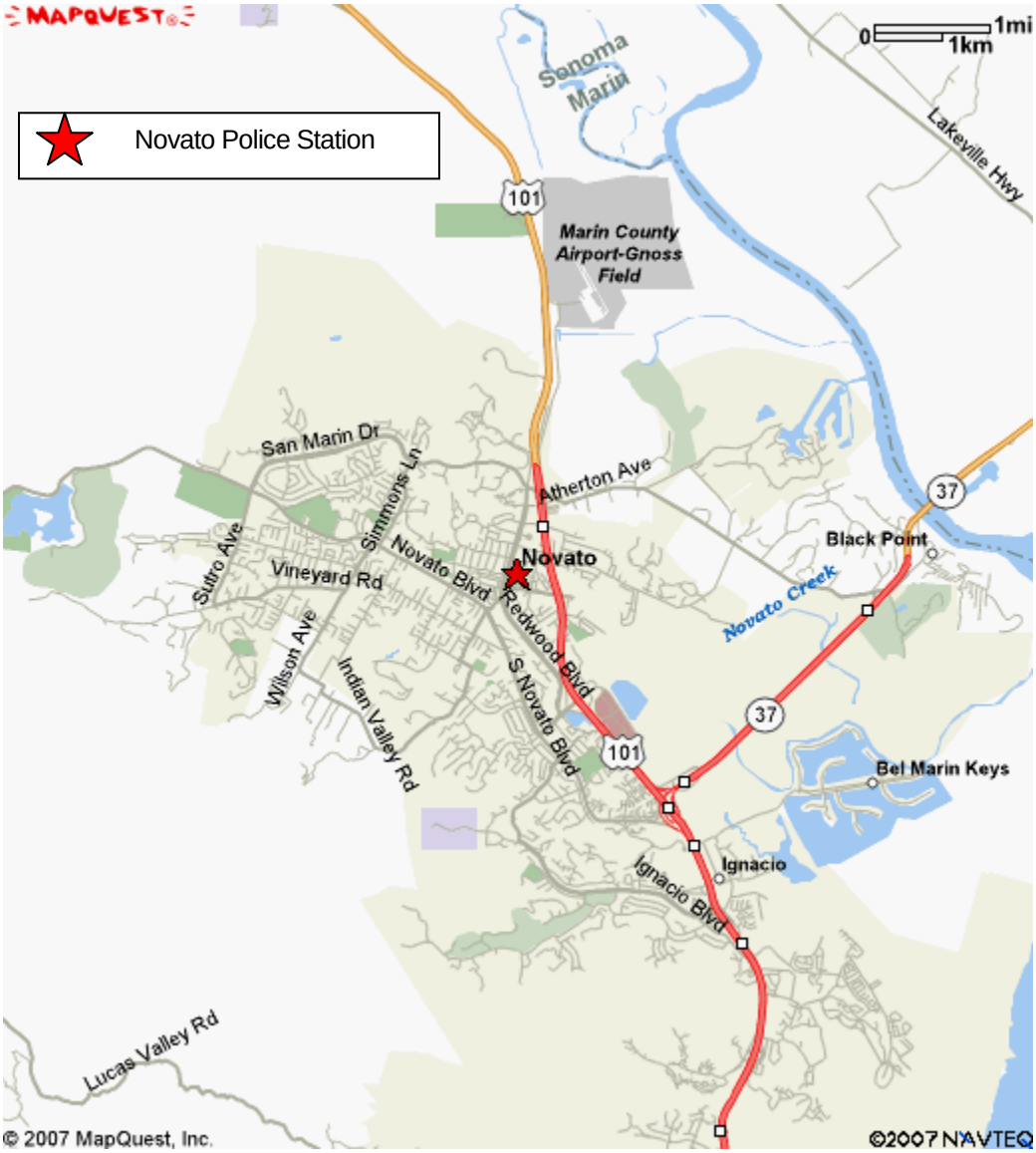


Figure 3-9 Novato Police Station Map



The City of Novato and the Novato Fire Protection District operate a joint EOC. The EOC is located in the Novato Fire Administration Building. The space is home to the Novato Fire administration on a day-to-day basis. During emergency conditions it is converted into a full operational EOC.

The primary EOC is well supplied with a computer network, wireless internet and printers, telephones, dedicated fax lines, copy machines, televisions, an internal video display system, comprehensive status boards and various communications systems. RACES operators are located in the EOC Communications Room near the Message Center and Planning and Intelligence Section. Status boards are in place for the collection and disseminations of information. Monitors are available throughout the EOC to show information on significant events and other event specific information as well as for media monitoring purposes. (City of Novato Emergency Operations Plan)

Cooperation among the two public agencies supports the public's desire for cooperation among public agencies as noted in the public questionnaire. This also works to accomplish mitigation Goal #3, "Continue hazard mitigation coordination and communication with governmental agencies and private entities and ensure that public funds are used in the most sufficient manner."

Novato's alternate EOC is located at the Novato Police Station in the Police Department Training Room. The alternate EOC will be activated if, for some reason, the primary EOC is not functional, or access to the primary EOC is hindered. Direction and control authority will be transferred from the primary EOC to the alternate EOC when deemed necessary by the EOC Director. The Logistics section will arrange for relocation and/or acquisition of staff and supplies for the alternate EOC if activated. The EOC Coordinator will ensure that the Operational Area EOC is aware that the alternate EOC is being used.

In the event of a major disaster the City anticipates the need for an alternative dispatch location to facilitate communication and flow of information. Five radio consoles and CAD are operational, but the operational capabilities of the alternate EOC are relatively limited. To make the alternate EOC fully operational a 9-1-1 trunk line is needed plus other equipment and supplies. A mitigation action is listed in this plan to accomplish this need. This also supports the public's desire to strengthen emergency services.

Hospitals

The Novato Community Hospital is licensed for 47 acute care beds. The new hospital was built because the former hospital could not be upgraded and was an older structure which posed an appreciable risk. The new site meets state seismic regulations. The state Building Standards for hospitals are more stringent than the Uniform Building Code used by cities. Seismic risk for these types of structures are resolved consistent with current known design factors prescribed through engineering practices and the applicable regulation of the regulatory authority.

Dam Failure

Dam Inundation is defined as the flooding which occurs as the result of structural failure of a dam. Structural failure may be caused by seismic activity. Seismic activity may also cause inundation by the action of a seismically induced wave which overtops the dam without also causing dam failure. This action is referred to as a seiche. Landslides flowing into a reservoir are also a source of potential dam failure or overtopping. Dam failures is further discussed in the Flood section of this plan.
The Novato Creek Dam (also known as Stafford Dam) a seismic stability analysis was prepared for the North Marin Water District by Woodward-Clyde Consultants in 1992. The study confirmed the following information contained in the City of Novato General Plan: The Stafford Dam was designed to withstand a magnitude 8.25 Richter earthquake on the San Andreas Fault.

Water and Wastewater Systems

There are several wastewater treatment plants in Novato maintained by Novato Sanitary District Sewage collection systems throughout Novato can be expected to sustain widespread damage if ground movement damages mains or pipelines. Most of the facilities have emergency power, but a prolonged period without electricity could result in spills that would cause sewage to flow along roads and storm drains and eventually into the Bay. (Source Marin County General Plan)
About 20% of Novato's water supply originates from Stafford Lake. Stafford Treatment Plant is typically operated in the late spring through early fall to supplement the North Marin Water District's purchased water supply. The amount of Stafford water used during the year depends on the storage levels attained with the previous winter's rainfall.

Potable Water availability and distribution for supporting life and treating the sick and injured is of major concern. It is expected that the primary water sources could be compromised due to damage to their treatment plants, pump stations and /or the pipelines that distribute potable water. The water

district/supplies in the City of Novato Operational Area are: North Marin Water District serving the Novato and Point Reyes Station areas. The District's treatment plants recently initiated a seismic upgrade plan for their 18 water tanks with a five-year completion date.

Figure 3-9.a Novato Water Service Area

Novato Water Service Area		
(Year ending June 30, 2005)		
§	Service Area (Square Miles)	75
§	Active Connections	19,738
§	Dwelling Units	22,801
§	Estimated Population	59,000
§	Average Household Size (People)	2.6
§	Miles of Pipeline	288
§	Number of Hydrants	2,413
§	Number of Main Valves	3,830
§	FY 2005 Annual Water Production (Acre-Feet):	
	Stafford Lake & Treatment Plant	734
	Russian River Aqueduct	9,326

Schools

Public schools in California are generally constructed to very high standards because their design and construction is strictly regulated by the state. In Novato school buildings are steel or wood-frame buildings which are the least susceptible to earthquake damage.

Bridges

Earthquakes can cause severe damage to bridges and liquefaction can aggravate any earthquake damage. Structural damage can be created if bridge supports sink unevenly into liquefiable soils. There are currently 16 public highway bridges located throughout Novato. The oldest was constructed in 1929 and the latest in 1992. Under Title 23 of the Code of Federal Regulations (Federal Highway Act), Caltrans Division of Structure Maintenance and Investigations performs biennial inspections of bridges throughout the state, counties and local jurisdictions. These reports contain descriptions of physical changes to the structure, recommendations for work to be done, or additional information. Bridges across Highway 101 could be vulnerable in the event of a major earthquake and Caltrans reports at this time (2004 to 2006) that they have not been seismically retrofitted. Communicating with and encouraging CALTrans to seismic retro-fit US-101 bridge sections located within the City of Novato is a mitigation action in this plan.

The Local Bridge Seismic Safety Retrofit Program is a part of the statewide Seismic Safety Retrofit Program. This program was established by emergency legislation (SC-36X) enacted during an extraordinary legislative session after the October 1989 Loma Prieta Earthquake. The purpose of this program is to provide funding assistance to local agencies for remedying structural seismic design deficiencies of public bridges on local streets and roads in California. Candidates for this state-mandated program are those bridges that are determined to be Category 1 (bridges that may collapse

in a seismic event and potentially threaten public safety). It was determined that the Redwood Boulevard bridge at Novato Creek was eligible under the program in 1992. Design and authorization for construction occurred in 1994 and the retrofit project was completed in January 1995. No other bridges in Novato have been identified for retrofits under the Seismic Safety Retrofit Program.

Figure 3-10 Seismic Safety Retrofit Program

Status Report for Local Seismic Retrofit Projects (as of 4/11/2001)

27C0103L — Complete
Feature Carried: REDWOOD BLVD
Feature Intersected: NOVATO CREEK
Proj. ID: STPLX-5361(004) — 49
County Name: Marin — Dist.: 04
Novato

Schedule	Planned	Actual
Strategy	11/4/92	11/4/92
Design		1/4/94
Constru. Auth.		6/16/94
Project Complete		1/4/95

Current $ Estimate: $181,331
Comments: The cost of $181,331 covers both 27C0103L and R.

27C0103R — Complete
Feature Carried: REDWOOD BLVD
Feature Intersected: NOVATO CREEK
Proj. ID: STPLX-5361(004) — 50
County Name: Marin — Dist.: 04
Novato

Schedule	Planned	Actual
Strategy	11/4/92	11/4/92
Design		1/4/94
Constru. Auth.		
Project Complete		1/4/95

Current $ Estimate: $0
Comments: Cost is shown under 27c0103L.

27C0113 — In Design
Feature Carried: MRSHAL-PETALUMA RD
Feature Intersected: SALMON CREEK
Proj. ID: — 51
County Name: Marin — Dist.: 04
Marin County

Schedule	Planned	Actual
Strategy	2/27/97	2/27/97
Design	12/9/97	1/21/98
Constru. Auth.	1/15/00	
Project Complete		

Current $ Estimate: $57,000
Comments:

27C0144 — In Design
Feature Carried: CREEK ROAD
Feature Intersected: SAN ANSELMO CREEK
Proj. ID: STPLZ-5277(005) — 52
County Name: Marin — Dist.: 04
Fairfax

Schedule	Planned	Actual
Strategy	2/27/97	2/27/97
Design		1/26/98
Constru. Auth.	8/1/00	
Project Complete		

Current $ Estimate: $67,000
Comments:

27C0150 — In Design
Feature Carried: ALEXANDER AVE
Feature Intersected: ALEXANDER AV
Proj. ID: STPLZ-5166(004) — 53
County Name: Marin — Dist.: 04
Larkspur

Schedule	Planned	Actual
Strategy	4/17/97	4/17/97
Design		1/21/98
Constru. Auth.		
Project Complete		

Current $ Estimate: $108,000
Comments:

28C0006 — Complete
Feature Carried: WATERFRONT RD
Feature Intersected: PACHECO SLOUGH
Proj. ID: BHLS-5928(011) — 54
County Name: Contra Costa — Dist.: 04
Contra Costa County

Schedule	Planned	Actual
Strategy	1/7/92	1/7/92
Design		1/5/93
Constru. Auth.		
Project Complete		9/6/95

Current $ Estimate: $53,996
Comments:

28C0012 — Pre-Strategy
Feature Carried: SPRR
Feature Intersected: PORT CHICAGO
Proj. ID: — 55
County Name: Contra Costa — Dist.: 04
Contra Costa County

Schedule	Planned	Actual
Strategy		
Design		
Constru. Auth.		
Project Complete		

Current $ Estimate: $108,000
Comments:

28C0054 — In Design
Feature Carried: WILBUR AVE
Feature Intersected: WILBUR AVE OH (AT&SF RR)
Proj. ID: BHLS-5038(006) — 56
County Name: Contra Costa — Dist.: 04
Antioch

Schedule	Planned	Actual
Strategy		
Design		
Constru. Auth.		
Project Complete		

Current $ Estimate: $417,960
Comments:

7

Printed: April 11, 2001

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MARIN COUNTY BRIDGE LIST

Bridge Number	Dist	Bridge Name	Facility Carried	City	Bypass Length	Lanes ONUN	AADT	Appr Width	Str Type	Road Width	Year Built	SD/FO	Length	Suff Rating
27C0008	04	SAN ANSELMO CREEK	MEADOW WAY	FRFX	199	0100	55	5.5	302	3.0	1950	FO	21	43.1
27C0013	04	MILLER CREEK	LUCAS VALLEY RD		3	0200	6500	12.5	104	11.2	1959		20	89.0
27C0016	04	MILLER CREEK	LUCAS VALLEY ROAD		3	0200	1000	11.3	201	11.3	1961		40	85.8
27C0017	04	NICASIO CREEK	PT RYES PETLUMA RD		32	0200	1100	11.6	204	12.3	1960		41	95.3
27C0018	04	LAGUNITAS CREEK	SIR FRANCIS DRAKE		16	0200	2300	11.6	204	12.3	1964		59	94.3
27C0019	04	SAN RAFAEL CREEK	GRAND AVE	SRF	5	0300	19800	12.2	101	12.2	1965		74	75.2
27C0021	04	NOVATO CREEK	GRANT AVE	NVTO	2	0200	9343	13.7	104	9.2	1936	FO	11	75.9
27C0022	04	IRWIN CREEK	2ND ST	SRF	2	0400	20000	19.2	201	13.6	1965	FO	19	75.5
27C0023	04	ESTERO DE SAN ANTONIO	VLY FD FRNKLIN SCH		10	0200	100	7.3	201	8.5	1964		74	97.0
27C0024	04	NOVATO CREEK	NOVATO BLVD	NVTO	2	0200	4100	12.2	204	12.3	1969		30	96.6
27C0028	04	CORTE MADERA CREEK	BON AIR RD	LKSP	5	0200	3000	14.0	302	8.5	1958	SD	129	36.5
27C0030	04	WIDOW REED CREEK	CAMINO ALTO	MLV	2	0400	3000	21.6	101	17.0	1970		17	91.7
27C0031	04	HALLECK CREEK	NICASSIO VLY RD		23	0200	2000	6.7	104	11.0	1931		10	78.3
27C0032	04	NICASIO DRAIN #1	NICASSIO VLY RD		23	0200	1750	11.6	119	12.6	1968		7	97.1
27C0033	04	NICASIO DRAIN NO 2	NICASSIO VLY RD		27	0200	1750	12.2	119	12.3	1968		7	94.8
27C0035	04	NICASIO CREEK	PT REYES PETLMA RD		16	0200	2590	6.4	104	7.3	1937	FO	31	70.4
27C0036	04	ARROYO SAUSAL(CHSE FACY)	PT REYES PETLMA RD		51	0200	2590	7.9	119	13.6	1933		10	86.0
27C0037	04	BOWMAN CANYON	NOVATO BLVD		35	0200	1250	6.7	104	7.3	1948		7	78.4
27C0038	04	NOVATO CREEK	DIABLO AVE	NVTO	2	0600	17918	25.9	101	24.6	1966		10	89.2
27C0039	04	LAGUNITAS CREEK	SIR-FRANCIS DRAKE		32	0200	3000	12.2	505	9.8	1982		24	88.1
27C0040	04	CORTE MADERA CR(DRAKE)	SIR-FRANCIS DRAKE	SLMO	2	0500	18300	29.9	104	19.9	1929		13	67.9
27C0041	04	DEVILS GULCH	SIR-FRANCIS DRAKE		31	0200	3000	10.7	111	12.6	1920		14	68.0
27C0042	04	LAGUNITAS CREEK	SIR-FRANCIS DRAKE		27	0200	2000	7.3	104	7.3	1929		18	61.1
27C0043	04	SAN GERONIMO CREEK	SIR-FRANCIS DRAKE		31	0200	3500	7.0	104	11.3	1929		10	92.8
27C0044	04	SIR FRANCIS DRAKE BL UP	SIR FRANCIS DRK BL	LKSP	199	0004	0		702		1935		17	
27C0045	04	WOLFE GRADE POC	SIR FRANCIS DRK BL	LKSP	3	0005	0	0.0	502	2.4	1968		31	
27C0046	04	WIDOW REED CREEK	MILLER AVE (MLVLY)	MLV	2	0200	11300	12.2	101	12.6	1929		6	79.3
27C0048	04	KEYES CREEK	TOMALES PETALUMA R		13	0200	1200	11.6	119	12.5	1977		7	96.3
27C0050	04	CORTE MADERA CR(DRAKE)	SIR FRANCIS DRAKE	ROS	2	0200	18300	9.1	111	9.3	1926	FO	19	62.3
27C0051	04	SOUTH SAN ANTONIO CREEK	SAN ANTONIO RD		3	0200	200	7.6	104	7.0	1917		31	51.6
27C0052	04	SUMMIT AVE SIDEHILL VIADUCT	SUMMIT AVE	MLV	199	0200	157	5.8	701	5.0	1980	FO	22	50.0
27C0053	04	BUNKER ROAD TUNNEL	ALEXANDER AVE		6	0200	2000	11.0	111	11.0	1938	FO	7	77.9
27C0054	04	EAST GATE RD UC	SAUSALITO LATERAL		3	0200	11400	11.0	104	11.0	1938	FO	12	68.8

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Bridge Number	Dist	Bridge Name	Facility Carried	City	Bypass Length	Lanes ONUN	AADT	Appr Width	Str Type	Road Width	Year Built	SD/FO	Length	Suff Rating
27C0055	04	IGNACIO BLVD OH	IGNACIO BLVD	NVTO	2	0500	18100	23.2	205	23.2	1984		39	96.3
27C0065	04	WIDOW REED CREEK	LOCUST AVE	MLV	2	0200	3000	11.0	101	12.2	1934		8	80.7
27C0066	04	MARIN CNTRY DAY SCH POC	PARADISE DR	CMAD	13	0002	2730	0.0	702	2.4	1970		29	
27C0067	04	ARROYO HOLON	DOHERTY DR	LKSP	5	0200	3000	12.5	101	10.9	1965	SD	13	30.9
27C0068	04	BRANCH CORTE MADERA CRK	MEADWOOD DR	LKSP	2	0200	3000	11.0	105	8.6	1974		13	80.6
27C0069	04	BRANCH CORTE MADERA CRK	LUCKY DRIVE	LKSP	5	0200	3000	12.2	119	12.2	1970		8	96.3
27C0070	04	CORTE MADERA CREEK	COLLEGE AVE		3	0200	3000	13.4	101	13.3	1970		10	97.6
27C0071	04	CORTE MADERA CREEK	LAGUNITAS ROAD	ROS	3	0200	1500	11.9	204	6.2	1930	FO	24	47.9
27C0072	04	ROSS CREEK	GLENWOOD AVE	ROS	3	0200	1500	5.5	201	5.3	1930		16	73.5
27C0073	04	CORTE MADERA CREEK	BARBER AVE	SLMO	2	0200	900	7.9	204	7.3	1930		35	62.5
27C0074	04	CORTE MADERA CREEK	WINSHIP ROAD	ROS	2	0200	1500	5.5	111	5.5	1925	FO	28	54.7
27C0075	04	BELLUM BLVD UP	BELLUM BLVD	SRF	3	0002	0		702		1930		21	
27C0076	04	MAHON CREEK	LINDARO ST	SRF	2	0200	5735	14.0	119	14.1	1962		8	96.5
27C0077	04	SAN RAFAEL CREEK	LINCOLN AVE	SRF	2	0200	11601	13.4	201	13.4	1959	SD	18	79.7
27C0078	04	ROSS CREEK	SHADY LANE	ROS	2	0200	1500	7.3	111	6.6	1930	FO	13	62.9
27C0079	04	SAN ANSELMO CR-SYCMRE BR	CENTER BLVD	SLMO	2	0100	10000	5.5	204	5.4	1940	FO	23	74.6
27C0080	04	SAN ANSELMO CREEK	MADRONE AVE	SLMO	71	0200	1000	7.0	104	5.5	1930	FO	9	55.1
27C0081	04	SLEEPY HOLLOW CREEK	CALETA AVE	SLMO	2	0200	400	7.9	501	7.9	1989		19	92.5
27C0082	04	GALLINAS CREEK	REDWOOD HWY	SRF	3	0200	8000	10.1	119	10.0	1969		15	93.8
27C0083	04	MILLER CREEK	LAS GALLINAS AVE		3	0200	3830	19.5	201	19.5	1970		16	97.5
27C0084	04	GALLINAS CREEK	FREITAS PRKY	SRF	2	0200	8738	9.4	119	9.4	1970	FO	8	82.0
27C0085	04	GALLINAS CREEK	LAS GALINAS AV	SRF	2	0400	6871	17.4	101	17.4	1965		7	96.3
27C0086	04	ARROYO SAN JOSE	BEL MARIN KEYS BL	NVTO	199	0400	15000	22.6	119	22.6	1970		17	78.0
27C0088	04	WARNER CREEK	DIABLO BLVD	NVTO	2	0200	17918	9.8	101	12.1	1970		9	93.3
27C0089	04	NOVATO CREEK	SUTRO AVE	NVTO	2	0200	6583	10.7	101	13.1	1935		10	96.4
27C0090	04	NOVATO CREEK	SIMMONS AVE	NVTO	2	0200	4217	11.3	104	7.2	1932	FO	11	76.5
27C0091	04	WARNER CREEK	TAMALPAIS AVE	NVTO	2	0200	4207	9.8	101	9.7	1973		11	95.6
27C0092	04	NOVATO CREEK	SEVENTH ST	NVTO	2	0400	8997	20.7	201	19.4	1971		18	91.1
27C0093	04	NOVATO CREEK DRAIN	BEL MARIN KEYS BL	NVTO	199	0200	9800	11.0	201	19.6	1960	SD	12	48.0
27C0094	04	SAN ANSELMO CREEK	SAUNDERS AVE	SLMO	2	0200	2000	9.1	104	9.1	1935		23	73.0
27C0095	04	ARROYO SAN JOSE	IGNACIO BLVD	NVTO	2	0400	6743	24.4	119	31.1	1960		8	96.4
27C0096	04	DUTTON SLOUGH	REDWOOD BLVD	NVTO	5	0400	6683	24.1	319	19.2	1968		9	89.1
27C0097	04	IRWIN CREEK	3RD ST	SRF	2	0400	20000	12.5	119	15.2	1968	FO	7	75.6

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Bridge Number	Dist	Bridge Name	Facility Carried	City	Bypass Length	Lanes ONUN	AADT	Appr Width	Str Type	Road Width	Year Built	SD/FO	Length	Suff Rating
27C0098	04	ARROYO NICASIO	NICASIO VAL RD		199	0200	1330	6.7	104	6.5	1928	FO	32	58.0
27C0099	04	SN GERON NAT GLF CRS POC	NICASIO VALLEY RD		32	0002	1330	0.0	702	0.0	1960		27	
27C0100	04	SAN ANSELMO CREEK	BRIDGE AVE	SLMO	2	0200	3000	9.4	104	9.3	1935		35	65.6
27C0101	04	SAN ANSELMO CREEK	CENTER BLVD	SLMO	2	0200	10000	9.1	111	8.6	1935	FO	14	48.2
27C0102	04	SAN RAFAEL CREEK	W SAN FRANCISCO BL	SRF	199	0300	50	9.1	201	9.7	1981	FO	15	87.5
27C0103L	04	NOVATO CREEK	REDWOOD BLVD	NVTO	2	0200	5000	10.1	104	8.2	1947	FO	57	78.4
27C0103R	04	NOVATO CREEK	REDWOOD BLVD	NVTO	2	0200	5000	13.7	104	9.4	1929		57	80.4
27C0104	04	OLEMA CREEK	SIR FRANCIS DRAKE		8	0200	3370	7.3	101	7.3	1930	FO	18	72.2
27C0105	04	ARROYO SAUSAL TRIBUTARY	WILSON HILL RD		29	0200	330	6.1	119	7.3	1928		8	79.2
27C0106	04	OLEMA CREEK	BEAR VALLEY RD		8	0200	1270	7.3	104	6.4	1937	FO	25	77.4
27C0107	04	REDWOOD CREEK	MUIR WOODS RD		10	0200	2187	7.0	104	7.3	1946	SD	7	47.5
27C0108	04	REDWOOD CREEK	MUIR WOODS RD		10	0200	2187	7.6	201	8.4	1958	FO	31	79.0
27C0109	04	SAN ANTONIO CREEK	MRSHAL PETALUMA RD		23	0200	328	7.3	104	7.4	1929		8	89.6
27C0110	04	SALMON CREEK	MARSHALL-PETALUMA		48	0200	328	5.5	104	7.3	1928	FO	7	83.4
27C0111	04	SALMON CREEK	MARSHALL PETLUM RD		43	0200	328	4.9	104	7.3	1931	FO	10	74.0
27C0112	04	SALMON CREEK TRIBUTARY	MRSHAL-PETALUMA RD		42	0200	328	5.2	104	7.3	1928		7	84.2
27C0113	04	SALMON CREEK	MRSHAL-PETALUMA RD		40	0200	400	5.5	104	9.9	1931	FO	42	93.2
27C0116	04	PINE GULCH CREEK	OLEMA-BOLINAS RD		199	0200	2076	7.6	101	9.8	1986		13	75.0
27C0119	04	CHILENO CREEK TRIBUTARY	CHILENO VALLEY RD		26	0200	213	5.8	104	6.4	1927		13	82.7
27C0120	04	ESTERO DE SAN ANTONIO	FALLON-TWO ROCK RD		11	0200	249	5.8	104	7.9	1932		7	89.8
27C0121	04	STEMPLE CREEK	ALEXANDER RD		6	0200	60	6.7	504	7.8	1962		25	86.0
27C0122	04	STEMPLE CREEK	TWN BRIDGE RD		6	0200	80	6.4	201	7.3	1958		28	76.1
27C0123	04	ESTERO AMERICANO	SLAUGHTER HOUSE RD		13	0200	125	4.9	201	7.3	1990		23	94.4
27C0124	04	ESTERO DE SAN ANTONIO	MIDDLE RD		10	0200	40	6.7	201	8.4	1958		60	97.0
27C0125	04	ESTERO AMERICANO	VLY-FRD-FRKLN SCH		5	0200	100	9.8	201	9.8	1961		60	97.0
27C0126	04	SAN GERONIMO CREEK	S GERONIMO VLLY DR		2	0200	1500	5.5	104	9.1	1929		7	92.1
27C0127	04	SAN GERONIMO CREEK	MONTEZUMA RD		199	0200	50	7.3	119	7.3	1938		10	84.3
27C0128	04	COYOTE CREEK	FLAMINGO RD		2	0200	1605	9.1	201	10.0	1964		22	95.8
27C0129	04	COYOTE CREEK TRIBUTARY	ENTERPRISE CONCRSE		2	0200	50	7.3	702	7.3	1950		7	73.0
27C0130	04	SAN GERONIMO CREEK	LAGUNITAS RD		2	0200	200	6.7	504	6.6	1964		20	84.5
27C0131	04	REDWOOD CREEK	PACIFIC WAY		2	0200	50	5.5	102	5.1	1956	FO	7	85.5
27C0132	04	MILLER CREEK	MOUNT SHASTA DR		2	0200	500	12.2	201	12.2	1962		27	95.0
27C0133	04	MILLER CREEK	MT MCKINLEY RD		2	0200	800	12.2	201	12.2	1963		19	96.3

Data presented here is for information only. It should not be used to determine the official status of a bridge's eligibility for HBRR money

Page 3

Structure Maintenance & Investigations

SM&I

February 2005

MARIN COUNTY BRIDGE LIST

Bridge Number	Dist	Bridge Name	Facility Carried	City	Bypass Length	Lanes ONUN	AADT	Appr Width	Str Type	Road Width	Year Built	SD/FO	Length	Suff Rating
27C0134	04	MILLER CREEK	MOUNT LASSEN DR		2	0200	980	6.1	101	6.1	1925	FO	9	84.1
27C0135	04	MILLER CREEK	MOUNT LASSEN DR		2	0200	980	6.1	201	6.1	1965	FO	24	92.9
27C0136	04	SAN GERONIMO CREEK	CREAMERY RD		2	0200	50	6.1	104	7.3	1948		7	97.0
27C0137	04	SAN GERONIMO CREEK	MEADOW WAY		2	0200	100	6.7	201	8.5	1965		21	95.0
27C0140	04	WIDOW REED CREEK	LAGOMA ST	MLV	2	0200	2000	14.3	101	11.3			8	75.8
27C0141	04	FAIRFAX CREEK	SPRUCE RD	FRFX	2	0200	255	4.9	104	7.4	1930		7	52.9
27C0142	04	FAIRFAX CREEK	AZALEA AVE	FRFX	2	0200	110	6.4	104	5.5	1930	SD	9	30.9
27C0143	04	FAIRFAX CREEK	MARIN DR	FRFX	2	0200	110	7.3	111	7.5	1930		13	59.0
27C0144	04	SAN ANSELMO CREEK	CREEK ROAD	FRFX	2	0200	255	6.1	104	6.2	1929		42	57.9
27C0146	04	SAN ANSELMO CREEK	CANYON ROAD	FRFX	999	0100	100	3.6	101	3.5	1998	FO	10	67.8
27C0147	04	SAN ANSELMO CREEK	PASTORI ST	FRFX	199	0100	55	5.5	101	5.4	1930	FO	12	60.9
27C0148	04	S HEIGHT SIDEHILL VIADUCT	SOUTHERN HEIGHT BL	SRF	3	0100	120	3.4	702	2.7		SD	49	29.2
27C0149	04	ROSS CREEK	NORWOOD AVE	ROS	2	0200	1000	4.6	111	5.2	1908	FO	16	64.1
27C0150	04	ALEXANDER AVE OH	ALEXANDER AVE	LKSP	2	0200	150	6.7	112	6.2	1925	SD	50	29.8
27C0151	04	SAN ANTONIO CREEK	PT REYES PETLMA RD		32	0200	1450	11.6	201	12.2	1964		31	94.8
27C0152	04	SIR FRANCIS DRAKE POC	SIR FRANCIS DRK BL	LKSP	5	0004			205	3.0	1981		120	
27C0153	04	SAN ANSELMO CREEK	NOKOMIS AVE	SLMO	2	0200	300	7.3	104	5.5	1930	FO	35	60.0
27C0154	04	SAN GERONIMO CREEK	MOUNTAIN VIEW RD		2	0100	100	3.7	402	3.3	1962	FO	16	59.0
27C0155	04	MILLER CREEK	BRIDGEGATE DR		199	0200	500	11.0	504	11.0	1987		19	88.3
27C0156	04	WARNER CREEK	SOUTH NOVATO BLVD	NVTO	2	0200	18000	21.3	501	21.3	1992		15	96.3
27C0158	04	LINDEN LANE UP	RAILROAD	SRF		0200			106				15	100.0
27P0001	04	LAGUNITAS CREEK	STATE PARK ROAD	STPK	0	0200		7.3	402	7.3	1947		37	66.5
27P0002	04	LAGUNITAS CREEK	MILL CROSSING	STPK	0	0100		3.0	309	3.1	1947	FO	34	42.6
27P0007	04	AYALA COVE PIER	PIER	STPK	0	0000			504		1967		0	
27P0010	04	POINT BLUNT PIER	POINT BLUNT PIER	STPK	0	0000		0.0	702	0.0	1961		0	
27P0011	04	BIKE PATH OC	BIKE PATH	STPK	27	0000			502		1980		53	
27U0001	04	ESKOOT CREEK	STINSON BEACH RD	NRA	0	0200		7.9	101	8.7	1959		10	98.0
27U0007	04	RODEO LAGOON	BUNKER RD	NRA	0	0200	600	8.5	505	8.5	1983		15	99.0
27U0009	04	BAKER-BARRY TUNNEL	BUNKER ROAD	NRA	6	0001		7.9	018	4.9	1918	SD	721	24.5

Data presented here is for information only. It should not be used to determine the official status of a bridge's eligibility for HBRR money

Transportation Systems

All of the Highway 101 interchanges in and near Novato are at risk from earthquake. The Novato Safety Element advises that "a major earthquake would be expected to cause considerable damage to transportation systems. Roads, bridges and highway overpasses are susceptible to damage or failure in the event of a major earthquake.

After an earthquake it is expected that the Golden Gate Bridge and the Richmond/San Rafael Bridge may be unusable for 24 hours because of damage to the approaches. Highway 37 may be impassable for at least 72 hours due to liquefaction, rock slides and debris in the road way. Highway 101 may be impassable in spots for at least 12-24 hours due to collapsed bridges, settling of the roadbed in filled areas, rock slides, and debris (including abandoned cars) in the roadways. Potential road closures are shown in the following map if a 7.5 quake occurred on the North Golden Gate San Andreas Fault.

A serious hazardous materials spill, flooding or multiple car wreck could close Highway 101 in both directions for hours or even days. This would in turn cause gridlock and the inability of citizens to either return from work in the area to go to work. These incidents would prevent access to the area by Golden Gate Bridge and Transportation District which operates the Golden Gate transit and local bus service, ferry service and the Golden Gate Bridge linking Novato to Sonoma and Marin County cities and the City of San Francisco. The City of Novato is at risk and can become landlocked and inaccessible due to its dependence on Highway 101, Highway 37 and access to the surrounding communities. This would cause severe economic hardship on the City and put the ability for emergency responders to move from one side of the City to another in a timely manner at risk.

ABAG produced the report: "Riding Out Future Quakes - Pre-Earthquake Planning for Post-Earthquake Transportation System Recovery in the San Francisco Bay Region". The report includes technical documentation and modeling earthquake maps. The purpose of this project was to assess the vulnerability of the region's transportation system to earthquakes as an initial step in expanding pre-earthquake planning.

The impacts of an earthquake on our transportation system are based on a careful analysis of data from the Northridge and Loma Prieta earthquakes. Because the predicted number of road closures is so large, an extra effort was made by ABAG to check and recheck assumptions to ensure that the numbers are not systematically large.

Predicted road closure for Marin County and selected earthquake scenarios are listed in the table below and are shown in the modeling maps that follow. These estimates include:

- direct causes of closures, including faulting, liquefaction, land sliding, and shaking damage to bridges and highway interchanges; and
- indirect causes of closures, including threat of building collapse or structural damage to highway and rail structures, small hazmat releases, water and gas pipeline leaks, and other miscellaneous closures.

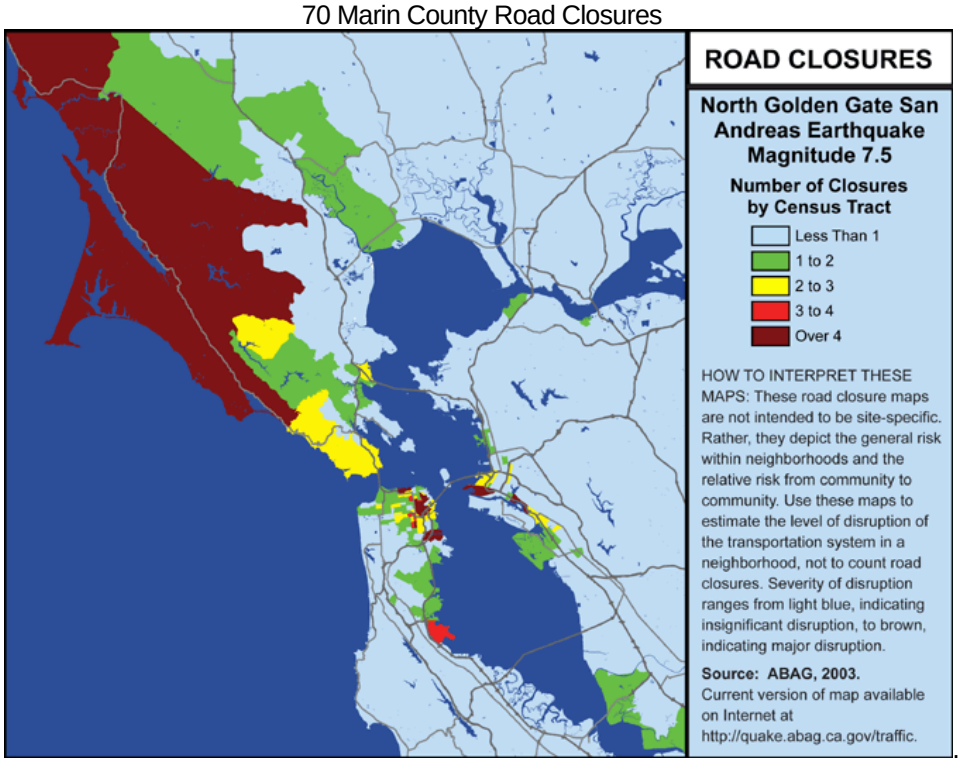
Note that this modeling process does not include:

- Secondary disasters (such as huge fires, toxic gas releases far larger than occurred Northridge or Loma Prieta, or dam collapse);
- Possible road closures created for emergency housing or public assistance centers; or
- Extensive land sliding due to soils being saturated with water associated with a very large winter storm.

Table 3-3 Predicted road closure for Marin County

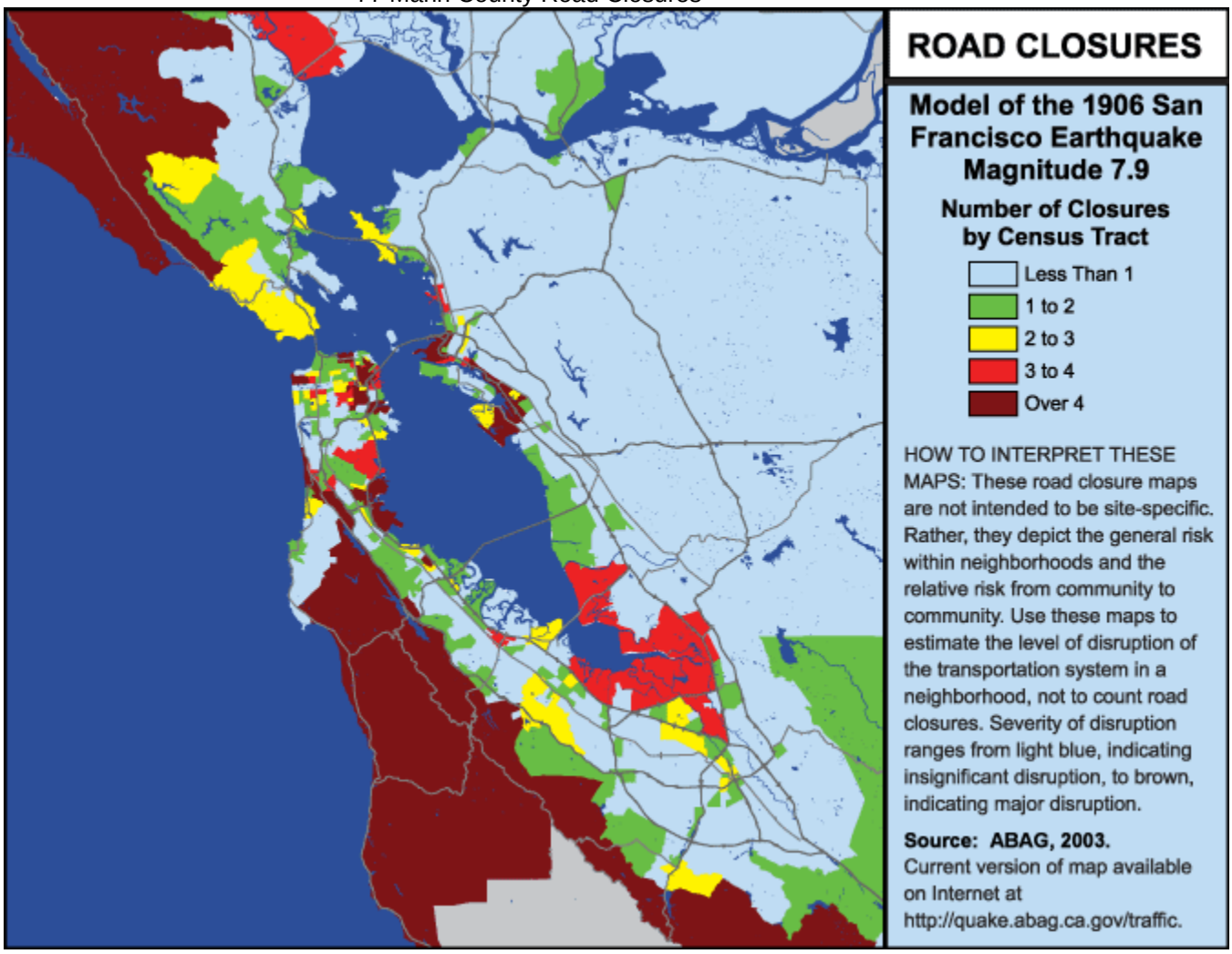
Earthquake Scenarios	Marin
San Andreas - Santa Cruz Mts.	3
San Andreas - Peninsula-Golden Gate	22
San Andreas - Northern Golden Gate	70
San Andreas - Entire Bay Area	77
No. San Gregorio	20
Southern Hayward	15
Northern Hayward	20
N + S Hayward	28
Rodgers Creek	20
Rodgers Creek - Northern Hayward	34
Rodgers Creek - Entire Hayward	41

Figure 3-11 San Andreas Earthquake -- Northern Golden Gate Segment
70 Marin County Road Closures



This scenario earthquake is for a magnitude 7.5 earthquake on the Northern Golden Gate segment of the San Andreas Fault. An earthquake along the Northern Golden Gate segment of the San Andreas Fault would cause approximately 581 road closures in the Bay Area with an expected 70 road closures in Marin County. As can be seen from examining the above map and table, the rural roads in western Marin and Sonoma counties are expected to severely impacted. State Route 1 is the major access route for these rural areas. It is important to note that roads in this area are not redundant and that access to some of the rural communities along them is likely to be severely impaired. State Route 1 also runs parallel to the fault source for this earthquake, a situation likely to increase its disruption.

Figure 3-12 San Andreas Earthquake -- Entire Bay Area
77 Marin County Road Closures

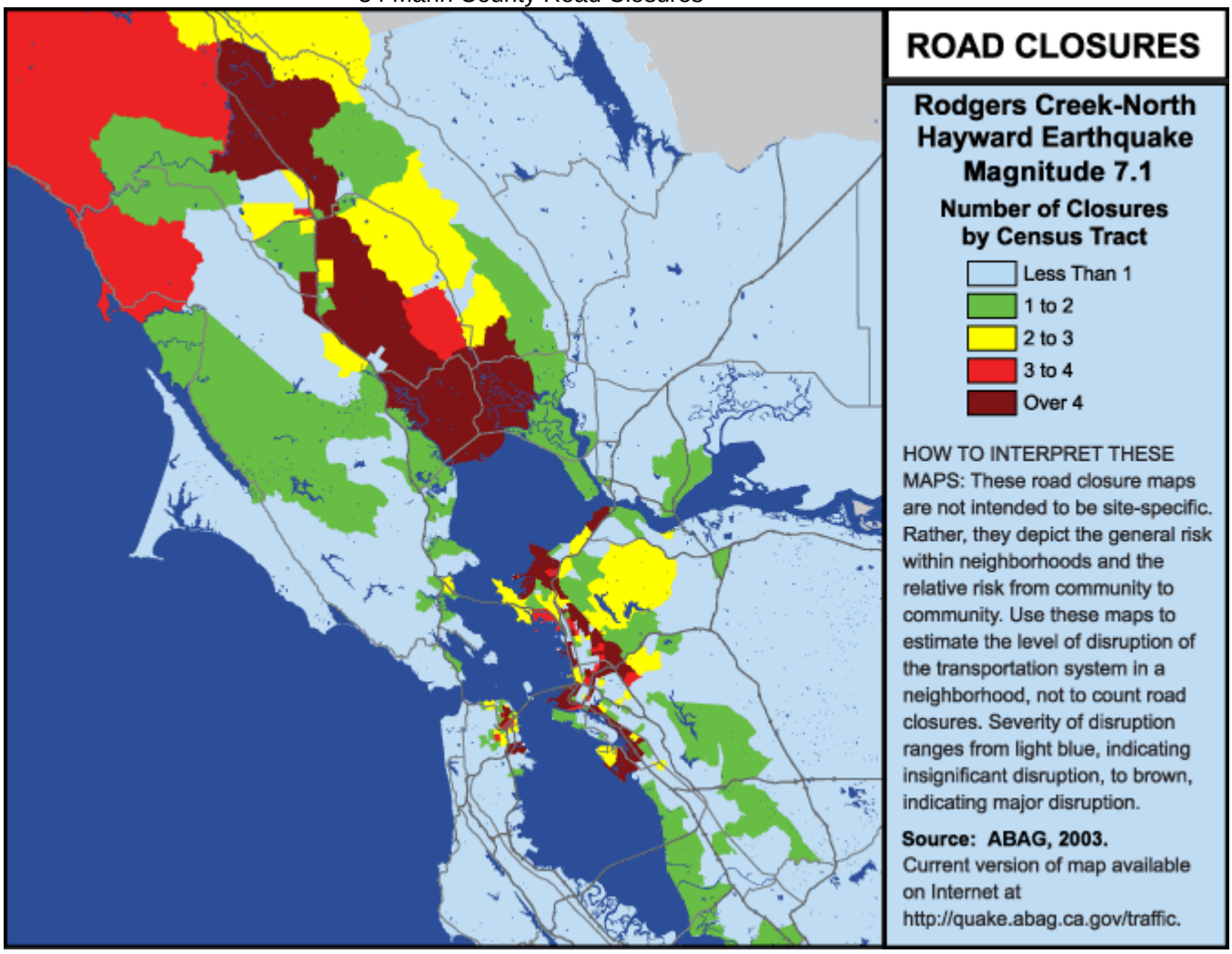


This scenario earthquake is for a magnitude 7.9 earthquake on the San Andreas Fault. It is a model of a repeat of the 1906 earthquake.

An earthquake along the entire Bay Area portion of the San Andreas Fault would cause approximately 1,332 road closures in the Bay Area with an expected 77 road closures in Marin County. Ground shaking damage to road and highway structures, including BART, is the largest cause of damage in Alameda County, while closures due to building damage is the most common cause of road closures in San Francisco. Faulting is the most common cause of closures in San Mateo and Santa Clara counties.

State Routes 1, 9, 35, 84, and 92, the major access routes for these rural areas, are all in the heavily impacted area. Similarly, rural roads as well as State Route 1 in Marin County will be heavily impacted. It is important to note that these roads are not redundant and that access to some of the rural communities along them is likely to be severely impaired.

Figure 3-13 Rodgers Creek and Northern Hayward Segments
34 Marin County Road Closures



This scenario earthquake is for a magnitude 7.1 earthquake on combined northern segment of the Hayward fault and the Healdsburg-Rodgers Creek fault between Healdsburg and Oakland.

An earthquake along the combined Northern Hayward - Rodgers Creek faults would cause approximately 1,084 road closures in the Bay Area with 34 road closures in Marin County.

Most of the closures are expected to occur along the east Bay and north into Sonoma County. Three zones are expected to have the most severe transportation disruptions: the zone immediately adjacent to the fault along the I-580 corridor; the zone immediately adjacent to the Bay along the I-880 corridor; and the zone along the State Route 101 corridor in Sonoma County. Few alternatives are available if these north-south connectors are not fully operational in the North Bay. While it has not been within the scope of this project to predict the performance of individual structures, the effect on the Bay Area's toll bridges is expected to be serious, particularly the Richmond, Carquinez, and Bay bridges. It should also be noted that in most cases these bridges are not redundant and that thinking about alternatives in the event that they are not fully functional is critical. Local roads and highways in the Highway 101

corridor, particularly near I-580, the Richmond-San Rafael Bridge, State Route 37, and in San Francisco, are also expected to experience multiple road closures.

From an emergency planning perspective, this scenario earthquake is particularly problematic because all of the Bay Area's toll bridges may be affected, either directly or due to closures of local roads feeding the bridges. The Richmond-San Rafael, Carquinez, and Bay bridges are particularly subject to problems in this earthquake. Even if these bridges remain intact, liquefaction and extensive settlement on the approaches may impact traffic flow.

Other Utilities

Immediately following an event, numerous communication system failures could occur and be compounded by system use overloads and loss of electrical power. This would include the use of cellular phones and pagers. The City of Novato has two utility substations that serve the City. A long term power outage in the City of Novato could cause economic damage and life safety threats due to lack of water and sanitary services. Electrical power in the City of Novato is particularly vulnerable to the loss of electrical power throughout Novato because of the potential loss of the PG&E substation at Ignacio, which provides power directly to Marin. In addition, transmission lines are vulnerable to many hazards. PG&E has given a priority addressing hazardous situations, such as downed wires. PG&E then focuses on restoration of the largest number of customers as quickly as possible, and on repairs that will restore service to critical facilities such as hospitals, water pumping stations and police and fire departments.

Repairs to electrical equipment may require physically clearing roadways, and movement of special equipment. Restoration of local electrical power will be coordinated with regional and local utility representatives. Up to 60% of the system load may be interrupted immediately following the initial earthquake shock wave.

The Ignacio substation located on Hamilton Drive is a staffed substation, which has been in operation since 1941, houses oil-filled electrical equipment (transformers, oil circuit breakers and regulators) and associated equipment, materials and controls. The operating electrical equipment is located throughout the substation yard. This substation also includes storage areas or spare oil-filled electrical equipment and gas cylinders.

The property to the south of the yard across Hamilton Drive is business/industrial property, and the property to the north and east is undeveloped open wetland. There is a flood control canal along the west and north fence outside the yard.

A control building houses the main control for the substation equipment. Substation systems operators operate these controls 24 hours per day, 7 days per week. The maintenance building housed spill control equipment, and miscellaneous materials and supplies necessary for the maintenance and repair of equipment. A storage shed near the couth fence houses a stand-by generator. The entire yard is surrounded by a six-foot high chain link fence topped with one foot of barbed wire.

Natural gas leaks will pose a fire threat in the susceptible areas of intense ground shaking and /or poor ground near the shoreline. Breaks in the system will affect large portions of Novato. Restoration of natural gas service could be significantly delayed.

National Pipeline Mapping System

Because of the recent San Bruno natural gas line explosion maps and pictures identifying gas transmission pipelines for the Novato area from the National Pipeline Mapping System are included in this plan. The City has requested this same information in electronic format and once received will be posted to the City's GIS system. The GIS system will provide more detail.

Figure 3-14 National Pipeline Mapping System

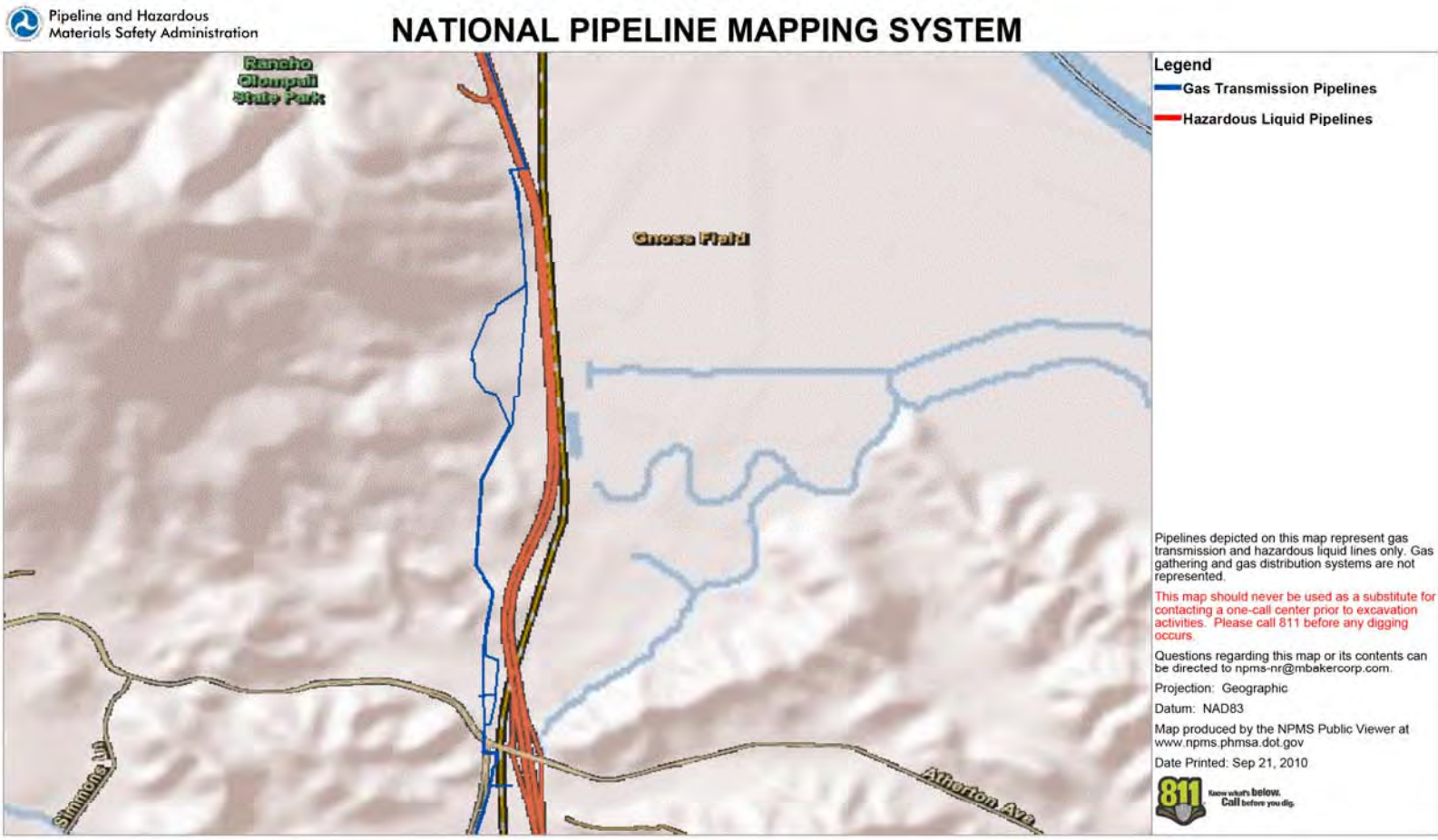


Figure 3-15 National Pipeline Mapping System

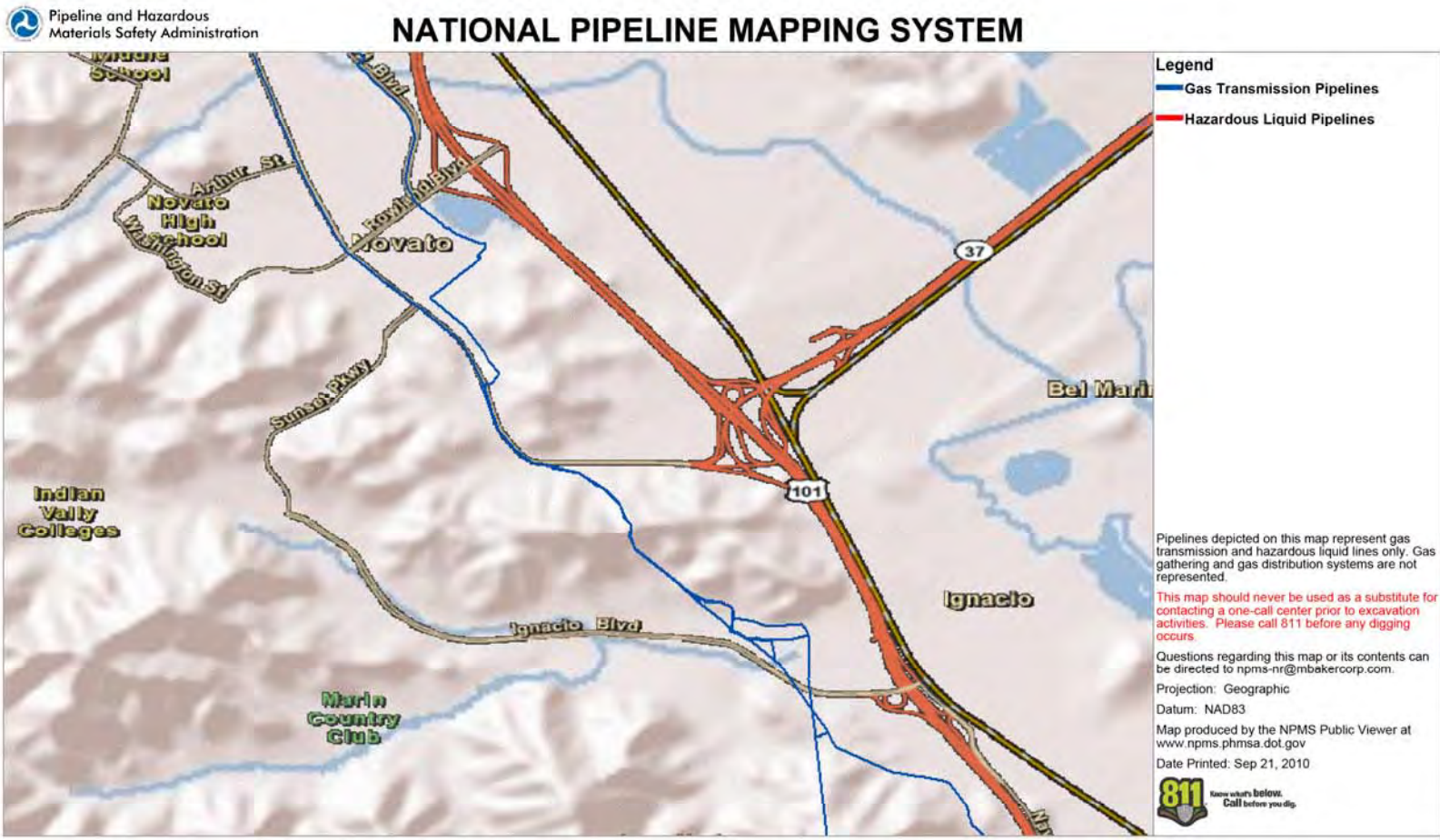


Figure 3-16 National Pipeline Mapping System

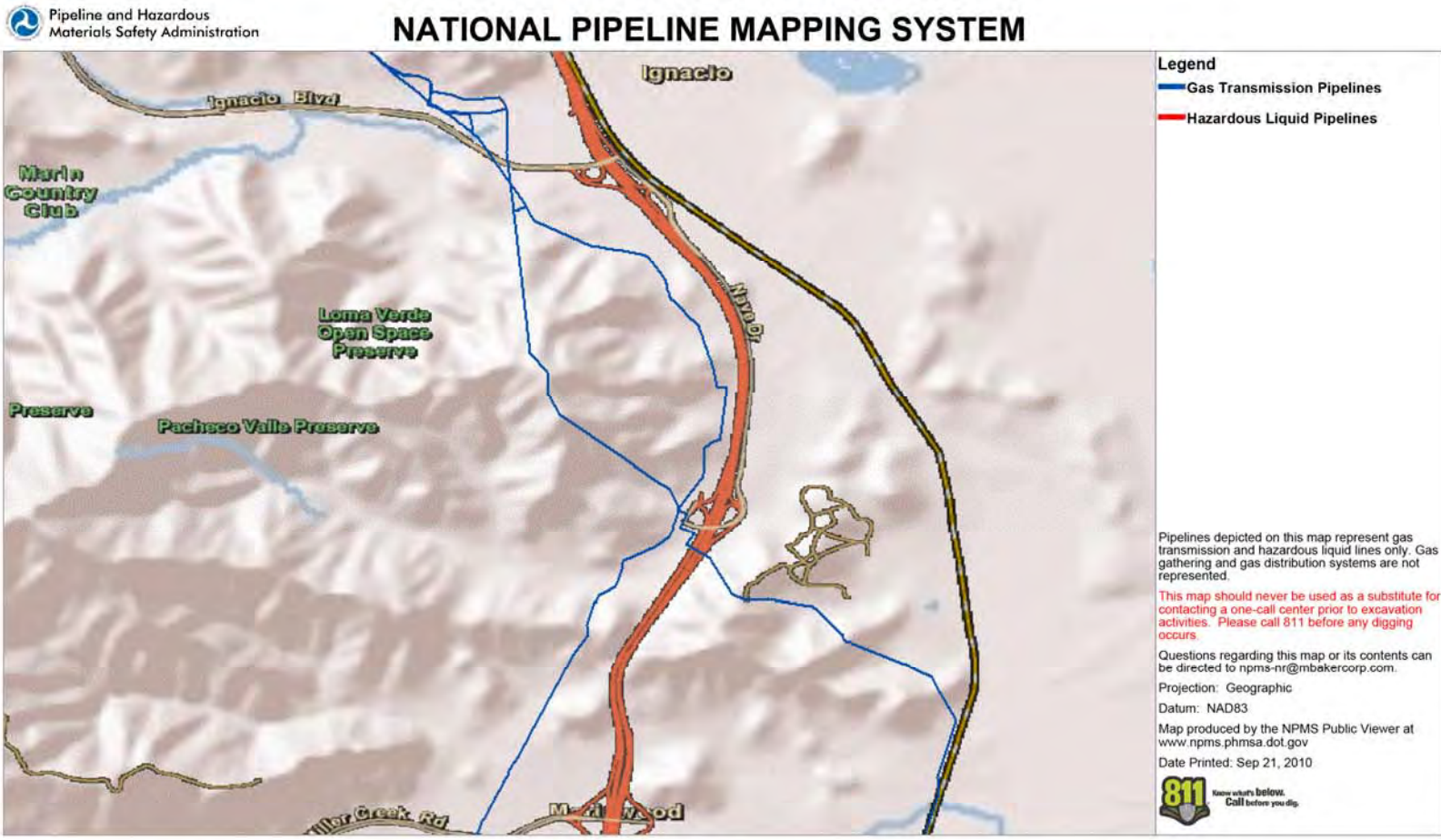


Figure 3-17 Pipeline Mapping System

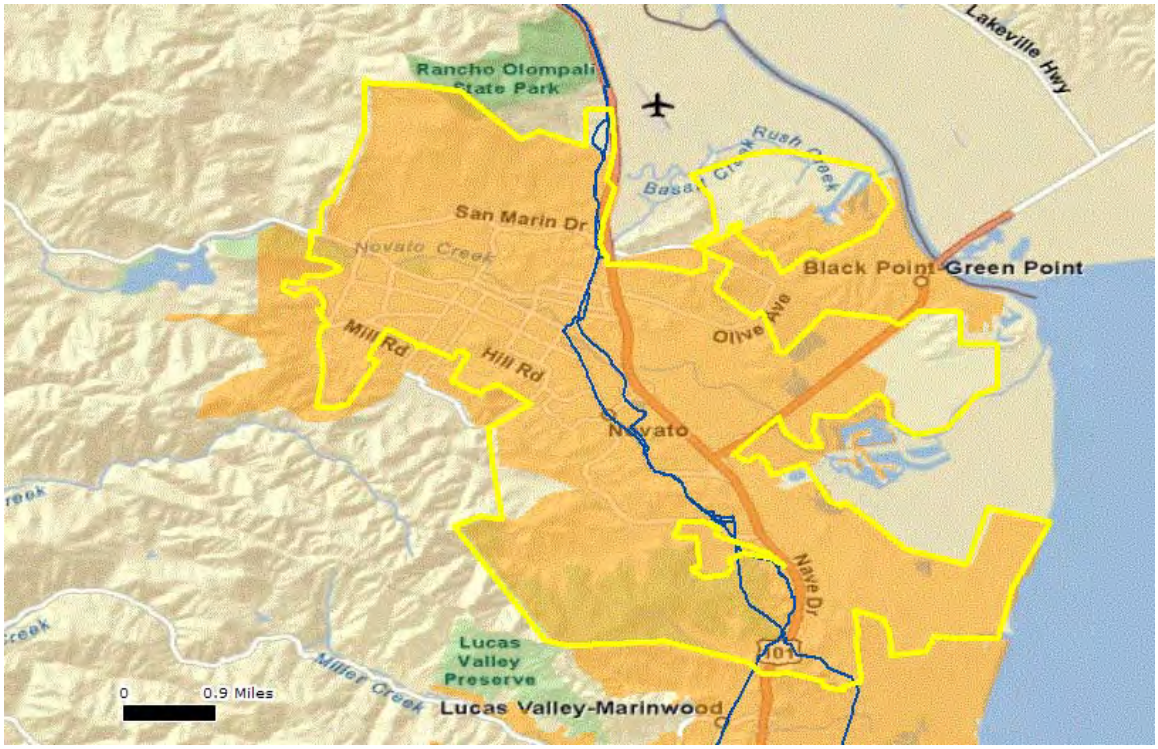
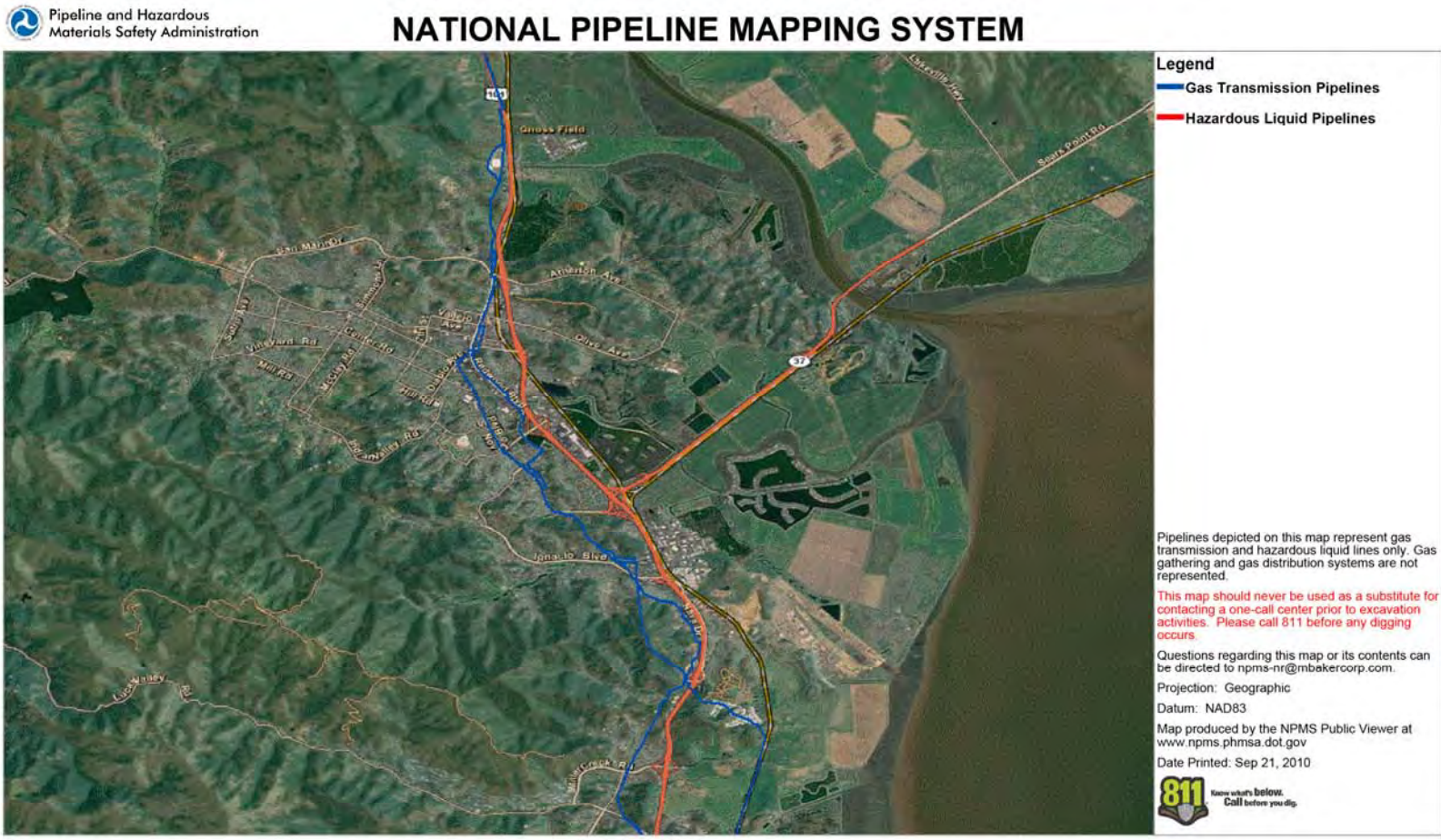


Figure 3-18 National Pipeline Mapping System



Aviation Hazards

Gnoss Field is an airport within the service area of the Novato Fire Protection District. The Marin County Airport is staffed and maintained by the County's Public Works Department (DPW) for the benefit of the flying public. With a 3300' lighted runway, parallel-lighted taxiway and GPS approach Gnoss is ready to serve the needs of the community 24 hrs/day. The airport is attended day, and night security is on duty all nights. . The airport consists of 120 acres and is home base to over 295 aircraft, from small singles to corporate.

The Novato Fire District does not have any specialized equipment to handle air crash rescue scenarios. Our type one engines carry a reserve of Class B foam and our crews train to fight flammable liquid fires. The District is also versed at multi-causality incidents that may occur from a crash landing. The

District has responded to several incidents at the airport including aircraft landing without their landing gear down, aircraft that have overshot the runway and occasional airplane crashes. The airport has an excellent safety record and we do not have any current significant events to demonstrate our capabilities at the airport. The chance for liquefaction at Gnoss Field based on USGS modeled earthquakes is 30%.

Railroad Hazards

There is one rail line that bisects the city. Trains operating on this line pass through developed areas of the city. Because the railroads and interstate highways are federally controlled or regulated, the city's options in regulating transport on these lines are limited or non-existent. The railroad tracks enter the District from the northeast, parallel to Highway 37, and then at the Ignacio "Y" turn north parallel to Highway 101. In 1995 the railroad operated a single round trip freight service through Novato six days a week. The service through Novato started in Napa, passing through Novato around noon, on the way to Petaluma. The return train from Petaluma usually passed through Novato late in the afternoon on the way back to Napa. The Southern Pacific Railroad right-of-way has been purchased for potential future transit use. This right-of-way may be used in the future by diesel buses, electric light rail trains, or diesel electric trains.

The Fire District has responded to fires that were either created by a "hot box" (overheated bearing) within the wheel assembly that creates molten chunks of metal that start wildland fires and a rare engine compartment fire for the diesel locomotives. These were unusual but easily handled incidents by fire service personnel. Currently the rail does not create a special hazard for firefighting forces. (Source: NFPD 2009 All Risk Standards of Cover).

The Sonoma-Marin Area Rail Transit (SMART) Project is a passenger rail project located in San Francisco's North Bay. The project provides rail service along 70 miles of the Northwestern Pacific Railroad alignment. Utilizing the publicly owned railroad right of way, the rail project will serve fourteen stations, from Cloverdale in Sonoma County to the San Francisco-bound ferry terminal in Larkspur, Marin County.

Figure 3-19 Sonoma-Marin Area Rail Transit map

The SMART rail corridor parallels Highway 101, the only regional north-south transportation facility in the North Bay. The SMART project is being designed to reduce the North Bay's reliance on the single-occupant auto and to provide multi-modal, fuel-efficient alternatives to existing traffic and congestion on Highway 101. In addition, the rail project will enhance and improve the region's land use policies and preservation of agricultural lands by restricting all rail stations to incorporated areas.

The SMART Project expects to use Diesel Multiple Unit (DMU) vehicles along the corridor. The DMU is quieter, with lower noise levels and air emissions than conventional locomotive-hauled equipment. Project is estimated to begin service by 2014. (source: SMART website)

The North Coast Railroad Authority (NCRA) is proposing to resume rail service over the Russian River Division (RRD) of the Northwestern Pacific Railroad (NWP). The NWP is an existing railroad that has provided rail service dating back to the early 1900's. The RRD of the NWP is approximately 142 miles long extending from Willits in Mendocino County, California to Lombard, Napa County, California. This rail corridor runs parallel to U.S. Highway 101 corridor through Mendocino, Sonoma, Marin, and Napa counties to Novato, California. At Ignacio, south of Novato, the rail corridor runs east/west along CA Highways 37 and 121 near the north shore of San Pablo Bay, to Lombard, north of the City of American Canyon, where the NWP connects to the currently operating California Northern Railroad (Cal Northern).

NCRA was formed in 1989 by the California Legislature under the North Coast Railroad Authority Act, Government Code Sections 93000, *et seq*. The Act was intended to ensure continuation of railroad service in Northwestern California and envisioned a railroad playing a significant role in the transportation infrastructure serving a vital part of the State that suffers from restricted access and limited transport options.

In 1992, the state purchased the ERD of the NWP. In 1996, NCRA purchased the segment of the railroad line from Willits to Healdsburg, including a perpetual easement to operate rail freight service between Healdsburg and Lombard. Currently, the NWP Line from Willits to Healdsburg is owned by NCRA, and from Healdsburg to Lombard is owned by SMART District. NCRA has a perpetual freight service easement over SMART right-of-way, and SMART has a perpetual passenger service easement over the portion of the right-of-way owned by NCRA between Healdsburg and Cloverdale.

SMART's enabling legislation (Assembly Bill (AB) 2224) provides that the District must work with NCRA and the Federal Railroad Administration (FRA) "to achieve safe, efficient, and compatible operations of both passenger rail and freight service along the rail line in Sonoma and Marin Counties." Coordination of SMART's passenger rail service and NCRA's freight service is governed by an existing Operating Agreement.

The freight service will be operated by an independent contracted operator. NCRA has currently entered into a contractual agreement with NWP Co. NWP Co. proposes to resume the operations of freight service in the rail corridor from Willits to Lombard for transport of general freight to serve the communities in the rail corridor. In this rail corridor, NWP Co. could also transport solid waste to landfills beyond the four-county area, replacing the diesel truck hauling currently used for this service. The proposed project does not propose the transport of hazardous waste, dangerous, highly flammable or explosive material. Source: www.northcoastrailroad.org

3.4.6 Impact and Loss Estimates

It is unknown when the next earthquake will occur and how damaging it might be. It could occur on a regional fault, be deep or shallow and shake for seconds or a minute. The damages caused are dependent upon the variables stated above. However, shaking of 0.3g and greater will be felt strongly and could cause widespread damage.

It is not possible to predicate accurately the consequences that an earthquake might cause, however ABAG created estimates of the number of properties and their estimated market value. The numbers are based on map of Earthquake Shalking Potential for California, Spring 2003. ABAG created these values ***only*** to provide estimates of property at risk in hazard areas and not intended to represent scenarios of loss due to hazards, nor do they represent the replacement value that would be damaged or destroyed during a hazard event. In addition, they do not include public and other nontaxable improvement.

Table 3-4 Estimated market value of properties in shaking potential earthquakes

	Total	Lowest Potential	Moderate Potential	Highest Potential
Residential and Mixed Use Properties:				
Number or properties	14,424	0	11,189	944
Estimated market value ($ Million)	$6,148	$0	$4,809	$480
Commercial and Other Properties:				
Number or properties	843	0	577	181
Estimated market value ($ Million)	$1,012	$0	$586	$397
Industrial and Other Properties:				
Number or properties	1,416	0	891	523
Estimated market value ($ Million)	$649	$0	$326	$322
Grand Total:				
Number or properties	16,683	0	12,657	1,648
Estimated market value ($ Million)	$7,810	$0	$5,721	$1,199

Source: Association of Bay Area Governments, 2006

Table 3-5 Estimated market value of properties in earthquake liquefaction

	Total	Moderate	High	Very High
Residential and Mixed Use Properties:				
Number or properties	14,424	2,288	3,431	654
Estimated market value ($ Million)	$6,148	$975	$1,376	$234
Commercial and Recreational Properties:				
Number or properties	843	78	443	43
Estimated market value ($ Million)	$1,012	$246	$457	$83
Industrial and Other Properties:				
Number or properties	1,416	405	413	241
Estimated market value ($ Million)	$649	$102	$259	$68
Grand Total:				
Number or properties	16,683	2,771	4,287	938
Estimated market value ($ Million)	$7,810	$1,323	$2,093	$384

Source: Association of Bay Area Governments, 2006

3.5 Flood

3.5.1 Hazard Identification

A flood may be defined as a temporary rise in stream flow that results in water overtopping its banks and inundating areas adjacent to the channel. The size and frequency of occurrence of a flood depends on a complex combination of conditions, including the amount, intensity, and distribution of rainfall, and previous moisture conditions. Drainage pattern floods are generally classified either as slow-rise or flash floods. Slow rise floods in City of Novato may be preceded by a warning period of hours or days. Evacuation and sandbagging for slow-rise floods may have often lessened damage. Conversely, flash floods are most difficult to prepare for due to extremely limited, if any, advance warning and preparation time. The area subject to inundation is referred to as the "Flood-Plain." The flood-plain is divided into two hazard areas: 1- The "Floodway," which is the portion that carries the deep fast moving water (usually defined as the area needed to contain a 100-year storm) and 2- The flood fringe area which is the remainder of the flood-plain, subject to shallow slow moving water.

The magnitude of the flood is measured in terms of its "peak" discharge, which the maximum volume of water (in cubic feet) is passing a point on the channel. Floods are usually referred to in terms of their frequency of occurrence, which is related to the discharge; for example the "100 year flood" for a particular channel is the size flood selected by a government agency for planning purposes (usually a 50-year or 100- year) is referred to as the "selected or regulatory flood."

3.5.1.a Location

Majority of the information in this section is attained from the City of Novato Local Flood Hazard Mitigation Plan which is attached as Appendix 3. City of Novato has a long and varied coastline with San Pablo Bay to the East and is laced with numerous streams, creeks and drainages facilities discharging through lowlands to it. These creeks and waterways are usually subject to some form of flooding during the annual wet, winter rain season. The degree of flooding is dependent upon topography, vegetation, the duration and intensity of rain and consequent storm water runoff. Many developed areas are located in flood plains. Additionally, many hill and mountain areas are subject to flash flood conditions. Major flooding would also occur in the event of dam failure within Novato. Winter storms can generate heavy wave action along the bay coastal areas of Novato which, either by itself or when combined with high tides and/or high winds, can initiate flooding along the ocean and bay coastlines of Novato.

3.5.1.b Flood Area

The North Marin Water District maintains an open space preserve near Loma Verde. The Novato area contains a network of rivers, streams, creeks, lakes, and other water bodies that are prone to flooding, including:

The Petaluma River

The Petaluma River originates approximately 20 miles north of the City of Petaluma and forms the northeast border of the Novato area. Petroleum and gravel products are transported from Petaluma to San Pablo Bay via the river. Marshlands along the Petaluma River have been considered for nomination as a federal estuarine sanctuary.

San Pablo Bay

San Pablo Bay borders the eastern edge of the area. This shoreline extends for approximately seven miles. San Pablo Bay is a navigable waterway that provides access to San Francisco Bay and the Pacific Ocean.

Most of the bay front lands are in agricultural, conservation or open space uses, and floods frequently. These areas are reclaimed marshlands which had been near high tide level when drained. Since reclamation, long-term settlement of these areas has left them below mean sea level and they require pumping to drain.

Novato Creek

Novato Creek flows from west to east and bisects the area. The watershed of Novato Creek encompasses the majority of the area, and its drainage basin encompasses 44 square miles. Numerous streams flow into Novato Creek, including Warner Creek, with a 5.1-square-mile drainage area; Arroyo Avichi, with a 1.6-square-mile drainage; and Arroyo San Jose, with a 5.7-square mile drainage. In addition to these major waterways, numerous local drainage channels and storm drains discharge into Novato Creek and its tributaries. Pacheco Creek flows through the southern part of Novato.

Novato Creek has a long history of flooding and is the main flood hazard to the community. According to the most recent Flood Insurance Study, flooding is caused by steep slopes in the upper reaches of streams and short duration storms of high intensity. Several inadequate bridges and culverts add to the flood problem. The main flood problem occurs in the lower reaches of Novato and Warner Creeks, and consists primarily of ponding behind the levees of these channels, whose capacities are inadequate to carry off large flows. Downstream of U. S. Highway 101, Novato Creek has little to no bed gradient and is influenced by tidal action from San Pablo Bay.

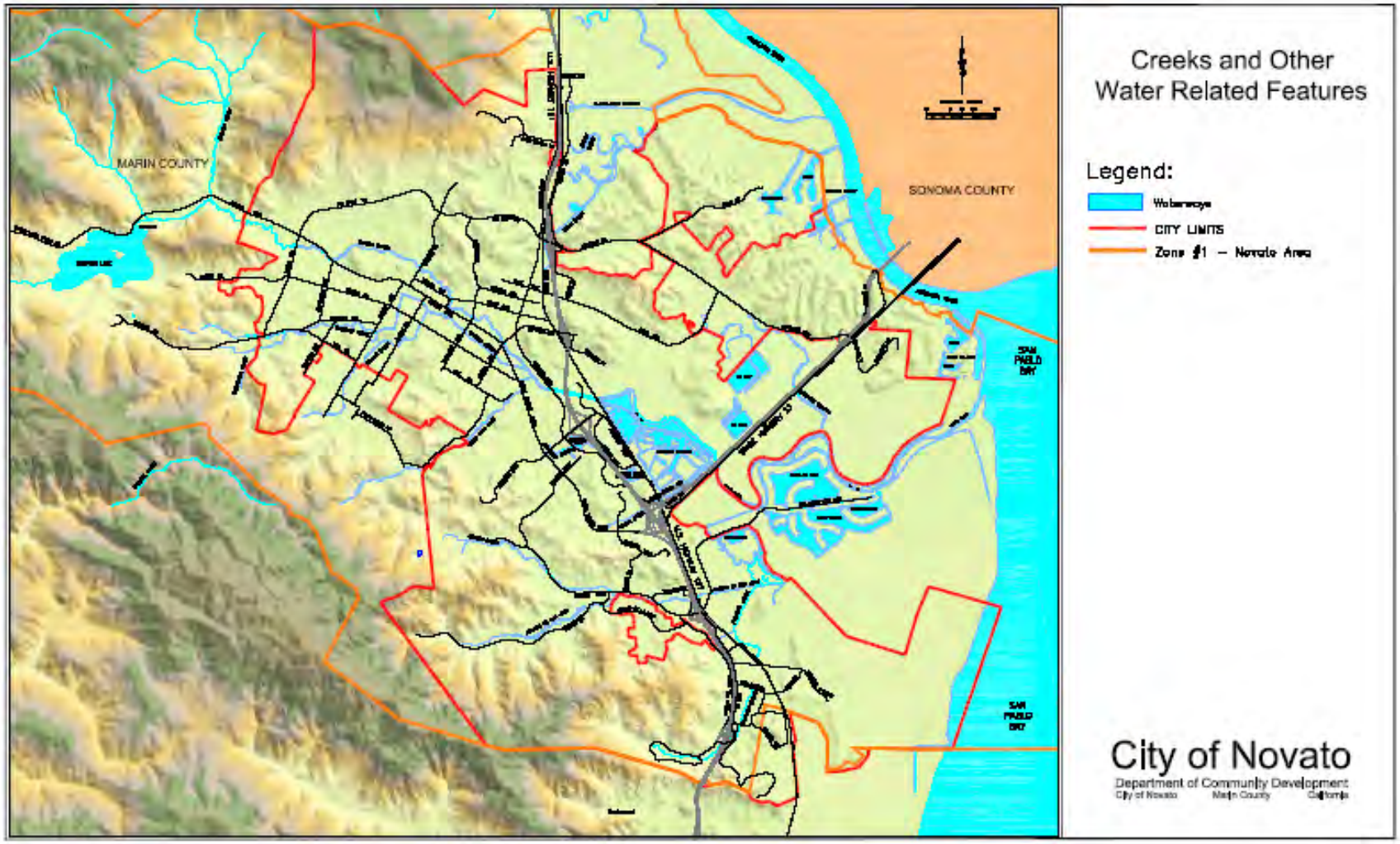
Rush Creek
Rush Creek flows eastward from Highway 101 to the Petaluma River, north of the City limits.

Stafford Lake
Stafford Lake is a reservoir and headwater for Novato Creek approximately 11 miles upstream from San Pablo Bay. The reservoir, which was established in 1951, stores water for domestic use and reduces flooding along Novato Creek. The reservoir has a storage capacity of 4,430 acre-feet and a water surface area of 245 acres. The North Marin Water District (NMWD) supplies about 95 percent of Novato with potable water. The Marin Municipal Water District (MMWD) supplies an area including Hamilton Field. NMWD receives most of its water from the Russian River, via the North Marin Aqueduct. NMWD has an agreement with the Sonoma County Water Agency that provides an annual entitlement of 12,360 acre-feet (4 billion gallons) of Russian River water. NMWD also receives a small amount of its supply from Stafford Lake, a reservoir on Novato Creek west of the City.
MMWD receives its water from reservoirs on Lagunitas Creek in central Marin County, two other reservoirs, and from the Russian River. The water supply is adequate to meet the demand under General Plan build out. Water distribution facilities are developed on a site-by-site basis, financed by the developer through agreements with the water agency.

Dam failure resulting from earthquakes is another potential source of flooding. Lake Stafford Dam, an earth embankment constructed in 1951, is 71 feet high and creates Stafford Lake. Located upstream of Novato, the dam is designed to withstand an earthquake with a magnitude of 8.25 Richter on the San Andreas Fault, with a design epicenter located 10 miles from the dam. This dam is under the jurisdiction of the California Division of Dam Safety. The inundation zone is the hypothetical event of a sudden failure of the dam is on file with the North Marin Water District. Refer to Figure 3-16, Dam Failure Inundation Area.

Stafford Lake has also developed into a recreation destination for many in the community. It provides opportunities for fishing and is stocked with Florida-strain largemouth bass. Because it is a drinking water source access for fishing is restricted within 1500 feet of the dam and intake tower.

Figure 3-20 Novato Creeks and Water Features



3.5.2 Secondary Hazards

3.5.2.a Landslides

Debris avalanches, debris flows and associated storm-triggered landslides' have caused most of the deaths and much of the structural damage attributed to land sliding in California. Such incidents have occurred frequently in the past and as growth and development place more people, more structures and more roadways in areas susceptible to landslides, the potential destruction and cost of storm related landslides becomes greater and greater.

During a severe storm such as the one which occurred in January 1982, thousands of debris avalanches and debris flows may be triggered in both rural and urban areas, smashing homes, blocking roads, severing utilities and water supply, and injuring or killing people. Damage control and disaster relief may be required from local agencies, private organizations, and state and federal governments. Emergency operations may be seriously hampered by closure of major highways and main roads and loss of communications. Evacuation of dangerous areas may be necessary. Extensive efforts may be required to rescue trapped persons, recover bodies, remove debris, assist in reestablishing vital public services and utilities, and offer continuing care and shelter to affected persons. City of Novato lies in the California Coast Ranges and has two contrasting topographic settings: steep hills and ridges; and flat marshlands, bay plains and mud flats. The hills and ridges of central and southeastern Marin are characterized by very steep slopes and by sharp differences in the strength and stability of the geological materials underlying the surface soils. These differences are generally expressed by the lack or presence of landslide deposits, which are widely but unevenly distributed on the slopes. Most landslide damage has taken place within pre-existing landslide deposits.

Landslides constitute one of the principal hazards to structures, roads, and utilities on these hillsides. A typical soil debris avalanche in Marin involves a few hundred cubic yards of soil and colluvium and is the result of total saturation of a part of the regolith on a hillside. During the last 20 years, they have occurred abundantly when about 4 inches or more of rain has fallen in 10 hours or less. In other places they have occurred during normal rainfall as a result of excessive water introduced into the hillside through domestic use.

The aftermath of wildland fire produces a new area of potential landslide as burned and defoliated areas are exposed to winter rains.

3.5.2.b Severe Weather

Severe weather in this area generally includes heavy rains and are periodically accompanied by strong winds, lightning, or hail. Heavy rains coupled with low temperatures or other severe weather conditions can result in increases in traffic accidents, disruptions in transportation, commerce, government, and education. Severe weather incidents can also cause utility outages due to falling trees or other debris as well as injuries. Thunderstorms are usually short in duration (seldom more than two hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry season.

The flooding of 2005/06 resulted after an intense 24 hour period of rain fall which 4.45 inches of rain fell in Novato. Wind speeds reached 60 miles per hour and blew down trees and toppled power lines leaving 13,285 Marin County residents without power. The rain caused mudslides that blocked roads and damaged homes in North Marin areas. In Novato, a slide on Pacheco Creek Drive required the evacuation of three homes.

Windstorms

The potential risk of widespread damage in Marin County from wind is not as considerable as the risk from earthquakes or wildfires. Nevertheless, severe windstorms pose a significant risk to life and

property by creating conditions that disrupt essential systems such as public utilities, telecommunications, and transportation routes. High winds can and do occasionally cause damage to homes and businesses. Severe windstorms can present a very destabilizing effect on the dry brush that covers local hillsides and urban wildland interface areas and increase wildfire threat. Destructive impacts to trees, power lines, and utility services also are associated with high winds.
In windstorms, reports of dislodged roofs and fallen trees and power lines are common. The winds are not considered major widespread threats to population and property, but do involve responses from emergency service personnel. Fallen power lines may cause widespread power outages and fire. Falling trees can occasionally cause fatalities and serious structural damage. These incidents are rare as well as localized.

El Nino
In the spring of 1997, Pacific Ocean temperatures along the equator from South America to Australia were rising above normal, changing wind patterns in the area. This phenomenon was known as El Nino. As part of the global impact of El Nino, heavy storms for 1997-1998 were predicted for the State of California.

On February 9, 1998, President Clinton, in response to a request from Governor Wilson, declared a major disaster for 27 counties in the State of California. The disaster was designated as FEMA-1203-DR-CA. On February 13, 1998 four additional counties were added; on February 26, four more counties were added, and on March 6, 1998, six additional counties were designated, bringing the total to 41. Most damage was caused by flooding; however there was extensive damage from high winds and slides as well.

3.5.2.c Dam Failure
Dam Inundation is defined as the flooding which occurs as the result of structural failure of a dam. Structural failure may be caused by seismic activity. Seismic activity may also cause inundation by the action of a seismically induced wave which overtops the dam without also causing dam failure. This action is referred to as a seiche. Landslides flowing into a reservoir are also a source of potential dam failure or overtopping. Dam failures is further discussed in the Flood section of this plan.
Dam failures can result in the worst flood events. A dam failure is usually the result of neglect, poor design, or structural damage caused by a major event such as an earthquake. When a dam fails, a gigantic quantity of water is suddenly let loose downstream, destroying anything in its path. Besides the passage of the Dam Safety Act, other improvements concerning dams have been made throughout California as a result of the near-failure of the Lower San Fernando Valley Dam.

The Novato Creek Dam is owned by North Marin Water District. Stafford Lake was created with the construction of Stafford Dam on Novato Creek in 1951. It was created to provide a drinking water source of supply for the growing Novato community.

The Novato Creek Dam (also known as Stafford Dam) a seismic stability analysis was prepared for the North Marin Water District by Woodward-Clyde Consultants in 1992. The study confirmed the following information contained in the City of Novato General Plan: The Stafford Dam was designed to withstand a magnitude 8.25 Richter earthquake on the San Andreas Fault.

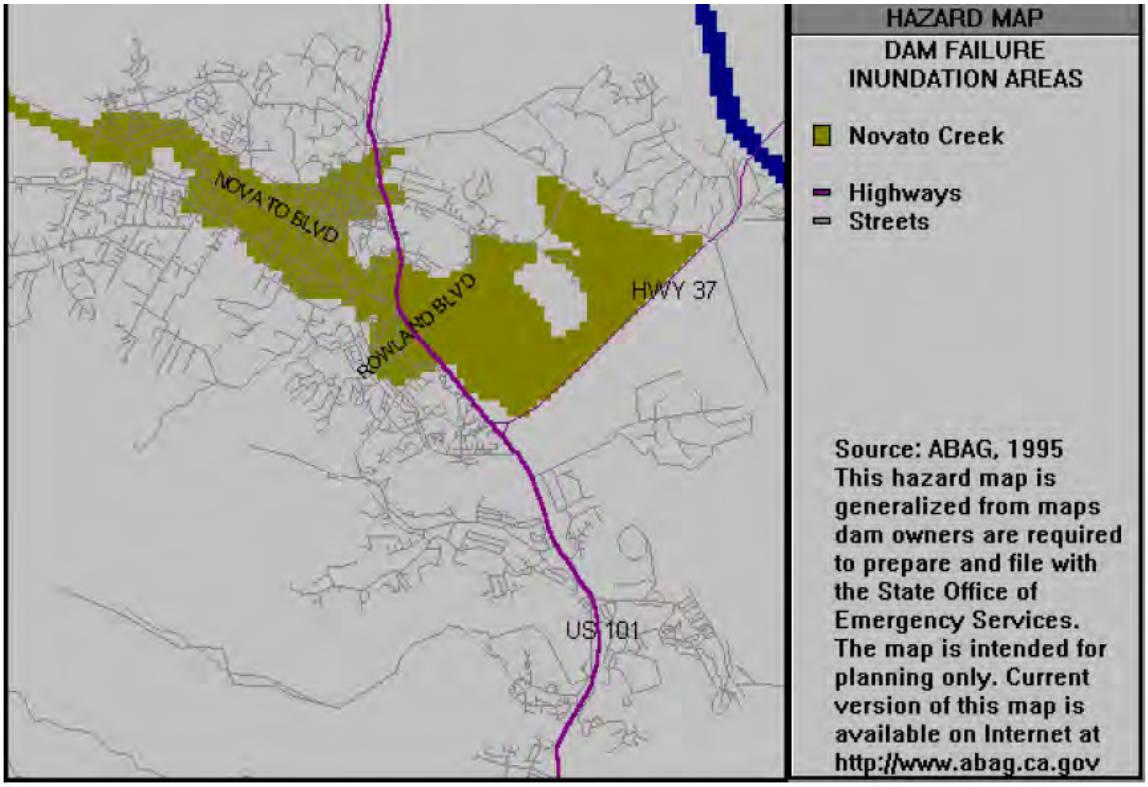
Figure 3-21 Stafford Lake

The dam failure evacuation area extends approximately 4 1/2 miles, passing Through the City of Novato and ending in the agricultural area between the City of Novato and San Pablo Bay.

The threat to the City of Novato is severe. The most critical zone is the San Marin residential area in the vicinity of Miwok Park and will be flooded very shortly after dam failure. The flood waters will reach the first built up area at San Marin Drive/Sutro Avenue 11 minutes after dam failure. 32 minutes after dam failure, the flood waters will begin to inundate the business district & city government buildings, and will reach U.S. Highway 101 approximately 50 minutes after dam failure.

The following maps show the swath of inundation in the event that the dam at Novato Creek was to fail.

Figure 3-22 Dam Failure Inundation Area



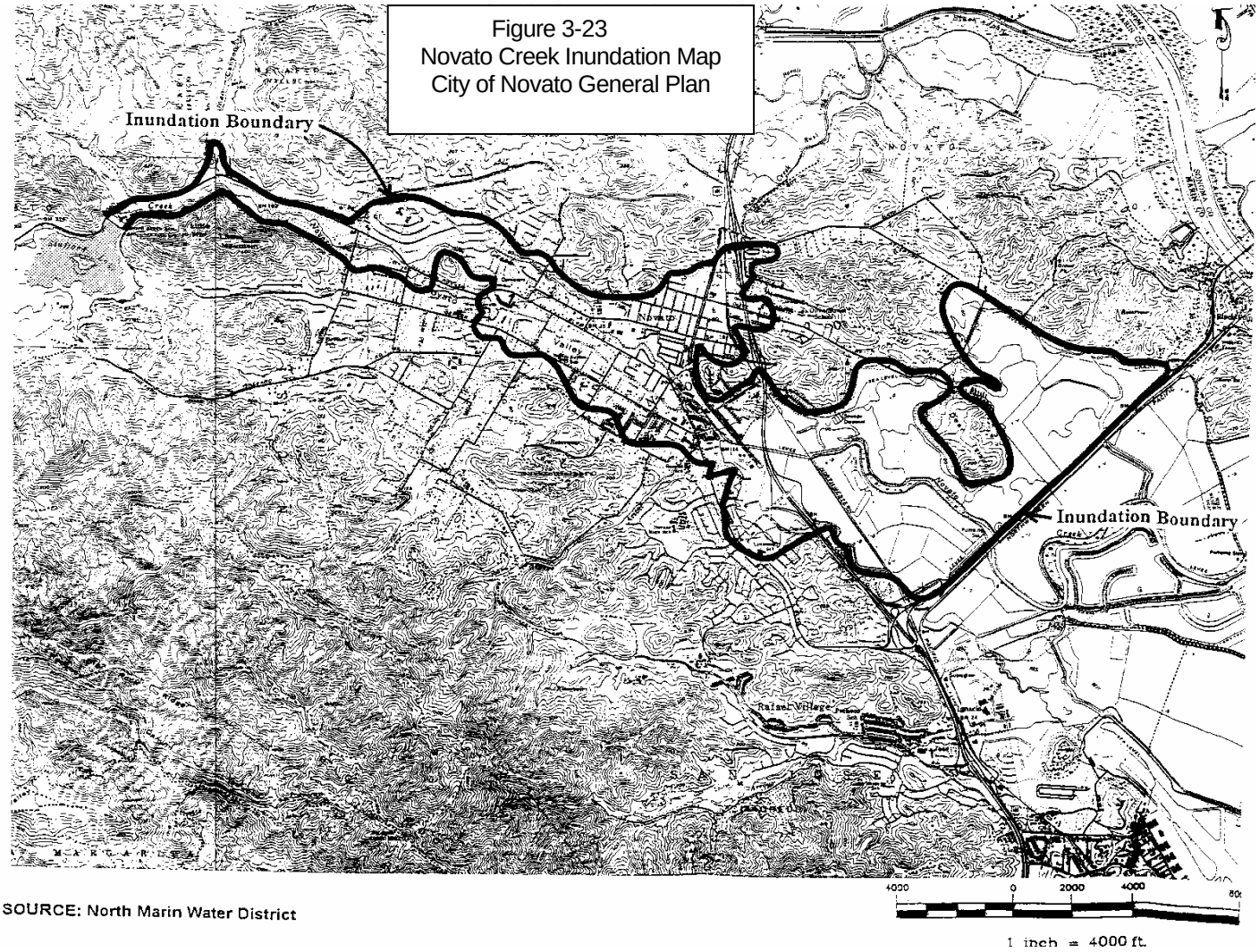


Figure 3-23
Novato Creek Inundation Map
City of Novato General Plan

SOURCE: North Marin Water District

3.5.3 Event History

December 31, 2005
Over a 24 hour period ending the afternoon of December 31, 2005, 4.45 inches of rain fell in Novato. Wind speeds reached 60 miles per hour and blew down trees and toppled power lines leaving 13,285 Marin County residents without power. The rain caused mudslides that blocked roads and damaged homes in North Marin areas. In Novato, a slide on Pacheco Creek Drive required the evacuation of three homes.

Flooding occurred in several locations around Novato Creek routing about 100 residents of a mobile home park from their homes after 3-4 feet of water inundated the area. The storm also caused breaches in Novato levees: 1 50-70 foot breach behind Novato Community Hospital at 100 Rowland Way and another breach at Davidson Street. A shelter was opened at Todd Center in Novato. Some residents had to be evacuated by rescue boat.

The storm closed numerous local roads. Flooding shut down Highway 101 at the Sonoma County line, the northbound Highway 101 exit to Mill Valley and Stinson Beach, and Sausalito/Marin City southbound off-ramp to High 101. At 1 p.m., all roads connecting Point Reyes Station, Inverness and Bolinas to eastern Marin remained impassable. Several routes to West Marin were cleared by evening.

The Novato Emergency Operations Center (EOC) was activated at 5:45 am at 95 Rowland Way as a result of the evacuations due to flooding and residential damages that occurred. Many residents required boat rescue on Nave, Joan, Laruen, Center Rd and Diablo Ave, several streets were also evacuated. On McKeon Ct. and Wilmac Ave several flooded properties and damaged homes experienced repetitive loss when Wilson Creek bypassed the Center Road Bridge. Portions of Highway 101 SB near San Marin Drive and Hwy 37 EB near Novato Creek and the industrial park were closed to through traffic for several hours. Slides forced may families to be evacuated from residents in the Pacheco subdivision. Most of these events caused sufficient damage to warrant a Presidential disaster declaration, allowing Federal assistance to be made available within the disaster area. Approximately thirteen DR projects valued at $261,000 in damages were submitted to FEMA for reimbursement. All fund reimbursement was approved by FEMA and have been paid and closed.

Table 3-6 Estimated Losses for Novato Flood Events

Date	Loss Estimates	Damage
December 17, 2005 to January 12, 2006 DR 1628	$261,000	Levee break, street flooding, EOC operating, shelter opened, down trees, toppled power lines leaving 13,285 Marin County residents without power, mudslides families evacuated, highway closed
December, 1996 to January, 1997 DR 1155	$41,000	Street and property flooding, creek erosion
February, 1995 DR 1046	$160,000	Street and property flooding, slide and debris flows

Related Report from Public Works Department
STORM RELATED ACTIVITIES

During the week the Public Works staff was busy with activities related to the intense storm events that occurred. The most significant damage was incurred by homes on Pacheco Creek Drive where a debris flow from an upslope fire road in County Open Space removed part of one house and forced the temporary evacuation of four houses. Staff responding to the emergency arranged for North Bay Construction to perform immediate debris removal and cleanup was completed. The County Open Space District has arranged for a geotechnical engineer to examine the situation and develop both short term and long term stabilization options. The Open Space personnel have placed plastic sheeting and diversion piping to divert rain water from the debris origin and path. Staff has engaged another geotechnical engineer for a peer review of the County's consultant proposal. Staff has contacted Republic Electric to replace a light pole that was removed by the debris flow. Staff will keep the homeowners informed of any repair proposals that the consultants develop.

The current in Novato Creek eroded two areas near the intersection of Novato Boulevard and Diablo Avenue. An area behind the telephone building and an area along Novato Boulevard were repaired through the placement of rock riprap by Maggiora-Ghilotti under contract with the Flood Control District. Further upstream, an oak tree was lost at the Mary Page property and other properties experienced erosion.

A levee breech off Rowland Way in the vicinity of Novato Community Hospital was repaired by Maggiora-Ghilotti under contract with the Flood Control District. Although a large amount of water flowed into the area near Slade Park, no evacuations or flooding of homes was experienced. Another levee breech occurred near Pacheco Creek and part of the Roblar mobile home park was flooded. Although there was a good amount of water, the level did not submerge any of the homes.

Other areas where flood waters were notable were on McKeon Court and Rena Court off Warner Creek, the Nave Gardens subdivision off the Novato and Arroyo Avichi Creeks, Commercial Boulevard and Digital Drive off Arroyo de San Jose, and San Marin Drive between Simmons Lane and Estado Way off Novato Creek.

The Previous 1996 Flood Plan described the following:

"Novato Creek has a long history of flooding and is the main flood hazard to the community. According to the most recent Flood Insurance Study (FIS), flooding is caused by steep slopes in the upper reaches of streams and short duration storms of high intensity. Several inadequate bridges and culverts add to the flood problem. The main flood problem occurs in the lower reaches of Novato and Warner Creeks, and consists primarily of ponding behind the levees of these channels, whose capacities are inadequate to carry off large flows. Downstream of U.S. Highway 101, Novato Creek has little/no bed gradient and is influenced by tidal action from San Pablo Bay.

Warner Creek and Arroyo Avichi rise and overflow their banks at the confluence with Novato Creek. Localized flooding occurs periodically along Wilson Creek, Vineyard Creek, Ignacio Creek, Arroyo San Jose and Pacheco Creek." "The City has implemented a Local Drainage Master Plan to accommodate the 25 year storm flow, as a result of a Storm Drainage Improvement Bond Measure approved in 1989. The previously mentioned 1985 Bond Measure for Flood Control is being implemented by the Marin County Flood Control and Water Conservation District. These improvements include a detention pond and pump station at Deer Island on the lower portion of Novato Creek and channel improvements to Novato Creek, Warner Creek, and Arroyo Avichi."

Average Rain Fall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average temp. (°F)	48.6	52.2	54.5	57.7	61.3	65.6	68.0	68.2	67.0	62.5	54.4	48.5
High temperature (°F)	56.6	61.5	64.8	69.4	73.8	79.2	82.5	82.5	81.0	75.3	64.1	56.8
Low temperature (°F)	40.5	42.9	44.2	45.9	48.7	52.0	53.5	53.8	52.9	49.6	44.6	40.2
Precipitation (in)	7.5	7.3	5.3	1.9	0.8	0.2	0.0	0.1	0.4	1.8	5.3	5.5

Normal climate around Novato, California

Based on data reported by main weather stations National Weather Service

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days with precip.	10	9	9	5	3	1	0	0	1	3	7	9
Wind speed (mph)	7.1	7.3	8.4	8.6	9.0	9.6	8.9	8.4	7.4	6.4	6.0	6.4
Morning humidity (%)	91	89	86	83	82	78	77	78	77	79	87	88
Afternoon humidity (%)	70	61	53	44	38	32	30	29	31	37	57	67
Sunshine (%)	48	65	74	82	90	94	97	96	93	86	66	49
Days clear of clouds	7	8	10	12	17	22	27	26	24	19	10	8
Partly cloudy days	6	7	9	10	9	6	3	4	4	6	8	6
Cloudy days	19	13	12	8	5	2	1	1	2	6	12	17
Snowfall (in)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

3.5.4 Future Potential

The basis for floodplain management is a flood having probability of occurrence of 1 percent in any given year. This flood is also known as the 100-year flood; this however, is a statistical measure rather than an actual measure. In fact, a 100-year fold may occur more frequently than once every 100 years. Given the history of flooding in the area, the reality is that future flooding events will occur and will affect the City of Novato to varying degrees.

MAY 24, 2007 THURSDAY WWW.MARINIJ.COM

Marin flood a sign of global warming?

Climate change also seen as possible cause for die-off of seabirds on coast

By Mark Prado
IJ reporter

SAN FRANCISCO — A devastating flood sweeps through the Ross Valley on New Year's Eve 2005. Dead tufted and horned puffins turn up on beaches near Point Reyes earlier this year.

Both could be signs that Marin is beginning to feel the impacts of global warming, experts said Wednesday at a National Oceanic and Atmospheric Administration briefing on climate change.

Marin and the Bay Area already have heard global warming could force the bay to rise by three feet by the end of the century; experts have said that would flood coastal communities including Hamilton Field, Highway 37 and parts of the Tamalpais Valley.

But there may already be impacts of climate change, including the Dec. 31, 2005, flood that devastated the Ross Valley.

"What causes floods in that particular area of Marin is the rain rates. It's not so much the total amount, but how fast it falls."

— David Reynolds, senior meteorologist with the National Weather Service

"As the atmosphere warms, it can hold more moisture and you can get higher rain rates," said David Reynolds, senior meteorologist with the National Weather Service. "The whole western Pacific Ocean has been warmer since the mid-1990s and that has provided the fuel for the tropical (storms) that feed this moisture into the atmosphere and ends up hitting the California coast. We are seeing more of those occur. The New Year's Eve flood of 2005 was one of those types of events."

As the rain clouds — from an unusually wet, tropical "Pineapple Express" storm in the Pacific — traveled west Dec. 31, 2005, they rapidly climbed the steep western slopes of 2,571-foot Mount Tamalpais. As clouds rose they became cooler, and cold air can't hold water as well as warm air. The rain let loose and

Researchers, page A7

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RESEARCH: Marin flood seen as sign of global warming

From page A1

wreaked havoc as flooding swept through the Ross Valley.

"What causes floods in that particular area of Marin is the rain rates," Reynolds said. "It's not so much the total amount, but how fast it falls."

Off the Marin coast, wind patterns appear to be changing, upsetting a key environmental process that provides food at the bottom of the food chain, experts said at the briefing. Scientists fear it could be because of climate change and may be the cause of the dead tufted and horned puffins seen on West Marin beaches at the beginning of the year.

"This year we have seen a die-off of seabirds," said Maria Brown, superintendent of the Gulf of the Farallones National Marine Sanctuary. "We have seen them washing ashore because of the lack of food."

Researchers theorize weather patterns — too much wind or too little wind — are having an affect on the "upwelling" process that nurtures krill: tiny, pinkish, shrimp-like crustaceans. Krill are a key food for many sea creatures.

"Our whole marine food web is dependent on upwelling," Brown said.

The fertilizing nutrients necessary for krill begin in the cold depths of the ocean. Those nutrients eventually must come near the surface and bask in sunlight for photosynthesis to occur which, in turn, generates conditions in which krill flourish.

To get to the surface, nutrients ride funnels of water that are created by winds. Too much or too little wind can upset the process. Upwelling is still occurring, not in the spring and summer as was typical, but in the summer and fall.

"These changes are happening on a relatively rapid scale and they are not giving wildlife the opportunity to adapt the way it traditionally would," Brown said. "What we are seeing is rapid climate change, coupled with habitat loss, pollution and other ecological stresses that potentially could lead to the greatest species extinction of our time."

Blue whales seemingly disappeared from the sanctuary last year as well, and experts worry warmer waters could upset coho salmon populations and other fish populations, which are used to colder water.

Sanctuary crews are set to sail Thursday to survey the ocean off of Marin and the impact of global warming.

"The experts agree this is man-caused due to greenhouse gases," the weather service's Reynolds said. "It's not the natural variability of the climate.

"It's something we need to be concerned about."

Contact Mark Prado via e-mail at mprado@marinij.com

Marin County Flood Control & Water Conservation District

The Marin County Flood Control and Water Conservation District is a political subdivision of the State of California and is a separate and distinct agency from the County of Marin. It was established in 1953 by an act of the State Legislature known as the Marin County Flood Control and Water

Conservation District Act, which can be found in Chapter 68 of the Appendix to the California Water Code. The boundaries of the District are the same as the boundaries of the County of Marin. The governing Board of the District is the Board of Supervisors of the County of Marin who sit as the Board of Supervisors of the District. Staffing of the District is provided by the County Department of Public Works. The staff charges time spent on flood control work to the appropriate Flood Control Zone within the District and; therefore, the Zones pay the salaries.

Within the Flood Control District several Flood Control Zones have been created in areas with specific flooding problems. These Zones do not cover the entire District and are, for the most part, concentrated in the eastern urbanized corridor of Marin County. The vast majority of the land area of the County is not covered by any Flood Control Zone. The Zones can perform many functions, including the construction, operation and maintenance of levees, pumping stations, culverts and drainage ways, the cleaning and maintenance of creeks, and, as of July 1, 1007, is the administering agency for the Marin County Stormwater Pollution Prevention Program (MCSTOPPP). All actions but the Zones are authorized by the Board of Supervisors of the Flood Control District.

Each Zone has an Advisory Board appointed by the Board of Supervisors. This Board serves without remuneration and advises the Board of Supervisors in all matters relating to the Zone but most specifically about spending policy and project priority. The Advisory Board members' terms are reviewed every four years but they do not have a specific term of office. They must by resident electors of the Zone in which they serve. The Advisory Boards do not have ultimate authority and can only make recommendations to the Board of Supervisors o the District. However, for all practical purposes, the Board of Supervisors has in the past, in virtually every case, ratified the recommendations of the Advisory Boards.

District funds come from the General Fund of the County. These funds can be used only for administrative purposes and cannot be used to build or maintain flood control facilities. Flood control projects are funded by the residents of the area protected via their local Flood Control Zone. Prior to Ptop.13, Zone funds came from a tax voted on by (and levied only upon) the residents of the Zone. Post Prop. 13 Zone funds come from a pool of funds handed out by the State.

There are at the present time, six active and two dormant Flood Control Zones within the District. The Zones vary greatly in size and financial resources as well as in degree of problems within each Zone. In numerical order the Zones are:

Flood Control Zone #1 – Novato Area

This is a relatively large Zone located in the northern part of Marin County. It encompasses the entire watershed tributary to Novato and Rush Creeks including all of the City of Novato and a sizable amount of unincorporated area around the City. The main goal for many years has been to construct a major flood control project to alleviate flooding in downtown Novato. The final phase of this project is scheduled for construction. Additional activities in Zone 1 consist of periodic maintenance dredging in the lower reaches of Novato Creek, Warner Creel, and Arroyo Avichi, and an annual debris clearance program, which for the first time in 1983, utilized the services of the Marin Conservation Corps (MCC).

Flood Control Zone #2 – Mill Valley Area

This is a large Zone located in Southern Marin which encompasses the entire watershed tributary to Richardson Bay including all the City of Mill Valley, the communities of Marin City, Tam Valley and Alto and an additional sizable amount of unincorporated area. In the early 1960s the Zone was the local sponsor for a major Army Corps of Engineers flood control project on Coyote Creek in Tam Valley. In addition to maintaining the Coyote Creek Project the Zone has constructed, operates and maintains

four pumping stations and carries out an annual creek cleaning program utilizing the services of the MCC.

Flood Control Zone #4 – Bel Aire Area

This is a relatively small Zone located on the Tiburon Peninsula encompassing portions of the City of Tiburon as well as part of the unincorporated area of Bel Aire. Presently, the Zone is maintaining existing facilities including two pump stations and also does an annual cleaning of drainage ways utilizing the services of the MCC.

Flood Control Zone #5 – Stinson Beach

This is another relatively small Zone which encompasses the watershed of Eskoot Creek which runs through the community of Stinson Beach. The main function of Zone 5 is the annual maintenance of portions of Eskoot Creek by the MCC.

Flood Control Zone #6 – San Rafael Meadows

This is a very small Zone located just west of Highway 101 across from the County Civic Center. This area was annexed to the City of San Rafael in 1978 and maintenance operations were turned over to the City. It was the intention of the City and people in the area to keep the Zone in existence to function as a potential capital project funding mechanism for future construction works. However, Proposition 13 seriously crippled the Zone's fund raising powers and so it has been relatively inactive for some years.

Flood Control Zone #7 – Santa Venetia

This is a small Zone located east of the Marin County Civic Center on the Point San Pedro Peninsula. Zone 7 is faced with a number of serious on-going problems including areas that have experienced considerable subsidence resulting in some of it being below the high tide level. Accordingly, much of the Zone is affected but both storm water runoff and unusually high tides. Santa Venetia is protected but a levee and the Zone has constructed and operates five major pumping stations as well as several other flood control facilities. In addition, the Zone carries out an annual drainage way cleaning program using the MCC and, during the winter, the MCC also do a 'Storm Patrol" through Zone 7 before and after major storms.

Flood Control Zone #9 – Ross Valley

This is a very large Zone encompassing the watershed drained by Corte Madera Creek and includes the towns of Corte Madera, Fairfax, San Anselmo, Ross and Larkspur as well as the unincorporated communities of Kentfield and Greenbrae. Zone 9 was established in 1966 to act as a sponsoring agency for a major U.S. Army Corps of Engineers Flood Control project on Corte Madera Creek. The project was approximately 80 percent completed by 1971 but was stopped due to environmental concerns. Since then the Zone and Corps have been evaluating various alternatives for completing the project. Consensus on how to proceed was recently reached and the Corps is beginning preliminary design. The MCC carries out an annual cleaning of the Project and do some fire suppression mowing just upstream of the Bon Aire Road Bridge.

Flood Control Zone #10 – Inverness Ridge Area

Located along the west shore of Tomales Bay and east flank of the Inverness Ridge, Zone 10 was formed after the disastrous January 1982 storm that severely devastated the area. After dealing with the aftermath of that storm, the Zone has been relatively dormant but is being kept intact to be ready for future storms. Some creek clearance is done by the MCC and/or County forces on an as needed bases.

Figure 3-24
Marin County Flood Control Zone map

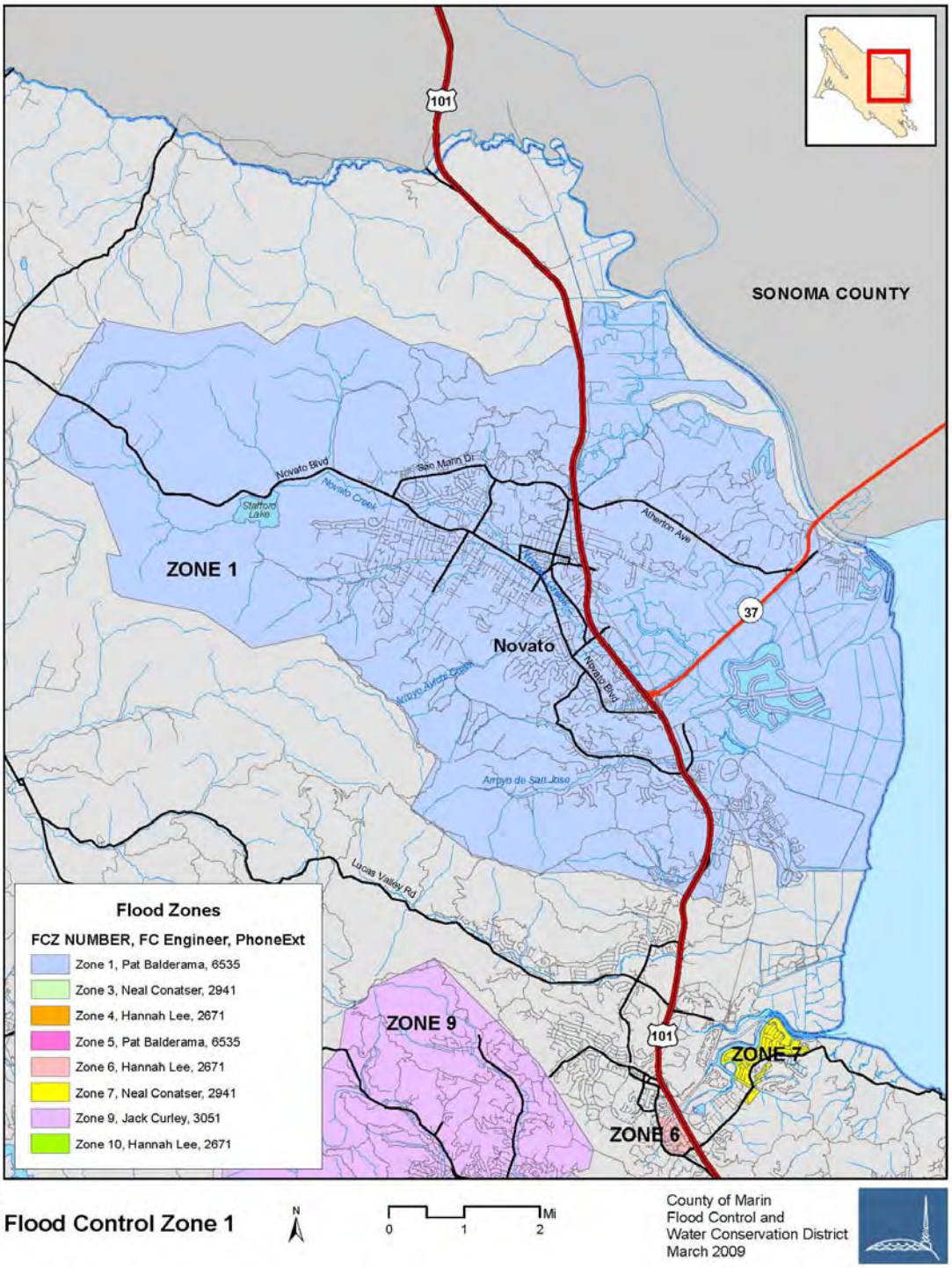
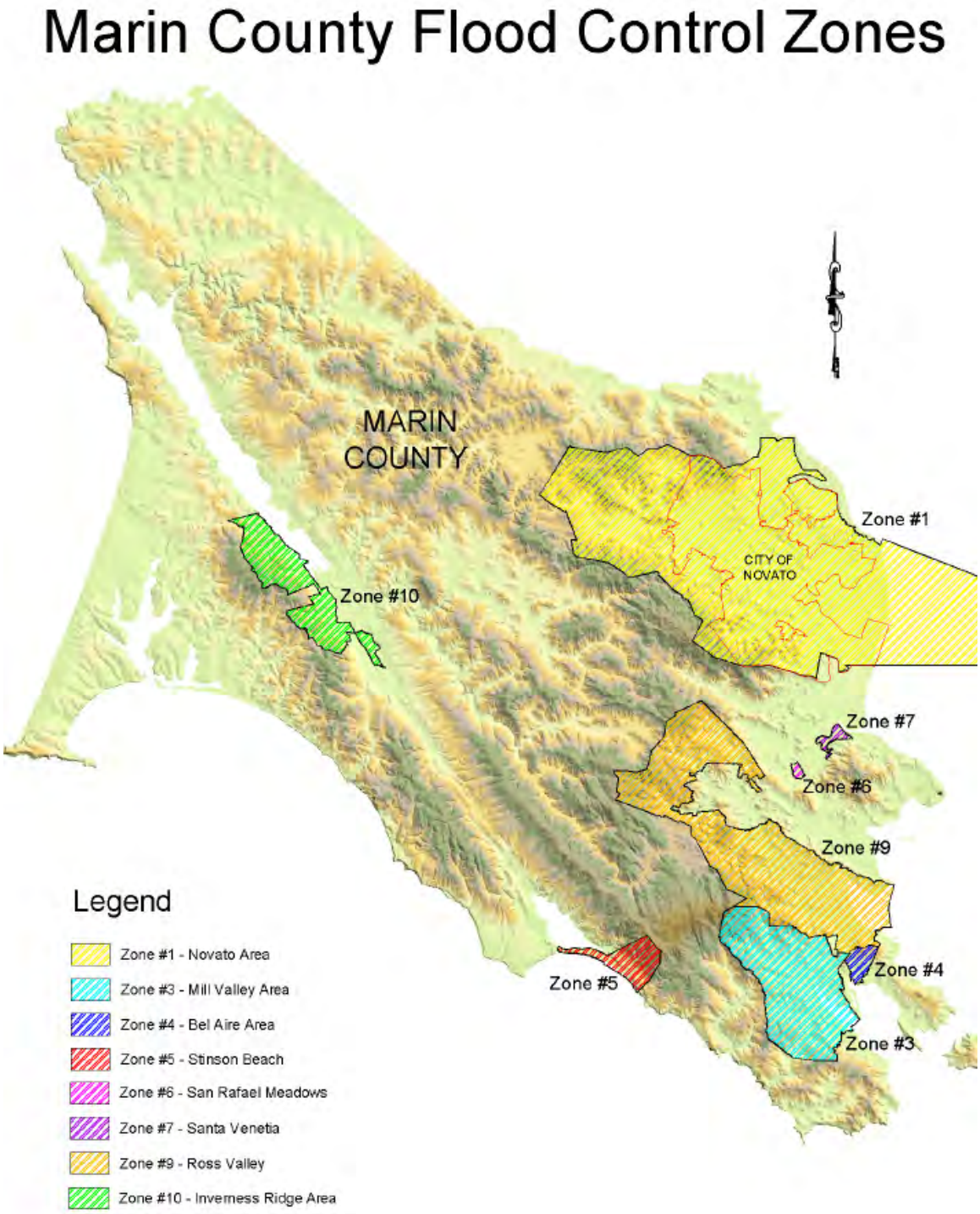


Figure 3-25
Marin County Flood Control Zone map



Flood FIRM Maps in Novato have been revised a number of times and the following table documents those revisions. It is critical for both the Flood Insurance Program and the Flood Mitigation projects that the Flood FIRM maps are kept current and accurate. The FIRM map and the DFIRM map was adopted 5/4/2009. It is the intent of the City of Novato to make these maps a hazard mitigation ongoing project. As it has been the intent of the City of Novato to make these maps a hazard mitigation ongoing project.

DATE ISSUED PER FINAL SUMMARY OR LOMC DETERMINATION	CASE NUMBER PER FINAL SUMMARY OR LOMC DETERMINATION	LOMC TYPE	FILE NAME ISSUED BY FEMA (.PDF)	FEATURES REMOVED FROM THE SFHA	FEMA FINAL SUMMARY OF LOMC MAP ACTIONS NOV. 4, 2008	REVALIDATED LOMC MAY 5, 2009			PRE & POST FIRM ZONE		LINK TO LOMC LETTER	FINAL MAP	COMMENTS
						YES	NO	DFIRM MAP PANEL	PRE LOMC ZONE	POST LOMC ZONE			
AUG141979	199531106MBJ	LOMA	08-14-79 JARVIS	Property	Not Incorporated	X		282D		X	MC_LOMA_08-14-79.	16 RM 95	Shown outside DFIRM 5/4/2009
MAR241981	199533002MBJ	LOMA	03-24-81 SCOTT	Structure	Not Incorporated	X		281D		X	MC_LOMA_03-24-81.pdf		Structures are shown outside SFHA per
JAN251982		LOMA		Property	Not Incorporated		X			X			Missing Letter , per FEMA Not Found
JAN251982	1995532149MBJ	LOMA		Structure	Not Incorporated	X		277D		X	MC_LOMA_01251982.pdf		Revised with LOMC_CLOMR 02-09-994A2
OCT281982	199533000MBJ	LOMA	10281982	Structure	To Be Redetermined		X	277D			LOMC_LOMA_10281982.pdf	12 PM 85	Structures are shown inside SFHA per
FEB231983	199531108MBJ	LOMA	2231983	Property	Not Incorporated	X		277D		X	MC_LOMA_02231983.	17 PM 50	Property is shown outside DFIRM 5/4/2009
OCT41983	199533004MBJ	LOMA	10-04-83 KAEHLER	Property	Not Incorporated	X		281D		X	MC_LOMA_10-04-83.	18 RM 39	Property is shown outside DFIRM 5/4/2009
DEC141984	199531107MBJ	LOMA	12-14-84 NOLAN	Property	Not Incorporated	X		281D		X	MC_LOMA_12-14-84.	15 RM 94	Portions of the property are shown inside
MAR291985	199533001MBJ	LOMA	03-29-85 MANLY	Structure	Not Incorporated	X		283D		X	MC_LOMA_03-29-85.	17 RM 47	Structure is shown outside DFIRM 5/4/2009
SEPT41985	199531055MBJ	LOMA	09-04-85 CHIU	Structure	Not Incorporated	X		279D		X	MC_LOMA_09-04-85.	8 RM 34	Structure is shown outside DFIRM 5/4/2009
MAR101986	199209658MBJ	LOMR-F	03-10-86 LUDWICK	Structure	Superseded	X		277D			LOMC_LOMR_03-10-86.	20 RM 45	Structure is shown inside SFHA per
JUN111987	199209664MBJ	LOMR	-87 WRYSI	Structure	To Be Redetermined	X		283D		X	LOMC_LOMR_06-11-87.pdf	3 RM 36	Structure shown outside SFHA per DFIRM
DEC021987	199209665MBJ	LOMR-F	1987_DECEMBER_2	Structure	Not Incorporated	X		283D		X	MC_LOMR_12021987.	20 RM 76	Structures are shown inside SFHA per

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						YES	NO	DFIRM MAP PANEL	PRE LOMC ZONE	POST LOMC ZONE			
FEB031998	98-09-315A	LOMR-F		Structure	Not Incorporated	X		283D		X	C_LOMR_98-09-315A	21 RM 92	Property is shown inside SFHA per DFIRM 5/4/2009
JUN081998	98-09-675A	LOMA		Structures	Not Incorporated	X		283D		X	C_LOMA_98-09-675A	20 RM 6	Portions of the property are shown inside
OCT291999	99-09-1216A	LOMA		Structure	Not Incorporated	X		287D	X	X	C_LOMA_99-09-1216A	10 RM 49	Structure is shown inside SFHA per DFIRM 5/4/2009
JAN212000	99-09-1082A	LOMR-F		Structure	Not Incorporated	X		283D	AE7	X	C_LOMR_99-09-1082A	25 RM 39	Portions of APN 143-340-35 fal within a SFHA per
APR042000	00-09-474C	CLOMR-F		Structure			X	284D	AE7	X	C_CLOMR_00-09-474C	00 RM 87	Structures are shown inside SFHA per DFIRM
MAY242000	00-09-635A	LOMA		Structure	Not Incorporated	X		277D	AO	X	C_LOMA_00-09-635A	13 RM 12	Structure is shown inside SFHA per DFIRM 5/4/2009
JUL182001	01-09-674P	LOMR		Property	Incorporated		X	277D 276D		X	C_LOMR_01-09-674P	RS25-097	Property is shown inside SFHA per DFIRM 5/4/2009
JAN182002	02-09-298A	LOMA		Structure	Not Incorporated	X		277D		X	C_LOMA_02-09-298A	21 RM 59	Property is shown inside SFHA per DFIRM 5/4/2009
MAR202002	02-09-455A	LOMA		Structure	Not Incorporated	X		277D		X	C_LOMA_02-09-455A.pdf		APN's shown outside SFHA per DFIRM 5/4/2009
JUN122002	02-09-724A	LOMA		Structure	Not Incorporated	X		301D	C	X	C_LOMA_02-09-724A	3 RM 84	Structure is shown outside SFHA per DFIRM 5/4/2009
JUN212002	02-09-994A	CLOMR-F		Property	Not Incorporated	X		277D	AE7	X	C_CLOMR_02-09-994A	18 RM 89	Property is shown inside SFHA per DFIRM 5/4/2009
NOV132002	02-09-1388A	LOMA-DEN		Structure			X	277D	AO 2		LOMC_LOMA_02-09-1388	12 RM 116	Structure is shown inside SFHA per DFIRM 5/4/2009
OCT152003	03-09-1598A	LOMA-DEN		Structure			X	283D	AO 2		LOMC_LOMA_03-09-1598	8 RM 41	Structure is shown inside SFHA per DFIRM 5/4/2009

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						YES	NO	DFIRM MAP PANEL	PRE LOMC ZONE	POST LOMC ZONE			
NOV232004	04-09-1765A	LOMR-F		Structure	Not Incorporated	X		283D		X	IC_LOMR_04-09-1765	2003 RM 179	Structure is shown outside SFHA per DFIRM 5/4/2009
DEC162004	04-09-1697A	LOMR-F-DEN		Structure			X	277D		AO 2	IC_LOMR_04-09-1697	22 PM 80	Structures are shown inside SFHA per DFIRM
JAN052005	05-09-0108A	LOMA		Structure	Not Incorporated	X		282D		X	IC_LOMA_05-09-0108	14 RM 60	Portion of structure is shown inside SFHA per
FEB112005	05-09-0339A	LOMA-DEN		Structure			X	279D		AO 1	IC_LOMA_05-09-0339	13 RM 27	Structure is shown inside SFHA per DFIRM 5/4/2009
JUN142005	05-09-1161A	LOMA			To be Redetermined		X	283D		X		2003 RM 180	Missing Letter, Properties are shown inside
AUG302005	05-09-1406A	LOMR-F		Property	Not Incorporated	X		281D	AE7	X	IC_LOMA_05-09-1406	2004 RM 339	Portions of property are shown inside
APR192006	05-09-A080P 04-09-1085R	LOMR-APP CLOMR		Property	Not Incorporated		X	283D		X	IC_LOMR_05-09-a080	2003 RM 180	Property is shown inside SFHA per DFIRM 5/4/2009
JUN122006	06-09-B997A	LOMA		Property	Not Incorporated	X		276D		X	IC_LOMA_05-09-B997	13 RM 49	See LOMC LOMR 09-09-2365P
JUN282006	06-09-BA59A	LOMA		Property	Not Incorporated	X		276D		X	IC_LOMA_06-09-BA59	13 RM 49	Property is shown inside SFHA per DFIRM 5/4/2009
JUN292006	06-09-BA68A	LOMR-F-OAS		Structure	Not Incorporated	X		277D		X	IC_LOMR_06-09-BA68	20 RM 42	Portions of the property are shown inside
JAN232007	07-09-0583A	LOMA		Structure	Not Incorporated	X		276D		X	IC_LOMA_07-09-0583	13 RM 27	Portions of the property are shown inside
FEB062007	07-09-0647A	LOMA		Structure	Not Incorporated	X		276D		X	IC_LOMA_07-09-0647	4 OS 82	Structure is shown outside SFHA per DFIRM 5/4/2009
MAR162007	05-09-A080P	LOMR		Property			X	279D			LOMC_LOMR_05-09-a080	15 RM 88	Not Revalidated
SEPT202007	07-09-1536A	LOMR-FW		Structure	Not Incorporated	X		283D		X	IC_LOMR_07-09-1536	13 RM 79	Portions of property are shown inside
APR012008	08-09-0691A	LOMA		Structure	Not Incorporated	X		277D	AE7	X	IC_LOMA_08-09-0691	8 RM 57	Structure is shown inside SFHA per DFIRM 5/4/2009

These LOMCs will longer be in effect when the FIRM becomes effective.

4. LOMCs To Be Redetermined
The LOMCs in Category 2 above will be revalidated through a single revalidation letter that reaffirms the validity of the determination in the previously issued LOMC. For LOMCs issued for multiple lots or structure where the determination for one or more of the lots or structures has changed, the LOMC cannot be revalidated through this administrative process. Therefore, we will review the data previously submitted for the LOMC requests listed above and issue a new determination for the affected properties after the effective date of the revised FIRM.

5. LOMCs Undetermined
The LOMC listed above are currently under review and placed under the appropriate determination category listed above prior to the effective date of the FIRM.

This Document is not an "Official" FEMA flood zone determination,
If you have any questions about a DFIRM Please call 1-877-336-2627 or visit the FEMA website at http://www.fema.gov
or http:/www.fema.gov/plan/prevent/fhm/st_main.shtm

REVALIDATED MAY_30_2009.pdf

Acronyms

Letter of Map Changes	LOMC
Letter of Map Amendment	LOMA
Letter of Map Revision	LOMR
Conditional Letter of Map Amendment	CLOMA
Conditional Letter of Map Revision	CLOMR
Flood Insurance Rate Map	FIRM
Digital Flood Insurance Rate Map	DFIRM
Based on Fill	LOMR-F
Federal Emergency Management Agency	FEMA
Special Flood Hazard Area	SFHA
Letter of Map Amendment (Out as Shown)	LOMA-OAS
Letter of Flood Map Revision (Floodway)	LOMR-FW
Letter of Map Revision (Continued)	LOMR-APP
Letter of Map Amendment (Non-Removal)	LOMA-DEN

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						YES	NO	DFIRM MAP PANEL	PRE LOMC ZONE	POST LOMC ZONE			
MAY032011	11-09-2363A	LOMA		Structure				276D			LOMC LOMA 11-09-2363	13 RM 49	Removal See also Record ID 24
MAY052011	11-09-2361A	LOMA		Property				276D			LOMC LOMA 11-09-2361	15 RM 21	Removal See also Record ID 60

The CRS Repetitive Loss Plan Volume 1 describes the program as providing all of the different activities that FEMA tracks and credits as part of normal City planning. One of the benefits listed in obtaining a rating in the CRS Program is that every Flood Insurance Policyholder in the City then receives a discount on a portion of their annual flood insurance policy premium. This discount is 5% for every Class rating that is achieved. The City Currently qualifies for a Class 7 rating which results in a 15% discount. The City has over 1,300 flood insurance policies in affect and its citizens realize a savings of approximately $80.000 in flood insurance premiums.

The City has adopted Repetitive Loss Ordinances and describes the City's Repetitive Loss Plans purpose to obtain public input/consensus by following a proper planning process to develop a plan that determines what is best/feasible for the community in addressing the issue of local repetitive loss properties. The Plan's progress is reviewed annually by City and staff and reported to FEMA. The Plan may be updated as often as desired by the local community, however the CRS Program requires mandatory Repetitive Loss Plan updates at least once every five years.

The CRS Plan is sent for review to the following agencies:

- FEMA Regional CRS Coordinator
- California State National Flood Insurance Program NFIP Coordinator
- Insurance Services Office
- Marin County Flood Control and Water Conservation District
- City of Petaluma

The Community Rating System Volume 2

- This Volume of the CRS Program contains documentation to support the various floodplain management activities. It is a request for verification of these activities from the ISO/CRS Specialist to qualify the city of Novato to be classified as a CRS Class 7 or possibly a Class 6.

The Community Rating System Volume 3

- This Volume contains confirmation of the following flood mitigation, public information and flood planning activities.
- Elevation certificates completed since the last five-year recertification. The City maintains a computer format of the elevation certificates on the City website. The most recent elevation certificate on file was from 2003.
- A letter sent to insurance agents, real estate agents, mortgage lenders and banks.

The Community Rating System Volume 4, 2005 Cycle Verification:

- This Volume contains a summary of outreach projects which includes CRS notices in Novato's Activity Guide which is mailed to all Novato residences.
- The Volume documents compliance with California Code 1102 on property resale reports on whether the property is in a Special Flood Hazard Area (SFHA).
- The City has provided references to the Marin County Free Library of catalogued resources pertaining to flooding. The City has significantly updated the City's current website with regard to flood information. This includes linking Elevation certificate data to the website.
- The volume confirms the City is regularly updating GIS based aerial photograph and base mapping including topographic mapping, zoning, water features and open space.
- The volume contains a map showing the overlap of both open space and natural and beneficial areas with the floodplain. This shows a total of 5,022 acres in the floodplain, the City now maintains 3,532 acres of open space including 62.5 acres of natural and beneficial acres.
- The Volume contains a copy of the City's latest floodplain ordinance. The map for the open space also shows the intersection of low density zoning and the floodplain. This shows 387.5 acres of low density zoning in the 5022 acres of floodplain.
- The Volume demonstrates the GIS layers for flood mapping coordination as well as how the GIS is updated and used. The Elevation reference marks are maintained in the City as benchmarks, and full alphabetical listing of the benchmarks is included in the volume.
- The volume contains the completed Storm water Master Plan Questionnaire, along with its supporting documents. And includes the appropriate Ordinances.
- The Volume also contains a copy of the City's Repetitive Loss Plan as revised and adopted in 2000 including a map showing the repetitive Loss Properties.
- The Volume contains a flood warning program questionnaire.
- The volume contains documentation of the Hamilton Army Base conversion project, levees. The developments were subsequently removed from the
- Regulating floodplain by FEMA. The levee supporting documentation is provided.
- The volume contains the Notice to Residents Regarding the Special Flood Hazard Area, (SFHA) and the SFHA mailing list.

3.5.5.b Repetitive Loss

City of Novato Resolution Number 139-00 officially adopted the City of Novato Repetitive Loss Plan on December 12, 2000. The Repetitive Loss Plan qualifies the City of Novato (through the Federal Community Rating System (CRS) for a Class 7 rating. This results in a 15% base flood insurance premium reduction for flood insurance policyholders of record within the City. The City currently has accumulated 1,716 CRS credit points, verified by Insurance Services Office, Inc., FEMA's independent appraiser. These credit points were awarded to the City for performing the following FEMA-designated activities:

- Elevation Certificates
- Map Information
- Outreach Projects
- Hazard Disclosure
- Flood Protection Library
- Additional Flood Data
- Open Space Preservation
- Higher Regulatory Standards
- Flood Data Maintenance
- Storm Water Management
- Floodplain Management Planning
- Drainage System Maintenance
- Dam Safety

Updates to the City of Novato Repetitive Loss Plan

The City of Novato has performed specific actions to update and add to comprehensive CRS Program Repetitive Loss Plan. This Plan was last updated on December 14, 2000 with Resolution No. 139-00. The Repetitive Loss Plan has been reviewed annually by the Public Works Department. In 2007, 2008 and 2010 further steps were taken to update the Plan in accordance with the Repetitive Loss Plan Goals of:

- Reduce Flood damage to existing buildings by helping property owners and/or residents to protect themselves and their property from (a.) The infrequent but severe general flooding resulting from major storm events that generate storm water runoff that exceeds the capacity of the creek system, (b.) local drainage system flood events, and (c.) Sewer back-up problems that can occur during local flood events.

- Ensure that residents are given adequate warning of floods. .A repetitive loss plan was completed and published on September 13, 2010. This plan is included below.

PROGRESS REPORT ON THE FLOODPLAIN MANAGEMENT COMPONENTS OF THE CITY OF NOVATO REPETITIVE LOSS PLAN

City of Novato
Public Works Department
75 Rowland Way #200
Novato, CA 94945

September 13, 2010

City of Novato

RLP Progress Report
September 13, 2010

BACKGROUND

This progress report was prepared and is submitted for continued credit under the National Flood Insurance Program's (NFIP) Community Rating System (CRS). The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. It is designed to provide an annual update and report on accomplishments toward continual implementation of the City of Novato's floodplain management activities. The City's floodplain management plan is the Repetitive Loss Plan (RLP). This Plan, originally prepared in 1995, was updated and adopted by the Novato City Council on December 12, 2000 by Resolution 139-00. The RPL can be found at http://ci.novato.ca.us/Index.aspx?page=458 and is available for review at the Public Works Department located at 75 Rowland Way #200, Novato, CA 94945. The City is currently in the process of preparing an update of the RLP which is expected to be incorporated into the Flood Hazard Mitigation Plan (FHMP) which is a document that is much broader in scope and purpose.

The City of Novato has consistently managed the floodplain above and beyond the minimum standards of the NFIP. In 2010 the City's efforts were recognized by FEMA with a Class 6 rating which provides for automatic discounts of up to 20% being made to flood insurance policy holders. There are nearly 1500 flood insurance policy holders in Novato, and this discount amounts to a total savings of about $220,000 for the community. See also: *http://www.fema.gov/nfip/*. Excluding the normal business of managing floodplains and drainage systems, the City estimates an annual expenditure of $20,000 on administration of the CRS program, including periodic mailers and staff. This expenditure yields a significant measurable return to our residents.

Floodplain management activities described in the RLP are also addressed in Section 5 of the Multi-Jurisdictional All-Hazard Mitigation Plan (Plan) for the City of Novato and the Novato Sanitary District. This Plan was adopted by the Novato City Council on July 10, 2007 by Resolution 92-07, and is posted on-line http://www.ci.novato.ca.us/. Additionally, the City is preparing the FHMP that identifies flood prone areas, drainage projects, and various mitigation strategies.

PROGRESS ON RECOMMENDATIONS FROM SECTION VIII OF THE REPETITIVE LOSS P PLAN

The recommendations and corresponding progress reports that follow are organized according to Section VIII of the RLP.

A. Continue Existing Plan Activities: The City will continue to provide residents located within designated floodplain areas with annual notices. This notice is

published in our Vision Magazine yearly and when possible distributed as a flyer. The notice provides information regarding protective measures to minimize flood damage to their property. The City continues to provide sand, sandbags and sand bagging procedures to residents to flood proof or impede flood waters from entering their properties as part of the routine storm and flood operations.

B. Emergency Services: City staff regularly meets with local emergency service authorities and implement storm and flood prevention and maintenance operations for the coming rain season (See Attachment D). The City continues to implement the current flood-warning program via Radio AM 530 and Storm Patrol operations, which is part of the Emergency Response Plan that meets the State's Standard Emergency Management System (SEMS) requirements. The Public Notice provides information on available flood-emergency services.

The City of Novato has hired an Emergency Services Manager who is actively participating in flood plain management activities such as flood warning, flood response, critical facilities protection, and health and safety maintenance. Other emergency preparedness programs include the Get Ready Marin Household Emergency Disaster Preparedness Program, described on-line at http://ci.novato.ca.us/Index.aspx?page=729.

C. Property Protection: As of August 2009, the City has 37 repetitive loss properties and they are concentrated in three geographic areas. The process of auditing repetitive loss properties continues by staff. All properties located in the three repetitive loss areas continue to receive information on flood preparedness and how to reduce flood losses.

D. Property Protection: The City has continued to acquire current FEMA forms and literature and has made this information available to the public in all our City Facilities and we have updated FEMA documents at the Novato Library. We have also completed the addition of our drainage facilities to our GIS AutoCAD files. This includes drainage structures, pipes outfalls and other drainage facilities for both City and the County of Marin. This resource provides instant information about public and private drainage systems for quick reference and problem solving.

E. Public Information: The City has current FEMA literature and makes this information available to the public. Our FIRM maps have been available on stand-alone PC GIS application for several years. We have implemented a Web based GIS application available to all City Staff and public via our Intranet. The application includes the current FIRM maps including all LOMA's and LOMAR's. Property can be queried through any number of ways to

determine if it is within a Special Flood Hazard Area. In addition, we ensure that the public is aware of FEMA's mapping information platform and map viewer webpages.

The City's goal will be provide this GIS application to the general public via the Internet. It is currently undergoing Beta testing. The site contains certain information not permitted to post publically on the Internet. The authority stems from California Government Code Sections 6254.21 and subsequently 6254.24. Effective January 1, 1999, Senate Bill No. 1386, in part, amended the Public Records Act, and Government Code Section 6254.21,relating to the posting of certain information on the internet.

We anticipate much of this information will be available to the public in the future via the Web however, it will be necessary to "disable" some of its current functionality in order to comply with the above.

F. Structural Projects: The City has a capital improvement program that progressively addresses flooding in all areas of Novato. Recently completed projects include the Cherry Street Drainage Project (at Highway 101) and the Diablo Avenue Drainage Improvements (near Warner Creek and Center Boulevard). The Rush Creek drainage proejct (Sweetser Ave. to Olive Ave. along the railroad right-of-way) is currently in the design phase with construction anticipated for 2010-2011 pending final funding. The Rush Creek drainage improvements will reduce flooding in the downtown on lower Grant Ave, Reichart, Sweetser and Vallejo.

Flooding along Vineyard Creek near Center Road was studied by both the Marin County Flood Control District and the City of Novato. In collaboration with the District, two projects to increase channel capacity and reduce flood levels were recently completed for Vineyard Creek.

OBJECTIVES FOR FUTURE CONSIDERATION

C. Property Protection: Staff has attended two FEMA training programs including: "Managing Floodplain Development Through the National Flood Insurance Program" (FEMA E-273); and "Floodplain Management and Duties of the Local Administrator" (FEMA/DWR course).

D. Public Information: Implementation of a Public Service Announcement System for the availability of FEMA literature has not been completed, although the City website is in the process of being redesigned, and this will provide increased opportunity for public outreach.

E. Structural Projects: The City will continue working with the County for funding (used in conjunction with Local funding) to complete the capital improvement project to reduce flooding at critical locations.

NEW PROJECTS OR RECOMMENDATIONS

It is anticipated the RPL update currently being prepared will include some revised recommendations and recommendations for new projects. Recent flooding events including the December 31, 2005 have lead to the increased awareness and importance of funding for flood control projects. Conceptual structural projects have been identified as a result of this flood event, with some having been completed (see Item F. Structural Projects, above).

Since the original RLP was prepared in November 200, the number of repetitive loss properties in the City of Novato has increased from 22 to 37. Future updates and progress reports will evaluate contributing factors for this increase and will develop mitigation measures intended to reverse this trend.

CONTACT INFORMATION

For more information, contact:

City of Novato
Public Works Department
75 Rowland Way #200
Novato, CA 94945.

Engineering Division — Phone: (415) 899-8246
David Harlan — Phone: (415) 899-8948

The City of Novato has completed a Flood Hazard Mitigation Plan which includes the components for updating the CRS Repetitive Loss Plan. The areas of that Plan are referred to by action and page number in the following:

Table 3-7 Flood Reduction Loss Activity

Flood Reduction Competitive Loss Activity	Page Location
Special Flood Hazard Area Notice to all residents	Page 4
Part 2, Public Outreach Documentation	Page 8 to 22
Flood Hazard Warning Instructions on Novato Emergency Radio Station 530 A.M.	Page 5
City of Novato Flood Damage Prevention Ordinance Dec. 2000	Page 92
Flood Hazard identification and flood hazard reduction activities SF 3 through SF 11	Page 106 to 108
Countywide Watershed Stewardship Plan with specific project identification	Page 109 and Pages 130-140
City of Novato Capital Improvements Projects to reduce flood hazards	Page 141 to 146
Flood reduction funded Projects	Page 146 to 180
City of Novato Ongoing Flood improvement Projects	Page 195 to 196
Future Flood Mitigation Projects Page	Page 201 to 205
Official Notice for Vulnerable Properties	Page 57
List of City of Novato Repetitive Loss Properties as of 6/2007 with map	Page 58-60
List of City Novato Flood Insured Properties	Page 68
Documentation of Elevated Homes	Page 71-74
CRS Program and Rating System Five Year Cycle Visit documentation	Page 77-84
Nation Flood Insurance Program Update for the City of Novato matrix, (located in the Flood Mitigation Plan).	Page 85-88

Figure 3-26

Official Notice for Vulnerable Properties

This is an
OFFICIAL NOTICE
from the
CITY OF NOVATO
affecting your neighborhood.

9494783911 C003

CITY OF NOVATO

This notice is being sent to you because your property is in or near the Special Flood Hazard Area. This area is the portion of Novato determined to have a high risk of flooding, placing you and your property at risk. Please take a few minutes to review the following information. If you have any questions about the information in this letter, please contact the City of Novato Public Works Department at (415) 899-8246 or 75 Rowland Way #200. More information can also be found at **www.ci.novato.ca.us/pw.**

Flooding in Novato

Heavy rains occasionally cause flooding 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 the Bahia area. Your property is in one of these high risk locations, placing you in danger of damage as well.

Flood Insurance

Homeowner's insurance policies do not cover flood damage. To protect your home and possessions from flooding, you must purchase flood insurance. Fortunately, the City of Novato's work to protect the city from flood losses reduces by 10% the cost of your flood insurance policies from the National Flood Insurance Program. If you do not already have flood insurance, talk to your insurance agent.

Before a Flood

- Rake up and bag leaves as often as possible before storms. Leaves clogging storm drains are the primary source of most flooding in Novato.
- Do not throw anything into drainage ditches or streams; not only is it a violation of City Code, but blocked drainage ways cannot carry water.
- Clean drains around your home, in including roof gutters, down spouts, drain inlets, pipes, drainage ditches and driveway culverts.
- Always check with the Community Development Department, Building Division (899-8989) and the Engineering Division before doing any work on your property. Permits may be required to ensure that your work does not cause unintended problems.

During a Flood

- Tune in to the Novato emergency radio station, 530 AM.
- Report any local flooding or severe runoff to the Maintenance Division (415-899-8280) or Police Department (415-897-4361)
- Do not walk or drive through flooded areas.
- Be careful of downed power lines and displaced animals in the water, especially rattlesnakes & rats.
- During and after, watch your step for open manhole covers and debris underfoot, like broken glass or cracked sidewalks.

Please visit www.ci.novato.ca.us/pw to get more detailed information about the flooding danger to your property. For more information, you can also find resources at the Marin County Free Library, the Novato Police Department, and the City of Novato Public Works Department.

The Federal Emergency Management Agency (FEMA) insures properties against flooding losses in the Bay Area through the National Flood Insurance Program. Those properties that have had more than one insured flood loss are called repetitive loss properties and are summarized in the table below. A listing of historical insurance claims on Novato properties is available in the Flood Hazard Mitigation Plan, pages 89 to 97. The list includes: date of loss, address of property, flood insurance policy number and total paid.

Table 3-8 City of Novato Repetitive Loss Properties as of 6/2007

Mit?	Ins?	Occupancy	Zone	Firm	Building Value	Tot Building Payment	Tot Contents Payment	# of Losses	Total Paid
NO	YES	SINGLE FMLY	AE	N	104,544	94,763.36	5,000.00	3	99,763.36
NO	YES	SINGLE FMLY	AO	N	56,900	9,373.77	4,374.50	2	13,748.27
NO	YES	SINGLE FMLY	B	N	50,400	2,577.83	17,537.96	3	20,115.79
NO	NO	SINGLE FMLY	AE	N	111,239	41,252.23	1,603.75	4	42,855.98
NO	YES	SINGLE FMLY	AO	N	62,000	7,790.79	0.00	2	7,790.79
NO	YES	SINGLE FMLY	AE	N	200,000	54,193.55	5,926.57	4	60,120.12
NO	NO	SINGLE FMLY	B	N	76,500	11,808.07	892.44	3	12,700.51
NO	YES	SINGLE FMLY	AO	N	55,700	20,802.47	0.00	2	20,802.47
NO	SDF	SINGLE FMLY	B	N	122,113	42,274.69	12,637.68	4	54,912.37
NO	YES	SINGLE FMLY	A01	N	90,300	22,971.63	7,290.95	2	30,262.58
NO	YES	SINGLE FMLY	AOB	Y	160,352	25,716.40	16,600.61	3	42,317.01
NO	NO	SINGLE FMLY	AO	N	52,500	14,414.16	0.00	2	14,414.16
NO	SDF	SINGLE FMLY	AE	N	117,451	24,556.97	2,414.87	4	26,971.84
NO	NO	SINGLE FMLY	A05	N	65,000	28,109.41	795.00	2	28,904.41
NO	NO	SINGLE FMLY	AO	N	64,700	13,613.86	2,000.00	2	15,613.86
NO	YES	SINGLE FMLY	AOB	N	83,510	23,485.56	6,887.00	3	30,372.56
NO	NO	SINGLE FMLY	AO	N	590,000	34,005.53	0.00	2	34,005.53
NO	YES	SINGLE FMLY	AO	N	70,000	28,899.11	14,373.04	3	43,272.15
NO	YES	SINGLE FMLY	AO	N	90,000	11,094.24	1,897.00	2	12,991.24
NO	YES	SINGLE FMLY	X	N	375,000	27,616.59	7,348.79	3	34,965.38

Mit?	Ins?	Occupancy	Zone	Firm	Building Value	Tot Building Payment	Tot Contents Payment	# of Losses	Total Paid
NO	NO	SINGLE FMLY	AO	N	57,300	13,074.91	2,149.24	2	15,224.15
NO	NO	SINGLE FMLY	B	N	6,142,500	20,934.15	10,357.50	2	31,291.65
NO	YES	SINGLE FMLY	AE	N	116,887	28,161.75	4,043.25	3	32,205.00
NO	NO	SINGLE FMLY	AO	N	60,000	11,516.82	5,749.00	2	17,265.82
NO	NO	ASSMD CONDO	C	N	0	6,333.07	6,647.24	2	12,980.31
NO	YES	SINGLE FMLY	AE	N	136,980	80,445.48	13,562.89	3	94,008.37
NO	YES	NON RESIDNT	AO	N	461,440	47,661.98	0.00	3	47,661.98
NO	NO	SINGLE FMLY	X	Y	250,000	37,815.72	3,770.00	3	41,585.72
NO	NO	SINGLE FMLY	A	N	135,000	29,096.88	16,800.00	2	45,896.88
NO	YES	SINGLE FMLY	B	N	130,746	16,425.17	567.61	3	16,992.78
NO	NO	SINGLE FMLY	AE	N	222,610	16,151.71	0.00	3	16,151.71
NO	YES	SINGLE FMLY	AOB	N	104,425	21,478.66	272.12	2	21,750.78
NO	YES	SINGLE FMLY	AE	N	93,080	17,822.71	0.00	2	17,822.71
NO	YES	SINGLE FMLY	AE	N	217,755	77,361.31	0.00	2	77,361.31

(FEMA NFIP Repetitive Loss Update Worksheets (AW-501) are on file)

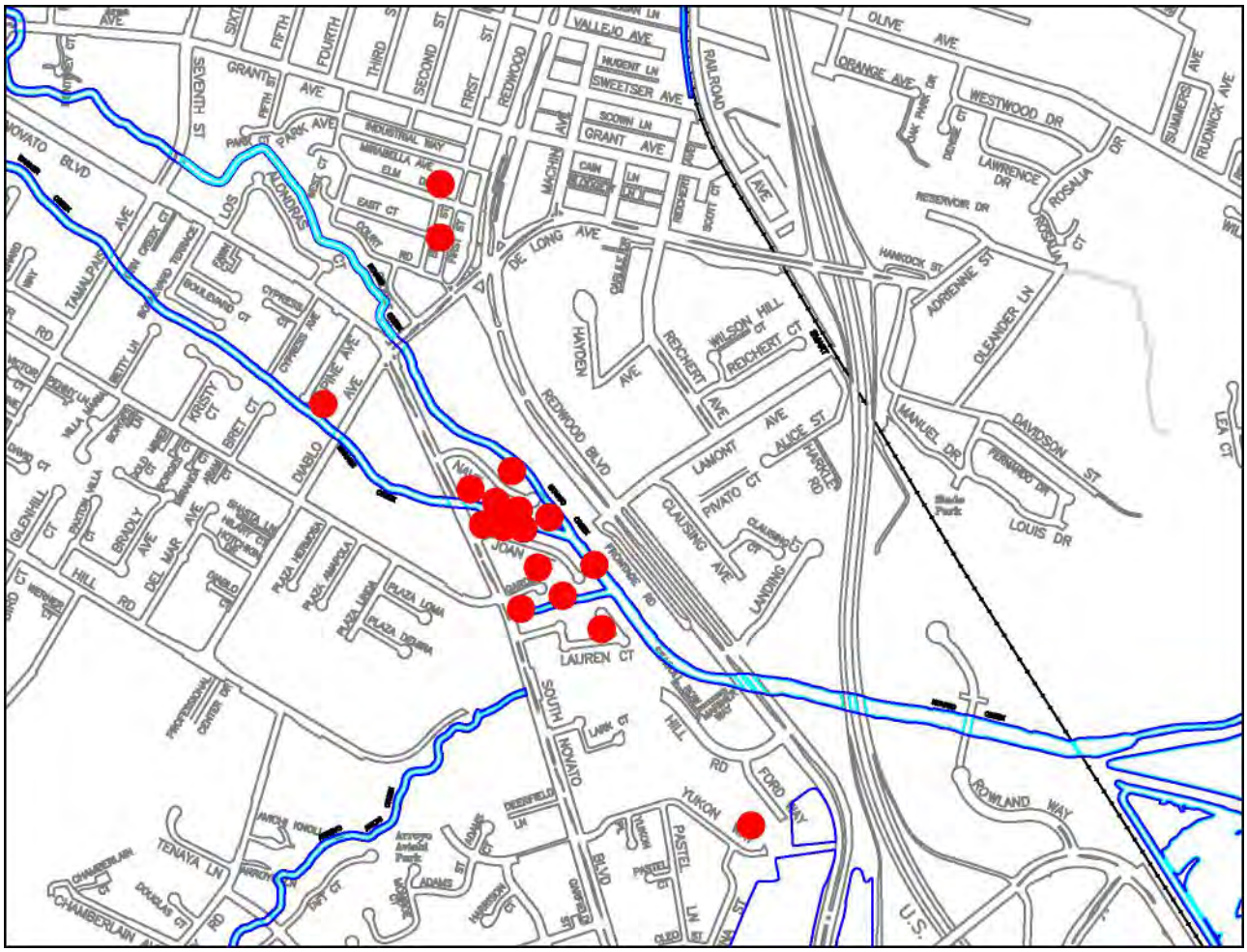


Figure 3-27
CRS Repetitive Loss Sites

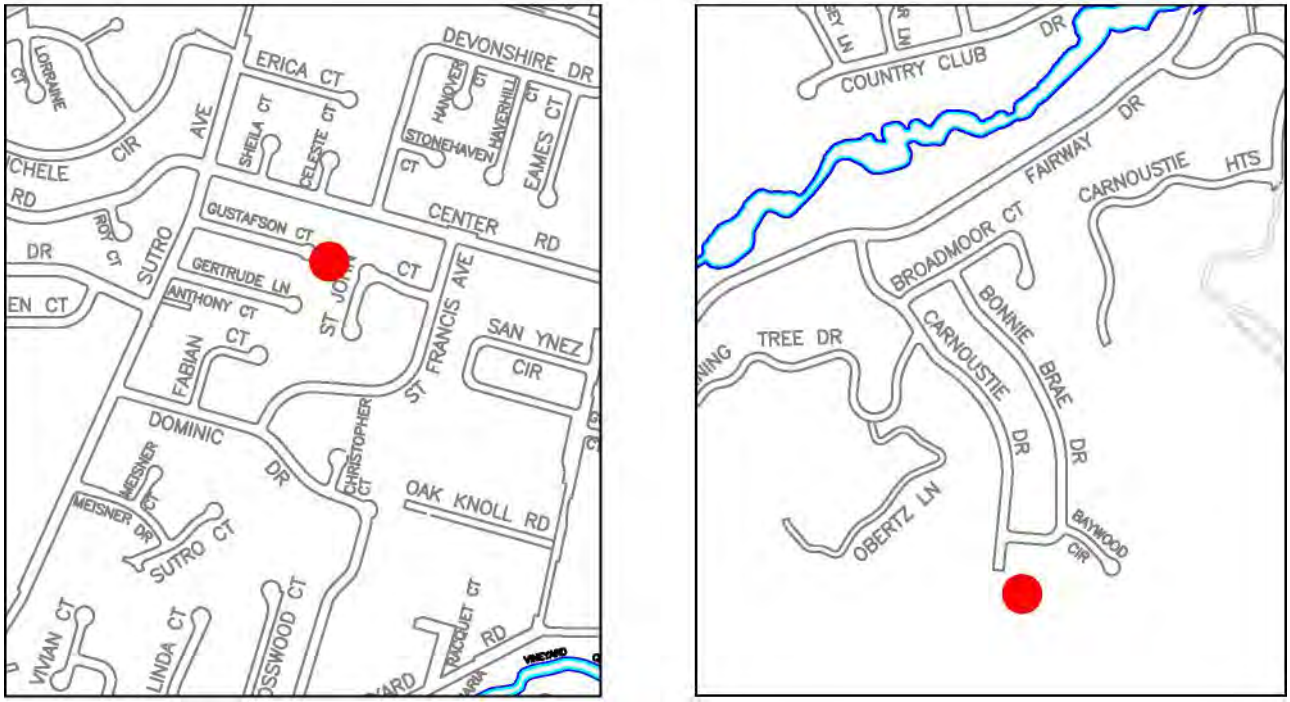


Figure 3-28
Repetitive Loss Sites Detail

3.5.6 Impact and Loss Estimates

Estimating losses of future floods is difficult; however future floods will impact the Novato Community, and can cause millions in damages and disrupting normal activities. The tables below identify paid flood claims within Novato since the City joined the NFIP.

	Total	100-year Flood Plan	500-year Flood Plan of Other Concern
Residential and Mixed Properties:			
Number of properties	14,424	1,652	1,006
Estimated market value ($ Million)	$6,148	$609	$365
Commercial and Recreational Properties:			
Number of properties	843	144	257
Estimated market value ($ Million)	$,1012	$225	$196
Industrial and Other Properties:			
Number of properties	1,416	329	230
Estimated market value ($Million)	$649	$95	$117
Grand Total:			
Number of properties	16,683	2125	1,493
Estimated market value($ Million)	$7,810	$930	$678

Source: Association of Bay Area Governments, 2006

3.5.6.a National Flood Insurance Program (NFIP) Data for Novato

The Federal Insurance and Mitigation Administration (FIMA) within FEMA is responsible for administering the National Flood Insurance Program (NFIP) and administering programs that provide assistance for mitigating future damages from natural hazards. Those properties within Novato that have had more than one insured flood loss are called repetitive loss properties and are summarized in the tables that follow; source: Association of Bay Area Governments, 2004.

	Total	100-year Flood Plain	500- year Flood Plain or Other Concern	Outside Flood Plain
Number of properties	32	30	0	2
Number of claims	78	73	0	5
Total claims	$873,344	$818,778	$0	$54,566

Figure 3-30 NFIP Data

Community Overview

Community:	NOVATO, CITY OF	**State:**	CALIFORNIA
County:	MARIN COUNTY	**CID:**	060178

Program:	Regular	**Emergency Entry:**	02/26/1971	**Regular Entry:**	01/19/1978
Status:	PARTICIPATING			**Status Effective:**	01/19/1978
Current Map:	09/29/1989	**Study Underway:**	YES	**Level of Regs:**	
FIRM Status:	REVISED			**Initial FIRM:**	01/19/1978
FHBM Status:	SUPERCEDED BY FIRM			**Initial FHBM:**	06/28/1974

Probation Status:
Probation Effective: **Probation Ended:**
Suspension Effective: **Reinstated Effective:**
Withdrawal Effective: **Reinstated Effective:**

CRS Class / Discount:	08 / 10%	**Policies in Force:**	1,473
Effective Date:	05/01/2007	**Insurance in Force:**	$283,550,500.00
CAV Date:	01/18/2001	**No. of Paid Losses:**	307
CAC Date:		**Total Losses Paid:**	$3,136,830.50
Upton Jones Claims	**HMGP Projects**	**Sub. Damage Claims Since 1978:**	12
ICC Claims	**FMA Projects**		

Donnelly Study

Community:	NOVATO, CITY OF	**State:**	CALIFORNIA
County:	MARIN COUNTY	**CID:**	060178

Total

Area(Sq. miles):	26.02	**Value of Prop. at Risk 1980:**	$269,646,514.00
Population 1980:	43,916	**Value of Prop. at Risk 1987:**	$289,444,906.00
Households 1980:	15,493	**Value of Prop. at Risk 2002:**	$336,902,304.00
Households 1987:	16,628		
Annual % Change Houlseholds(1980-1987):			1.01
Average value of composite property at risk (SCOR) 1987-2002:			$312,613,404.00

Floodplain

Area(Sq. miles):	8.218	**Rank:**	264
Households 1980:	2,501	**State Rank by Risk Change:**	95
Households 1987:	2,685	**Rank by Risk Change:**	526
Households 2002:	3,125	**Regional Rank by Risk Change:**	116
		Change in Value of Prop. at Risk:	$47,457,398.00
Total Cost Study:	$0.00		
Comm. Share:	0	**Regional Rank by SCOR:**	64
Last Study:	0	**State Rank by SCOR:**	53

Insurance Overview

As of 04/30/2007

Community:	NOVATO, CITY OF	**State:**	CALIFORNIA
County:	MARIN COUNTY	**CID:**	060178

Overview | Occupancy | Zone | Pre/Post FIRM

Total by Community		Group Flood Insurance	
Total Number of Policies:	1,473	Total Number of Policies:	0
Total Premiums:	$864,636	Total Premiums:	$0
Insurance in Force:	$283,550,500	Insurance in Force:	$0
Total Number of Closed Paid Losses:	307	Total Number of Closed Paid Losses:	1
$ of Closed Paid Losses:	$3,136,831	$ of Closed Paid Losses:	$2,565
Post Firm Minus Rated Policies		**Manufactured Homes**	
Total Number of Minus Rated Policies:	37	Total Number of Policies:	5
A Zone Minus Rated Policies:	37	Total Number of Closed Paid Losses:	0
V Zone Minus Rated Policies:	0	$ of Closed Paid Losses:	$0
ICC		**1316**	
Total Number of ICC Closed Paid Losses:	0	Number of Properties by Community:	0
$ of ICC CLosed Paid Losses:	$0		

Substantial Damage Losses

Number of Substantial Damage Closed Paid Losses: 12

Insurance Occupancy

As of 04/30/2007

Community:	NOVATO, CITY OF	**State:**	CALIFORNIA
County:	MARIN COUNTY	**CID:**	060178

Overview | Occupancy | Zone | Pre/Post FIRM

	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
Single Family	903	$636,788	$208,379,300	274	$2,596,330.06	$120,444.77
2-4 Family	75	$26,816	$13,445,100	6	$41,704.59	$2,000.00
All Other Residential	435	$113,452	$41,553,600	8	$115,282.42	$3,420.00
Non Residential	60	$87,580	$20,172,500	19	$383,513.43	$13,208.47
Total	1,473	$864,636	$283,550,500	307	$3,136,829.00	$139,072.00

	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
Condo	483	$97,431	$47,195,500	4	$33,698.78	$1,420.00
Non Condo	990	$767,205	$236,355,000	303	$3,103,131.72	$137,653.24
Total	1,473	$864,636	$283,550,500	307	$3,136,829.00	$139,073.00

Insurance Zone

As of 04/30/2007

Community:	NOVATO, CITY OF	**State:**	CALIFORNIA
County:	MARIN COUNTY	**CID:**	060178

Overview | Occupancy | Zone | Pre/Post FIRM

	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
A01-30 & AE Zones	421	$293,276	$78,793,500	54	$626,656.18	$33,760.34
A Zones	40	$47,471	$9,412,100	13	$72,117.53	$4,695.00
AO Zones	744	$392,683	$130,270,700	138	$1,220,846.54	$52,158.47
AH Zones	3	$2,610	$555,200	0	$0.00	$0.00
AR Zones	0	$0	$0	0	$0.00	$0.00
A99 Zones	0	$0	$0	0	$0.00	$0.00
V01-30 & VE Zones	1	$2,501	$242,000	0	$0.00	$0.00
V Zones	0	$0	$0	0	$0.00	$0.00
D Zones	0	$0	$0	3	$15,244.11	$680.00
B, C & X Zone						
Standard	147	$89,174	$28,181,000	90	$1,056,538.45	$41,645.00
Preferred	117	$36,921	$36,096,000	8	$142,862.54	$6,009.43
Total	1,473	$864,636	$283,550,500	306	$3,134,263.00	$138,947.00

Insurance Pre/Post FIRM

As of 04/30/2007

Community:	NOVATO, CITY OF	**State:**	CALIFORNIA
County:	MARIN COUNTY	**CID:**	060178

Overview | Occupancy | Zone | Pre/Post FIRM

Pre-FIRM

	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
A01-30 & AE Zones	268	$260,746	$62,042,600	54	$626,656.18	$33,760.34
A Zones	39	$39,476	$8,912,100	13	$72,117.53	$4,695.00
AO Zones	546	$324,760	$94,061,200	136	$1,162,967.95	$50,668.47
AH Zones	3	$2,610	$555,200	0	$0.00	$0.00
AR Zones	0	$0	$0	0	$0.00	$0.00
A99 Zones	0	$0	$0	0	$0.00	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00	$0.00
V Zones	0	$0	$0	0	$0.00	$0.00
D Zones	0	$0	$0	3	$15,244.11	$680.00
B, C & X Zone	214	$95,553	$48,248,000	94	$1,151,975.44	$45,229.43
Standard	127	$67,862	$21,925,000	87	$1,014,116.25	$39,645.00
Preferred	87	$27,691	$26,323,000	7	$137,859.19	$5,584.43
Grand Total	1,070	$723,145	$213,819,100	300	$3,028,959.00	$135,032.00

Post-FIRM

	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
A01-30 & AE Zones	153	$32,530	$16,750,900	0	$0.00	$0.00
A Zones	1	$7,995	$500,000	0	$0.00	$0.00
AO Zones	197	$66,506	$36,155,400	2	$57,878.59	$1,490.00
AH Zones	0	$0	$0	0	$0.00	$0.00
AR Zones	0	$0	$0	0	$0.00	$0.00
A99 Zones	0	$0	$0	0	$0.00	$0.00
V01-30 & VE Zones	1	$2,501	$242,000	0	$0.00	$0.00
V Zones	0	$0	$0	0	$0.00	$0.00
D Zones	0	$0	$0	0	$0.00	$0.00
B, C & X Zone	50	$30,542	$16,029,000	4	$47,425.55	$2,425.00
Standard	20	$21,312	$6,256,000	3	$42,422.20	$2,000.00
Preferred	30	$9,230	$9,773,000	1	$5,003.35	$425.00
Grand Total	402	$140,074	$69,677,300	6	$105,303.00	$3,915.00

Wilmac Avenue – McKeon Court Flood Study

(Map available with study documents. Too large for this document.)

Wilmac Avenue - McKeon Court Flood Study

For

Marin County Flood Control and Water Conservation District

April 12, 2006

White & Prescott
Engineering and Surveying
1620 Grant Avenue
Novato, CA 94945

1

Wilmac-Avenue - McKeon Court, Novato
Flood Study

Area Studied

The area of this study was originally Vineyard Creek and nearby drainage bounded by Center Road, Wilson Avenue, Novato Boulevard and McClay Road. A major portion of the creek within this area runs between Wilmac Avenue and McKeon Court. After the study began, the homes at the northerly end of Arbor Circle were added to the study area.

See accompanying map which shows creeks, streets, homes , addresses, surveyed grades and elevations. This map also shows high water elevations at various locations during the peak of the December 31, 2005 flood.

Purposes of Study

1. Identify the probable causes of the flooding which occurred December 31, 2005 in and near homes on Wilmac Avenue and McKeon Court, Novato.

2. Recommend work and construction for the short-term alleviation or reduction of this flooding.

3. Make recommendations for long-term permanent solutions to alleviate this flooding if these solutions become apparent during the course of our work.

Work Performed

In accordance with an agreement with the Marin County Flood Control and Water Conservation District, we provided the following items of work.

1. Met with County personnel shortly after the storm and reviewed the impacts of the flooding.

2. Acquired maps from the City of Novato for our use in this study. These maps included: a) topographic maps with drainage features shown, b) orthophoto maps, and c) computer generated maps which show topography, property lines, addresses and street numbers.

3. Surveyed storm drainage elevations, street grades, wall grades, finished floor elevations, garage elevations, and other features. Added survey information to map.

4. Reviewed City of Novato Local Drainage Master Plan. Reviewed Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM).

5. Interviewed neighborhood residents, County personnel, and City personnel to acquire information concerning the recent flooding and past flooding.

6. Analyzed flooding based on maps, surveys and interviews.

This resultant study is divided into two parts. The first part consists of a flooding analysis and recommendations for work and improvements within entire area studied. The second part consists of flooding analyses and recommendations for work and improvements for local drainage sub-areas.

In general, costs and priority of work were not considered when making our recommendations. Costs will be considered and priorities of work will be assigned by the jurisdictions responsible for such work.

Entire Study Area

Flooding Analysis (Flood of December 31, 2005)

1. Vineyard Creek was too congested and possibly not wide enough to carry the high flows which resulted from this storm. The floodway was narrow with shrubs and vines on the banks. Trees with multiple trunks and low branches also obstructed the floodway. The entrance to the concrete box culvert at Center Road was partially blocked with silt and shrubs. We estimate that this blockage reduced the capacity of the culvert by approximately fifteen percent.

2. Movement and deposits of gravel and sediment from upstream created less flow capacity in the creek and possibly flatter slopes in the creek flow line.

3. The concrete box culvert at Center Road may not be adequate to accommodate high flows.

4. The concrete encased sewer lines which cross the creek near the McKeon Court cul de sac act as weirs. These sewer lines prevent the creek from seeking a more efficient, natural slope. The creek flowline drops approximately one foot immediately below the downstream sewer line crossing, thus indicating that the flood water surface would most likely be lower if not for the weir effect of the two concrete encased sewer crossings.

5. When flood levels rise above the banks in Vineyard Creek adjacent to Wilmac Avenue, the concrete wall along the westerly side of Wilmac Avenue parallel to the creek prevents flood water from spilling onto Wilmac Avenue, but also causes flood water to rise to elevations whereby adjacent homes and properties on McKeon Court are flooded. Originally there was a wood wall at this location which was placed sometime after the Wilmac Avenue Subdivision was constructed. The wood wall was replaced with a rock-faced concrete wall in 1996. We surveyed the top of this wall at the projections of the side property lines on McKeon Court. We compared the surveyed top of wall to the design grades for this wall shown on the County Improvement Plans for the wall replacement. We found that the wall as built is higher than the design grades by one and one-half inches to three inches. In order to determine adverse impacts, if any, due to the increase in height of the wall, we recommend that a hydrology/hydraulic study be made to analyze its effect on the flooding issue. The relationship of the top of this existing wall to the grades and elevations on adjacent properties on McKeon Court is given in the following Table A.

Table A

McKeon Court Address	Top of Wall at Center of Lot	Average Ground at Rear Fence	Approximate Ground at Back Yard	House Finished Floor	Garage Elevation at Entrance
10	45.80	44.05	44.40	46.13	44.19
20	45.10	43.35	43.80	45.52	43.97
30	44.65	43.05	43.20	44.57	43.16
40	44.35	42.80	43.00	44.44	42.97
50	44.15	42.75	43.00	44.11	42.64
60	43.95	42.35	42.50	43.87	42.57
70	43.65	42.00	42.50	43.72	42.30
80	43.25	41.85	41.90	43.52	41.95
90	42.90	41.40	42.00	43.50	41.95

Recommended Short-term Work and Improvements

1. Calculate the floodway cross-section needed for this creek to pass a 100-year storm.

2. Enlarge the creek, if needed. (The recent widening and cleaning during January, 2006 may have provided most, or all, the floodway needed.)

3. Maintain this floodway aggressively every year for its entire length between Center Road and McClay Avenue. Remove all debris and brush. Remove all new-growth tree saplings. Trim additional trunks from trees to create single-trunk trees within floodway. Trim lower limbs which would interfere with flood flows.

4. Remove silt and sediment if they interfere with the capacity of the creek.

5. Remove any barriers to the inlets and outlets of the concrete box culverts at Center Road and McClay Road.

Recommended Long-term Work and Improvements

1. Widen the creek, if needed, and maintain the creek yearly to accommodate the 100-year storm.

2. Lower the sewer lines which cross the creek.

3. Replace the concrete box culvert at Center Road, if warranted, to accommodate a 100-year storm. Consider lowering the flowline of this structure in order to reduce backup ponding on either side. This flowline lowering should be associated with dropping the sewer line crossings.

4. Study the installation of a wall or other barrier between the creek and the rear fences of the homes on McKeon Court. Provide for drainage from rear yards.

Local Study Areas

Center Road at Vineyard Creek - Flooding Analysis (Flood of December 31, 2005)

The flood water surface rose above the back of sidewalk at the upstream end of the concrete box culvert at Center Road. The top of sidewalk at this structure is higher than the adjoining street. The flood flows split at this point. Roughly half of the flood waters went down Wilmac Avenue and to the sump area approximately 120 feet southeasterly at 1958 Center Road. The other half flowed northwesterly to the intersection of Arbor Circle and Center Road. This flooding eventually overwhelmed both these sump areas. On the Arbor Circle side, flood water crossed Center Road and flowed down McKeon Court. On the southeasterly side, flood waters flowed from the street onto private property at 1958 Center Road.

Arbor Circle - Flooding Analysis

Water flooded from the creek, flowed between houses to the street and thence down Arbor Circle to pond at the intersection of Center Road. At this point the flood water joined with water backing out of the catch basins at this intersection. Ponding rose to a height where it flowed across Center Road and down McKeon Court.

Arbor Circle - Recommended Short-term Work and Improvements

1. Install a flap gate and a manually-operated gate in the storm drainage system between the Center Road box culvert and Arbor Circle in order to prevent storm water from backing out of Vineyard Creek and flooding the intersection.

2. During the times the gates are engaged, use a portable water pump to pump the local surface runoff into Vineyard Creek below the box culvert.

Arbor Circle - Recommended Long-term Work and Improvements

If feasible, install a storm drain bypass from the drainage system in the Arbor Circle sump area down McKeon Court; thence to Vineyard Creek. Combine this improvement with the recommended improvements for the McKeon Court cul de sac.

the lower area where Wilmac Avenue turns away from Vineyard Creek.

4. Where the rear yards of the homes on Wilmac Avenue adjoin the creek, storm water flowed from the creek between the houses to the street. Some garages and two portions of homes which had rooms converted from garages were flooded. Once the water reached the street, it flowed to the low point at the cul de sac.

5. At the cul de sac, storm water ponded to a depth which inundated garage floors, but did not flood finished floors of homes. The storm drain system at this cul de sac appeared to be working, but could not keep up with the flood volume. This system was probably not operating efficiently due to the high water surface elevation in the creek. One of the property owners at this location observed that the storm drain system at this location did not work at the peak of the 1982 and 1998 floods. During the 2005 storm, flood water flowed easterly between houses to get out of the cul de sac area.

Wilmac Avenue - Probable Causes of Flooding

1. The southerly end of the concrete flood wall in Wilmac Avenue was not connected to the back of sidewalk at the box culvert.

2. The garages along this street are only approximately 4 inches higher (average) than the adjacent curbs and sidewalks. Therefore, when flood flows cannot exit completely through the storm drainage system, the cul de sac and lower street area flood rapidly. The street was constructed using rolled curb and gutter and the pavement is fairly high, so there is minimal storage available in the street for extra storm water.

Wilmac Avenue - Recommended Short-term Work and Improvements

In the cul de sac area, remove any obstructions where flood waters need to move through. For example, the bottoms of fences should be at least 6 inches above adjacent ground. Any re-surfacing of the cul de sac pavement should be done in such a way that the pavement elevation does not become significantly higher.

Wilmac Avenue - Recommended Long-term Work and Improvements

1. Analyze the concrete flood wall. It may be possible to place a parallel wall to protect McKeon Court residences from high water in the creek, in which case the gap in the concrete wall just below the box culvert could be closed.

2. Construct a new catch basin on either side of the street just before the cul de sac and connect to the existing catch basin in a straight line with the existing storm drain line. This will allow more water to enter the storm drain system.

3. Replace the outlet storm drain pipe with a larger pipe.

Margory Court Cul de Sac - Flooding Analysis

The water surface rose to an elevation of approximately 38.5 feet and this cul de sac flooded. One garage may have had a couple of inches of water inside, but no other garages or finished floors of homes were affected. Probable causes of this flooding are as follows.

1. Storm water flowed overland from the sump area in the street at 1958 Center Road.

2. Water backed up from the Wilmac Avenue area to the north.

3. Flood waters were not able to exit immediately through the storm drain system because of possible system overload due to flooding at Margory Court and Wilmac Avenue. Additionally, high water surface elevation at the storm drain outlet in the creek may have helped prevent this discharge.

Margory Court Cul de Sac - Recommended Long-term Work and Improvements

1. Replace the existing 15 inch diameter storm drain with a larger pipe to help accommodate flood flows.

2. Analyze the storm drainage system at the easterly corner of 18 Margory Court. If possible, eliminate two of the three drainage structures at this location.

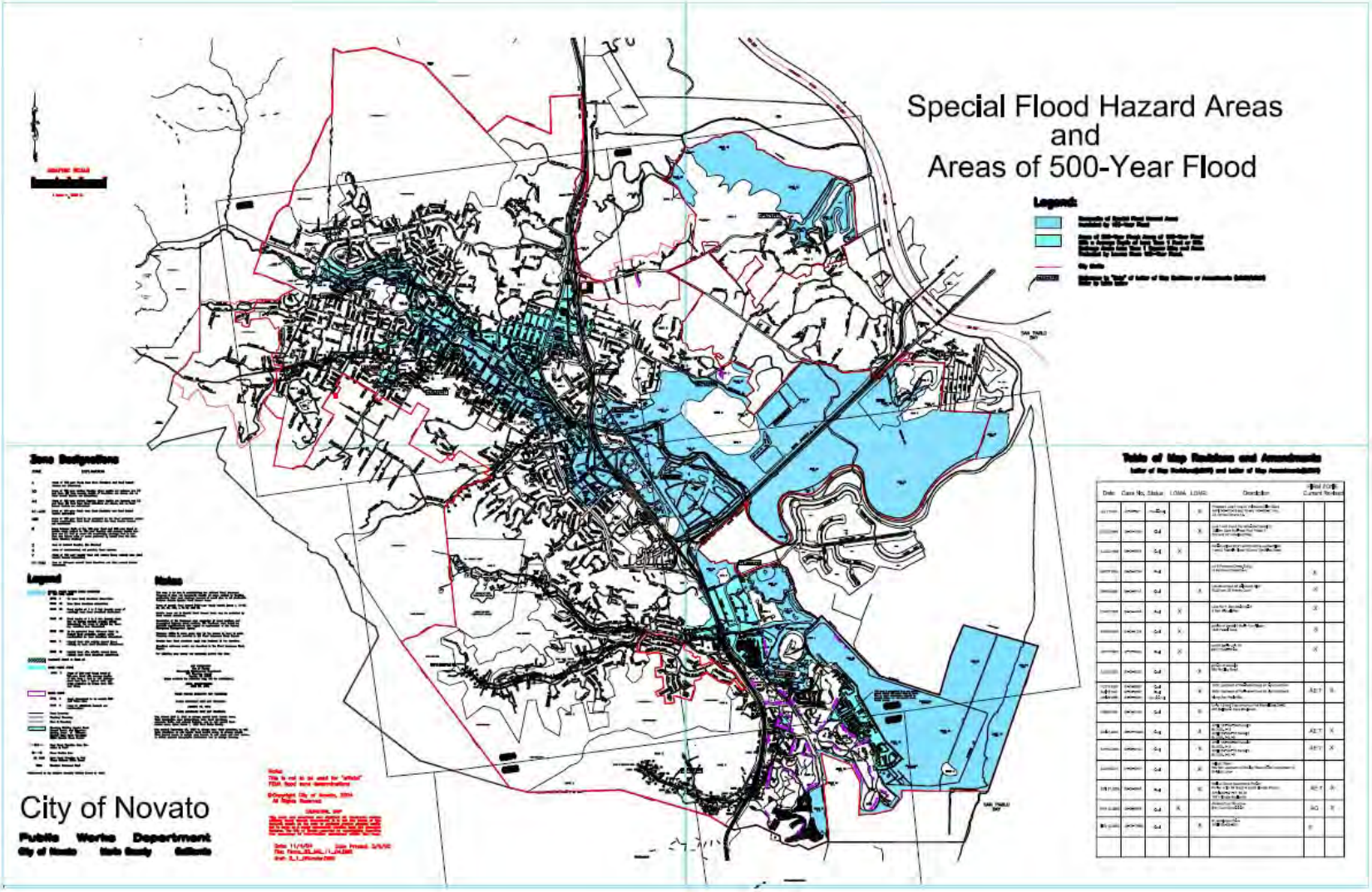
Table 3-9 Completed Drainage Related Projects

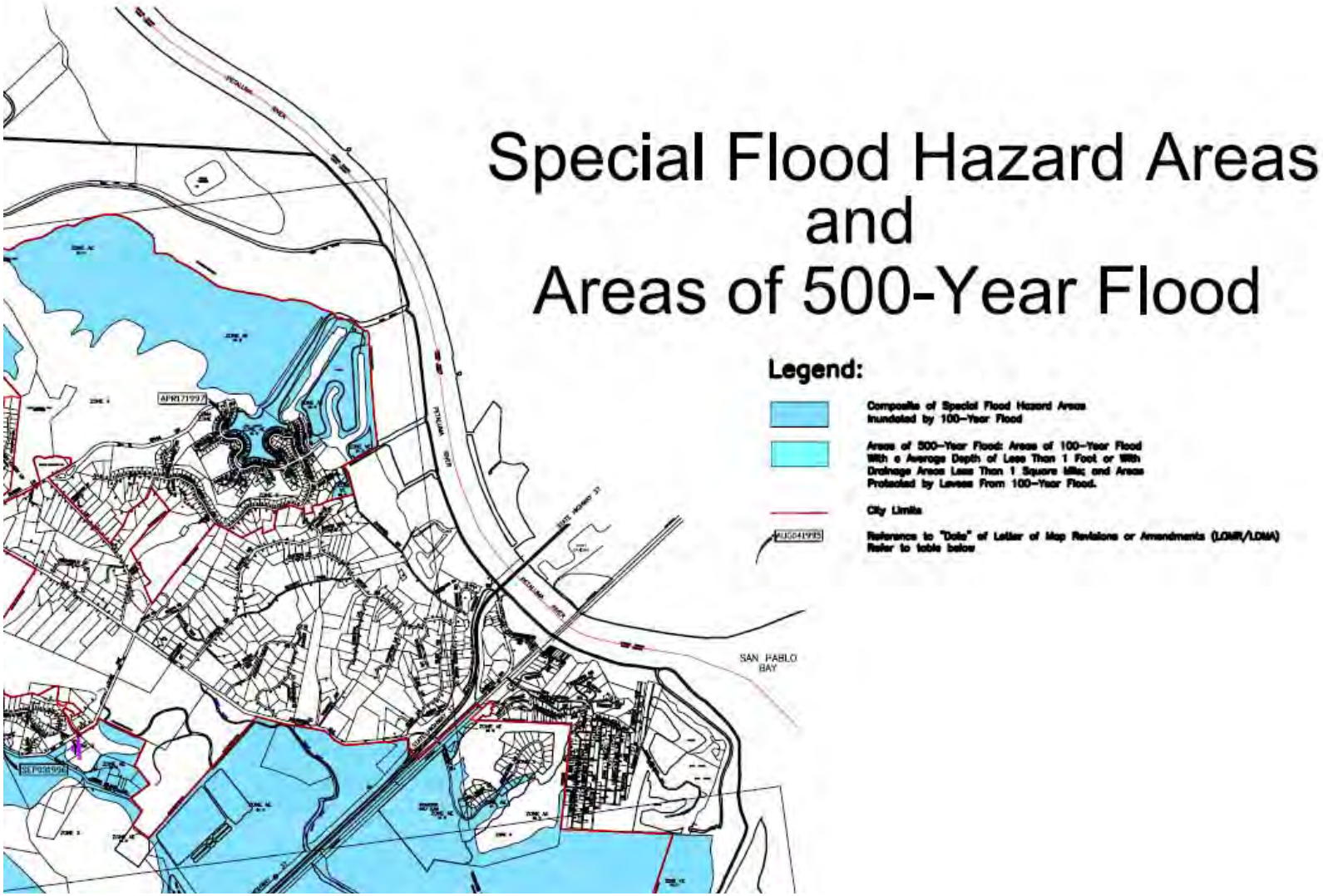
Project	Description	Year Completed
Bradley Avenue	Pavement and drainage improvements	2002
Bahia streets	Improve surface streets and drainage problems	2003
O'Hair Park	Drainage improvements	2004
Measure B streets and drainage problems	Improve drainage problems	2003

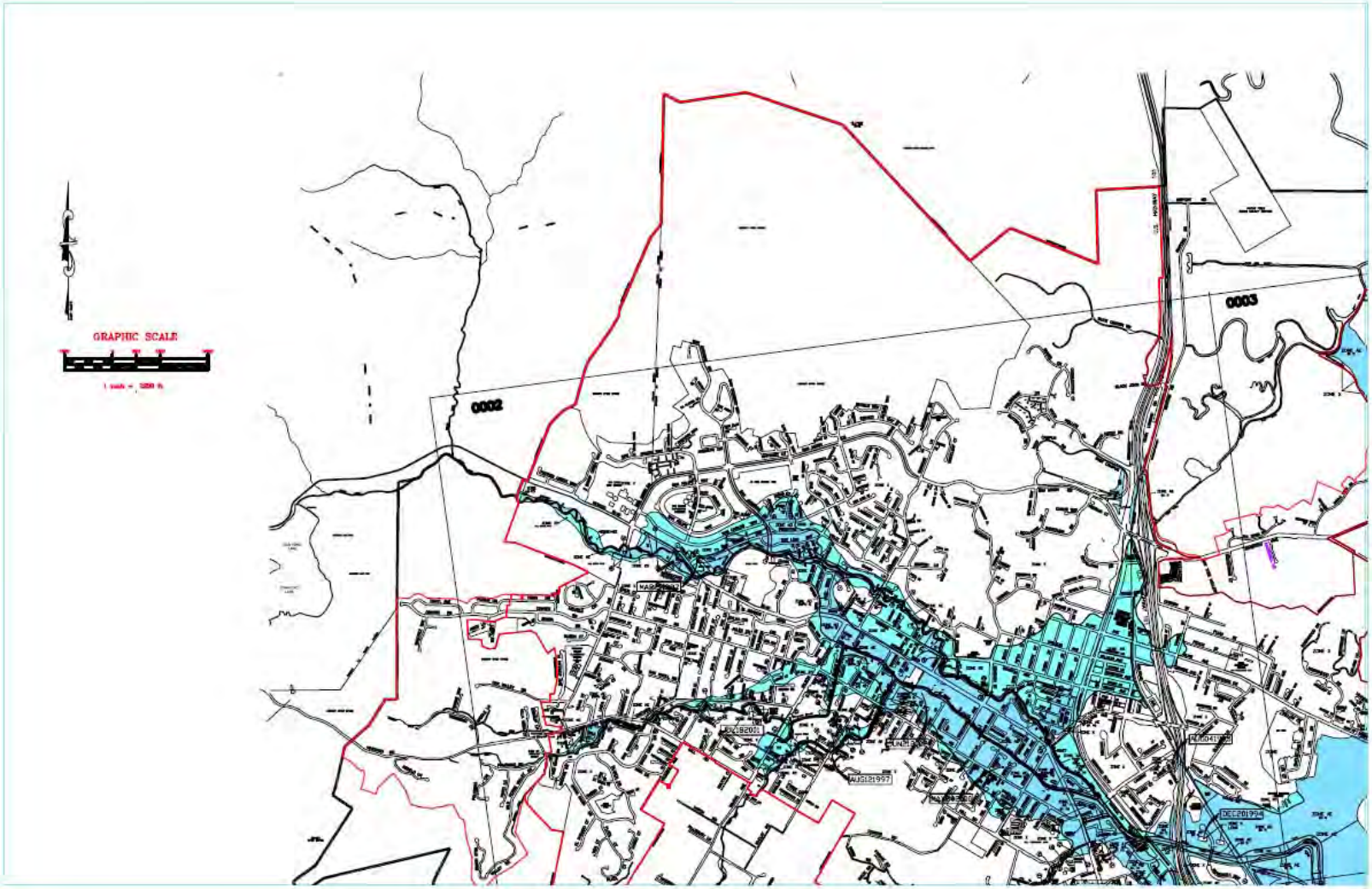
3.5.6.b Special Flood Hazard Area

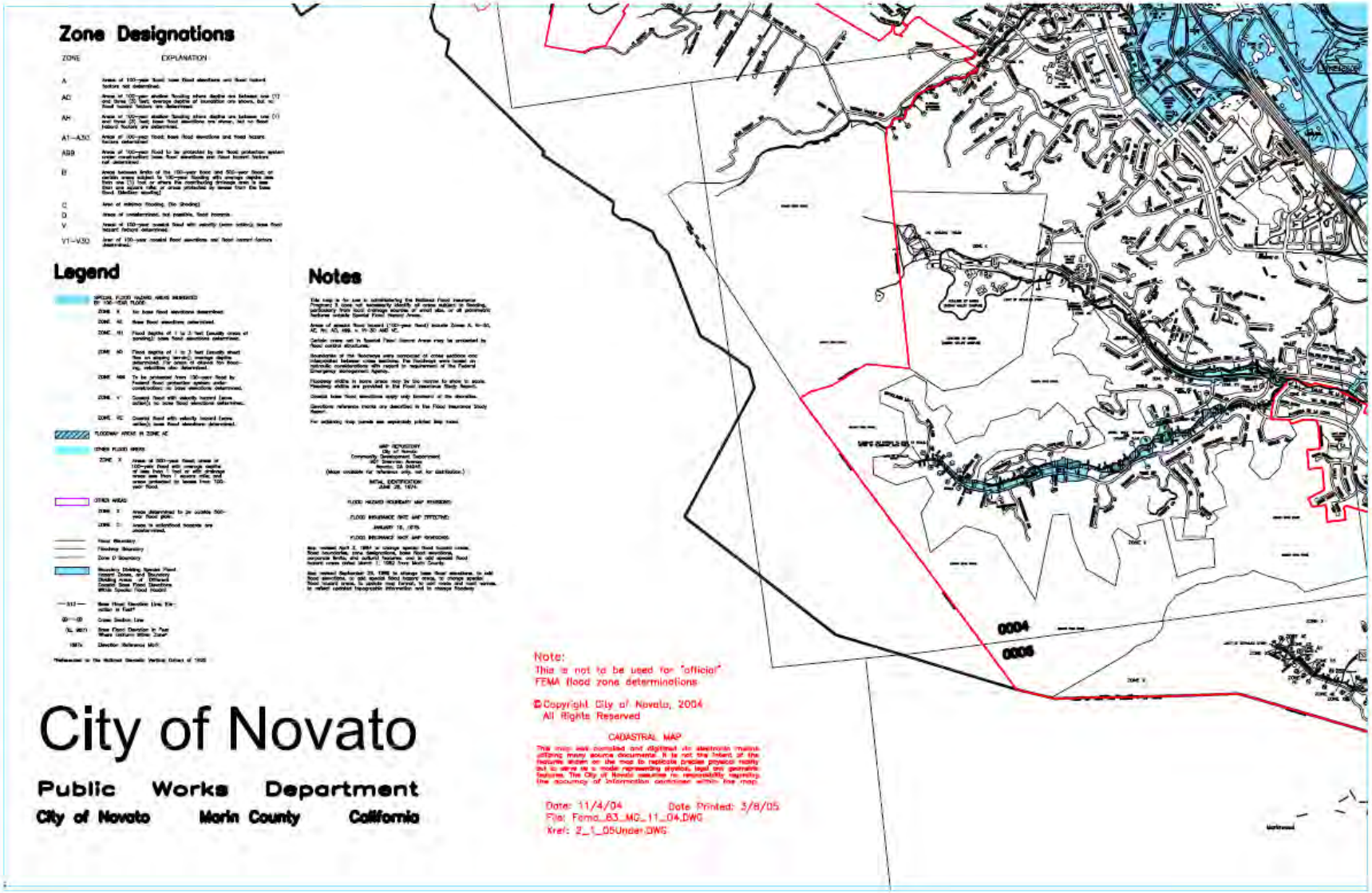
The City of Novato has a number of creeks and tributaries that are susceptible to flooding during heavy rains, posing a threat to safety and property. Over 5,000 acres within Novato are designated as being in a Special Flood Hazard Area (SFHA). Properties upstream of the Confluence of Novato, Warner and Arroyo Avichi Creeks are most susceptible to inundation during the 100 year flood event: Heavy rains in 1980, 1982, 1983, 1986, 1989, 1998, and 2005-06 caused flooding and damage to buildings within these areas. Other areas with high flood danger include Ignacio, Arroyo San Jose, and Vineyard Creeks, as well as the Bahia area. Property need not be located in the SFHA to sustain flood damages. When drainage course or storm drains become clogged, they will backup and overflow causing property damage to even upland structures. (City of Novato Public Works Department)

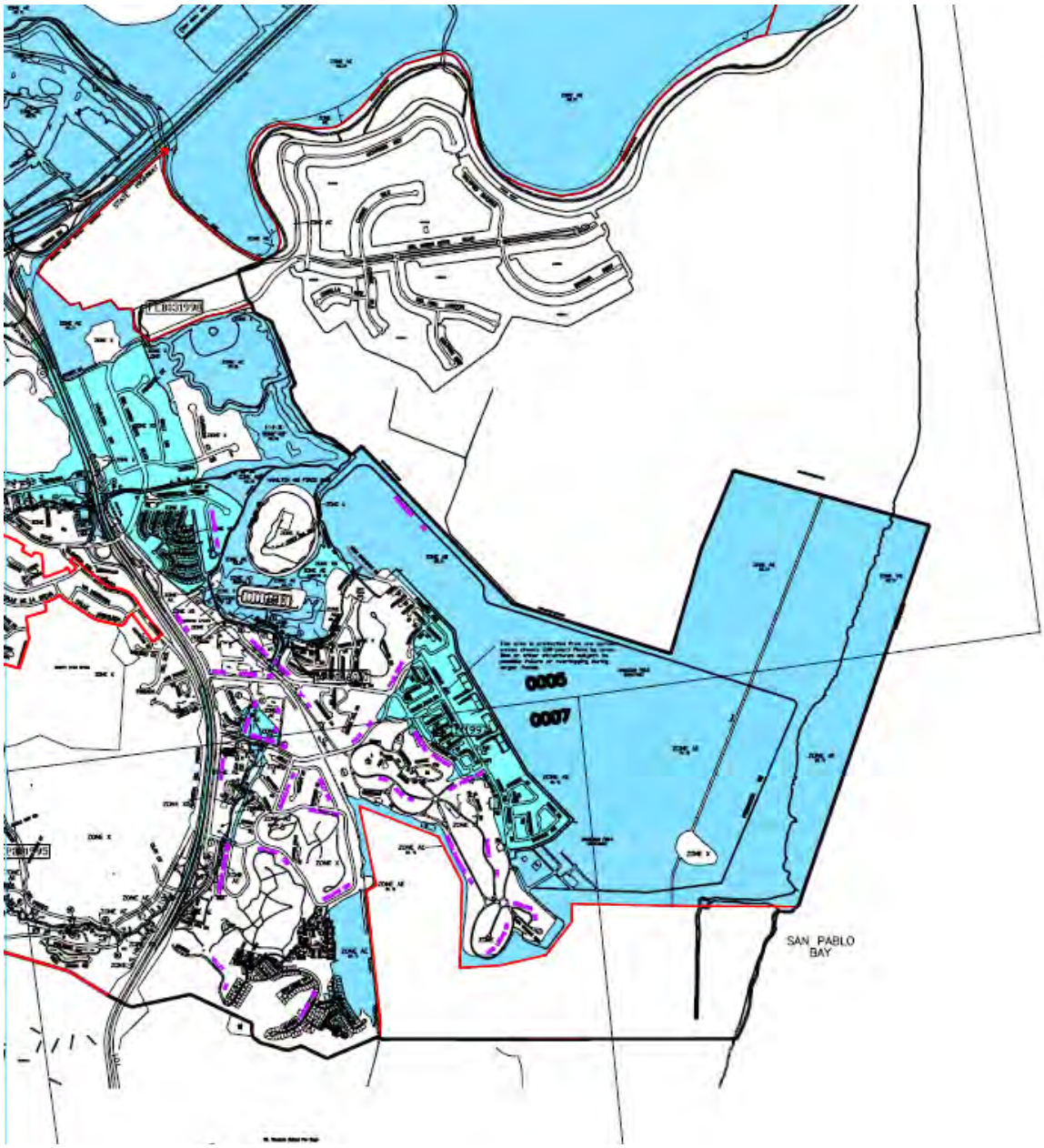
Figure 3-31 Special Flood Hazard Areas




Special Flood Hazard Areas
and
Areas of 500-Year Flood
Legend:
Composite of Special Flood Hazard Areas Inundated by 100-Year Flood
Areas of 500-Year Flood: Areas of 100-Year Flood With a Average Depth of Less Than 1 Foot or With Drainage Areas Less Than 1 Square Mile; and Areas Protected by Levees From 100-Year Flood.
City Limits
Reference to "Date" of Letter of Map Revisions or Amendments (LOMR/LOMA) Refer to table below
SAN PABLO BAY


GRAPHIC SCALE
0002
0003


Zone Designations
ZONE
EXPLANATION
A
AO
AH
A1—A30
AR
B
C
D
V
V1—V30
Legend
Notes
City of Novato
Public Works Department
City of Novato Marin County California
Note:
This is not to be used for "official" FEMA flood zone determinations
©Copyright City of Novato, 2004
All Rights Reserved
CADASTRAL MAP
Date: 11/4/04 Date Printed: 3/8/05
File: Fema_83_MC_11_04.DWG
Xref: 2_1_05Under.DWG
0004
0005


0006
0007
SAN PABLO
BAY

3.5.7 Exposure and Vulnerability

Flooding is a natural occurrence, however once it occurs; personnel will be needed to assist in rescuing any person trapped by flood waters, securing utilities, and controlling traffic. Recognizing this potential dangerous situation, the City has as a high priority mitigation action to continue training Public Works, Police and Fire personnel in flood response rescue techniques. These actions can overtax the city resulting in requiring mutual aid from outside agencies.

Flooding in City of Novato has the potential to result in damage to life and property. Rapid storm water and debris runoff can create flood conditions. The City of Novato has a number of creeks and tributaries that are susceptible to flooding during heavy rains, posing a threat to safety and property. Over 5,000 acres within Novato are designated as being in a Special Flood Hazard Area (SFHA). Properties upstream of the Confluence of Novato, Warner and Arroyo Avichi Creeks are most susceptible to inundation during the 100 year flood event: Heavy rains in 1980, 1982,1983,1986, 1989, 1998, and 2005-06 caused flooding and damage to buildings within these areas. Other areas with high flood danger include Ignacio, Arroyo San Jose, and Vineyard Creeks, as well as the Bahia area.

Property need not be located in the SFHA to sustain flood damages. When drainage course or storm drains become clogged, they will backup and overflow causing property damage to even upland structures. (City of Novato Public Works Department)

For purposes of the Repetitive Loss Plan, areas of the City where structures have historically suffered damage from flooding are designated as Zone AO (Depth 1& 2) and AE (Elev. 7-19) and are located immediately upstream of the confluence of Novato, Warner and Arroyo Avichi Creeks.

The above areas compromise a total of approximately 248 acres containing approximately 650 parcels. The majority of these parcels contain single-family residences. Approximately 10% of the parcels are occupied by businesses, including small business offices, retail buildings and strip malls. To our knowledge, none of these structures contains a basement area.

Critical facilities incorporate essential facilities that if damaged or destroyed, could severely hinder a jurisdiction's ability to properly respond with vital service in the event of a disaster. Such facilities could be: emergency operations centers, police and fire stations, hospitals, transportation systems and others. The table below lists various critical and important facilities within the 500 year Flood Plain and the 100 year Flood Plain.

Table 3-10 Critical Facilities within the 500 year Flood Plain and the 100 year Flood Plain.

	Total Number	Minimal or Undetermined Flood Hazard	500 year Flood Plain or Other Concern (Zone X500)	100-yr Flood Plain (Zone V or Zone A)
Health Care Facilities:	7	5	2	0
Hospital	1	1	0	0
Long-Term Care Facility	1	1	0	0
Primary Care or Specialty Clinic	3	2	1	0
Home Health Agency	2	1	1	0
Schools:	20	16	1	3
Elementary School	13	9	1	3
Middle School	3	3	0	0
High School	3	3	0	0
College	1	1	0	0
Critical Facilities:	28	22	3	3
City-Owned	17	13	3	1
Owned by Special Districts	11	9	0	2
Bridges and Interchanges:	44	16	9	19
Locally-Owned	16	2	6	8
State-Owned	28	14	3	11

Source: Association of Bay Area Governments, 2004

Health care facilities are based on a list of licensed facilities from the California Office of Statewide Heat Planning and Development.

K-12 schools and colleges are based on a combination of addresses from Thomas Bros. and the individual faculties.

Bridges/interchanges, these numbers are draft totals.

It's possible that the sum of the hazard categories will not equal the total number of facilities.

3.5.7.a Transportation Systems

There are several modes of transportation within the Novato area. They include roadways, a municipal airport, bus service, and a rail line. These modes of transportation have influence on the City of Novato and some can be affected or shut down in a flood event. The rail line system is further discussed in the in the Earthquake Hazard Analysis section within the Transportation Systems subheading.

The Novato Fire District also has a whole system of "fire roads" to allow access to the wildland and ranch properties that exist. These fire roads experience frequent washouts and flood-related damage. Most require four-wheel drive vehicles.

Traffic congestion is a significant problem in and around Novato. Detours necessitated by flooding contribute significantly to congestion. A long-term detour along any of the major roadways could impact traffic from the San Francisco Bay Bridge to Petaluma.

The Petaluma River, although not a significant commercial waterway, serves a large number of pleasure boaters and is home to some commercial fishing vessels. Flooding brings a significant amount of debris into the river making it dangerous for small vessel traffic.

Highway and Other Access

Primary access to the City of Novato is US Highway 101, the main north-south corridor in the West Bay Area. Novato is 12 miles north of Interstate Highway 580, a major east-west corridor serving the Bay Area. State Highway 37 joins US 101 at Novato making the area a hub for North Bay travel. State Highway 116 is ten miles north of Novato.
Numerous common carriers provide interstate and intrastate service. The Petaluma River and the Northwestern Pacific Railroad provide access via water and rail, respectively.

3.5.7.b Utilities

High water flows, soil erosion, corrosion and electrical short-circuits can damage power, water, sewer and fuel systems, as a result of floods. Specific damage to utility systems by floods within Novato is unknown.

The Pacific, Gas and Electric Company works to safeguard their electric system to minimize the risk of service interruptions. Tree branches or entire trees falling into power lines are a common cause of power outages during high winds, heavy snow and ice storms. Each year PG&E prunes or removes approximately 1,600,000 trees to make sure that the required distances between vegetation and our power lines are maintained. Each year 113,000 miles of distribution line and 18,500 miles of transmission line, as well as poles and transmission structures are inspected to ensure the safety and reliability of our system. (PG&E website)

3.5.7.c Airports

Gnoss Field is located in the County outside of Novato's Sphere of Influence. It is a general aviation airport owned and operated by the County and has no scheduled commercial flights. It has, however, a significant number of private aircraft operations and an air taxi service. The County's Gnoss Field Master Plan describes the expected growth in airport operations and related development. It projects a doubling of based aircraft in the period 1986 to 2006, with an increase in operations (one landing or one take-off) from 189,000 in 1996 to 204,000 in 2006. The improvements called for in the Master Plan include facilities to maintain a fixed-based aviation operator.

3.5.7.d Dam Failure

Dam failures can result in the worst flood events. Landslides flowing into a reservoir are also a source of potential dam failure or overtopping. A dam failure is usually the result of neglect, poor design, or structural damage caused by a major event such as an earthquake. When a dam fails, a gigantic quantity of water is suddenly let loose downstream, destroying anything in its path. Besides the passage of the Dam Safety Act, other improvements concerning dams have been made throughout California as a result of the near-failure of the Lower San Fernando Valley Dam.

The Novato Creek Dam is owned by North Marin Water District. Stafford Lake was created with the construction of Stafford Dam on Novato Creek in 1951. It was created to provide a drinking water source of supply for the growing Novato community.

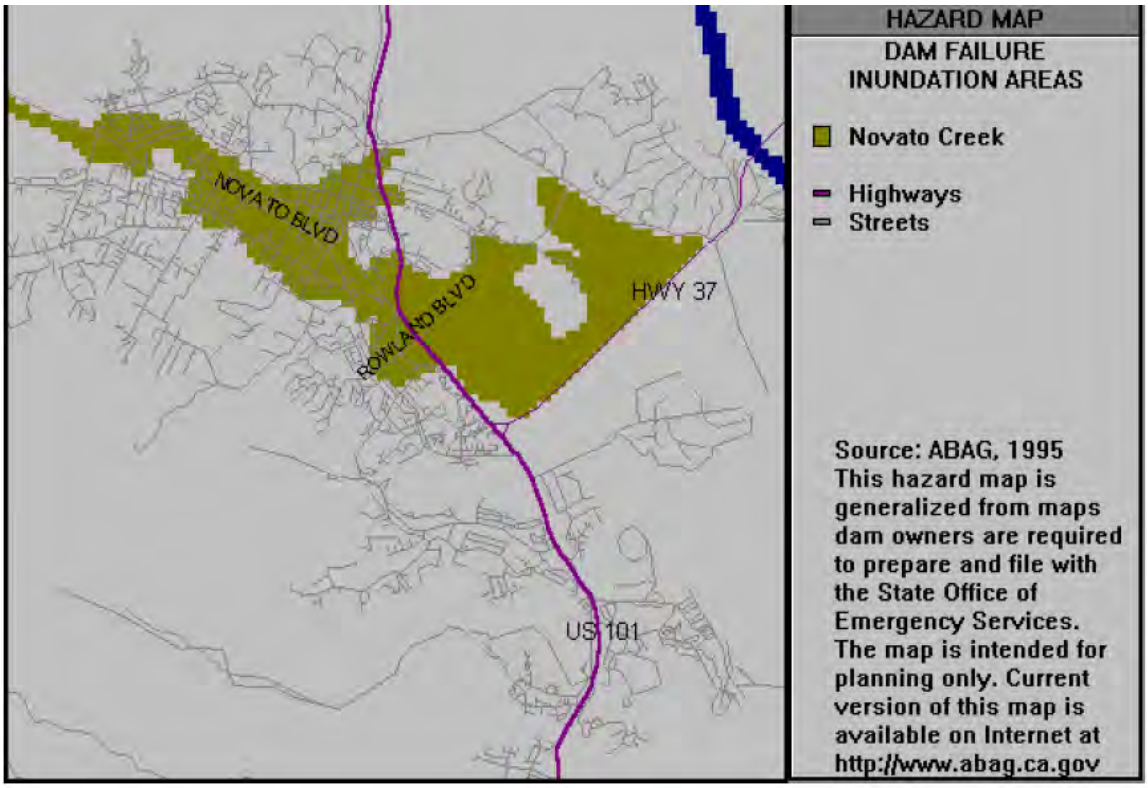
Figure 3-32 Stafford Lake

The dam failure evacuation area extends approximately 4½ miles, passing through the City of Novato and ending in the agricultural area between the City of Novato and San Pablo Bay.

The threat to the City of Novato is severe. The most critical zone is the San Marin residential area in the vicinity of Miwok Park and will be flooded very shortly after dam failure. The flood waters will reach the first built up area at San Marin Drive/Sutro Avenue 11 minutes after dam failure. 32 minutes after dam failure, the flood waters will begin to inundate the business district & city government buildings, and will reach U.S. Highway 101 approximately 50 minutes after dam failure.

The following maps show the swath of inundation in the event that the dam at Novato Creek was to fail.

Figure 3-33 Dam Failure Inundation Areas



3.6 Wildland Urban Interface Fire

The Novato Fire Protection District (NFPD) is located in the northernmost section of Marin County, California. The Fire District encompasses approximately 71 square miles and serves a population of 65,000. The District protects approximately 43,000 acres of which approximately 44 square miles are wildland urban interface areas. It is bounded on the north by San Antonio Creek and Sonoma County, by Pacheco Grade and the community of Marinwood to the south, by the Petaluma River and San Pablo Bay to the east, and westerly to a point approximately three miles past Stafford Lake and along the ridgeline of Big Rock Ridge. The City of Novato lies within as well as outlining areas of unincorporated county lands and is served by the District. The North Marin Water District is the primary water purveyor in the NFPD and is the sole provider of the fire flow delivery system. Much of the information in this section is provided by the NFPD Standards of Cover, City of Novato Emergency Plan, Marin County Emergency Plan and Novato General Plan. The NFPD Standards of Cover is attached as Appendix 4.

3.6.1 Hazard Identification

Wildfire behavior is based on three primary factors: weather, topography and fuel. A wildland fire is a fire in which the primary fuel is natural vegetation. Wildland fires can consume thousands of acres of vegetation, timber and agricultural lands. Fires ignited in wildland areas can quickly spread, if unabated, to areas where residential or commercial structures are intermingled with wildland vegetation. Similarly, fires that start in urbanized areas can grow into wildland fires. Wildland/urban interface fire hazards are especially pronounced in areas of high structure densities adjacent to undeveloped open space areas with dense vegetation. The greatest wildfire threat to human life and property is within the wildland-urban interface where homes and businesses intermingle with wildland vegetation.

Wildfires can be caused by natural events, such as lightning or high winds. However, most wildland fires are human caused. Campfires, careless smokers, electrical sparks, and arson cause most wildland and wildland/urban interface fires.

Fires are easily ignited and spread rapidly on the grass-covered slopes in the District, and such fires have caused destruction of property when they impinged on homes. Those slopes, commonly 35 percent to 45 percent, typically face south or southwest. This setting is typified by the locations at Verissimo Valley, Rebecca Way, and Indian Valley.

3.6.2 Future Potential

Wildland fire hazards exist in varying degrees over approximately 85% of Marin County. The fire season generally lasts from five to six months. The western portion of the county is heavily influenced by the Pacific Ocean in terms of local climate. In these environments, the fire hazard is mitigated by summer fog intrusion and lower temperatures. However, during the two to three weeks of "off-shore" wind events each fall, even the coastal areas become an extreme fire hazard, as lack of rain and dried vegetation with gusty winds equate to a high fire potential.

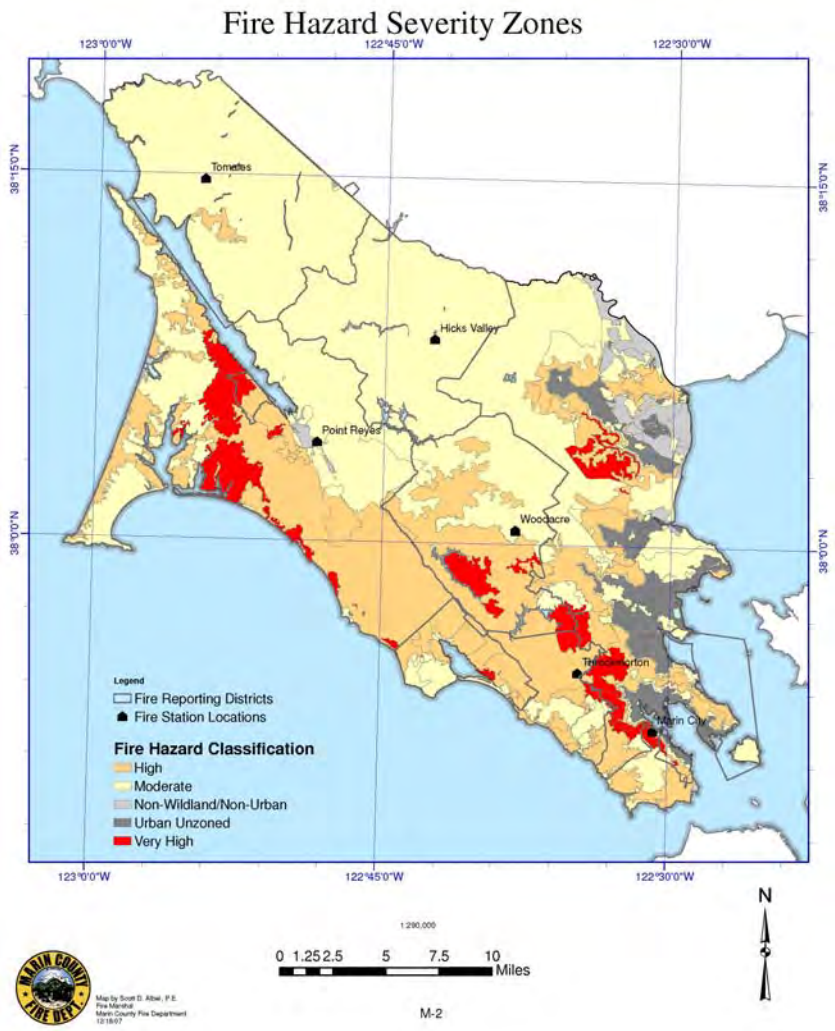
Fire modeling is a tool utilized to forecast fire behavior and fire potential. An important application is in portraying the nature of the threat to structures exposed to wildland fires. It is also used to evaluate the capability of initial attack response forces to control a fire before it escapes initial attack.
The history of California wildfires indicates that the following trends will continue. According to the California Fire Plan, risk from wildfire to life, property, natural resources, and firefighter safety is increasing.

- Population will grow and more people will live and use wildland areas.
- Topography and climate support ecosystems where large wildfires can be expected.
- Drought and fuel moisture conditions will be unpredictable but almost always dangerous in fire season.
- More structures will be constructed in areas that are very susceptible to wildfire.
- Historical legacy of narrow roads, difficult entrance, insufficient water supplies, flammable building construction and location that make many communities and homes wildfire-prone still exits.
- Public demand for wildland fire protection and other services will increase.
- Deteriorating woodland health, increasing fuel loads and other factors have led to more intense, destructive wildfires; unabated this pattern will continue.
- Assets at risk will increase, especially watershed assets, because of the rapid rise in the demand for water to supply more people. Based on population projections, the potential for accelerating loss of protected assets, especially life and property, will be greater from disastrous wildfires.

Hazard Zone Maps

After the disastrous firestorm in the Oakland-Berkeley Hills in 1991, the Legislature required California Department of Forestry (Cal Fire) to identify very high fire hazard severity zone (VHFHSZ) within the Local Response Areas. The very high fire hazard severity zones are identified on a consistent statewide criterion based on the severity of fire hazard that is expected to prevail in those areas. Very high fire hazard severity zones are based on data and models of potential fuels over a 30 – 50 year time horizon and their associated expected fire behavior and expected burn probabilities to quantify the likelihood and nature of vegetation fire exposure to buildings. The maps below are especially based on a geographic information system data set developed by CAL Fire for very High FHSZs within the Novato area and County of Marin. The NFPD has experienced several devastating interface fires over the years. The fuel, weather and topographic conditions that support the ignition and spread of wildland I-Zone fire are still present within the District. This area is in the High and Very High Hazard rating. The purpose of the VHFHSZ is to classify lands in accordance with whether a very high fire hazard severity is present so that public officials are able to identify measures that will mitigate the rate of spread, and reduce the potential intensity of uncontrolled fires that threaten to destroy resources, life, or property and to require that those measures be taken.

Figure 3-34 Marin County



“"WUI designated Zones” vs. Cal-Fire "Fire Hazard Severity (FHZ) FHZ Maps"”

- It should be noted that the Wildland-Urban Interface Zone and the Fire Hazard Severity Zones (FHZ) as determined by CAL FIRE are two different designations:
- The CAL FIRE FHZ maps were developed using criteria including slope, aspect, fuel type, critical fire weather, and fire history.
- Developers of the WUI Zone map not only took into account slope, aspect, and fuel type they also used the structure's proximity to wildland, as well as structure density.
- As a result of the above, the State's FHZ maps include many areas that have few or no structures
- WUI map is confined to areas containing communities of homes and structures.
- The City of Novato and Novato Fire District have created a well thought out and easy to use information bulletin informing homeowners, contractors, architects, developers and other interested parties on alternative ways to conform to the new requirements for construction for

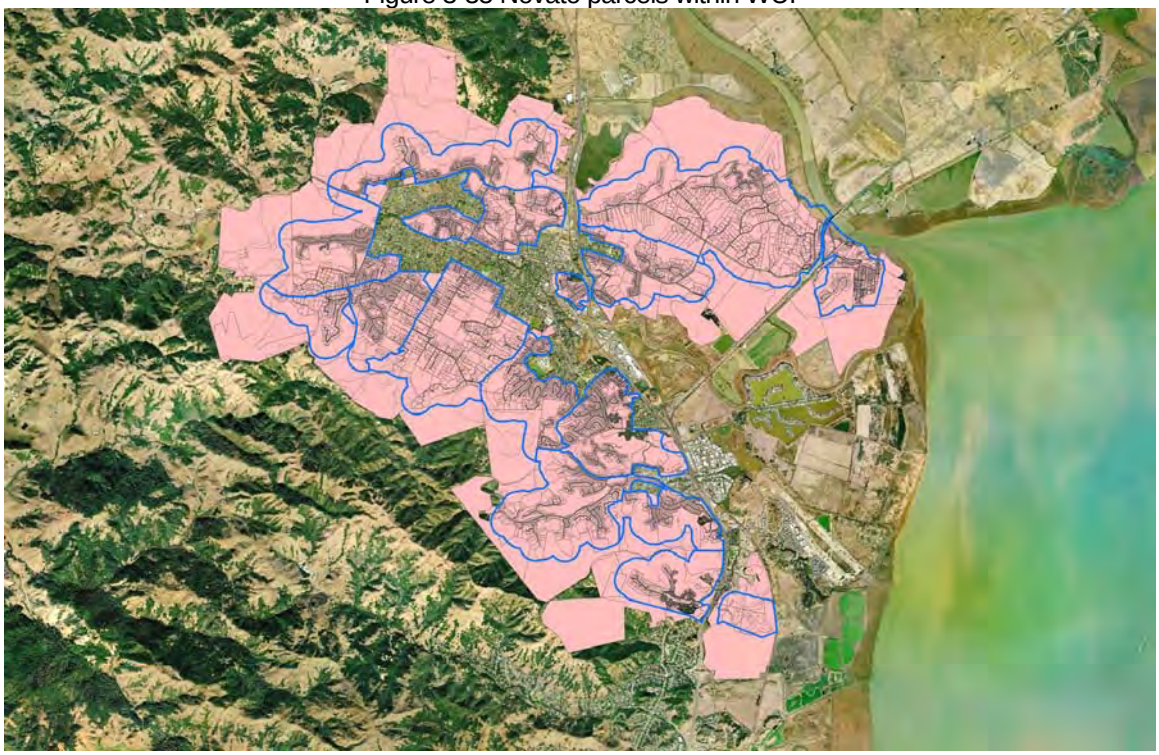
new and remodeled homes that fall within the WUI areas.

As a result of the implementation of the WUI codes the Novato Fire Protection District (NFPD) adopted an ordinance (Ordinance No. 2005-1) and resolution that adopted the 2003 edition of the International Urban-Wildland Interface Code (WUI Code) within areas of the City of Novato and NFPD. In tandem with this with Ordinance No. 2005-1, the NFPD also adopted Resolution No. 2005-7 making local climatic and topographic findings that justified the need for more stringent fire protection building requirements. As a result, the NFPD set forth its policy to enact construction requirements contained in the WUI Code in areas designated to be WUI areas and the City of Novato by Resolution No. 134-07, ratified the NFPD's Ordinance 2005-1 and Ordinance 2007-1 adopting the 2003 International Code Council Urban Wildand Interface Code, the 2007 California Fire Code, 2006 International Fire Code and Appendices of the 2000 Uniform Fire Code.

The Wildland-Urban Interface Fire Area Building Standards was established to set minimum standards for materials and material assemblies and provide a reasonable level of exterior wildfire exposure protection for buildings in Wildland-Urban Interface Fire Areas. The standards require any new building constructed in a Wildland-Urban Interface to be designed and constructed with the intent of lessening the vulnerability of a building and to resist the intrusion of flame or burning embers projected by a vegetation fire (wildfire exposure).

The WUI Code identified approximately 11,000 parcels within the greater Novato area that would be subject to the code.

Figure 3-35 Novato parcels within WUI



A4 • NOVATO ADVANCE • July 23, 2008

OUR VIEW

Better safe than sorry in 'WUI'

Wildland Urban Interface is one of those technical terms that sound clunky. So the firefighting profession has shortened the term to its initials, WUI, which firefighters pronounce as "woo-eee." That's obviously a lot more fun to say.

The term is one that Novatans are likely to become more familiar with, since most Novato properties, about 11,000 out of 20,000 parcels citywide, are inside the wildland urban interface.

That means they're subject to new fire-safety regulations.

Officials at the Novato Fire Protection District and the city of Novato have deemed that homeowners living inside the WUI need to use fire-resistant materials when they remodel their homes.

For example, if Novatans who own homes in the WUI (c'mon, say it all together now: woo-eee) replace so much as one window, they need to install tempered glass or some other type of fire-resistant glass.

The new rules also require that exterior doors be replaced with solid-core wood or another non-combustible material, that decks be constructed of fire-resistant material, that replacement gutters have covers to prevent the accumulation of leaves. A full list is available at city hall.

That's a step beyond what's required statewide. In most of California, these regulations only kick in when new homes are built in the WUI. Here, the regulations affect remodels, too.

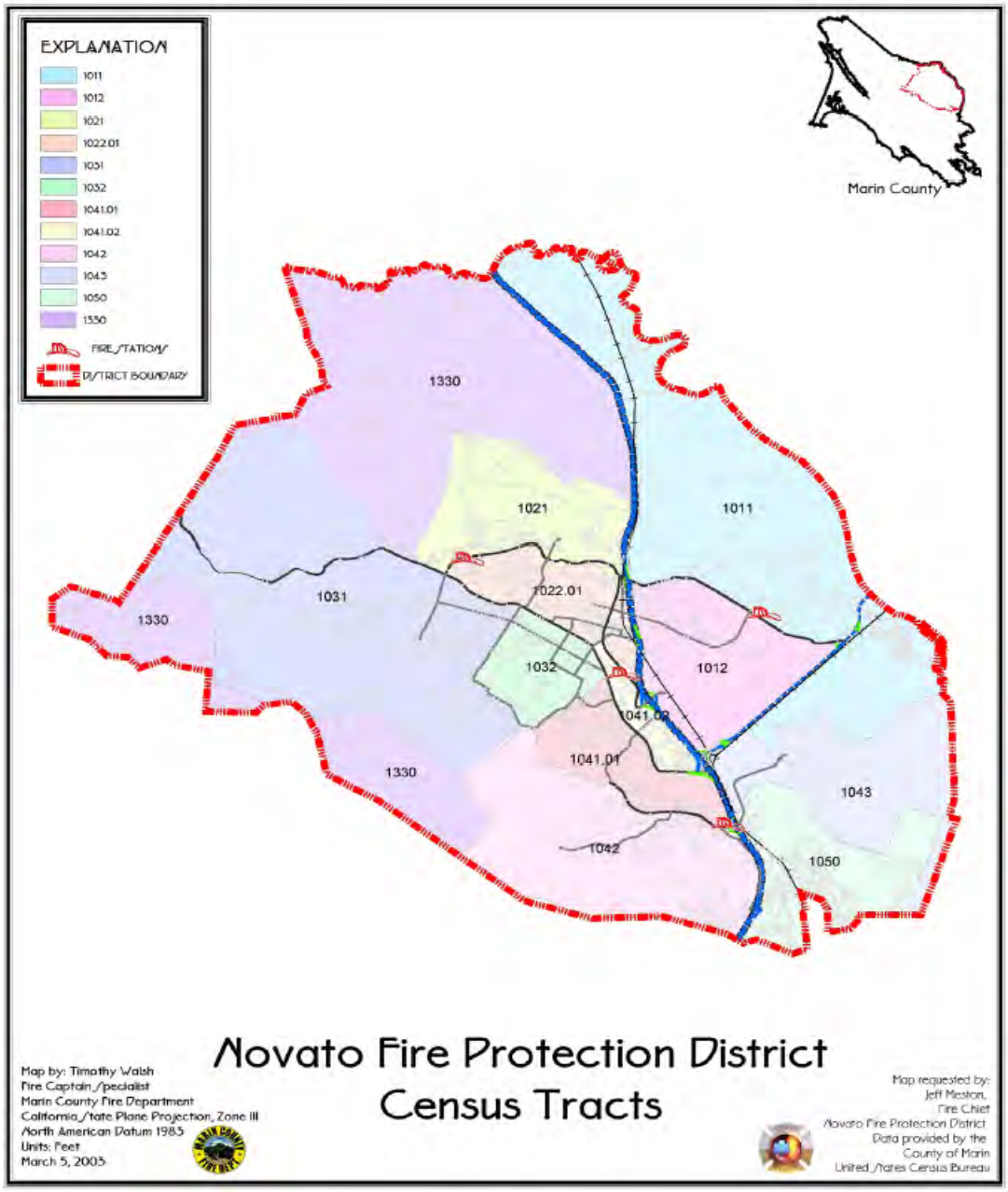
Overall, we think that's a good thing.

The rules took a lot of people by surprise, which is unfortunate. Some contractors hadn't heard of the new rules, so they went ahead and ordered glass that wasn't fire-resistant. The city made the right move to extend the deadline a little, to let these folks slide. We think that the city and the fire district could have rolled out the new rules with more fanfare so that more contractors would have known about them.

We sympathize with homeowners who don't like being saddled the extra expense of fire-resistant materials (tempered glass costs twice as much).

But we've watched the damage caused by this summer's California wildfires, and think it's better to be safe than sorry in fire prone areas, such as Novato's WUI.

Figure 3-36 Novato Fire Protection District Census Tracts



For the purpose of identifying where the emergency incidents originate, the District is now divided in to twelve census tracts that correspond to the United States Census Bureau and are depicted in the map above. These census tracts were utilized as they encompass the District's urbanized areas and include the demographics for each area.

3.6.3 Event History

Although the Novato area has not experienced catastrophic wildland or wild land /urban interface fires like those that caused significant loss of life in the 1991 Oakland Hills fire and the 1993 and 2003 Southern California fires, NFPD has experienced several interface fires (I-Zone fires) over the years (I-Zone is defined as the urban/wildland interface). The fuel, weather, and topographic conditions that support the ignition and spread of wildland fires are still present within the District and wildland fires have consumed acres of land in the Novato area. The table below lists fire incident activity and damages from 2005 to 2009.

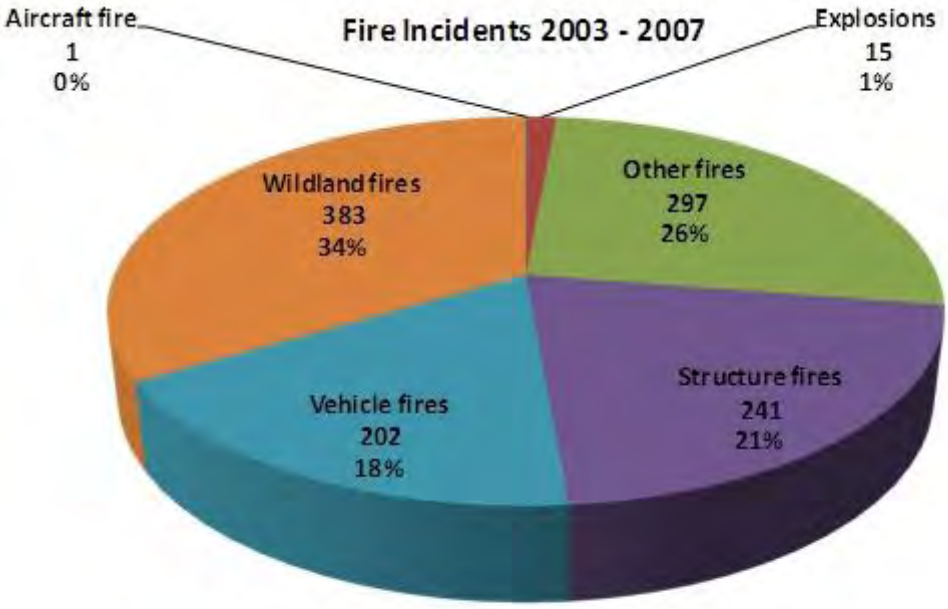
Table 3-11 Fire Incident Activity 2005 to 2009

Year	# of calls	Acres Burned	Structures Burned
2005	78	10.56	45
2006	99	25.95	64
2007	131	27.56	57
2008	113	17.36	44
2009	84	6.79	50

Another large fire not listed above occurred at San Marin High School in 1999.

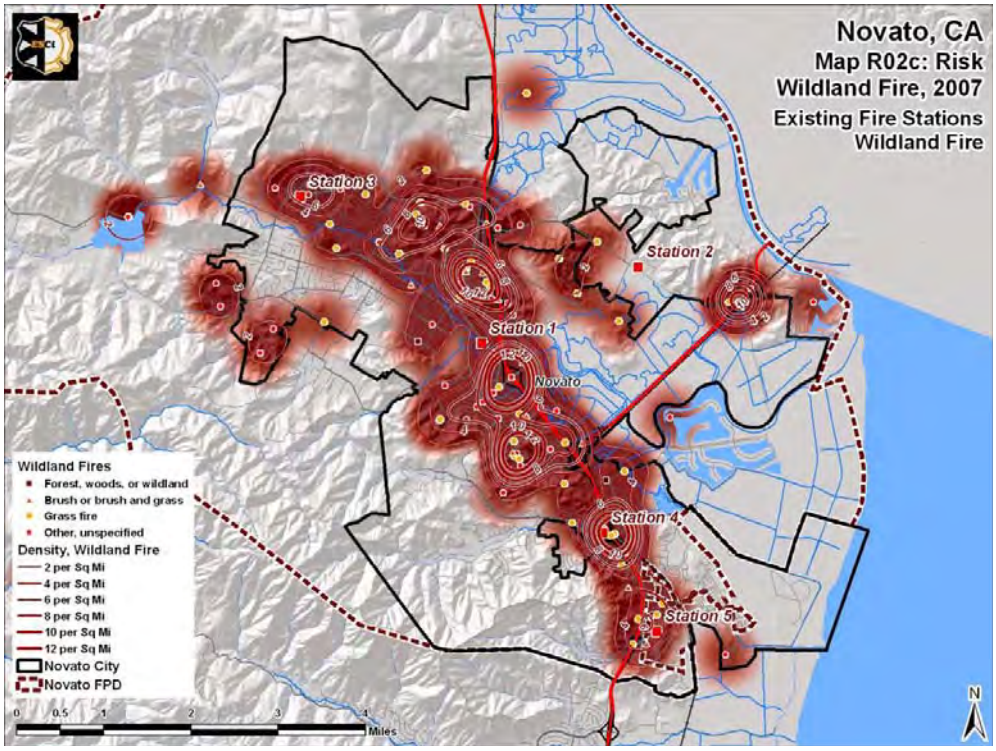
The chart below identifies the type of fire incident within the District during 2003-2007.

Figure 3-37



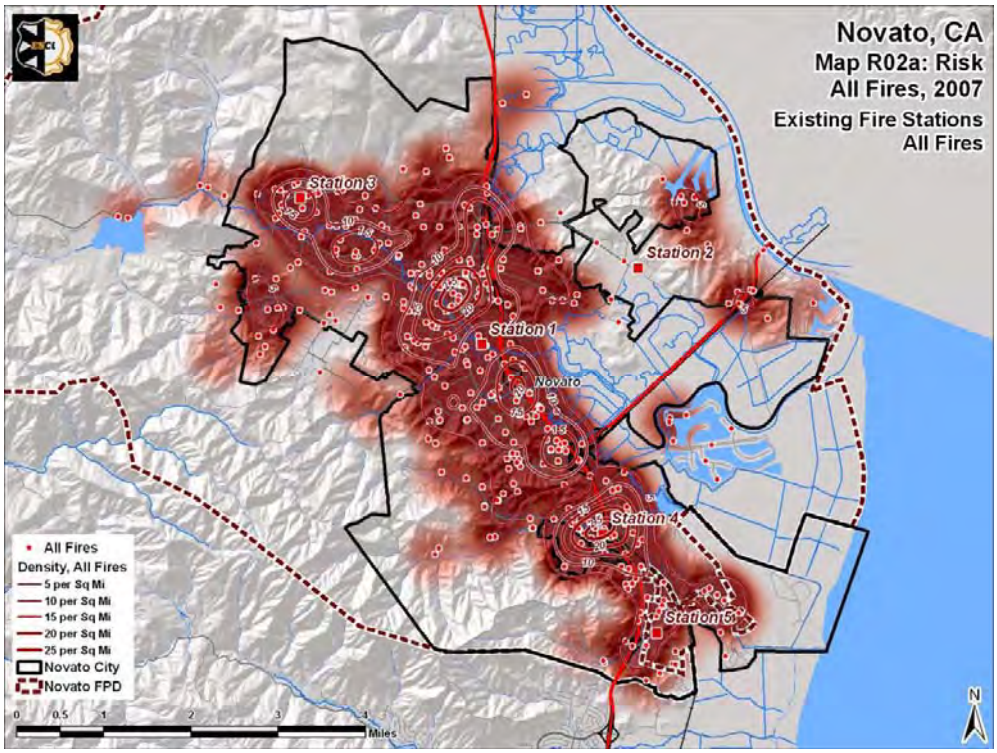
The following map show density of all wildland fire incidents and their contour clusters within the Novato Fire Protection District for 2007.

Figure 3-38 Novato Area Wildland Fire, 2007



The following map shows density of all fire incidents and their contour clusters within the Novato Fire Protection District for 2007.

Figure 3-39 Novato Area All Fires, 2007



3.6.4 Exposure and Vulnerability

There are several areas in the Marin County which contain heavy fuel loads. Many homes have been built on steep slopes with vegetation in close proximity. These slopes are often steep, located in rugged terrain and have very few access routes. The onset of Sudden Oak Death has significantly increased the number of dead or weakened trees in most areas. The lack of clearing naturally or by residents has led to a fuel build up. In several areas, an "Urban Interface" fire hazard is created as older neighborhoods directly border wild lands, parks, or forests. These areas often have mature vegetation, large tree canopies and invasive fire-prone brush which could cause the fire to spread quickly.

The topography in the county is typical of the mountains in the Coastal Range where they abruptly rise upward from the rugged shoreline to elevations of more than 2000 feet. This creates an opportunity for a wildland fire to spread uphill in many directions making it extremely difficult for the firefighters to control a fire in these areas. This is made more difficult when trying to protect structures. In addition, typical small winding roads on steep grades make timely and effective fire fighting difficult.

The topography in the inland areas can also cause significant fire fighting challenges due to hotter, drier climates. The higher density of homes and population further complicates fire-fighting efforts, as well as reduced water storage and pressure in these situations.

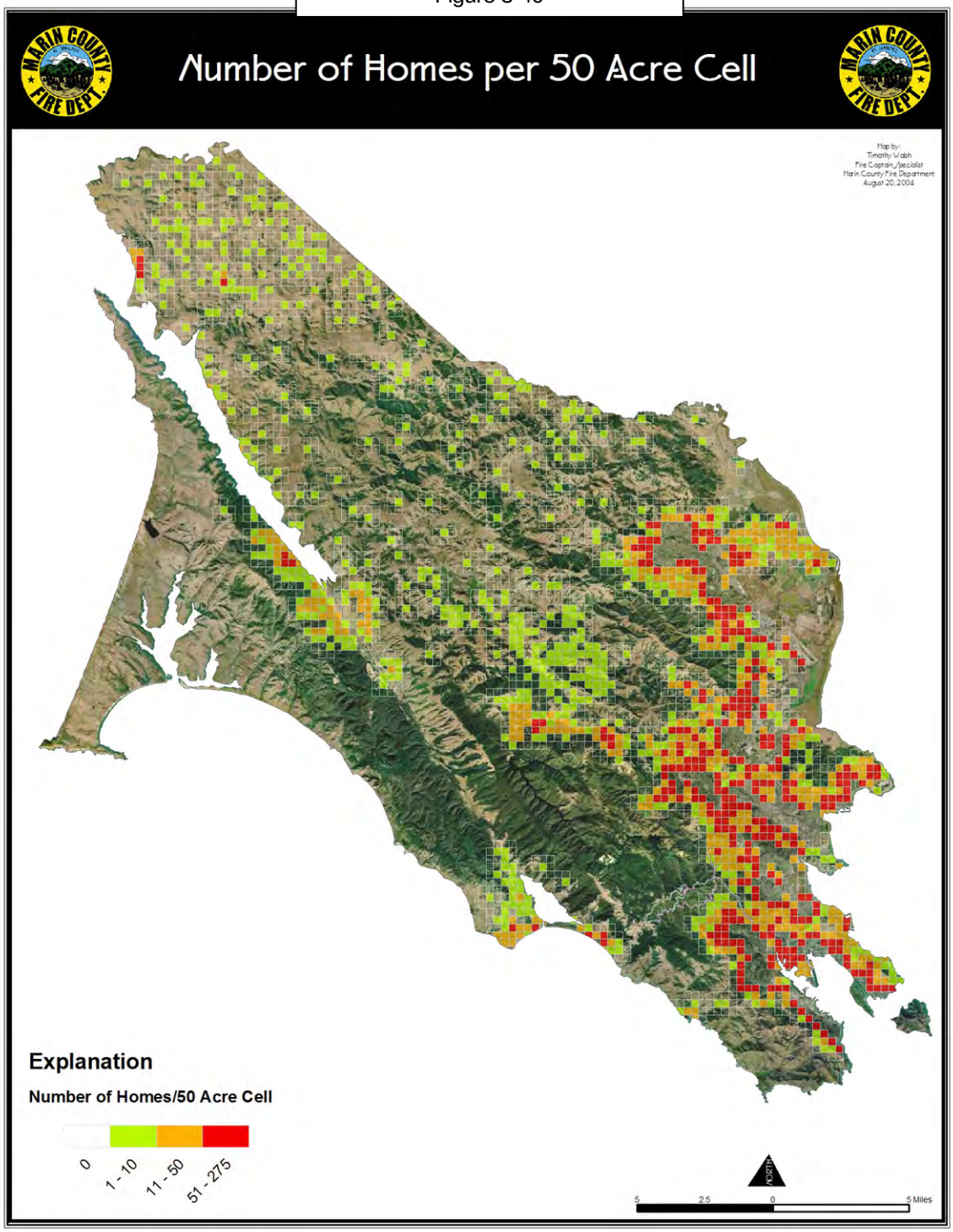
People, and their activities, may cause wildland fires. Since the heaviest concentrations of people are found along Highway 101, most fires start there. Use of equipment, people playing with fire, arson, off-road vehicles, mowing, and debris burning are among the most common causes of wildland fires. Trees growing into power lines have been a frequent cause of large and damaging fires. Lightning strikes can spark many

fires simultaneously in widely separated areas. Many of these fires may smolder for days before becoming very active.

Over 50% of Novato land is open space creating a huge wildland interface, which creates an additional risk to homes that surround open space areas. In many cases, open space becomes an island surrounded by homes. There are several rural areas in and around Novato where wildland fires could cause significant damage to buildings. The highest risk area is Black Point, just outside the city limits, which has narrow roads, older structures, limited access, steep slopes and chaparral vegetation. The other areas are Wild Horse Valley (just outside City Limits), parts of Bahia, Ridge Road and Pacheco Valle, which have dense brush and grass near homes.

Numerous factors affect how vulnerable a structure is to a wildland fire ignition. Roof composition, siding material, construction type and materials, slope, fire-resistant vegetation and defensible space are some general variables that affect structure survivability. For this analysis, the total hazard classification and housing density were used to define structure vulnerability identified in Figure 3-34 below. Each 50-acre cell was assessed to determine the number of homes within each cell. A rank was assigned to each 50-acre cell based on housing density.

Figure 3-40



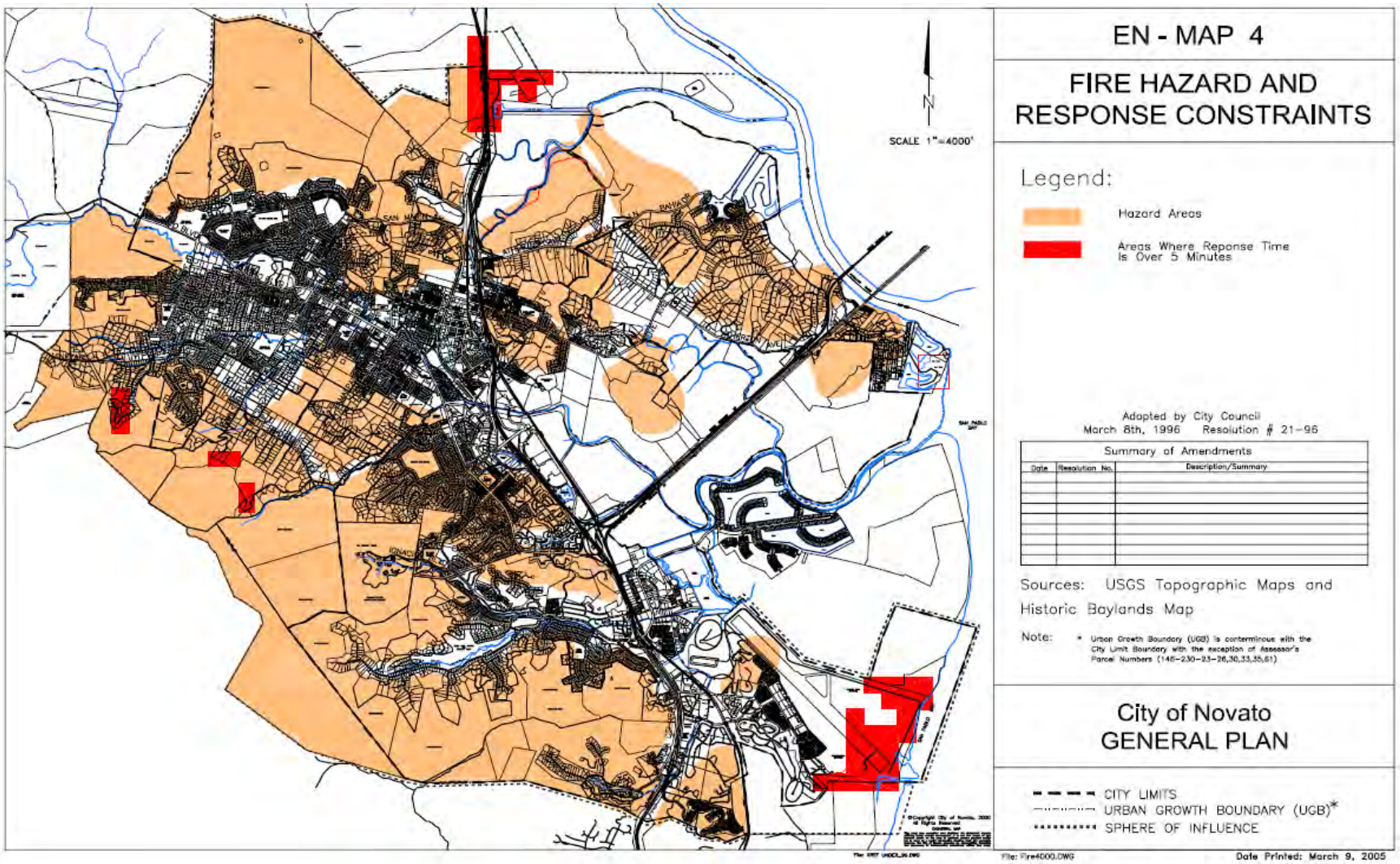
There is significant wildland/urban interface in Novato and surrounding unincorporated areas. There are several areas (i.e. Green Point, Bahia, Verissimo Valley, Wild Horse Valley, Indian Valley and Pacheco Valle) where a 10 to 30 acre wildland fire could result in great losses. In these areas, under an extreme weather window, many homes could be lost, and dollar losses reaching millions.

Wood frame apartment complexes or condominiums present varying degrees of fire risk and fire control problems that generally go unrecognized. In addition, because close spacing is common in the City's mobile home parks, these dwellings are particularly susceptible to fire damage if a fire is not controlled quickly.

The downtown commercial area (Old Town) is comprised of wood, closely packed frame structures without adequate firewalls, which pose serious conflagration potential. Commercial/industrial areas that are congested and were built prior to the enactment of the automatic sprinkler ordinance create some potential for a fire of a magnitude that is beyond the City's resources. A loss of a block of Old Town could result in a major financial loss for the community, requiring significant response from the City in the area of Recovery Operations.

The map below, from the City of Novato General Plan, identifies several areas of Novato with high fire risk. These include commercial areas with older, wood-frame buildings constructed without fire walls or sprinkler systems, and residential neighborhoods located in grassy or wooded areas on top of ridges and/or on north or east-facing slopes.

Figure 3-41 Fire Hazard and Response Constraints Map



Much of the Novato infrastructure is within the Wildland Urban Interface Fire Threat area as listed in the table below.

Table 3-12 WIldland Urban Interface Fire Threat

Novato Wildland Urban Interface Fire Threat	Total	Within Threat Area
Roads	262	194
Freeway	24	17
Highway	3	1
Primary Road	13	9
Secondary Road	18	13
Minor Street	205	153
All Railroads	9	4
Pipelines Under Roads	238	176

Source: Association of Bay Area Government, 2004
Note: Because of independent rounding, subcategories may not add to totals. Mile of pipeline is an approximation based on miles of road.

Risk Assessment within the Novato Fire Protection District (RHAVE)
The Novato Fire Protection District has conducted an assessment of the significant structures that exist within the District. The process used is called RHAVE, a nationally recognized evaluation tool. RHAVE stands for Risk, Hazard, and Value Evaluation. It is a set of tools and methods to help fire service and community leaders make objective, quantifiable decisions about their fire and emergency service needs. Risk, hazard and value evaluations are performed at the following three levels. The RHAVE process was designed with some specific parameters:

- The basic system should be capable of being completed and used by trained personnel.
- The system should be adjustable according to the size and complexity of the community.
- The system should result in results that are understandable by both fire professionals and elected governmental officials.

The RHAVE process is not a fire spread of fire behavior modeling process and does not predict losses, but rather it characterizes potential for loss.

The RHAVE program has divided the assessment into four major categories:

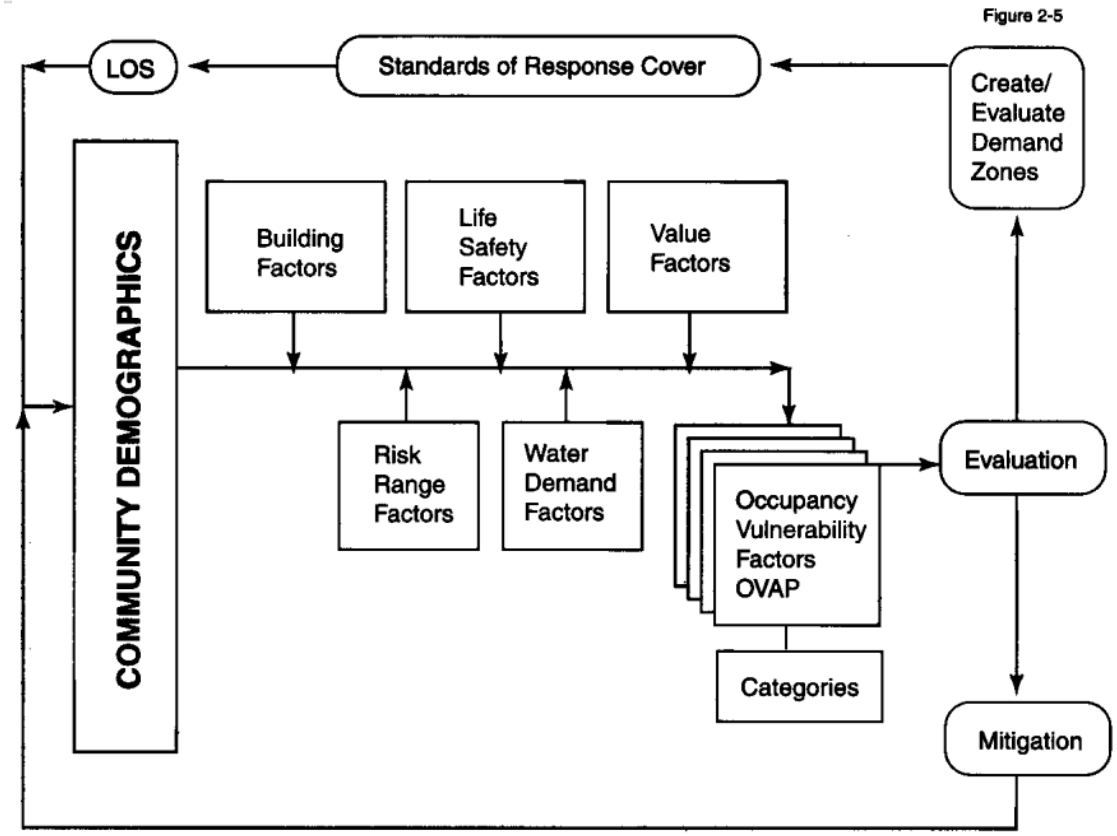
- Category 1, extreme or maximum risk properties. The Novato Fire District does not have any structures that meet this risk category.

- Category 2 or major risks properties do exist within the Fire District. The structures are outlined based on station response area. For an area to be classified as high hazard or key risk, it should contain continuously built-up areas of substantial size with a predominate concentration of property presenting a substantial risk of life loss, a severe financial impact on the community or unusual potential damage to property in the event of a fire. The major risk properties (mostly apartments and office buildings) within the Fire District are included in Appendix 5.

- Category 3 or routine or typical risk properties are abundant within the Novato Fire District. For an area to be classified as routine risk, it should contain built-up areas of average size. The risk of life loss pr property damage to property in the event of a fire is a single occupancy usually is limited to the occupants, although in certain areas, such as small apartment complexes, the risk of death or injury may be relatively high. These risks are often the greatest factor in the distribution of fire stations.

- Category 4 or remote or isolated risks do exist within the Fire District and generally are classified as ranches and areas on the perimeter of the District. These generally are isolated from any centers of population and contain few buildings. We have not analyzed these types of structures.

RAVE Formula



3.6.4.a Critical facilities

Critical facilities incorporate essential facilities that if damaged or destroyed, could severely hinder a jurisdiction's ability to properly respond with vital service in the event of a disaster. Such facilities could be: emergency operations centers, police and fire stations, hospitals, transportation systems and others. The table below lists various critical and important facilities within the fire threat area.

Table 3-13 Critical Facilities in Wildland Urban Interface Fire Threat Area

	Total Number	Not in Threat Area	Within Threat Area
Health Care Facilities:	7	2	5
Hospital	1	1	0
Long-Term Care Facility	1	0	1
Primary Care or Specialty clinic	3	0	3
Home Health Agency or Hospice	2	1	1
Schools:	20	5	15
Elementary School	13	4	9
Middle School	3	0	3
High School	3	1	2
College	1	0	1

Critical Facilities:	28	2	26
City-owned	17	0	17
Owned by Special Districts	11	2	9
Bridges and Interchanges:	44	17	27
Locally –owned	16	4	12
State Owned	28	13	15

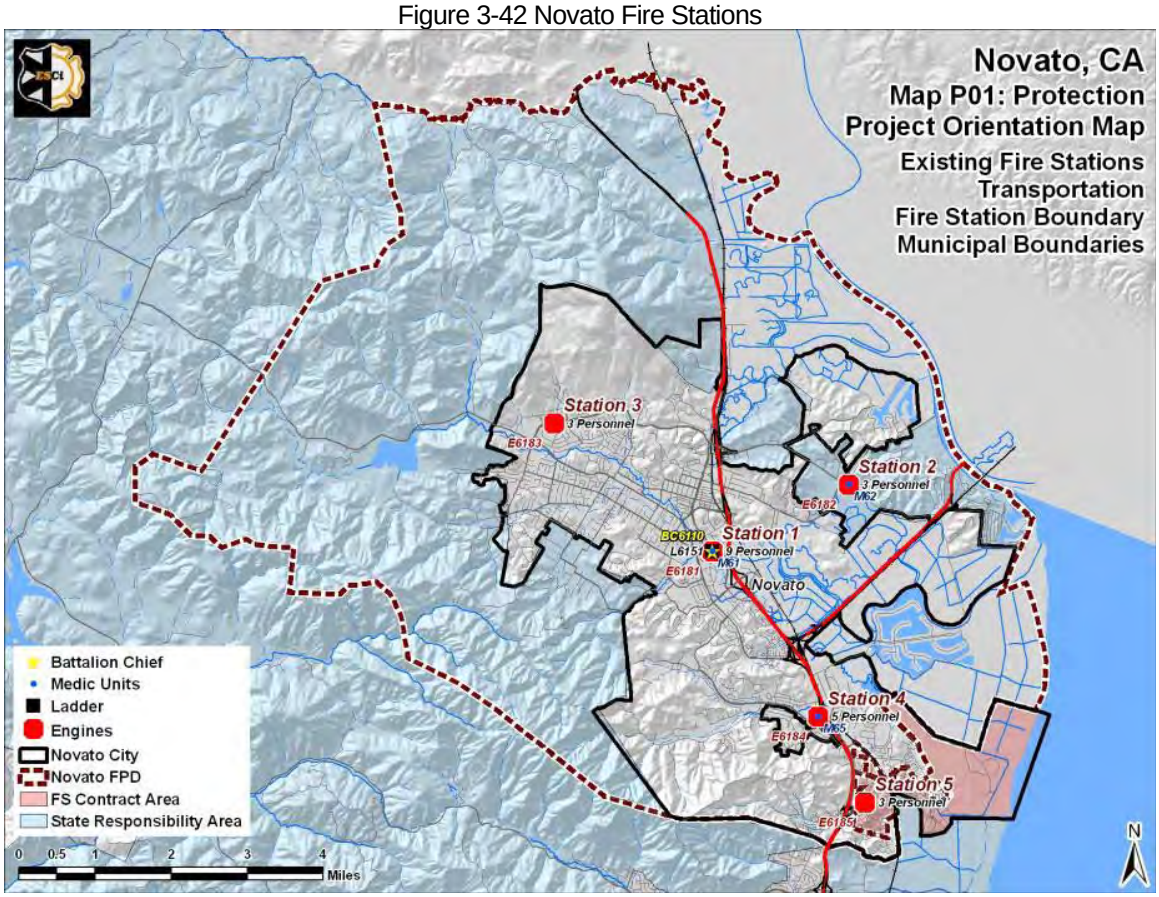
Source: Association of Bay Area Governments, 2004.

Note: Health care facilities are based on a list of licensed facilities from the California Office of State Health Planning and Development.
K-12 schools, colleges, and universities are based on a combination of addresses from Thomas Bros. and the individual facilities.
Special Districts should not be considered a complete count of special district facilities.
For critical facilities and bridges/interchanges, these numbers are draft totals. It is possible that the sum of the hazard categories will not equal the total number of facilities.

Fire fighters are often the first responders not just for fires but also for earthquakes, floods landslides and other emergencies. It is critical that fire stations and the personnel and equipment they hold are undamaged and operational for response to every type of disaster that could in the Novato area.

The main type of government facility located in or near high wildfire risk areas are fire stations. The locations of Novato Fire stations are identified in the map below. There are many benefits to having stations in these high risk areas because it places equipment and personnel in good positions to respond to events in their area. This map also identifies the District's Administration Building which also houses the City's Emergency Operations Center.

Figure 3-42 Novato Fire Stations



Public schools in California are designed to high fire-resistant standards, but these construction methods are intended to protect against small structure fires, not a major wildfire. Figure 3-37 below identifies schools in Novato and their location in relation to the WUI boundary.

Figure 3-43 Novato schools in relation to WUI boundary

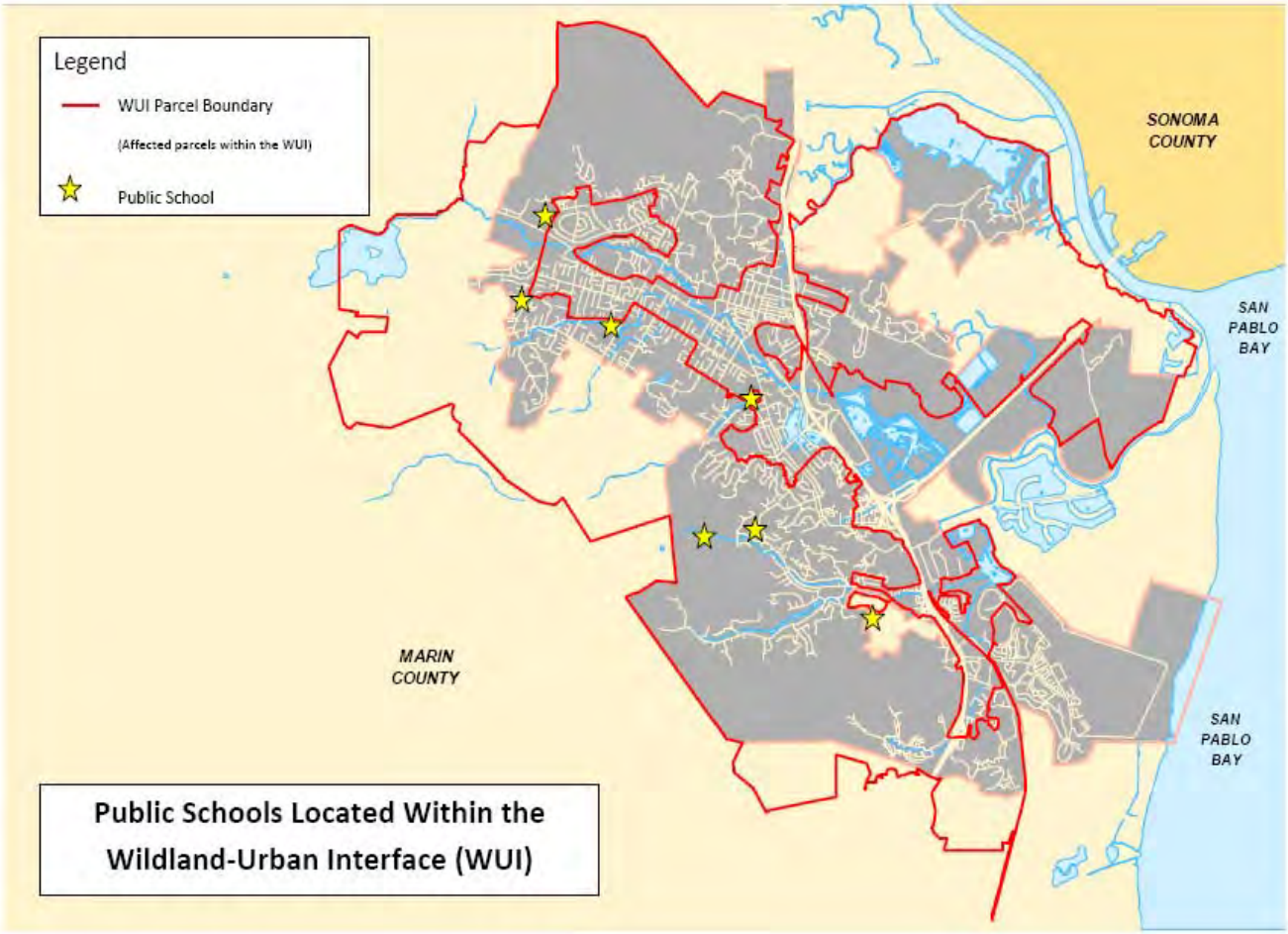
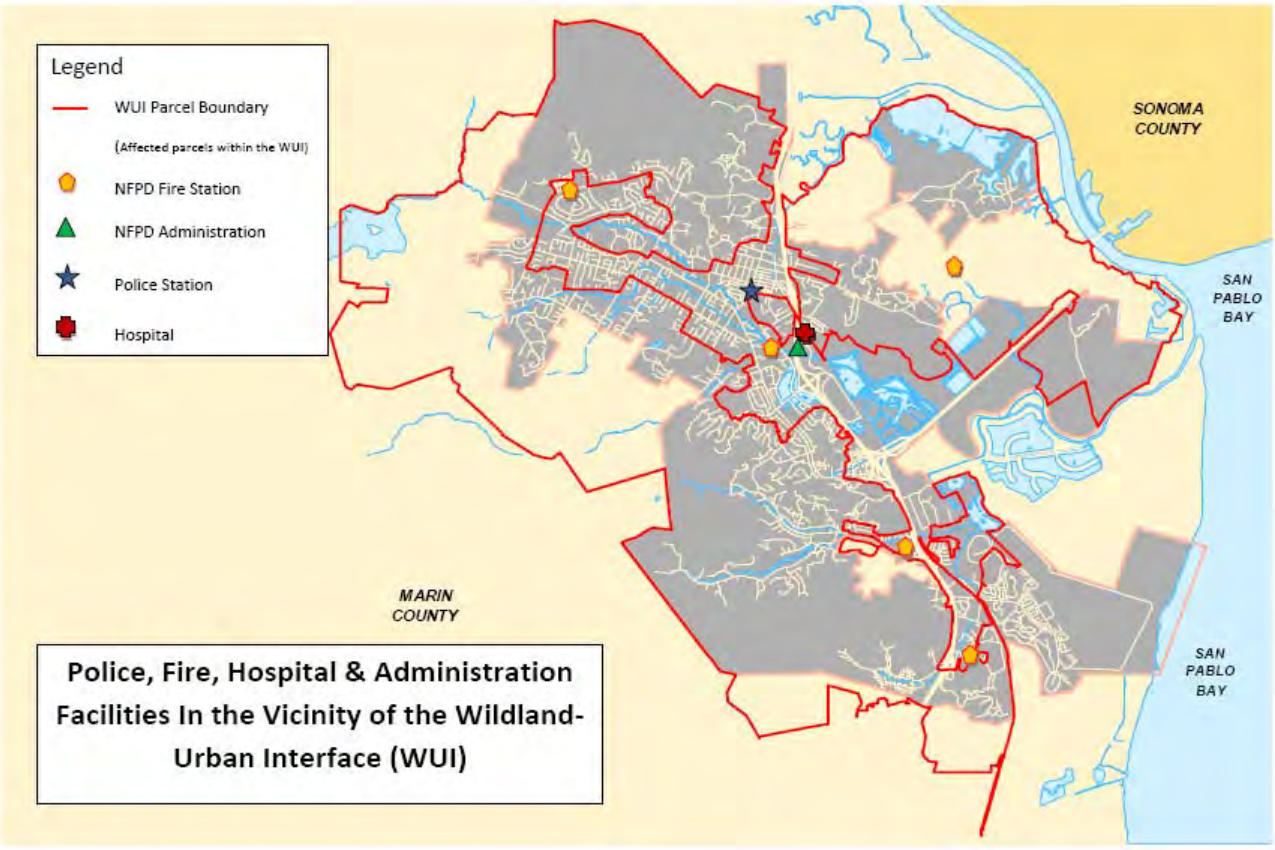


Figure 3-44 Emergency Facilities in relation to WUI boundary



Utility systems can be damaged by wildfires especially those located near or in the wildland/urban areas. Electricity, telephone and cable wires and the poles that support them can burn. Facilities and related equipment can also burn during intense fires.

The City requires each development to indicate the manner in which water is to be supplied and provide provisions for adequate water supply.

3.6.5 Impact and Loss Estimates

The three methods of interface fire hazard mitigation most often associated with increased structure survival are: ignition resistant building construction, vegetation clearance, and defensive actions during the wildfire exposure. However, it is important to not have unreasonable expectations of mitigation measures. A one-third or two-third reduction in historic loss patterns is reasonable with full implementation of both fuel reduction and improved building construction.

According to ABAG projections, a total of 13,087 properties are located in the wildland urban interface fire threat area. Their market value estimate of the properties in the WUI is listed in the table below.

Table 3-14 Properties in Wildland urban Interface area

Novato Wildland Urban Interface Fire Threat	Total	Within Threat Area
Residential and Mixed Use Properties		
Number of properties	14,424	11,305
Estimated market value ($ millions)	$6,148	$5,041
Commercial and Recreational Properties		
Number of properties	843	633
Estimated market value ($ millions)	$1,012	$721
Industrial and Other Properties		
Number of properties	1,416	1,149
Estimated market value($ millions)	$649	$457
Grand Total		
Number of properties	16,683	13,087
Estimated market value ($ millions)	$7,810	$6,219

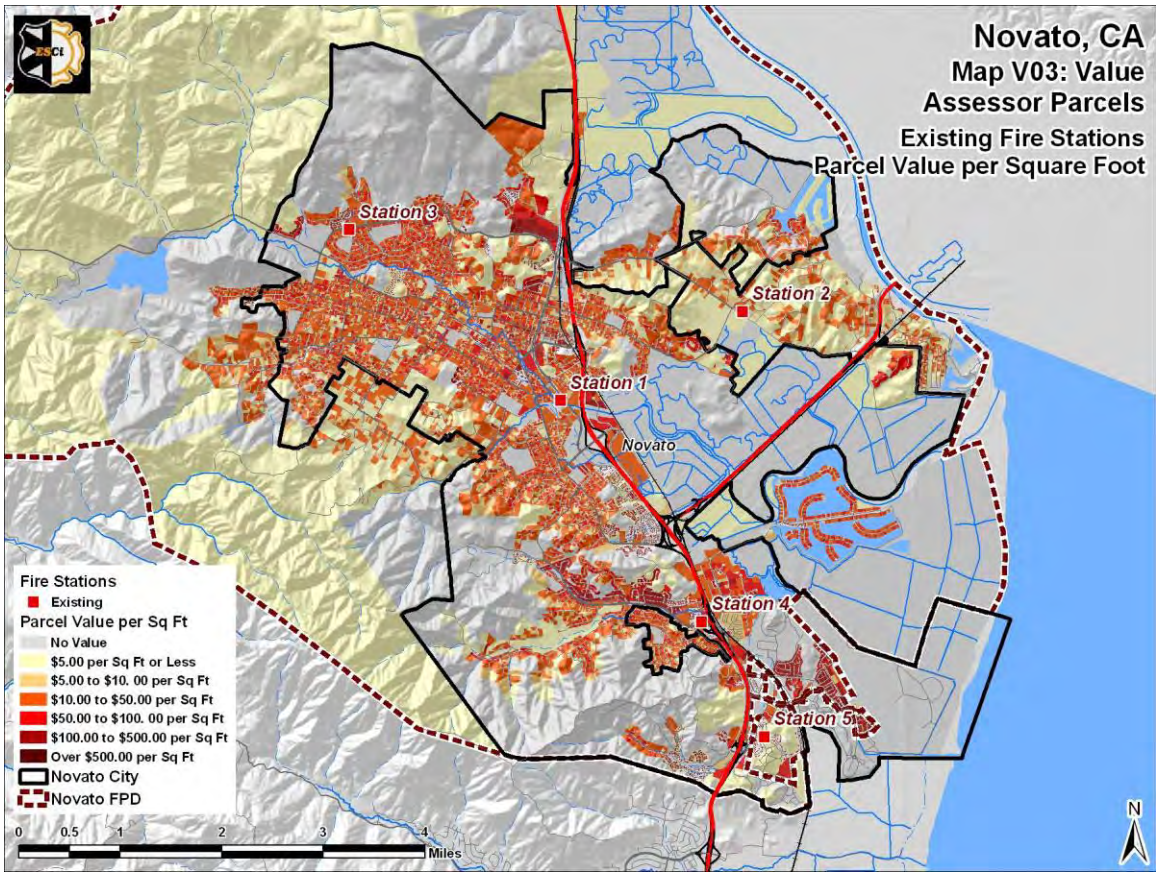
Source: Association of Bay Area Government, 2006

Note: Because of independent rounding, subcategories may not add to totals. Values are in millions of dollars.

The ability to estimate potential losses from wildfires is available--in more detail than listed in the table above--with computer models. They are however, very expensive and impractical for use in this plan and beyond the financial ability of the city to purchase.

Of the 50 structures burned in 2009, 6 were housing units; with an average replacement cost of $450,000 these housing units have an estimate replacement cost of approximately $2.7 million. The map below identifies assessor parcels and their values per square foot.

Figure 3-45 Value Assessor Parcels



Damage costs due to wildfires in California have increased from $30 million in 2000 to $974 million in 2003. In 2003, San Diego County was hit hard by wildfires. The Cedar fire burned 280,000 acres, destroyed over 2,400 residential properties, and killed 14 people. The simultaneous Paradise Fire burned an additional 57,000 acres and destroyed more than 200 homes. California spent an estimated $9 million per day fighting the 2003 season wildfires. FEMA awarded $17 million housing assistance and other grant to San Diego County, insured losses for this fire exceeded $2 billion.

Table 3-15 Costs of Wildfires in California

Year	Number Fires	Acres Burned	CDF Suppression Costs	Damage Cost	Structures Destroyed
2003	5,953	397,732	$252 million	$974 million	5,420
2002	5,759	112,810	$135 million	$174 million	327
2001	6,223	90,985	$109 million	$87 million	389
2000	5,177	72,718	$124 million	$30 million	130

3.7 Land Slide

3.7.1 Hazard Identification

Landslides include all movements of soil, rock or debris as a result of falling, sliding or flowing. The triggering cause may be heavy rainfall or seismic activity. An untimely occurrence of a large earthquake during or soon after a sustained period of moderate to heavy rainfall could produce a landslide problem of monumental proportions.

Debris avalanches, debris flows and associated storm-triggered landslides' have caused most of the deaths and much of the structural damage attributed to land sliding in California. Such incidents have occurred frequently in the past and as growth and development place more people, more structures and more roadways in areas susceptible to landslides, the potential destruction and cost of storm related landslides becomes greater.

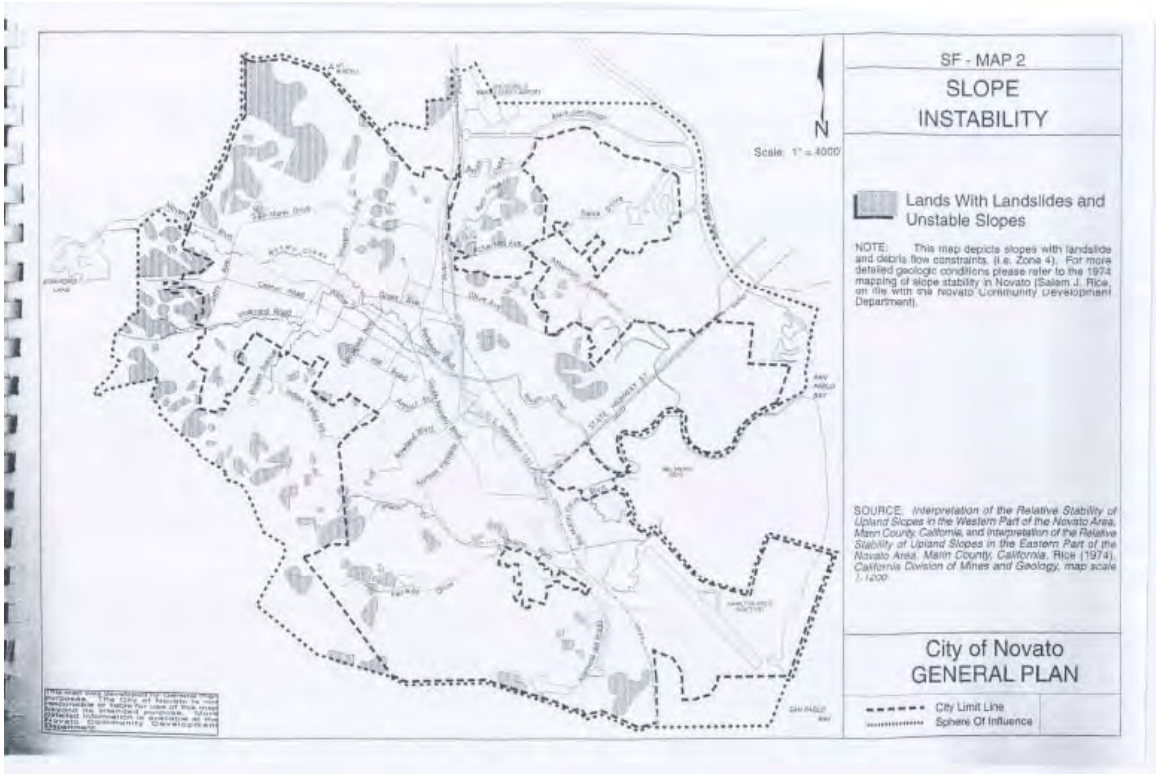
3.7.2 Future Potential

The best available predictor of where movement of slides and earth flows might occur is the distribution of past movements (Nilsen and Turner, 1975). These landslides can be recognized from their distinctive topographic shapes, which can persist in the landscape for thousands of years. Most of the landslides recognizable in this fashion range in size from a few acres to several square miles. Most show no evidence of recent movement and are not currently active. Some small proportion of them may become active in any one year, with movements concentrated within all or part of the landslide masses or around their edges.

According to the General Plan, potential hazards may be present when there are thick colluvial soils, soils on steep slopes, and expansive soils which in the presence of moisture, swell and shrink when returning to a dry condition. This hazard is compounded when unstable colluvial soils overlay geologically unstable formations, such as fault zones prone to earthquakes. Figure 3-41 below identifies areas of slope instability.

Several types of down slope movements produce soil instability, including landslides, soil creep and debris flows. Landslides are the rapid slide of bedrock and/or overburden. Landslide is generally large and destructive, involving millions of tons of rack. Though landslides can be naturally occurring, a frequent cause of landslides in California is the undercutting of slopes for construction. Sometimes these types of landslides can be more expensive than naturally occurring slides because there is usually a road or building beneath them to be damaged or destroyed. Soil Creep is the slow down slope movement of overburden and is the most common type of down slope movement.

Figure 3-46 Slope Instability



3.7.3 Event History

Some of the largest ancient landslides in the San Francisco Bay area are on a four-mile stretch on the coastal side of Inverness Ridge at the south end of Point Reyes. Most of the area is now stable, but several lakes there owe their existence to these slides.

1982

Debris flows are shallow landslides that transform into muddy slurries and travel down slope rapidly. On January 3-5, 1982, an exceptional rainstorm created debris avalanches throughout the San Francisco Bay area. These avalanches resulted in damages to at least 100 homes, and in the deaths of 15 residents.

1998

In Marin County, the early February rains of 1998 caused several landslides that resulted in at least $2,540,000 in damage to public and private properties. The landslides occurred mainly near the cities of Tomales, Mill Valley (including unincorporated areas), and Novato. Approximately 58% of the county's total cost was related to damage caused to homes by earth or debris slides. Two homes in the county were red-tagged. "Tagged" structures are those that have been either condemned (red) or in need of significant repair (yellow). More than nine landslides damaged public transportation corridors, although the cost was less than that to private properties. These landslides were rotational block slumps that removed one lane of many two-lane roads around the county, especially on steep, twisting roads near the coast, such as Panoramic Highway and Dillon Beach road. The main source of information for this report came from Jack Baker of the County Public Works and Valerie Quigley of the Office.

2005

Over a 24 hour period ending the afternoon of December 31, 2005, 4.45 inches of rain fell in Novato. Wind speeds reached 60 miles per hour and blew down trees and toppled power lines leaving 13,285 Marin County residents without power. The rain caused mudslides that blocked roads and damaged homes in North Marin areas. The most significant damage was incurred by homes on Pacheco Creek Drive where a debris flow from an upslope fire road in County Open Space removed part of one house and forced the temporary evacuation of three houses. The storm also caused breaches in Novato levees: 1 50-70 foot breach behind Novato Community Hospital at 100 Rowland Way and another breach at Davidson Drive.

The Novato Emergency Operations Center (EOC) was activated at 5:45 am at 95 Rowland Way as a result of the evacuations due to flooding and residential damages that occurred. Many residents required boat rescue on Nave, Joan, Laruen, Center and Diablo Ave, several streets were also evacuated. On McKeon Ct. and Wilmac Ave several flooded properties and damaged homes experienced repetitive loss when Wilson Creek bypassed the Center Road Bridge. Portions of Highway 101 SB near San Marin Drive and Hwy 37 EB near Novato Creek and the industrial park were closed to through traffic for several hours. Slides forced may families to be evacuated from residents in the Pacheco subdivision.

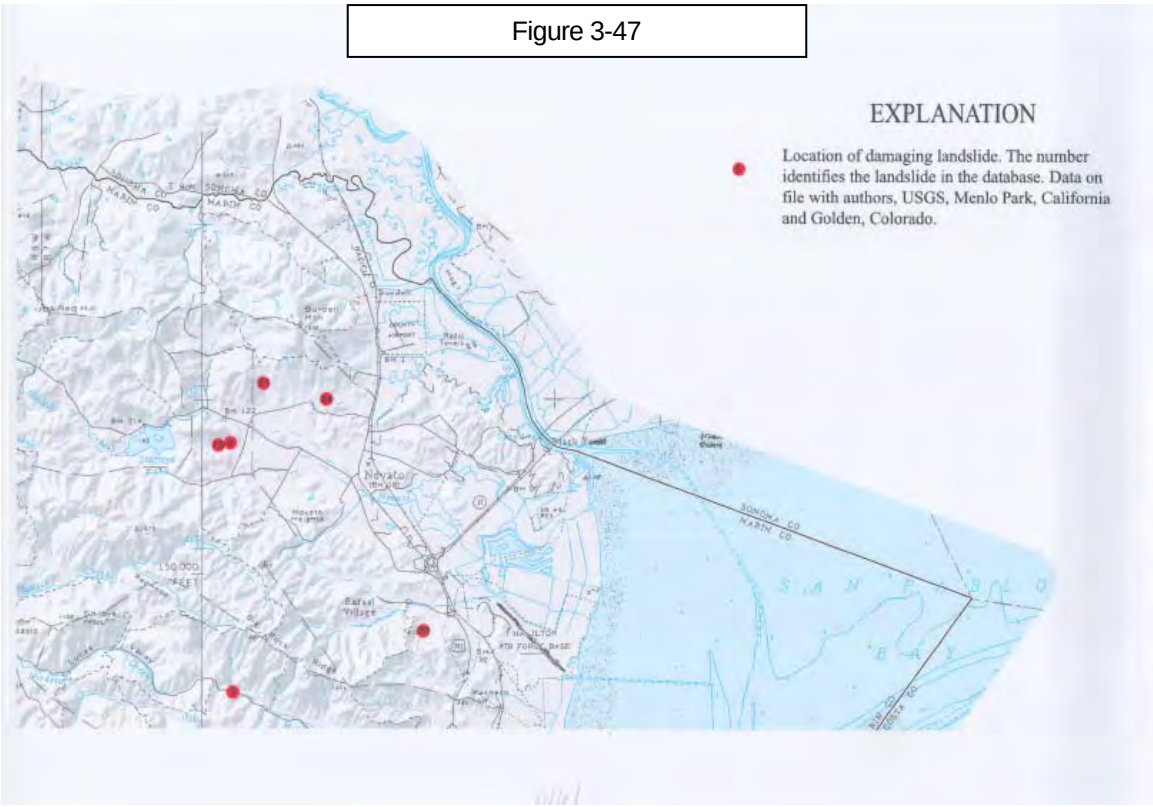
Most of these events caused sufficient damage to warrant a Presidential disaster declaration, allowing Federal assistance to e made available within the disaster area. Approximately thirteen DR projects valued at $261,000 in damages were submitted to FEMA for reimbursement. All fund reimbursement was approved by FEMA and have been paid and closed.

During the week the Public Works staff was busy with activities related to the intense storm events that occurred. The most significant damage was incurred by homes on Pacheco Creek Drive where a debris flow from an upslope fire road in County Open Space removed part of one house and forced the temporary evacuation of four houses. Staff responding to the emergency arranged for North Bay Construction to perform immediate debris removal and cleanup which was completed on January 4, 2005. The County Open Space District has arranged for a geotechnical engineer to examine the

situation and develop both short term and long term stabilization options. The Open Space personnel have placed plastic sheeting and diversion piping to divert rain water from the debris origin and path. Staff has engaged another geotechnical engineer for a peer review of the County's consultant proposal. Staff has contacted Republic Electric to replace a light pole that was removed by the debris flow. Staff will keep the homeowners informed of any repair proposals that the consultants develop.

Figure 3-42 shows locations of damaging landslides in Marin County, resulting from 1997-98 El Nino rainstorms.

Figure 3-47



3.7.4 Exposure and Vulnerability

Areas of Novato that are vulnerable to landslide hazards contain structures, road, sidewalks, underground and above ground utilities. They include roads that are critical for emergency access and evacuation. It is reasonable to assume that a severe storm or strong earthquake shaking could cause dozens of slides. Areas that could be impacted include, but are not limited to Pacheco Creek.

Because debris flows travel down slope and downstream from source areas, hazards commonly extend beyond the red zones show on the following USGS seismic hazard map. In the vicinity of the red zones, common areas of hazard are 1) near the base of steep hillsides, 2) near the mouths of steep side hill drainages, and 3) in and near the mouths of canyons that drain steep terrain.

The map shows the principal source areas of debris flows from natural hill slopes in the region. Debris flows and other fast-moving landslides may also occur from man-made slopes, such as the cut slopes along highways in hilly terrain, but such sources generally are not shown on the map. Debris flows also are possible from unmodified steep areas outside of the red zones, but we expect that most debris flows will originate in or near the red zones of the map. This is an aerial topographically-enhanced map showing established seismic geological hazards. The colors (magenta to purple) indicate the magnitude of the hazard; the lighter the hue the fewer hazards.

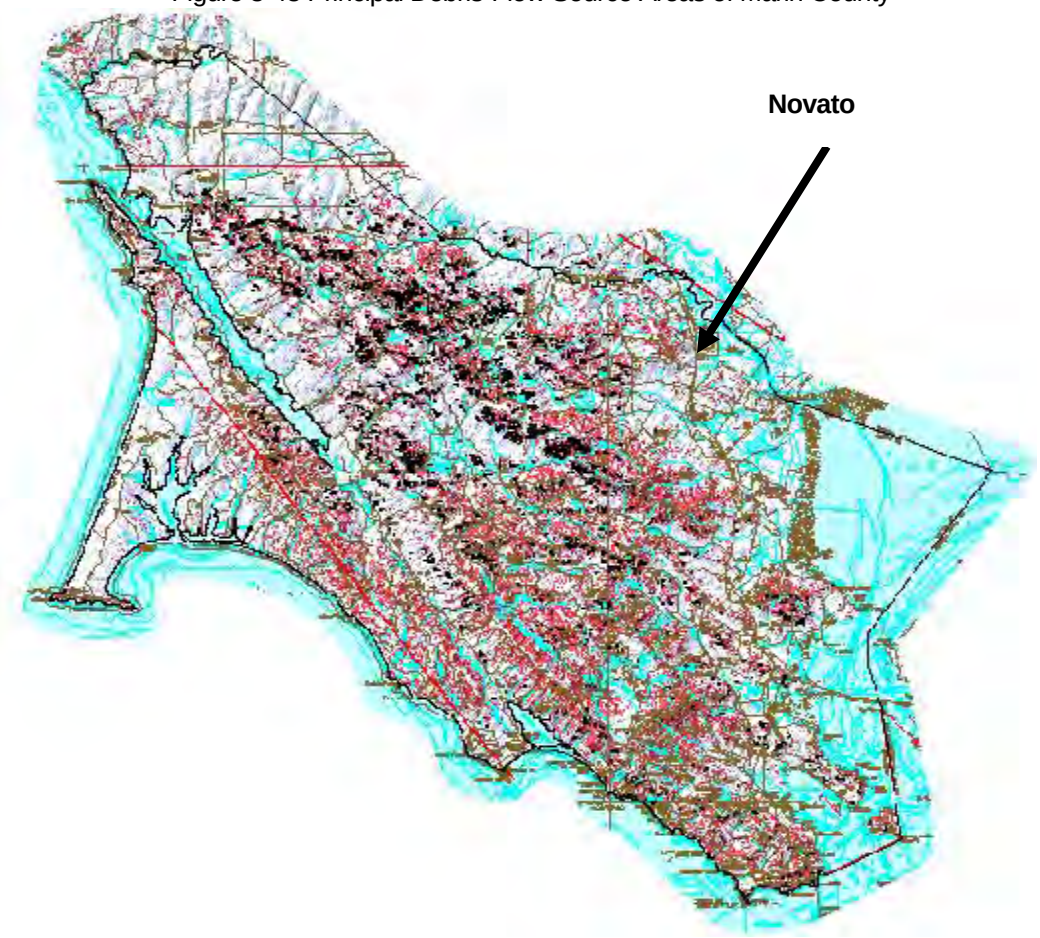
Because the map depicts source areas and not flow paths, and because of its broad area coverage and small scale, the map is intended to be used as a guide to general areas of debris-flow hazard rather than as a predictor of hazard at specific sites. Appropriate uses include storm-preparedness planning for emergency access and response.

The map provided by USGS below identifies the principal areas in Marin County that are likely to produce debris flows, which are also called "mudslides." Debris flows that occur in the bay region are fast-moving down slope flows of mud that may include rocks, vegetation, and other debris. These flows begin during intense rainfall as shallow landslides on steep slopes. The rapid movement and sudden arrival of debris flows pose a hazard to life and property during and immediately following the triggering rainfall.

Debris flows in a given storm originate from a number of sources scattered throughout steep parts of the landscape during subsequent storms, new debris flows originate from different sources. These various sources, however, are similar in topographic form because debris-flow initiation requires steep slopes and prefers concave parts of hillsides. These topographic characteristics are used to predict the likely future source areas shown on this map.

The red zones on the map below portray the principal areas from which debris flows can be expected during future storms. The black dots represent the debris-flow sources mapped after the catastrophic storm of January 1982. The dots provide an example of the abundance of debris flows that might be expected during a major rainstorm, and they illustrate the approximate nature of this predictive map.

Figure 3-48 Principal Debris-Flow Source Areas of Marin County



Principal predicted debris-flow source areas

Approximate source areas of debris flows triggered during the storm of January 1982

Approximate extent of mapping of 1982 debris flows

3.7.4.a Critical facilities

Critical facilities incorporate essential facilities that if damaged or destroyed, could severely hinder a jurisdiction's ability to properly respond with vital service in the event of a disaster. Such facilities could be: emergency operations centers, police and fire stations, hospitals, transportation systems and others.

According to ABAG estimates in the table below, there are eight city-owned critical facilities located within the "Mostly a Landslide Area". The City Maintenance yard and the Novato Sanitary District facilities are located near an area where the access road passes near areas of lands with landslides or unstable slopes. Landslide damage could cause access problems for the maintenance vehicles and equipment possibly impeding response travel times to emergency and rescue operations. However, the police department, fire administration building, and the emergency operation center are not located near a potential landslide or unstable slope.

Table 3-16 Critical Facilities in a Landslide Area

	Total Number	Very Few or No Landslides	Few Landslides	Mostly a Landslide Area
Health Care Facilities:	7	6	1	0
Hospital	1	1	0	0
Long-Term Care Facility	1	1	0	0
Primary Care or specialty Clinic	3	2	1	0
Home Health Agency or Hospice	2	2	0	0
Schools:	20	18	2	0
Elementary School	13	11	2	0
Middle School	3	3	0	0
High School	3	3	0	0
College	1	1	0	0
Critical Facilities:	28	18	2	8
City-owned	17	7	2	8
County-Owned	0	0	0	0
Owned by Special Districts	11	11	0	0
Bridges and Interchanges:	44	42	1	0
Locally-Owned	16	15	0	0
State-owned	28	27	1	0

Source: Association of Bay Area Government, 2004.

- Health care facilities are based on a list of licensed facilities from the California Office of Statewide Health Planning and Development.
- K-12 schools, colleges, and universities are based on a combination of addresses from Thomas Bros. and the individual facilities.
- Water, transit, fire and other special districts are included, but this should not be considered a complete count of special district facilities.
- For critical facilities and bridges/interchanges, these numbers are draft totals.
- It is possible that the sum of the hazard categories will not equal the total number of facilities.

3.7.5 Impact and Loss Estimates

Landslides and associated types of slope failure have become major geologic hazards in the San Francisco Bay region. As increasing development of hillside areas has taken place, the annual cost of damage from slope failure can be in the tens of millions of dollars. These losses can be greatly reduced by using geologic information to recognize, evaluate, and map those areas of potential instability, and applying this information in planning, designing, and organizing the use of hillside areas. Total direct costs of landslide damage from the January 3 to 5, 1982 storm in Bay Area counties exceeded $66 Million. Debris flow and other landslides resulting from the January 3-5, 1982, storm were mapped throughout the San Francisco Bay region from aerial photographs.

During heavy rain falls, excessive water consistently triggers mudslides in the county and have caused significant infrastructure damage during the floods of 1970, 1973, 1982, 1983, 1986, 1998, and January of 2005). Additionally, the potential for a significant earthquake increases the probable impact of landslide hazard threat throughout the county. Due to the 1998 storms, over $2.5M damages were caused due to landslide damages in Marin County.

The flooding of December, 2005, caused sufficient damage to warrant a Presidential disaster declaration, allowing Federal assistance to be made available within the disaster area. Approximately thirteen DR projects valued at $261,000 in damages were submitted to FEMA for reimbursement. All fund reimbursement was approved by FEMA and have been paid and closed. One resident was killed in 2006 as a result of a slide in Mill Valley.

According to ABAG projections, a total of 1,902 properties are located in the “Mostly a Landslide Area”, market value estimate of these properties is listed in the table below.

Table 3-17 Properties in the Mostly Landslide Area

	Total	Few Landslides	Mostly a Landslide Area
Residential and mixed use properties: Number of properties	14,424	3,519	1,821
Estimated market value ($ millions)	$6,148	$1,579	$925
Commercial and Recreational properties: Number of properties	843	202	28
Estimated market value ($ millions)	$1,012	$150	$42
Industrial and Other Properties: Number of properties	1,416	265	53
Estimated market value ($ millions)	$649	$102	$113
Grant Total:			
Number of Properties	16,683	3,986	1,902
Estimated Market value ($millions)	$7,810	$1,832	$1,080

Source: Association of Bay Area Governments, 2006

Note: Because of independent rounding, subcategories may not add to totals. Values are in millions of dollars.

3.8 Land Use

There are a number of underlying policies and objectives that form the foundation for the goals and policies of the land use in Novato. The policies have been defined in the Land Use Element of the City's General Plan including land use designations, infrastructure and public services, constraints analysis, the City's Sphere of Influence, and coordination with other local jurisdictions Central issues addressed are how to relate the development goals of Novato to the capacity of the transportation system and other infrastructure and to environmental constraints, and how to define limits to urbanization through a tightly drawn Sphere of Influence. The Novato General Plan is attached as Appendix 6.

Figure 3-45 below designates the general distribution and intensity of uses of land for housing, business, industry, open space, education, public buildings and facilities.

The City seeks to encourage efficient land use growth patterns that foster and protect the rural character of Novato while encouraging appropriate economic development in accordance with the City's unique local conditions. Ideally, Novato's future land use and development trends aim to attract a variety of businesses that can provide a range of job opportunities suitable for residents to work within the community, thereby reducing out-commuting and traffic congestion. The City has an active Redevelopment Agency that is making considerable strides to redevelop Novato's Historic Downtown and lands of the prior Hamilton Army airfield consistent with these land use objectives. The City also seeks to protect agricultural, natural resources, open space and community separator uses, public and private outdoor recreation uses that foster public health and safety, and farming enterprises.

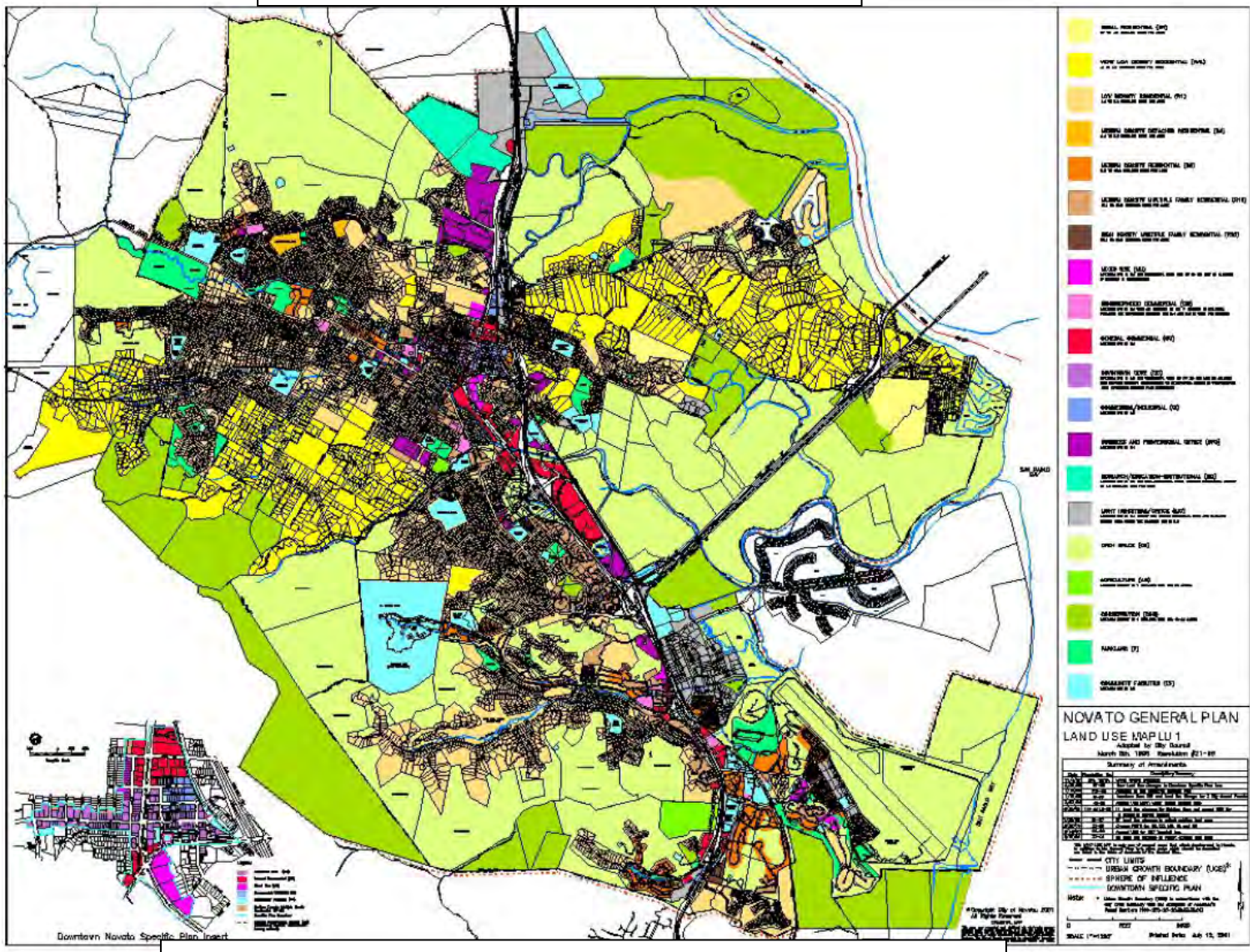
Land use decision-making is guided by the goals, policies and implementation measures contained in the text of the Land Use Element. The General Plan guides land use planning and policy decisions to reduce safety risks and achieve an acceptable level of public protection from known natural and man-made hazardous events.

The City is currently updating its General Plan. The update process is expected to take approximately three years to complete with the final version adopted by Council by the end of 2013. The plan will address major changes since 1996 including: physical conditions, scientific knowledge, new residents and State law.

The Safety Element of the Plan is scheduled to commence revision during the spring of 2012. Included in the revision of the Safety Element will be the integration of the Wildland Urban Interface (WUI) regulations developed by the Fire District and considerations to impacts due to sea level rise from climate change and expanded disaster preparedness provisions.

The hazard mitigation process (HMP) has provided the City with the opportunity to review and expand on policies contained within the general plan. The City views the general plan and the HMP as complementary planning documents that work together to achieve the ultimate goal of the reduction of risk exposure to the citizens of Novato. As the general plan updates proceed the approved HMP will be integrated into the final version of the general plan. Many of the ongoing recommendations identified in Implementation Plan of the HMP are programs recommended by the general plan.

Figure 3-49 Land Use Designations map



A larger copy of this map is available from the Planning Department

There are 20 land use categories in the 1996 General Plan Land Use map. Via goals, objectives, policies and programs, the Plan places emphasis on downtown revitalization. The figures in Table 3-18 below show the estimated maximum development allowed under the Plan; actual development may be considerably less. Maximum remaining potential development within the range and amount of land use areas is provided for future environmental impacts and infrastructure and service needs.

To assure that Levels of Service for transportation other public facilities, services and natural resources are maintained, the 1996 General Plan includes policies and programs for growth management and development on hillsides, slopes, wetlands and other sensitive environment settings.

Table 3-18

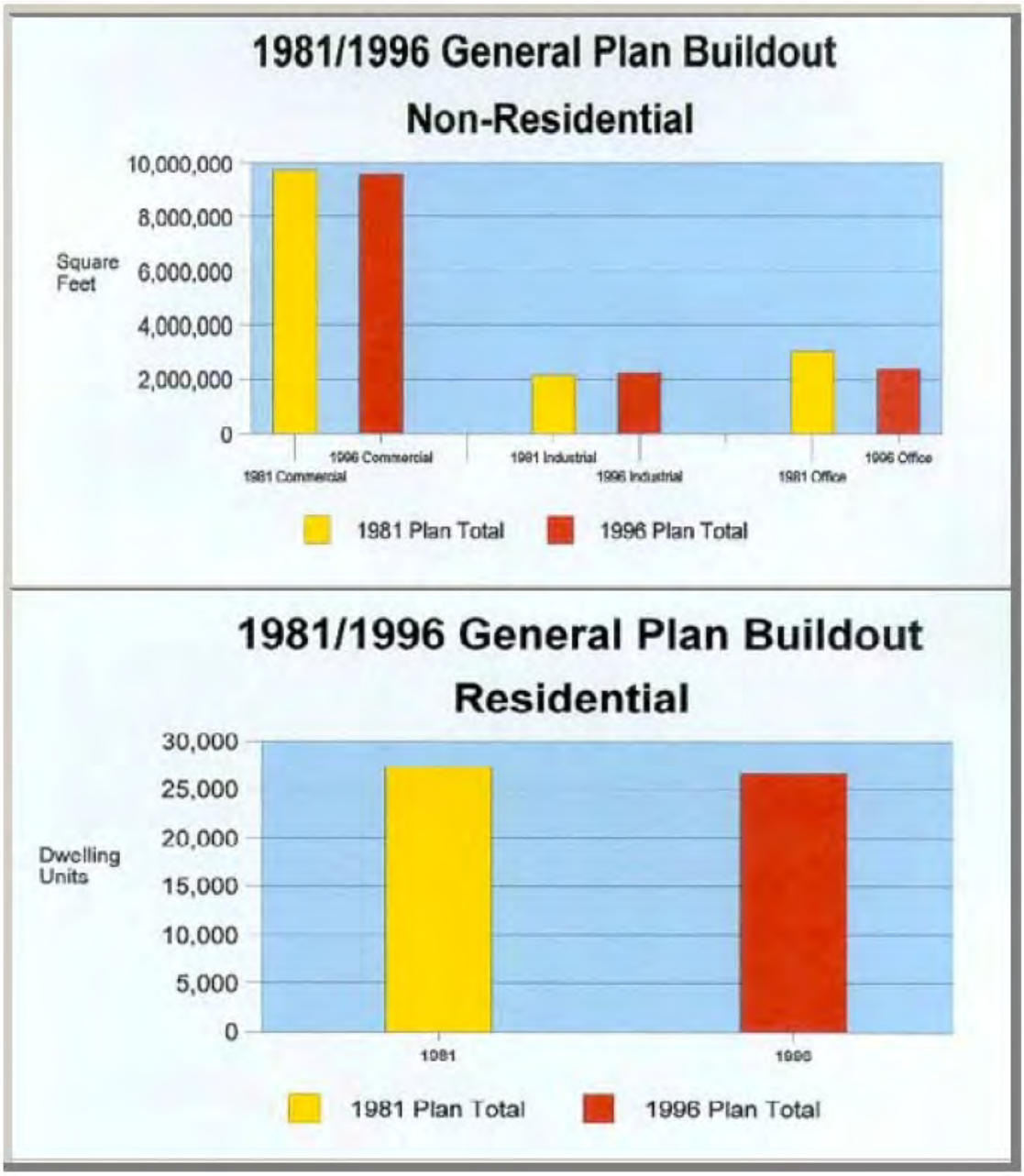
Build Out Under the City's 1996 General Plan				
Land Use	Existing Build and Vested 1995	1996 General Plan Estimated Increase Above 1995		1996 General Plan Total Estimated Build out
Residential	21,044 DUs	5,465 DUs	25%	26,509 DUs
Commercial	6,207,352 SF	3,372,103 SF	54%	9,579,455 SF
Industrial	135,549 SF	2,080,229 SF	1,534%	2,215,778 SF
Office	1,138,793 SF	1,253,848 SF	110%	2,392,641 SF

NOTES:

- "Existing built and vested" includes development under construction as of May 1995 and development, which is "vested" as guaranteed by a Development Agreement or other means.
- "Commercial" includes all development not strictly defined as "Industrial": or "office." It includes retail, wholesale, services, mixed non-residential uses, etc.
- Build out estimates include development on all vacant or under-developed land not publicly owned.

DUs = Dwelling Units SF = Square Feet

Figure 3-50



3.8.1 Current and Future Land Use Trends and Vulnerability

Existing land use in Novato is predominantly residential, in the valley areas west of Highway 101 and in pockets along the San Pablo Bay historic flood plain east of the freeway. Most units are

single-family detached on lots under one acre in size. With the increasing costs of land, however, the number of attached and multi-family units has increased.

Commercial uses are concentrated downtown along Grant Avenue, along Redwood Boulevard, in pockets along Highway 101, and in various small clusters and convenience centers. The Vintage Oaks Shopping Center, located east of the freeway and south of the Rowland Boulevard interchange, in the Novato Redevelopment Project Area, opened in 1991. The Novato Redevelopment Project is among the special land use controls in place in the City. It was established to re-plan and reuse a previously underutilized area by developing a regional shopping center, to increase employment opportunities and the supply of low- and moderate-income housing, and to provide public improvements. The project area covers approximately 400 acres east of Highway 101, north of Route 37, and south and west of Novato Creek.

Offices are located along the freeway, in and around Downtown, along Novato and South Novato Boulevards, and within the industrial parks. Novato Industrial Park contains the bulk of the City's warehousing, distribution, and manufacturing uses. Several industrial operations remain near the downtown, between the railroad and Redwood Boulevard.

Hamilton Field was closed in 1974; approximately 450 acres were declared surplus in 1979 and auctioned to private sector bidders in 1984. Approximately 270 acres adjacent to San Pablo Bay were transferred to the State for open space preservation. In 1993 the City approved plans of the New Hamilton Partnership for mixed use. Hamilton Field, now developed, includes 983 residential units and approximately 825,000 square feet of office, light industrial, and retail use; and 200+/- acres of parks, open space, and sport fields.

In 1995, the City, in cooperation with Marin County, also adopted a plan for a remaining 1,099 acres, known as the "Hamilton Reuse Plan." Now developed, the Plan area provides Low Density, Medium Density, and Medium Density Multiple Family Residential uses, representing 1,171 units of which 775 are affordable; 43 acres of Community Facilities and Civic Uses (including an 80-bed homeless housing and services facility, 92 transitional housing units); 8 acres of developed and planned commercial uses (including Neighborhood and General Commercial uses); 24 acres of parkland; and 795 acres of open space and wetlands.

Agricultural activities continue primarily outside the City Limits, in the areas west of Gnoss Field, south of Bell Marin Keys, and within the Indian Valley area.

A network of open space surrounds the Sphere of Influence defined in the Marin Countywide Plan as bounded by the Inland Rural Corridor on the west and north, San Pablo Bay on the east, and the San Rafael Sphere of Influence on the south. The Ignacio Valley and Indian Valley Open Space Preserves form the southwestern edge of the Sphere of Influence the Verissimo Hills Open Space Preserve, O'Hair Park site, and Mt. Burdell Open Space Preserve form the northwestern edge; Pacheco Valley and Loma Verde form the southeastern edge; and the Petaluma River and San Pablo Bay from the eastern and northeastern edges.
Several public and private projects have been the subject of great attention in recent years. Among the most significant to the City's future are:

Approved by the Marin County Board of Supervisors in 1994 and subsequently annexed into the City via voter initiative, the Buck Center for Research in Aging (BCRA) is located within the northern City limits, west of Highway 101. BCRA, being developed in phases, will consists of a 355,000sf laboratory and research facility and 130 units of housing for research assistants and other BCRA personnel.

Between 1980 and 2010, the City of Novato and its Sphere of Influence (SOI) has grown from a population of 43,916 to 51,904, an increase of 18 percent. The number of jobs in Novato increased by a far greater percentage - 31 percent - over this 30-year period, however, the recent national economic recession has lead to significant local job loss. The majority of new jobs created over the past 30 years are service and retail jobs.

With the adoption of a 20 year Urban Growth Boundary (valid through October 2017) and corresponding land use policies that target city centered growth rather than “suburban sprawl” type growth the City is expected to pursue more concentrated or infill growth. Infill development will help reduce the potential impact of new development on areas with hazard vulnerability (steep hillsides subject to slide, wild fire etc). Additionally, new development will be required to meet more comprehensive design and structure codes (Uniform Building Code etc), thus making new developments significantly more disaster resilient than older construction within the community.

While new construction will be more resistant to natural disasters like earthquakes (Rodgers Creek and/or Hayward faults) and fire, development near the urban centers of Novato will expose additional residential and commercial properties, and their populations to the associated risks.

In some instances, development of vacant and underdeveloped infill lots particularly along Novato’s drainage systems (Novato Creek etc) and the community’s many hillsides may lead to an increased risk from flooding, landslides and fire. Additional development in these areas can burden existing City special district services, including the Novato Fire District.

Additionally, as Novato grows, it becomes increasingly critical that the utility services (water, sanitary, power, roads etc) that support its population, are able to maintain or quickly resume functionality after a disaster.

The potential for increased vulnerability resulting from new development poses a continuing challenge for Novato planners, elected and appointed officials to balance the need for future development and economic growth with the responsibility for protecting the lives and property of its citizens. Fortunately, Novato has many forward thinking policies and regulations to assist with hazard reduction objectives, including the policies outlined in the Safety and Noise, and Public Facilities and Services Elements of the General Plan, complementary Zoning Ordinances, and Building Codes that meet and exceed the State minimum requirements.

Table 3-19

Location/Development	Type	Units	Status
Sutro Ave/Novato Blvd	SF	13	
N. Novato Blvd./Sutro Ave	SF	22	
San Marin/San Andreas Dr.	SF	100	
San Marin/San Carlos	SF	7	
Woodview Subdivision	SF	20	Complete
Laguna Vista Drive	SF	14	
Rudnick Estates	SF	24	
Atherton Ranch Residential	SF	91	Complete 2005
Atherton Ranch Residential	MF	23	
Nova Ro III Senior	MF	40	Complete 2004
Marion Heights	SF	12	Complete 2008
Marion Ave	SF	10	Complete 2008
Hamilton Meadows	SF	27	Complete 2004
San Pablo Ave	SF	20	Complete 2003
Rafael Village	SF	344	Complete 2005
Rafael Village Senior Housing	MF	100	Complete 2002
Capeheart Housing	Attached	351	Complete 2006
Capeheart Transitional	Attached	60	Complete 2007
Pacheco Ranch	SF	43	
Olive Ridge	SF	19	Complete 2007
Alvarado Inn	MF	20	
Buck	SF	130	
Tranquility	SF	3	
Cherry Hill Apts.	MF	13	
Twin Creeks	MF	10	
Marin Country Club Estates	SF	7	
Virginia Oaks	SF	5	Complete
Sansone	SF	2	
Maginisi	SF	1	
Fiedel	SF	19	
Paradise Ranch	SF	24	
Laguna Vista	SF	23	
Case Subdivision	SF	25	
Leveroni	SF	3	
Villas at Hamilton	MF	121	Complete 2002
Summerhill	SF	37	Complete 2005
Whole Foods Condominium	MF	168	
SF = Single Family MF = Multi-Family			

3.8.2 Recent public and private developments

Hamilton Field Air Force Base

The Hamilton Base was closed in 1974; approximately 450 acres were declared surplus in 1979 and auctioned to private sector bidders in 1984. Approximately 270 acres adjacent to San Pablo Bay were transferred to the State of California for open space preservation. In 1993 the City approved plans of the New Hamilton Partnership for mixed use with subsequent revisions, the project will have up to 955 residential units; 825,000 square feet of office, light industrial, and retail use; and 200 acres of parks, open space, and sport fields. Construction of the Hamilton Master Plan area started in 1995 and was 80 percent complete in 2008. The City, in cooperation with Marin County, has adopted a plan for the remaining 1,099 acres, known as the —Hamilton Reuse Plan. This plan includes: Low Density, Medium Density, and Medium Density Multiple Family Residential uses, representing 1,208 units; 43 acres of Community Facilities and Civic Uses (including an 80-bed homeless housing and services facility and up to 60 transitional housing units); 8 acres of commercial uses (including Neighborhood and General Commercial uses); 24 acres of parkland; and 795 acres of open space and wetlands.

Buck Center for Research in Aging

The Buck Center for Research in Aging (BCRA) project is located in north Novato, west of Highway 101. The project consists of a 355,000-square-foot laboratory, research facility, and 130 units of housing for research assistants and other BCRA personnel.

Section 4 – Capability Assessment

The Capability Assessment portion of the Hazard Mitigation Plan identifies current capabilities for implementing hazard mitigation activities. This section is divided into: Departments and Agencies, Codes and Regulations, Plans and Fiscal Resources. The City uses a variety of assets and authorities to reduce or mitigate impacts of natural disasters. The City's Municipal Code grants the City the legal authority for disaster mitigation and the California Constitution grants local governments authority to protect the public's health safety and moral welfare. Mitigation activities can include educating citizens, enforcing building and development codes, implementing capital improvement projects, establishing community goals, and policies.

An analysis of the City's capability to carry out the implementation measures with an eye toward hazard and loss prevention was conducted. The capabilities assessment required an inventory of the City's departments, policies, codes and regulations, local plans, and fiscal capabilities.

4.1 Departments and Local Agencies

4.1.1 City Departments

The departments within the City of Novato have responsibilities related to hazard mitigation planning and implementation. The City also benefits from the work of various state, federal, and non-governmental agencies.

Police Department

- Plans and coordinates response, recovery and mitigation activities
- Develops emergency operation plans for the City
- Leads emergency response and coordinates with fire for rescues and hazardous materials response
- Communicates with federal, state, and other local agencies
- Coordinates with the County to utilize the Marin Medical Reserve Corps (MMRC)
- Oversees disaster volunteers, such as the Radio Amateur Civil Emergency Service (RACES) and Disaster Assist Registry of Novato (DARN)
- Management Systems already in place in the event of a major disaster.
- Performs emergency response activities, including evacuation and security
- Maintains the newly developed warning system through telephone notification utilizing reverse 911 and the EAS system as their primary warning capability. Implementation and maintenance of the system was a joint effort with the Novato Fire Protection District (NFPD).

Community Development

- Verifies compliance with Uniform Building Code through checking plans, issuing permits, and conduction field inspections.
- Conducts comprehensive planning activities, including leading preparation of the General Plan
- Develops zoning regulations
- Prepares CEQA documents
- Leads situation analysis, damage assessments and documentation during emergency response
- Conducts site inspections to enforce permit and code requirements

Public Works

- Provides road construction and maintenance services
- Conducts emergency repair services to transportation and public works system
- Maintains drainage infrastructure
- Oversees floodplain management and flood mitigation programs
- Makes flood elevation determinations
- Maintains surviving utilities and services and evaluates the safety of structures and public infrastructure during emergency response
- Designs constructs and maintains city owned buildings
- Manages the Repetitive Loss Program

Disaster Council
- Established by City Code, 2-13
- Develops and recommends emergency and mutual aid plans and agreements

Administrative Services
- Maintains insurance on City facilities
- Operates the City Redevelopment Agency and manages Housing activities
- Manages internal City communications and computer systems
- Designated a grant analyst position to develop additional funding opportunities for various projects and programs.

Parks, Recreation and Community Services
- Coordinates care and shelter needs in emergencies coordinating with the Red Cross

4.1.2 Special Districts

Some municipal services for Novato residents and neighboring areas of unincorporated Marin County are provided services by independent special districts. Each of these special districts own and operate their own facilities and equipment and is managed by an elected governing board.

Novato Fire Protection District

The City of Novato recognizes the Novato Fire Protection District as the agency responsible for providing fire prevention, fire fighting services and emergency medical services to the incorporated area of the City of Novato. The district also responds to hazardous material incidents.
- Coordinates emergency response, including rescues, fire suppression and hazardous materials response.
- Plans and coordinates response, recovery, and mitigation activities
- Conducts emergency management and preparedness trainings
- Provides plan check and inspection services for fire related code compliance
- Oversees disaster volunteers, such as the Homeowners Emergency Action Response Team (HEART)
- Enforces the Vegetation Management Plan which sets clearance distances, type of vegetation for fire fuel breaks around structures

North Marin Water District

The district provides a supply of safe, reliable and high quality water to Novato residents and the surrounding areas.
- Provides potable water, including for firefighting, to areas of the City
- Constructs and manages flood control structures
- Operates and maintains water treatment, facilities and Novato Creek Dam (Stafford Dam)

Novato Sanitary District

The district provides a sewer collection system, wastewater treatment facilities and irrigation system for pastureland, a garbage collection system, curbside recycling, and a household hazardous waste collection.

- Operates and maintains wastewater treatment facilities

4.1.3 Regional Agencies

Association of Bay Area Governments (ABAG)
ABAG is a regional planning agency that provides assistance and financing to local public agencies to address regional issues such as land use, housing, environmental quality, economic development, and disaster risk. ABAG provides extensive resources about natural disasters in the area, including maps, estimates losses, and preparedness information.

Bay Area Air Quality Management District (BAAQMD)
BAAQMD is a regional planning agency that monitors and protects air quality. BAAQMD enforces regulations and issues permits for agricultural and vegetation management burns.

4.1.4 State Agencies

A number of state agencies are involved in disaster issues in and around Novato. The roles of key state agencies involved in mitigation are described below.

California Emergency Management Agency (Cal EMA)
Cal EMA serves as the lead state agency for emergency management in California. Among many other activities, it administers federal mitigation programs in the state, prepares the State Multihazard Mitigation Plan, and supports and oversees hazard mitigation planning activities of local governments.

California Geological Survey (CGS)
The CGS develops and disseminates technical studies and advice about geologic hazards. For example, it maps zones with risk of fault rupture, liquefaction, landslide and amplified shaking for regulatory purposes.

Department of Forestry and Fire Protection (CDF)
The CDF, in addition to being the lead agency responding to wildland fires in the state, oversees a number of programs to promote fire prevention and loss mitigation.

Department of Water Resources (DWR)
The Department of Water Resources (DWR) is the state agency with primary responsibility for the management of water in California, and for flood disaster preparedness and response. The DWR coordinates the National Flood Insurance Program (NFIP) in the state. The Department of Water Resources, Division of Safety of Dams, is responsible for approving the design and observing maintenance of major dams including Novato Creek Dam (Stafford Dam).

Seismic Safety Commission
The Commission investigates earthquakes, researches earthquake-related issues, and recommends to the Governor and Legislature policies and programs needed to reduce earthquake risk.

Department of Transportation (Caltrans)
Caltrans is responsible for planning, designing, building, operating and maintaining California's state highway system including bridges over Highway 101. This includes ensuring that new and existing state highway infrastructure are resistant to natural disasters.

Division of the State Architect (DSA)

The DSA provides design and construction oversight for K-12 schools and community colleges in the state. It ensures that all new public schools in California meet stringent disaster-resistant design and construction standards.

4.1.5 Federal Agencies

The roles of key federal agencies involved in hazard mitigation are described below. Many additional agencies are involved in other disaster issues, such as emergency response and rebuilding, such as include the Army National Guard and Army Reserve, among others.

Federal Emergency Management Agency (FEMA)

FEMA, part of the U.S. Department of Homeland Security's Emergency Preparedness and Response Directorate, is the key federal agency with responsibility to help communities prepare for, prevent, respond to, and recover from disasters. The Flood Insurance and Mitigation Division of FEMA administers the National Flood Insurance Program (NFIP). As part of the management of the NFIP, FEMA conducts a Community Assistance Visit (CAV) every 5 years for each community participating in the NFIP to ensure that the community is implementing the minimum floodplain management criteria of the NFIP.

Another program under The National Flood Insurance Program's (NFIP) is the Community Rating System (CRS). It is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

1. Reduce flood losses;
2. Facilitate accurate insurance rating; and
3. Promote the awareness of flood insurance.

FEMA also provides mitigation funds to state and local governments through a variety of grant programs, including the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA) and the Pre-Disaster Mitigation Program (PDM). The City of Novato has benefited from FEMA grants and guidance to mitigate its risks and to prepare this plan, as well as relying on assistance from FEMA after significant disasters.

The US Army Corps of Engineers (USACE)

The USACE, San Francisco District, has responsibility for civil works, flood control, flood fighting, environmental restoration, and Clean Water Act regulatory activities for a geographic area in the western United States.

US Geological Survey (USGS)

The USGS researches natural science issues and provides data and maps valuable for mitigation activities. For example, the USGS develops probabilities for future earthquake events, and has produced maps indicating locations where landslides and liquefaction are likely to occur in Novato.

4.1.6 Community Organizations

There are numerous organizations and groups that contribute to disaster management in Novato. By working with these groups, the City can extend its resources and personnel to more effectively reach its mitigation goals. Some of the most active groups are described below.

Novato Fire Foundation
A non-profit organization supported by the Novato Fire Protection District provides enhanced fire and life safety programs, services and education to the Novato community.

H.E.A.R.T.
The HEART program or Homeowner Emergency Action Response Team training is a comprehensive award winning service that the Novato Fire Protection District also provides. Citizens and businesses are taught by Novato Fire personnel in variety of subjects including First Aid, CPR, Urban Search and Rescue, Disaster Preparedness, Water Safety, Fire Prevention, Hazardous Materials, how to protect your home from a wildland fire, and how to organize your neighborhood emergency response team.

Bay Area Chapter of the American Red Cross:

Disaster Relief
The American Red Cross Bay Area Chapter provides 24-hour emergency assistance to people affected by fires, floods and other disasters. When a disaster occurs, Red Cross volunteers are on the scene immediately, providing a place to sleep, warm meals, clothing and counseling. Red Cross disaster relief services focus on meeting the immediate emergency needs of those affected and offering the support, information and resources necessary to help them recover from disaster. The City's Parks, Recreation, and Community Services department coordinates with Red Cross to open and operate designated shelters in Novato during a disaster.

Disaster Readiness
The American Red Cross Bay Area Chapter works everyday to ensure our community is ready for a disaster by building a corps of volunteers and partners who are trained and able to immediately activate. At the same time, the Red Cross is pre-positioning supplies, making improvements to systems, and helping to nurture the interagency and corporate collaboration that will be so essential to the community's recovery following a disaster.

The Marin Interagency Disaster Coalition (MIDC)
The Disaster Coalition provides countywide coordination and communication with nongovernmental and volunteer agencies in Marin County. MIDC has a representative at the Operational Area EOC.

4.1.7 Media
KCBS is responsible for the Bay Area EAS (Emergency Alert System).
The Highway Advisory Radio Novato Radio 530 AM will air emergency announcements as well.

The local newspapers: Novato Advance and the Marin Independent Journal cover local issues and provide information on pre and post disaster topics including disaster preparedness, flood mitigation programs and hazard mitigation.

There are also many other community groups and residents the City can work with to meet disaster management goals. Public interest groups, businesses organizations, civic clubs, specific industries (e.g. the construction industry), professional societies and others who have the same interests in keeping Novato a disaster resilient community.

4.2 Codes and Regulations

4.2.1 City Regulations

The City has adopted codes and regulations available for implementing hazard mitigation activities and to govern development, construction and land use activities. Developments in the City of Novato are subject to these codes and regulations. They include building codes, use limitations, mitigation requirements which help directly or indirectly minimize losses resulting from disasters. A brief description of each regulation is described in this section.

Subdivision Regulations

The City's subdivision ordinance, chapter 9 of the City of Novato Municipal Code establishes standards to regulate the division of land, defines minimum lot sizes, densities and development standards, and regulates land use in hazardous areas.

Subdivision regulations also establish standards to regulate the division of land and eliminate the creation of building sites in areas where flooding may create hazards to life or property. The regulations promote public health, safety and general welfare and minimize public and private losses due to flood conditions in specific areas and insure that reasonable caution is taken to preclude loss or damage to life and property.

Zoning Regulations

The City's Zoning Ordinance establishes various zoning districts and implements the goals and policies of the Novato general plan by classifying and regulating the uses of land and structures within the City of Novato. In addition it protects and promotes the public health, safety, and general welfare of residents, and preserve and enhance the aesthetic quality of the city. When lots are subdivided, the developer is required to provide adequate access for firefighters and storage of water for fire fighting.

Clean Storm Drain Regulation

This regulations ensures the future health, safety, and general welfare of the citizens of the City of Novato by establishing a funding source to provide enforcement of the city's Urban Runoff Pollution Prevention Ordinance, to provide maintenance and repair of the city's stormwater drainage facilities, to provide capital improvements to the city's storm drainage system, and to provide other clean stormwater activities. It also protects and enhances the water quality of the State's, and the Nation's watercourses, water bodies, and wetlands in a manner pursuant to and consistent with the Clean Water Act.

Development Standards

The development standards in chapter 5 of the municipal code are authorized by the California Government Code which allows local government controls in the area of building, planning and subdivision. The City development standards enforce disaster-resistant development to minimize risk from natural hazards.

Adequate Water Supply

Each permit or approval application affected by this requirement shall indicate the manner in which water is to be supplied. The degree of specificity shall relate to the type of permit or approval requested. All affected permit or approval processes shall include provisions for adequate water supply. This insures that the North Marin County Water District will provide water to serve the use and/or development upon the establishment of the use or the completion of the development. Each use or development proposal which involves or requires water service (domestic, commercial, industrial, agricultural) either for sanitary use, consumption, production, irrigation or visual amenity, shall provide for such water by agreement with the North Marin County Water District.

Flood Damage Prevention Requirements
Chapter 5-31 of the municipal code is titled Flood Damage Prevention Requirements. It was adopted to reduce flood hazards in the special flood hazard areas within the City of Novato. It addresses the construction, location, extension, conversion or alteration of structures or land in special flood hazard zones. These regulations apply to both new development and construction and existing structures. By regulating and restricting development in such areas will minimize risks of public and private losses due to flood hazards in these specific areas. The areas of special flood hazards are identified by the Federal Insurance Administration, through the Federal Emergency Management Agency.

It is the purpose of this section to promote the public health, safety and general welfare, and to minimize public and private losses due to flood conditions in specific areas, and to minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.

Waterway and Riparian Protection
This ordinance provides standards for the protection, maintenance, enhancement and restoration of streams and waterways in a manner which preserves and enhances their ecological integrity and resource functions and value. This ordinance establishes adequate buffer areas along watercourses to avoid flood hazards and maintain or expand storage capacity for flood waters; protect water quality and in-stream habitat; preserve, enhance and restore riparian habitat and adjacent wetlands and upland buffers; and, provide for continuous wildlife migration corridors connecting habitat areas. This regulation allows development, which is compatible with the important physical, habitat, aesthetic, and recreational functions of waterways, while ensuring that these functions and values are protected in perpetuity.

Hillside and Ridgeline protection
This ordinance reduces the potential for hazards and environmental degradation related to slope failure, increased erosion, sedimentation, storm water run-off, fire hazards, loss of vegetation, excessive grading, visual intrusion of structures, and potential for traffic hazards. It also provides for proper maintenance and fire management and minimizes public expense for long-term maintenance of slope areas and public improvements in hillside areas.

Drainage Development Requirements
In section 5-15 of the municipal code standards for drainage are defined and are necessary to insure that underground and surface waters are conducted through and away from developments in such a manner as to not detrimentally affect other properties; insure that underground and surface water is not a problem within the completed development; and further, to correct or improve existing underground or surface water problems within the boundaries of the development and within the immediately affected surrounding area

Fire Safety
The City of Novato recognizes the Novato Fire Protection District as the agency responsible for providing fire prevention and fire fighting services to the incorporated area of the City of Novato. Therefore, chapter 5-21 of the municipal code requires all applications for permits or approvals affected by this chapter shall be referred to the Novato Fire Protection District for its review and comment.

Fire regulations are adopted to minimize the hazard to life and property due to fire. All affected permit or request for approval applications shall include fire safety provisions. Such as:

- Street grades are limited so certain major equipment can properly function on such streets to not reduce speed of response vehicles.
- Certain developments must include proposed open space dedications or where developments abut existing open space, access for fire equipment to that open space shall be provided.

- Developments, including reroofing projects, proposed in high hazard fire areas shall use fire-resistive roofing material.
- Any development/construction to occur in areas defined by the Novato Fire District Board as high hazard fire areas shall, prior to final clearance occupancy or use, eliminate all of the following types of vegetation, except single specimen shrubs or trees, within 30 feet (or up to 100 feet for extra hazardous conditions upon direction of the fire chief) of all structures:

Building and Housing
The purpose of the Building and Housing code is to establish rules and regulations governing building activity in the city and to safeguard life, health, property, and public welfare by providing minimum fire retardancy requirements for new roof coverings. This information is also needed to assist the city in compiling information on the use, location, and condition of properties within the jurisdiction of the City of Novato and provides for the abatement of unsafe buildings. By agreement, for health and safety reasons, the city may share this information or resultant vital statistics with other governmental agencies.

The City has also adopted the most recent State of California approved Uniform Building Code, Uniform Mechanical Code, Seismic Safety Code, and National Electrical Code which contain structural requirements for existing and new buildings. The codes are designed to insure structural integrity during seismic and other hazardous events and prevent personal injury, loss of life and substantial structural damage. The City is prepared to adopt new codes and standards as passed by the State of California.

Disaster Council and Emergency Procedures
The emergency procedures of the municipal code provides for the preparation and carrying out of plans for the protection of persons and property within this city in the event of an emergency; the direction of the emergency organization; and the coordination of the emergency functions of the city with all other public agencies, corporations, organizations, and affected private persons. This section establishes the Disaster Council and empowers it to develop and recommend for adoption by the city council emergency and mutual aid plans and agreements and such ordinances and resolutions and rules and regulations as are necessary to implement such plans and agreements.

4.2.2 State Laws

California Environmental Quality Act (CEQA)
The California Environmental Quality Act requires a thorough analysis of potential environmental consequences resulting from a development project or from a plan that guides future development. CEQA provides a means by which City officials and the general public can identify the potential impacts a project will have on the community, and to allow for mitigation or avoidance of such impacts.

California has many laws and programs relating to hazard mitigation, the most effective of which include:
Cal OSHA
California Earthquake Hazards Reduction Act of 1986
Caldrons' Seismic Retrofit Program
California Fire Alliance
California Earthquake Authority's Seismic Retrofit Program
FEMA National Flood Insurance Program (NFIP), administered by the DWR

The following are state laws and executive orders related to hazard mitigation:

- Executive Order W-18-19
- Executive Order W-9-91
- Health & Safety Code §19211
- Health & Safety Code §19181.
- Public Resources Code §2621, et seq. (the Alquist-Priolo Earthquake Fault Zoning Act)
- California Environmental Quality Act Law and Guidelines (CEQA)
- Government Code 65302(g)

4.2.3 Federal Laws

Federal legislation has historically provided funding for disaster relief, recovery, and hazard mitigation projects and planning. The Disaster Mitigation Act of 2000 (DMA 2000) is legislation to improve this planning process (Public Law 106-390). The legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, the DMA 2000 legislation establishes a pre-disaster hazard mitigation program and requirements for the national post and pre-disaster Hazard Mitigation Grant Programs (HMGP).

Section 322 of DMA 2000 specifically addresses mitigation planning at the state and local levels. It identifies new requirements that allow HMGP funds to be used for planning activities, and increases the amount of HMGP funds available to states that have developed a comprehensive, enhanced mitigation plan prior to a disaster. States and communities must have an approved mitigation plan in place prior to receiving post-disaster HMGP funds. Local and tribal mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to and the capabilities of the individual communities.

FEMA prepared an Interim Final Rule, published in the Federal Register on February 26, 2002 (44 CFR Parts 201 and 206), which establishes planning and funding criteria for states and local communities. This Plan has been prepared to meet FEMA and State of California's Emergency Management Agency (Cal EMA) requirements thus making the City of Novato eligible for funding and technical assistance from state and federal hazard mitigation programs.

4.3 Plans

4.3.1 City Plans

There are numerous plans that address disaster management related to mitigation efforts within City of Novato. Some of these plans relate directly to hazard mitigation, such as the Public Safety Element of the General Plan. Other plans address various aspects of disaster management such as the emergency operation plan; other plans may have aspects relating to hazard mitigation.

General Plan

All cities in California are required to adopt a General Plan as a foundation of policy goals and is a statement of the community's vision for the future. The General Plan includes elements, which are sections addressing important issues for Novato. The City is currently updating its General Plan. The update process is expected to take approximately three years to complete with the final version adopted by Council by the end of 2013. The plan will address major changes since 1996 including: physical conditions, scientific knowledge, new residents and State law.

The hazard mitigation process has provided the City with the opportunity to review and expand on policies contained within the general plan. The City views the general plan and the HMP as complementary planning documents that work together to achieve the ultimate goal of the reduction of risk exposure to the citizens of Novato. As the general plan updates proceed the approved HMP will be integrated into the final version of the general plan. Many of the ongoing recommendations identified in Implementation Plan of the HMP are programs recommended by the general plan.

The Safety and Noise section is the element which most closely relates to the Hazard Mitigation Plan. The Safety and Noise element focuses on reducing geologic hazards, seismic hazards, flood hazards and emergency preparedness. The Safety Section deals with the protection of the community from unreasonable risks associated with the effects of earthquake, landslides, slope instability, subsidence and other known geologic hazards, flooding, and building collapse. This section includes a map of known seismic and other geologic hazards and also addresses locally relevant safety issues such as;

wildland and urban fires;
flooding, storm drainage; and
emergency response capacity.

A second purpose of this section is to guide land use planning and policy decisions to reduce safety risks and achieve an acceptable level of public protection from known natural and man-made hazardous events.

The Safety Element of the Plan is scheduled to commence revision during the spring of 2012. Included in the revision of the Safety Element will be the integration of the Wildland Urban Interface (WUI) regulations developed by the Fire District and considerations to impacts due to sea level rise from climate change and expanded disaster preparedness provisions.

Other elements also provide guidance relevant to mitigation, including the Land Use, Open Space, Environment, Housing, Public Facilities and Services, and Transportation elements. For example, the Land Use Element requires a constraints analysis in order to minimize hazards to people and property, and restricts land uses and density in hazardous areas, thereby limiting the number of people and buildings exposed to hazards.

Flood Mitigation Plan

The Local Flood Hazard Mitigation Plan specifically qualifies the City for flood protection programs that directly help homeowners due to flood problems and issues caused by flooding, i.e. Elevation/Acquisition/Relocation. Based upon Federal disaster declarations for the 2005/06 Winter Storms and 2006 Spring Storms, the State invited the County of Marin to submit grant applications for up to $10 million to pay for up to 75% of the costs for elevating homes in Special Flood Hazard Areas.

In support of the City's hazard mitigation efforts the State of California Office of Emergency Services (OES) has made a non-competitive grant available to the City. The Grant is funded through the Federal Emergency Management Agency Flood Mitigation Assistance Program (FEMA FMA) to update their Flood Mitigation Plan (Local Flood Hazard Mitigation Plan). This program provides assistance to repetitive loss communities for activities that will reduce the risk of flood damage to repetitive loss structures insurable under the National Flood Insurance Program (NFIP). The Novato City Council adopted resolution No. 19-06 accepting the Flood Mitigation Planning Grant (FMA04-PL04) in the amount of $66,666.00 on March 28, 2006.

In addition to addressing DMA 2000 requirements, the Plan also satisfies several requirements under the Community Rating System (CRS), in which the City of Novato is a participant. The National Flood

Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

1. Reduce flood losses;
2. Facilitate accurate insurance rating; and
3. Promote the awareness of flood insurance.

Flood insurance premium rates are discounted in increments of 5%. Novato insured's have received as much as 15% in premium discounts as a result of our activities. The CRS classes for local communities are based on 18 creditable activities, organized under four categories:

1. Public Information,
2. Mapping and Regulations,
3. Flood Damage Reduction, and
4. Flood Preparedness.

CRS activities covered under this Plan include revisions to our Local Flood Hazard Mitigation Plan, last updated in March 1996, and our Repetitive Loss Plan last updated in December 2000. This information is currently being submitted under the City of Novato's annual CRS recertification.

Capital Improvement Projects Plan

The Capital Improvement Projects Plan is prepared annually for the construction or acquisition of major capital facilities and equipment including municipal facilities, transportation, public works structures, and parks and community facilities. Transportation, drainage and utilities are projects that improve, build and provide major maintenance for City infrastructure.

Funds may be generated by voter approved taxes or assessments, or from developers who are required to pay their fair share of the cost of facilities determined to be required in the future to serve the new development. Projects may also be financed by grants, reimbursements, and transfers from other funds.

The CIP budget is separated into four categories as follows:

- Municipal facilities
- Parks, recreation and community facilities
- Transportation, drainage and utilities
- Technology and Organizational investments

Projects included in the current Capital Improvement Projects Plan to address flooding and storm drain issues include: Sunset Parkway Storm Drain Repair, Rush Creek Drainage Improvement, Center Road Bridge replacement at Vineyard Creek, Hamilton Levee Seepage collection. The Capital projects program also funds the Storm Drain Master Plan and the Storm Water Discharge Pollution Prevention program.

Emergency Operations Plan

The City of Novato Emergency Operations Plan (EOP) addresses the planned response to extraordinary emergency situations associated with disasters affecting Novato. The plan also

addresses integration and coordination with other governmental agencies when required. This plan is not intended to address the day-to-day emergency or well established emergency procedures.
This plan accomplishes the following:

- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting Novato
- Establishes the overall operational concepts associated with Novato's Emergency Operations Center (EOC) activities and the recovery process

This plan is based on the functions and principles of the California Standardized Emergency Management System (SEMS), the National Incident Management System (NIMS), and the California Incident Command System (ICS). It identifies how the Novato emergency operational system fits into the overall California and National risk-based, all-hazard emergency response and recovery operations plan. This document serves as a planning reference and as a basis for effective response to any hazard that threatens Novato. Departments within the City of Novato, and other agencies that have roles and responsibilities identified by this plan, are encouraged to develop plans, detailed standard operating procedures (SOPs), and emergency response checklists based on the provisions of this plan.

In addition the Emergency Operations Plan outlines procedures to assure continued functioning of political subdivisions in the event the governing body is unavailable to serve. A succession list for the City of Novato is approved by the City Council. Copies are kept in the City Manager's office.

Dam Failure Response Plan
This plan identifies procedures and policies for failure of the Novato Creek Dam at Stafford Lake on the west side of Novato. The plan identifies inundation areas, warning and evacuation procedures and emergency contacts.

County's Watershed Stewardship Plan
The plan identifies projects that address preventative measures to mitigate flood impacts.

Storm Drainage Master Plan
The completed Master Plan will assist creek inspections and pollution complaints investigations. The maps produced will show all pipe outfalls into creeks. The work product will also focus on the creation of a GIS database which will serve as a key to facilities management work in the City of Novato with respect to the NPDES mandate to be able to monitor flows throughout the City's network and storm drains.

Drainage Plan
The City of Novato has implemented a Local Drainage Master Plan to accommodate the 25 year storm flow, as a result of a Storm Drainage Improvement Bond Measure approved in 1989. The 1985 Bond Measure for Flood Control is being implemented by the Marin County Flood Control and Water Conservation District. These improvements include a detention pond and pump station at Deer Island on the lower portion of Novato Creek and channel improvements to Novato Creek, Warner Creek, and Arroyo Avichi."

4.3.2 State Plans
The State has numerous programs and plans addressing natural disasters. The most notable plans relating to hazard mitigation are listed below.

California Multi-Hazard Mitigation Plan
To be eligible for federal disaster assistance and mitigation funding the State of California is required to adopt a federally-approved State Multi-Hazard Mitigation Plan. The purpose of the plan is to reduce or prevent injury and damage from natural hazards in the State. The plan identifies past and present

mitigation activities, current policies and programs, and mitigation strategies for the future. The primary hazards addressed in the plan include: earthquake, landslide, fire and flood.

The California Fire Plan
The goal of this plan is to reduce the total costs and losses from wildland fire in the state by protecting at-risk assets through pre-fire management.

The State Flood Hazard Mitigation Plan
The a statewide flood mitigation plan lists priorities for managing fold risk at the state level and was approved by FEMA in 1996 following severe winter storms in 1995.

4.4 Fiscal Resources

The City has specific financial and budgetary tools available for hazard mitigation activities; some mitigation activities are accomplished without significant cost, while others requires a substantial investment. The financial resources below are potential avenues to funding mitigation measure identified in this plan. A variety of funding sources are available to the City, such as federal and state grants, community development block grants; capital improvements project funding; authority to levy taxes for specific purposes, fees for service, impact fees for homebuyers or developers for new development, ability to incur debt through general obligation bonds.

4.4.1 Federal Programs

Pre-Disaster Mitigation Program (PDM)
FEMA developed the PDM grant program to assist agencies with the requirements of the Disaster Mitigation Act of 2000 which requires communities to prepare a local hazard mitigation plan. The program funds 75 percent of the development cost of a plan. Development of this hazard mitigation plan was partially funded by a PDM grant awarded to the City in 2005.

Flood Mitigation Assistance Program (FMA)
FMA is a program under the National Flood Insurance Program (NFIP) that provides funding for states and communities to prepare Flood Mitigation Plans and conduct flood mitigation projects. The program funds 75 percent of a project's cost, the development cost of the City's Flood Mitigation Plan was partially funded by a FMA grant awarded to the City in 2004.

Community Development Block Grants
Block grants are issued by the Department of Housing and Urban Development to fund assistance for lower income people, in the areas of: housing, economic development, public works, community facilities and public service activities serving lower income people. These funds can be used for mitigation projects.

FEMA also provides mitigation funds to state and local governments through the Hazard Mitigation Grant Program (HMGP). The City of Novato has benefited from FEMA grants, as well as relying on assistance from FEMA after significant disasters.

4.4.2 State Programs

The state offers funding programs to support local mitigation projects, such as:

- CalTrans-evaluating and strengthening local bridges
- Infrastructure State Revolving Fund-low-cost financing for some infrastructure projects

- Proposition 50 funds-water projects
- Clean Water State Revolving Fund-low-interest loans for water treatment
- Watershed Protection Program-watershed management plans and projects
- Urban Streams Restoration Program-low cost flood control activities
- Flood Protection Corridor Program-flood protection activities

4.4.3 Local Programs

Many of the City's ongoing mitigation actions are currently or can be funded by the City's General Fund, examples include:

- Code enforcement inspection program for all apartments in the City
- Mail FEMA literature to property owners and residents in the SFHA areas

In addition, some of mitigation actions can be performed by existing staff currently funded by the general fund.

Capital Projects Funds

The 5-Year Capital Improvement Plan supports building and infrastructure improvement projects, which include mitigation measures. Funding for capital projects is developed from a variety of sources; many are external funding sources, such as federal or state grants. Additional funding is received by assessment districts, developer fees, general obligation bonds, storm water fees, gas taxes, permit fee waivers and others.

Section 5 – Hazard Mitigation Strategies

5.1 Introduction

This section presents mitigation goals and objectives to reduce or avoid long-term vulnerabilities to the identified hazards. These goals and objectives were developed by the committee through both careful consideration of the risk assessment findings and localized hazard identification and loss/exposure estimates, in addition to input from participating stakeholders, the public and an analysis of Novato's current capabilities assessment.

The planning committee representatives met with the consultant, staff and various department representatives to specifically discuss these hazard-related goals, objectives and actions as they relate to the overall Plan. Representatives of numerous departments were involved in this process.

The City conducted an assessment, reviewing existing local plans, policies, and regulations in addition to other capabilities relevant to hazard mitigation planning. The capabilities assessment required an inventory of the City's departments, governmental agencies, codes and regulations, plans, and fiscal capabilities.

Mitigation goals are defined as general guidelines describing what the City hopes to achieve in terms of hazard and loss prevention. They are usually long-range, policy-oriented statements representing city-wide visions. Objectives are statements that detail how the City's goals will be achieved, and define the steps to attain identified goals. These goals and objectives were developed to represent a vision of long-term hazard reduction. For each of these objectives, specific actions were developed that would assist in their implementation.
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Mitigation actions that address the goals and objectives were identified, evaluated and prioritized. These actions form the core of the mitigation plan. An Implementation Plan identifies who has responsibility for the action, the estimated time frame for completion and estimated funding or funding sources to support implementation and a cost benefit review.

Goals, objectives and actions presented in this plan are consistent with the Novato General Plan and its statement of the community's vision for the future as well as the Novato Flood Mitigation Plan and the Emergency Operations plan.

To stay compliant with the Disaster Mitigation Act of 2000, (DMA 2000), the City of Novato will make every effort to update this plan every five years. However, the City may update this plan at its own discretion any time prior to that if new hazard information becomes available, priorities for implementation change, an actual hazard event occurs, or other circumstances prompt an update.

Four goals were identified by the planning committee working from a variety of other similar plans and the Federal Emergency Management Agency (FEMA) planning guidance. Once the goals were established, objectives to meet the goals were selected through a similar process. For each goal, one or more objectives are identified that provide strategies to attain the goal. For the purposes of this plan, goals and objectives are defined as:

Goals are general guidelines that explain what is to be achieved. They are usually broad-based, policy-type statements that represent long-term global visions. Goals help define the benefits that the plan is trying to achieve.

Objectives are defined as short-term aims which, when combined, form a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

5.2 Mitigation Priorities

Mitigation programs and projects were ranked in priority based on evaluation by the planning committee. Many factors were considered in establishing the mitigation priorities. The mitigation strategies identified in this section were prioritized according to the criteria defined below:

1. Protect lives and property and the environment.
2. Reduce and/or eliminate hazard vulnerability.
3. Raise public awareness and support.
4. Consistent with the Citizens survey and public input.

Developing mitigation priorities is the key to any successful planning effort. For this first five year local hazard mitigation plan, an implementation plan was developed that meets the needs of the City and the requirements of 44CFR (Section 201.6). Subsequent updates to this mitigation plan may address other priorities identified in this plan.

Given the extreme importance of maintaining critical government functions and emergency response in times of disaster in combination with the large population who depend on government services and infrastructure the mitigation measures to improve the City's disaster resistance, readiness, or recovery capacity are generally given a high priority.

Earthquakes have the greatest potential to affect the largest number of people, critical facilities and buildings resulting in and to cause considerable economic losses. The extensive potential for damage, plus the probability of an earthquake occurrence in future decades, makes earthquake readiness a high priority. Flood measures are a high priority due to frequent past disasters and repetitive losses. The Flood mitigation actions in this plan correspond and compliment the Flood Mitigation Plan. Wildland fire can cause heavy property damage and landslides tend to be more localized and affect fewer people than other hazards but can be costly to mitigate.

5.3 Goals

Goal 1. Promote Disaster-resistant future development to minimize losses to existing and future structures within hazard areas.

<u>Objective 1.1:</u> Update and implement city plans, codes, standards and policies to minimize the impacts of natural hazards.

1.1.1 Review City codes every 3 years and adopt the most up to date State of California, revisions to the California Building Code and the International Code Council which increase resistance of structures to ground shaking and other geologic hazards.
1.1.2 Update hazard mitigation strategies every 3 years or as needed.

1.1.3 Update the City of Novato's Local Flood Hazard Mitigation Plan every five years.

Objective 1.2: Reduce the possibility of damage and losses from natural hazards to existing and future assets; particularly people, critical public or private facilities and infrastructure.

1.2.1 Repair water leak in the Police Building, (designated as an alternate EOC facility), to avoid any disruption to using the facility as an alternate EOC during an emergency.
1.2.2 Install an above ground diesel tank at the corporation yard to have diesel fuel readily available during an emergency.
1.2.3 Hire a consultant to study Novato's utility infrastructure with regard to event risks.

Objective 1.3: Improve the ability of City infrastructure to withstand natural hazard events.

1.3.1 Incorporate earthquake vulnerability assessment and mitigation into all infrastructure repair, maintenance and improvement projects to the extent feasible.
1.3.2 Compile and inventory City-owned buildings at risk.
1.3.3 Continue the code enforcement inspection program for apartments of 3 or more units in the City to find seismic safety, flood and health and safety compliance issues and to identify buildings at risk to specific hazards.
1.3.4 Continue to conduct annual inspection and maintenance of storm sewer drainage systems and utilize new vacuum truck with additional capacity and enhanced storm drain clearing technology.

Objective 1.4: Consider the impacts of hazards on future land uses.

1.4.1 Update General Plan every 10 years as feasible.
1.4.2 Development in floodplains shall be limited to protect lives and property and to comply with Federal, State and Local codes for floodplain development.
1.4.3 Discourage additional housing (especially elderly and high density) in areas of high hazard risk.
1.4.4 Continue to work closely with real estate developers to ensure the enforcement of real estate disclosure requirements and the recourses to keep those disclosures current.

Objective 1.5: Improve the City's ability to respond to and recover from emergencies and disasters caused by natural hazards.

1.5.1 Identify appropriate staffing levels of public safety personnel to address vulnerabilities identified within the capabilities of the City.
1.5.2 Purchase and install an emergency generator at the City's Todd Senior Center, (a designated emergency shelter) to provide power if electrical service is disabled during an emergency.
1.5.3 Conduct training biannually on response and recovery exercises for city staff and volunteers.
1.5.4 Develop a strategic plan for damage assessment and recovery of essential public facilities following earthquakes, particularly those of high public occupancy, as part of the City's emergency response planning.
1.5.5 Implement and maintain the telephone emergency response system to broadcast emergency information and warnings to designated first responders, the public, individuals, pre-designated telephone listing and selected geographical areas.
1.5.6 Prepare a site-specific vulnerability assessment of City -owned critical facilities that use the best available science and technology with regards human-caused hazards.

1.5.7 Protect the city's data, technology infrastructure and staff against cyber attacks such as but not limited to:

- Identity Theft
- Virus/Malware/Spyware/Spam
- Network and system attacks
- Web site hacking

Goal 2. Encourage businesses and private property owners to adopt appropriate mitigation actions.

2.1 Encourage the public to prepare and maintain a 3-day preparedness kit for home and work useable for all hazards.

2.2 Continue the City's outreach program to flood-prone property owners and the citizens of Novato to help them mitigate their flood risks.

2.3 Update City websites to provide convenient public access to earthquake hazard maps, and educational mitigation materials and distribute printed publications to the community concerning hazards.

2.4 Develop a program to supply tools and public education to citizens to do voluntary seismic retro-fit in residential areas. Provide classes on retrofit methods, and develop general public handouts on how to do flood, earthquake and fire mitigation for business and homeowners.

Goal 3. Improve hazard mitigation coordination and communication with governmental agencies and private entities and implement effective emergency plans.

3.1. Update the City's Emergency Preparedness Plan, as needed and update plan when the State of California and the County of Marin update their Emergency Preparedness plans.

3.2 Identify specific facilities, such as City Hall, schools, fire stations, police building and hospitals, and lifelines, such as telephones, electric, gas, water and sewer service critical to effective emergency/disaster response, and evaluate their abilities to survive and operate efficiently immediately after a disaster.

3.3 Publicize the City's evacuation routes and other aspects of the City's Emergency Preparedness Plan. Work towards creating neighborhood disaster systems.

3.4 Identify projects for pre-disaster mitigation funding and assure adequate funding where feasible to restore damaged facilities.

Goal 4. Reduce the possibility of damage and losses to existing and future assets, particularly people, critical facilities, infrastructure, and City-owned facilities from the following ***high*** risks hazards: Earthquake, Floods, Wildland Urban Interface Fire and Landslides.

Objective 4.1: Minimize the risk of personal injury and property damage resulting from seismic hazards.

4.1.1 Continue to require geotechnical and engineering geology reports by consulting Certified Engineering Geologists and/or Registered Geotechnical Engineers for development proposals on sites in seismically and geologically hazardous areas and for all critical structures.

4.1.2 Continue to monitor and review existing critical, high priority buildings to ensure structural compliance with seismic safety standards.

4.1.3 Request Caltrans to seismic retro-fit US-101 bridge sections located within the City of Novato.

4.1.4 Continue to require adherence to the Uniform Building Code for Seismic Risk Zone 4 in order to protect against seismic hazards.

4.1.5 Annually inspect the Hamilton levees and associated flood control pump stations.

4.1.6 Repair and resurface Atherton US 101 bridge crossing for safe vehicle traffic and protect rebar that is beginning to be exposed, this bridge crossing is a major evacuation route for the Novato area.

Objective 4.2: Minimize the risk of personal injury and property damage resulting from Floods.

4.2.1 Participate in the completion of the County's Watershed Stewardship Plan. The plan's projects will address preventative measures to mitigate flood impacts.
4.2.2 Continue using the Federal Emergency Management Agency's Flood Insurance Rate Maps [FIRM] to reduce risk of flooding; identify 100 Year Flood Events; and calculate flow rates within identified stream channels.
4.2.3 Continue to enforce the City's Flood Damage Prevention Ordinance and use current Flood Insurance Rate Maps for development.
4.2.4 Require all development in the 100 year flood zone to comply with the Floodplain Zoning requirements in the Novato Municipal Code and ensure projects comply with the California Environmental Quality Act and refer any development proposal that has a direct or indirect impact on flood protection to Public Works for comment and other agencies as necessary.
4.2.5 Require a Stream Management Plan for projects near a watercourse to minimize adverse impacts to riparian resources and flood levels.
4.2.6 Maintain Novato's compliance and good standing under the National Flood Insurance program (NFIP) and the Community Rating System (CRS).
4.2.7 Create a comprehensive computerized model of the Novato's basins and produce maps to aid the Clean Storm Water program by completing the Storm Drainage Master Plan. The GIS database will work to monitor flow throughout the City's network of storm drains.
4.2.8 Meet annually with all agencies involved in Marin County Flood Control projects to ensure that structural projects are considered and continue to cooperate with Marin jurisdictions in pursuing all available sources of funding to finance improvements to storm drainage facilities.
4.2.9 Train Public Works and Police personnel in emergency flood response techniques.
4.2.10 Reduce flooding in northeasterly area of downtown Novato by providing enhancements to the existing ditch on the west side of the railroad tracks.
4.2.11 Participate with FEMA to update and maintain the Flood FIRM/DFIRM maps.
4.2.12 Provide emergency flood control resources such as plastic sheeting and sand bags to businesses and citizens in emergencies.
4.2.13 Manage seepage at the Hamilton Levee to minimize impacts and inundation risks to private property.
4.2.14 Install pollution prevention devices at outfalls throughout the city to mitigate storm water discharges into the creeks.

Objective 4.3: Minimize the risk of personal injury and property damage resulting from Wildland Fire.

4.3.1 Expand the GIS system to identify properties located within the Wildland-Urban Interface (WUI).
4.3.2 Promote defensible space on City land behind homes in Novato.
4.3.3 Continue to identify and update facilities within urban/wildland fire interface areas.

Objective 4.4: Minimize the risk of personal injury and property damage resulting from slope and soil instability.

4.4.1 Continue to enforce existing regulations and procedures to identify potential hazards relating to geologic and soils conditions.
4.4.2 Require evaluation of all slopes, unstable land, areas susceptible to liquefaction or settlement, and areas containing expansive soils for safety hazards prior to issuance of any discretionary approvals and require appropriate mitigation measures.
4.4.3 Require that development in areas identified by the Slope Instability map, figure 3-41 be evaluated and, as appropriate, supervised by a Certified Engineering Geologist or a registered Geotechnical Engineer.
4.4.4 Continue the study of ground motion, landslide, and liquefaction.

5.4 Implementation Plan

Once the comprehensive list of Novato's goals, objectives, and action items listed above was developed, the proposed mitigation actions were prioritized by the Planning Committee. This step resulted in a list of acceptable and realistic long-term actions that address the hazards identified.

An implementation strategy is the chief component to a successful planning effort. For this first five-year hazard mitigation plan, an implementation strategy was developed that meets the needs of the City and the requirements of 44CFR (Section 201.6). Succeeding plan updates may address other priority actions.

An Implementation Plan is included for the mitigation actions receiving the highest ranking. These strategies were prepared according to the following criteria:

• **High Priority—**A project where benefits exceed cost, can be supported by existing program(s), funding has been secured, has potential grant funding, and can be completed in 1 to 5 years (short-term project). These mitigation actions serve Novato's best interests in moving the process forward.

• **Medium Priority—**A project where benefits exceed cost, and can be completed in 1 to 5 years once project is funded, funding is not secured, or would require special funding, and grant eligibility is questionable.

• **Low Priority—**A project where benefits exceed cost, funding has not been secured, no grant funding available and timeline for completion is long-term (5 to 10 years).

These priority definitions are dynamic and can change, as Council priorities shift and funding is secured. This schedule will be reviewed and updated annually as stated in the Plan Maintenance.

Most mitigation actions outlined below are designed to be carried out through the normal governmental and operational mechanisms used by the City in the performances of its duties and responsibilities on a day to day basis. To the extent possible, mitigation projects are most successful when fully integrated into on-going programs and mechanisms rather than establishing parallel or new mechanisms for implementation. Therefore, the City will strive to fully incorporate the Mitigation actions into existing programs. For example, the Flood FIRM maps need to be kept current and accurate. Therefore, it is the intent of the City to make these maps a hazard mitigation ongoing project.

The Disaster Mitigation Act of 2000 (at 44 CFR Parts 201 and 206) requires the development of an Implementation Plan that not only includes prioritized actions but one that includes information on how the prioritized actions will be implemented.

The following table illustrates the hazard mitigation action plan. This action plan includes the following:

- Mitigation Action number which correspond to the specific goal and objective met by the action
- Description of the action
- Responsible agency for implementation
- Estimated cost (if available)
- Benefits
- Timeframe for completion
- Possible sources of funding
- Benefits equal or exceed costs (Y or No)

Under timeframe for completion, the City has identified the following parameters:

- **Ongoing:** Action is currently being implemented under existing programs and
- Budgets
- **Short-term:** Action can be completed within 1 to 5 years once funding has been
- secured
- **Long-term:** Action will take 5 or more years to complete once funding has been secured

Benefit Cost / Review

The action plan is required to be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs. The benefits of the proposed projects were weighed against estimated costs as part of the project prioritization process. Since some projects may not be implemented for up to 10 years and associated costs and benefits could change dramatically in that time the benefit/cost analysis is less than what is required for projects submitted to the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Grant Program (PDM). Subjective ratings (high, medium, and low) were assigned to the costs and benefits of these projects.

Cost ratings were defined as follows:

• **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).

• **Medium**—The project could be implemented with existing funding but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.

• **Low**—The project could be funded under the existing budget or funding has been secured. The project is part of or can be part of an ongoing existing program.

Benefit ratings were defined as follows:

• **High—**Project will provide an immediate reduction of risk exposure for life and property.

• **Medium—**Project will have a long-term impact on the reduction of risk exposure for life and property or project will provide an immediate reduction in the risk exposure for property.

• **Low—**Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

For many of the strategies identified in this action plan, the City may seek financial assistance under the HMGP or PDM programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs the City reserves the right to define “benefits” according to parameters that meet the goals and objectives of this plan.

Implementation Actions	Description	Responsibility	Time Frame	Benefits	Estimated Cost	Benefits equal or exceed costs (Y or N)	Funding
1.1.3	Update the City of Novato's Local Flood Hazard Mitigation Plan every five years.	Engineering	Ongoing	Medium	Regular staff duties	Y	General Fund, Federal Grants
1.2.1	Repair water leak in the Police Building, (designated as an alternate EOC facility), to avoid any disruption to using the facility as an alternate EOC during an emergency.	Engineering	1 year	Medium	Low	Y	Long Tem Maintenance Fund
1.2.2	Install an above ground diesel tank at the Corporation Yard to have diesel fuel readily available during an emergency.	Maintenance	1 year	High	Low	Y	Long Term Maintenance Fund
1.3.2	Compile and inventory City-owned buildings at risk.	Building	1-5 years	Medium	Medium	Y	General Fund
1.3.3	Continue the code enforcement inspection program for apartments of 3 or more units in the City to find seismic safety, flood and health and safety compliance issues and to identify buildings at risk to specific hazards.	Building	Ongoing	Medium	Regular staff duties	Y	General Fund
1.3.4	Continue to conduct annual inspection and maintenance of storm sewer drainage systems and utilize new vacuum truck with additional capacity and enhanced storm drain clearing technology.	Engineering	Ongoing	High	Low	Y	Equipment Maintenance Fund

1.5.1	Identify appropriate staffing levels of public safety personnel to address vulnerabilities identified within the capabilities of the City.	Police, Fire	1 to 5 years	Medium	Medium	Y	General fund
1.5.2	Purchase and install an emergency generator at the City's Todd Senior Center, (a designated emergency shelter) to provide power if electrical service is disabled during an emergency.	Engineering, Maintenance	1 year	High	Low	Y	Long Term Maintenance Fund
1.5.3	Conduct training biannually on response and recovery exercises for city staff and volunteers.	Emergency Services	Ongoing	Medium	Low	Y	General Fund
1.5.5	Implement and maintain the telephone emergency response system to broadcast emergency information and warnings to designated first responders, the public, individuals, pre-designated telephone listing and selected geographical areas.	Police, GIS	1 year	High	Low	Y	General Fund
1.5.6	Prepare a site-specific vulnerability assessment of City-owned critical facilities that use the best available science and technology with regards human-caused hazards.	Police, Fire, Planning	5 to 10 years	Medium	Medium	Y	General Fund, Federal Grant
1.5.7	Protect the city's data, technology infrastructure and staff against cyber attacks such as but not limited to: • Identity Theft • Virus/Malware/Spyware/Spam • Network and system attacks • Web site hacking	Administrative Services	1 to 5 years	High	High	Y	Insurance Reserve, Development Impact Fees, General Fund
2.1	Encourage the public to prepare and maintain a 3-day preparedness kit for home and work useable for all hazards.	Emergency Services	1 to 5 years	Medium	Low	Y	General Fund, Federal and State Grants
2.2	Continue the City's outreach program to flood-prone property owners and the citizens of Novato to help them mitigate their flood risks.	Public Works	Ongoing	Medium	Low	Y	General Fund

2.3	Update City websites to provide convenient public access to earthquake hazard maps, and educational mitigation materials and distribute printed publications to the community concerning hazards	Emergency Services	1 to 5 years	Medium	Medium	Y	General Fund
3.1.	Update the City's Emergency Preparedness Plan, as needed and update the plan when the State of California and the County of Marin update their Emergency Preparedness plans.	Emergency Services	1 year	Medium	Regular staff duties	Y	General Fund
3.4	Identify projects for pre-disaster mitigation funding and assure adequate funding where feasible to restore damaged facilities.	Public Works, Administrative Services	Ongoing	Medium	Regular Staff duties	Y	General Fund
4.1.3	Request Caltrans to seismic retro-fit US-101 bridge sections located within the City of Novato.	Caltrans	1-10 years	Medium	Unknown	N/A	State funds
4.1.5	Annually inspect the Hamilton levees and associated flood control pump stations.	Maintenance	Ongoing	High	Regular Staff duties	Y	General Fund
4.1.6	Repair and resurface Atherton US 101 bridge crossing for safe vehicle traffic and protect rebar that is beginning to be exposed, this bridge crossing is a major evacuation route for the Novato area.	Engineering	1 year	High	Low	Y	Bond “B”,
4.2.1	Participate in the completion of the County’s Watershed Stewardship Plan. The plan’s projects will address preventative measures to mitigate flood impacts.	Engineering	Ongoing	Medium	Staff regular duties	Y	Capital Project Funds
4.2.4	Require all development in the 100 year flood zone to comply with the Floodplain Zoning requirements in the Novato Municipal Code and ensure projects comply with the California Environmental Quality Act and refer any development proposal that has a direct or indirect impact on flood protection to Public Works for comment and other agencies as necessary.	Planning	Ongoing	Medium	Low	Y	General Fund
4.2.6	Maintain Novato’s compliance and good standing under the National Flood Insurance program (NFIP) and the Community Rating System (CRS).	Engineering	Ongoing	High	Low	Y	General Fund

4.2.7	Create a comprehensive computerized model of the Novato's basins and produce maps to aid the Clean Storm Water program by completing the Storm Drainage Master Plan. The GIS database will work to monitor flow throughout the City's network of storm drains.	Engineering	1 year	High	Low	Y	Clean Storm Water Fund, Development Impact Fees Drainage
4.2.8	Meet annually with all agencies involved in Marin County Flood Control projects to ensure that structural projects are considered and continue to cooperate with Marin jurisdictions in pursuing all available sources of funding to finance improvements to storm drainage facilities.	Public Works	Ongoing	High	Staff regular duties	Y	General Fund
4.2.9	Train Public Works and Police personnel in emergency flood response techniques.	Public Works, Police Fire	Ongoing	High	Low	Y	General Fund, shared cost with Fire District
4.2.10	Reduce flooding in northeasterly area of downtown Novato by providing enhancements to the existing ditch on the west side of the railroad tracks.	Engineering	1-5 years	High	Low	Y	Development Impact Fees Drainage, Gas Tax, Bond "B"
4.2.11	Participate with FEMA to update and maintain the Flood FIRM/DFIRM maps.	Public Works	Ongoing	Medium	Staff regular duties	Y	General Fund
4.2.12	Provide emergency flood control resources such as plastic sheeting and sand bags to businesses and citizens in emergencies.	Maintenance	Ongoing	High	Low	Y	General Fund
4.2.13	Manage seepage at the Hamilton Levee to minimize impacts and inundation risks to private property.	Engineering	1 to 5 years	High	Low	Y	Hamilton CFD, Insurance Reserves
4.2.14	Install pollution prevention devices at outfalls throughout the city to mitigate storm water discharges into the creeks.	Engineering	1 to 5 years	Medium	Low	Y	Clean Storm Water
4.3.1	Expand the GIS system to identify properties located within the Wildland-Urban Interface (WUI).	Public Works	1-year	Medium	Low	Y	General Fund, GIS Fees

4.3.2	Promote defensible space on City land behind homes in Novato.	Maintenance	Ongoing	Medium	Medium	Y	General Fund, Grants

5.5 Mitigation Constraints

The City of Novato is surrounded by large open areas and adjacent Utility, State and County Jurisdictions and is not in a position to make regional decisions regarding major disaster plans beyond their borders, including regional evacuation, water supply, fire and emergency medical response. These other jurisdictional agencies are identified as the Novato Unified School District, Novato Fire Protection District, Novato Sanitary District, two municipal water districts, two communications companies and Pacific Gas and Electric . Each agency is directed by a board and funded by either service fee or separate tax assessment. Most important; agency service level boundaries overlap and in most cases extend beyond the jurisdictional responsibility of the City of Novato. In recognition for the need for multi-jurisdictional and regional response to disasters in the Novato area the City has a mitigation action to enhance its multi-jurisdictional and multi-functional emergency response training and exercises.

Since approval of the HMP by the City Council and submission to FEMA, the Novato Sanitary District has withdrawn from the mitigation planning and implementation process of this plan. The City will continue to revise, resubmit and implement it as a single-agency plan.

In this era of increased demands and constrained resources at all levels of government, the City will be severely challenged to implement some mitigation actions identified in the plan or to implement them within the timeframe specified. The City shall make every effort, given appropriate funding, to implement these strategies as identified.

Section 6 – Plan Maintenance

6.1 Monitoring, Evaluating & Updating

This section of the Plan describes the formal process that will ensure that the Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. The City will integrate public participation throughout the plan maintenance process. This section also includes an explanation of how the City intends to make the mitigation strategies and actions outlined in this Plan into existing planning mechanisms.

The Police Services Captain will be responsible for monitoring the plan annually for updates to the City's goals, objectives, and action items. If needed, the Captain will coordinate updates through the Hazard Mitigation Planning Committee.

6.1.1 Annual Updates

The Captain will solicit updates from the departments' assigned responsibility for implementation of each of the highest priority mitigation actions outlined in the Implementation Plan. Updates will be collected on the status of the mitigation action in order to identify those actions that have been completed, those that have been delayed, obstacles encountered, resources required, and other items that impact implementation. Suggestions for changes in priorities of existing actions may be made at that time, as well as suggestions for new mitigation actions to be incorporated into the next update of the plan. The updates will compile a progress report to include:

- Summary of any hazard events that occurred during the prior year
- Effectiveness and progress of mitigation programs/projects
- Amendments to the Implementation Plan to reflect current status of each action
- Brief discussion of actions not completed
- Recommendations for new programs and projects
- Changes in or potential for new funding options
- Changes in land development

This progress report will be:

- Posted on the City website.
- Provided to the local media through a press release
- Presented to the City Council.

6.1.2 Five Year Update

The City of Novato intends to update the HMP on a 5-year cycle from the date of initial plan approval. It will not be the intent of this five year update process to start from scratch and develop a new complete hazard mitigation plan. However, based on needs identified by the planning committee, this update will, at a minimum, include the following:

- The update process will be convened through the planning committee

- The hazard risk assessment will be reviewed and updated using best available information and technologies.
- Mitigation strategies and the Implementation Plan will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or new City policies identified under other planning mechanisms, as appropriate (such as the general plan).
- The draft update will be sent to appropriate agencies and departments for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The Novato City Council will adopt the updated plan.

6.2 Continued Public Involvement

The City of Novato is dedicated to involving the public directly in review and updates of the Plan. During all phases of plan maintenance the public will have the opportunity to provide feedback.

A press release requesting public comments will also be issued after each annual evaluation or when deemed necessary. The press release will direct people to the website or appropriate location where the public can review proposed updated versions of the Plan. This will provide the public an outlet for which they can express their concerns, opinions, or ideas about any updates/changes that are proposed to the Plan.

A copy of the Five year update Plan will be publicized and available for review on the City of Novato website. The Five-year update will include a community stakeholders meeting to solicit public comment and input. All public feedback will be forwarded to the appropriate city department for review and incorporation (if deemed appropriate). In addition, copies of the plan will be catalogued and kept at City public counters, various locations throughout Novato, including: Chamber of Commerce, County library, local governmental agencies and other locations. The existence and locations of these copies will also be posted on the City of Novato website. The website will contain contact information for public to which people can direct their comments and concerns.

All draft updates will be posted on the website and a public review period and hearing will be conducted prior to finalizing the draft for submission to the City of Novato City Council.

6.3 Incorporate into Other Planning Mechanisms

The information on hazard, risk, vulnerability, and mitigation contained in this plan is based on the best science and technology available at the time the HMP was prepared. The City, through adoption of its 1996 general plan (safety element), has planned for the impact of natural hazards. The HMP process provided the City with the opportunity to review and expand on policies contained within the general plan. The City views the general plan and the HMP as complementary planning documents that work together to achieve the ultimate goal of the reduction of risk exposure to the citizens of Novato. As the general plan update precedes the mitigation actions of the approved HMP will become an Implementation appendix of the Safety Element of the General Plan. Many of the ongoing recommendations identified in Implementation Plan of the HMP are programs recommended by the general plan. The City Council will review the plan again upon approval by FEMA as part of the General Plan update process. Other planning processes and programs the City will coordinate with the recommendations of the HMP include the following:

- City Emergency Response Plan
- Capital Improvement Programs
- Novato Municipal Code
- Storm water management program

Some action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation.

The mitigation objectives and actions outlined in the previous section are designed to be carried out through the normal governmental and operational mechanisms used by the City in the performance of its duties and responsibilities on a day to day basis. For example, any code revisions or updates will be accomplished using standard procedures for code development. Structural improvements to buildings and infrastructure will be incorporated into the City of Novato Capital Improvement Projects Plan and be subject to that process. To the extent possible, mitigation projects are most successful when fully integrated into on-going programs and mechanisms rather than establishing parallel or new mechanisms for implementation. Therefore, the City will strive to fully incorporate the Mitigation Strategy Implementation Plan into existing programs.

Appendices

Appendix 1

Novato Historical Guild Memo

Re DMA 2000 Hazard Mitigation Plan

To Whom it may concern,

The Novato Historical Guild has been asked to comment on the Hazard Mitigation Plan as it relates to historical structures and City owned buildings. Our concerns are (as we interpret the information on the plan given us) closely connected with four of the most significant hazards already identified: urban fire, flood, earthquake and landslides. The properties we have specifically identified are the following:

1) The City owns the structures known as the Carlile House (853 Reichart), the Kuser-Silva House (825 DeLong) and the Postmaster's House museum (815 DeLong). All three sit at the foot of a largely undeveloped slope, and the last two structures are supported above the level of the roadway by a retaining wall of significant height. The retaining walls and drainage systems both above and below these irreplaceable structures should be inspected to prevent liquefaction or erosion problems that could damage them. (In the course of some extensive repair work several years ago, a sump pump was installed under the Postmaster's house by the Historical Guild to mitigate the normal runoff which flows under this structure annually. Also please note that the construction of a residence and paved driveway on the uphill side of the museum may have affected the historic loading, absorption and drainage patterns on that hill.) Since all three structures are wooden, they need inspection and recommendations to minimize fire and seismic threats and possible severe weather damage. (The Novato Historical Guild installed a sprinkler system for internal fire protection in the Postmaster's house several years ago.) The contents of the Postmaster's house are largely irreplaceable (it is a museum), so it needs special protection. (Some of the mitigation measures might be carried out at little or no cost to the City if the Guild can be permitted to utilize its special talent for obtaining donations of materials and volunteer labor.)

2) At the former Hamilton Air Field the City owns several buildings, among which are the former Firehouse (in the small park west of Hanger Road, the ground floor of which has been promised to the Guild for use as a military museum), and the Headquarters building (Building 500) which is in use as an artist studio complex and in which part of the basement (after significant improvement) is used to store historical artifacts not currently on display to the public. The vulnerability of these buildings to earthquake has been minimized by recent retrofitting and, being internally sprinkled as well as being constructed of concrete, they are not especially threatened by fire, but they share the vulnerability to flooding that threatens the rest of the low lying Hamilton properties. They will benefit from any efforts to protect the area from floods caused by a tsunami, levi deterioration or other damage or a rising water table caused by upland storm drainage. (The Guild is also concerned that the exterior of the control tower structure be retrofitted and retained on the hanger at Hamilton. It is the classic orienting structure to show the historical use of the base.)

3) The Guild is very concerned with the preservation of the City owned historic structures along Sherman Avenue, especially the Presbyterian Church (now called City Hall at 901 Sherman), the A. D. Scott home (recently used as the Park and Recreation office at 917 Sherman), the William Hanen home (recently used by the Police department as a counseling office at 906 Sherman), the Nielsen/ Simmonshouse (recently the city manager's office at 900 Sherman) and to a slightly lesser extent the parsonage for the church and the small house formerly occupied by the clerk at the original Bank of Novato (both of which lie just to the north of the Church/city hall on the west side of Sherman Avenue). No specific recommendations can be made by us as to those structures at this time since their involvement in the plans for a new City Administration complex are as yet undetermined. The Guild does consider retention and retrofitting of the Church/City Hall building as the highest priority, and supports doing whatever is necessary to preserve that building safely on site. We feel the same way about the

- 2 -

Community House building at the southeast corner of Machin and DeLong Avenues. We note that the proximity and elevation of the present DeLong Ave. can present some traffic and drainage threats, which we would like to see examined and addressed, and that any new activity near that site include impact mitigation and/or retrofitting measures to assure the in tact preservation of both buildings.

4) There are numerous privately owned buildings it the area of Grant Avenue east of Redwood Blvd. that the Guild hopes to have preserved by City planning supervision and municipal cooperation. Some of these are:

On Grant Avenue: Scott's store (857 Grant Ave.), the Carlile store (815 Grant Ave.), the DeBorba Bar and restaurant (819 Grant Ave.), the Blacksmith Shop (presently Dr. Insomnia's Coffee House at 800 Grant Ave.) and the Porcella residence behind it (at 1009 Reichart Ave.), the Novato Bank building and the first post office building adjacent to the west thereof (826 & 828 Grant Ave.). The historic two story building originally known as The Club (presently Druid's Hall at 801 Grant Ave.) has been recently remodeled, hopefully with consideration for earthquake and fire mitigation, but it and the significantly age impaired First Railway Station (adjacent to the south on Reichart Ave.) are still subject to fire and flood damage. The water table along Grant Avenue is very high, and if the storm drainage system is neglected, serious water damage could result to all these buildings. They are also susceptible to an urban fire, being closely constructed to buildings on adjacent properties.

On Sherman Avenue the Hamilton house (920 Sherman Ave.) is privately owned. It is elevated to be minimally susceptible to flooding, but can still be threatened by fire or poor planning impacts.

Along Scott street there are at least two significant wood frame historic buildings, the Flatiron Building (at 701 Grant Ave.) and the Yelmorini Saloon (south thereof at 705 Scott Street.) The remnants of the third train station stand between Scott Street and Railroad Avenue. The City possesses the plans for this structure and some of the decorative trim has survived the fire and subsequent weather and neglect by the owner of this property. The Pini Mill, previously identified as an historical structure was been demolished and lost to the City. The Guild would like to see any new use of the railroad/mill property include requirements to replicate the train station and to protect and preserve in situo the exteriors of the two above identified adjacent buildings on Scott Street.

On the east side of Railroad Avenue there are significant historical structures which should be protected from fire, flood and earth movement as well as willful destruction by "improvement"; particularly the Oliver home at 910 Railroad Ave., the DeBorba home at 900 Railroad Ave. and the Hiribarren home at 904 Railroad Ave.

The Atherton/Pinheiro house, which has been recently renovated and relocated to a hillside cut on the west side of Redwood Blvd's north end has presumably been placed on an engineered site and retrofitted to protect against earthquake and fire. We are interested in its preservation, but do not consider it as endangered as the other properties listed above.

South of town on the west side of Highway 101 (at 5495 Redwood Highway) is the Gumescindo Pacheco home. It is presently the headquarters of the Pacheco Winery, and being maintained by the Rowland family. It is a significant historical structure that should be protected by the City.

The Trumbull Mansion (presently used by the Opus Dei Society of the Catholic church as a retreat house) is of significant historical interest and deserves special planning and preservation consideration. At present it appears to be well maintained by the owners.

The Daniel Hayden house (presently the Hilltop Restaurant at 850 Lamont Ave.) is another historic building that should be noted and monitored, but does not presently seem susceptible to very many natural threats.

Thank you for this opportunity to comment during the construction of the Hazard Plan. If we can be of further assistance, please do not hesitate to contact the Board of the Guild.

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Appendix 2

Sample Public Input Letter, Questionnaire, Results and Web Posting

Dear Resident:

City of Novato and the Novato Sanitary District is currently developing an All-Hazard Mitigation Plan as required in the Disaster Mitigation Act of 2000 (DMA-2000). This project addresses:

Safety of Life & Property by:

Implementing activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to losses from all hazards.

Reducing losses and repetitive damages for chronic hazard events.

Public Awareness by:

Developing and implementing education and outreach programs to increase public awareness of the risks associated with these hazards.

Providing information on tools; partnership opportunities, and funding resources to assist in implementing mitigation activities.

Natural Systems

Balancing natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment.

Preserving, rehabilitating, and enhancing natural systems to serve natural hazard mitigation functions.

Foster Partnerships and Implementation by:

Strengthening communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.

Encouraging leadership within public and private sector organizations to prioritize and implement local and regional hazard mitigation activities.

Enhancing Emergency Services by:

Establishing policy to ensure mitigation projects for critical facilities, services, and infrastructure.

Strengthening emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.

Coordinating and integrating hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

In accordance with that law, it is our intent to solicit input regarding hazards from the communities we serve. We have enclosed a short questionnaire designed to gather information vital to an effective Hazard Mitigation Planning Project. Please take a few minutes to fill out the questionnaire and return it, no later than _____ to: City of Novato
Police Department- Attention: Nancy Andrews
909 Machin Avenue
Novato, California 94945
Thank you for supporting our commitment to making City of Novato a safe place to live.

Public Input Questionnaire

City of Novato & Novato Sanitary District Hazards, Mitigation & Preparedness Questionnaire

This questionnaire is designed to help the Local Hazard Mitigation Commitee identify the community's concerns about natural and human-caused hazards, to better understand community needs in reducing risk and loss from such hazards. The questionnaire should be completed by an adult, preferably the homeowner or the head of the household. Please, take a few minutes to complete this questionnaire. All individual responses are strictly confidential, and are for research purposes only.

1. Zip code:_____ Internet Access ? Y/N _____

2. How concerned are you about the following disasters affecting your community? Please give each hazard a priority rating as follows:
0 = Not concerned; 1 = Somewhat concerned; 2 = Moderately concerned; 3 = Very concerned

Natural:

Floods	____	Landslide/Mudslides	____	Fire	____
Levee Failure	____	Earthquake	____	Telecommunications Failure	____
High Winds	____	Biological_plant_or_animal	____	Radiological Incident	____
Dam Failure	____			Special Events	____
Health Alert/Mass Disease	____	**Human caused:**		Terrorism	____
		Transportation Loss	____	Utilities Interruption	____

3 What is the most effective way for you to receive information about how to make your household and home safer from natural disasters? (***Please check all that apply.***)

Media:

- ☐ Newspaper stories
- ☐ Newspaper ads
- ☐ Television news
- ☐ Television ads
- ☐ Radio news
- ☐ Radio ads

Other methods:

- ☐ Schools
- ☐ Outdoor advertising (billboards, etc)
- ☐ Books
- ☐ Mail
- ☐ Fire Department
- ☐ Internet
- ☐ Fact sheet/brochure
- ☐ Church/religious organization
- ☐ Employer
- ☐ Public meetings
- ☐ University or research institution
- ☐ Utility Bills

4 In the following list, please check those activities that you ***have done***, ***plan to do*** in the near future, ***have not done***, or are ***unable to do***. (***Please check one answer for each preparedness activity***)

Have you or someone in your household:	Have done	Plan to do	Not done	Unable to do
Attended meetings or received written information on natural disasters or emergency preparedness?	☐	☐	☐	☐
Talked with family members about what to do in case of a disaster or emergency?	☐	☐	☐	☐
Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster?	☐	☐	☐	☐
Prepared a "Disaster Supply Kit" (extra food, water, medications, batteries, first aid items and other emergency supplies)?	☐	☐	☐	☐
In the last year, has anyone in your household been trained in First Aid or Cardio-Pulmonary Resuscitation (CPR)?	☐	☐	☐	☐

5 Would you be willing to make your home more resistant to natural disasters?
☐ Yes ☐ No (***If you answered NO skip to question 7***)

6. What nonstructural or structural modifications for earthquakes and floods have you made to your home?
(***Please check all that apply***)

6a. Nonstructural

- ☐ Anchor bookcases, cabinets to wall
- ☐ Secure water heater to wall
- ☐ Install latches on drawers/cabinets
- ☐ Fit gas appliances with flexible connections
- ☐ Others (please explain)
- ☐ Others (please explain)
- ☐ None

6b. Structural

- ☐ Secure home to foundation
- ☐ Brace inside of cripple wall with sheathing
- ☐ Brace unreinforced chimney
- ☐ Brace unreinforced masonry and concrete walls and foundations

7. Natural and human-caused disasters can have a significant impact on a community but planning for these events can help lessen the impact. The following statement will help us determine community priorities for planning for those hazards. Please tell us how important each one is to you.

Statement	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	☐	☐	☐	☐	☐
Protecting critical facilities (hospitals, transportation networks, fire stations)	☐	☐	☐	☐	☐
Preventing development in hazard areas	☐	☐	☐	☐	☐
Protecting natural environment	☐	☐	☐	☐	☐
Protecting historical and cultural landmarks	☐	☐	☐	☐	☐
Promoting cooperation among public agencies, citizens, non-profit organizations and businesses	☐	☐	☐	☐	☐
Protecting and reducing damage to utilities	☐	☐	☐	☐	☐
Strengthening emergency services (police, fire, ambulance)	☐	☐	☐	☐	☐

8. Please check the box that best represents your opinion of the following strategies to reduce the risk and loss associated with natural disasters.

Communitywide Strategies	Agree	Neutral	Disagree	Not Sure
I support a regulatory approach to reducing risk.	☐	☐	☐	☐
I support a non-regulatory approach to reducing risk.	☐	☐	☐	☐
I support policies to prohibit development in areas subject to natural hazards.	☐	☐	☐	☐
I support the use of local tax dollars to reduce risks and losses from natural disasters.	☐	☐	☐	☐
I support protecting historical and cultural structures.	☐	☐	☐	☐
I would be willing to make my home more disaster-resistant.	☐	☐	☐	☐
I support steps to safeguard the local economy following a disaster event	☐	☐	☐	☐
I support improving the disaster preparedness of schools.	☐	☐	☐	☐

THANK YOU VERY MUCH FOR PROVIDING THIS INFORMATION

Please return this questionnaire to:

Nancy Andrews
Novato Police Department
909 Machin Avenue
Novato, CA 94949

Or the public counters at the following Novato Facilities:

Novato Parks and Recreation Department
City Hall
Community Development Department (One Stop Shop)
Public Works Department
North Marin Water District
Novato Sanitary District
City of Novato Library
Novato Fire Protection District

Results of Public Input Questionnaire

City of Novato & Novato Sanitary District Hazards, Mitigation & Preparedness Questionnaire

This questionnaire is designed to help the Local Hazard Mitigation Committee identify the community's concerns about natural and human-caused hazards, to better understand community needs in reducing risk and loss from such hazards. The questionnaire should be completed by an adult, preferably the homeowner or the head of the household. Please, take a few minutes to complete this questionnaire. All individual responses are strictly confidential, and are for research purposes only.

1. Zip code: See Last Page Internet Access ? Y/N **94%**

2. How concerned are you about the following disasters affecting your community? Please give each hazard a priority rating as follows: ***0 = Not concerned; 1 = Somewhat concerned; 2 = Moderately concerned; 3 = Very concerned***

Natural:

Floods	3	Landslide/Mudslides	1	Fire	3
Levee Failure	1	Earthquake	3	Telecommunications Failure	1
High Winds	1	Biological_plant_or_animal	1	Radiological Incident	1
Dam Failure	0			Special Events	0
Health Alert/Mass Disease	1	**Human caused:**		Terrorism	3
		Transportation Loss	1	Utilities Interruption	1

3 What is the most effective way for you to receive information about how to make your household and home safer from natural disasters? (***Please check all that apply***.)

Media:

- ☐ Newspaper stories **66%**
- ☐ Newspaper ads **6.7%**
- ☐ Television news **6.7%**
- ☐ Television ads **53%**
- ☐ Radio news **26%**
- ☐ Radio ads **0%**

Other methods:

- ☐ Schools **20%**
- ☐ Outdoor advertising (billboards, etc) **13%**
- ☐ Books **0%**
- ☐ Mail **66%**
- ☐ Fire Department **53%**
- ☐ Internet **53%**
- ☐ Fact sheet/brochure **60%**
- ☐ Church/religious organization **6%**
- ☐ Employer **52%**
- ☐ Public meetings **46%**
- ☐ University or research institution **7%**
- ☐ Utility Bills **53%**

4 In the following list, please check those activities that you ***have done***, ***plan to do*** in the near future, ***have not done***, or are ***unable to do***. (***Please check one answer for each preparedness activity***)

Have you or someone in your household:	Have done	Plan to do	Not done	Unable to do
Attended meetings or received written information on natural disasters or emergency preparedness?	64%	18%	18%	0%
Talked with family members about what to do in case of a disaster or emergency?	73%	9%	18%	0%
Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster?	55%	18%	17%	9%
Prepared a "Disaster Supply Kit" (extra food, water, medications, batteries, first aid items and other emergency supplies)?	27%	45%	27%	0%
In the last year, has anyone in your household been trained in First Aid or Cardio-Pulmonary Resuscitation (CPR)?	55%	9%	36%	0%

5 Would you be willing to make your home more resistant to natural disasters?

☐ Yes **92%** ☐ No **7%** (***If you answered NO skip to question 7)***

6. What nonstructural or structural modifications for earthquakes and floods have you made to your home? (***Please check all that apply***)

6a. Nonstructural

- ☐ Anchor bookcases, cabinets to wall **53%**
- ☐ Secure water heater to wall **93%**
- ☐ Install latches on drawers/cabinets **30%**
- ☐ Fit gas appliances with flexible connections **69%**
- ☐ Others (please explain) **46%**
- ☐ None **41%**

6b. Structural

- ☐ Secure home to foundation **58%**
- ☐ Brace inside of cripple wall with sheathing **25%**
- ☐ Brace unreinforced chimney **8%**
- ☐ Brace unreinforced masonry and concrete walls and foundations **0%**

7. Natural and human-caused disasters can have a significant impact on a community but planning for these events can help lessen the impact. The following statement will help us determine community priorities for planning for those hazards. Please tell us how important each one is to you.

Statement	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	77%	15%	8%	0%	0%
Protecting critical facilities (hospitals, transportation networks, fire stations)	96%	0%	4%	0%	0%
Preventing development in hazard areas	92%	0%	8%	0%	0%
Protecting natural environment	58%	17%	18%	0%	16%
Protecting historical and cultural landmarks	38%	35%	14%	8%	0%
Promoting cooperation among public agencies, citizens, non-profit organizations and businesses	85%	15%	0%	0%	0%
Protecting and reducing damage to utilities	92%	8%	0%	0%	0%
Strengthening emergency services (police, fire, ambulance)	69%	15%	8%	0%	8%

8. Please check the box that best represents your opinion of the following strategies to reduce the risk and loss associated with natural disasters.

Communitywide Strategies	Agree	Neutral	Disagree	Not Sure
I support a regulatory approach to reducing risk.	50%	25%	8%	17%
I support a non-regulatory approach to reducing risk.	33%	50%	17%	0%
I support policies to prohibit development in areas subject to natural hazards.	92%	8%	0%	0%
I support the use of local tax dollars to reduce risks and losses from natural disasters.	62%	23%	15%	0%
I support protecting historical and cultural structures.	46%	31%	23%	0%
I would be willing to make my home more disaster-resistant.	85%	8%	8%	0%
I support steps to safeguard the local economy following a disaster event	85%	15%	0%	0%
I support improving the disaster preparedness of schools.	92%	0%	0%	8%

THANK YOU VERY MUCH FOR PROVIDING THIS INFORMATION

The survey respondents as of August 22, 2005 are…

19 Web surveys and 39 paper surveys for a total of 58 surveys

Responses per Zip Code

94945 20%
94947 40%
94948 0%
94949 40%

Questionnaire Web Posting

City of Novato, California

Page 1 of 1

CITY OF NOVATO

WHAT'S NEW!!

Hazards Mitigation and Preparedness Questionnaire

This questionaire is designed to help the Local Hazard Mitigation Planning Committee to identify the community's concerns about natural and human-caused hazards, to better understand community needs in reducing risk and loss from such hazards. The questionaire should be completed by an adult, preferably the homeowner or head of the household. Please take a few minutes to complete this questionaire. All individual responses are strictly confidential, and are for planning purposes only.

Click Here for More Information

Appendix 3

City of Novato Local Flood Hazard Mitigation Plan
(CD included in mailing)

Appendix 4

Novato Fire District Standards of Cover
(CD included in mailing)

Appendix 5

Standards of Cover

Risk Assessment and Risk Levels

Table 35 Major Risk Properties within Novato Fire District

Business Name	Address	Use	OVAP Score	Fire Flow (gpm)	Census Trac	Station	Sprinklered
Druids Hall	801 Grant	Assembly hall	41.53		1022.01	1	No
Novato Office Bldg	1510 Grant	Office	47.6	2750	1022.01	1	No
Marin Christian Life School	1370 So. Novato Blvd	School	40.4	2875	1022.01	1	Yes
Woodside Office	7250 Redwood	Office	42.03	3250	1041.02	1	Yes
Buck Center	8001 Redwood	Research center	42	2000	1021	1	Yes
Golden Gate Plaza	101 Rowland	Mercantile	43.33	1750	1012	1	Yes
Golden Gate Plaza	108 Rowland	Office	43.33	2000	1012	1	Yes
Medical Office	165 Rowland	Office	42.03	2000	1012	1	Yes
Quantum Shift	88 Rowland	Office	42.03	2000	1012	1	Yes
Fireman's Fund	777 San Marin Dr	Office	42.61	2500	1021	1	Yes
Vintage Oaks	113 Vintage Way	Shopping Center	48.97	2500	1012	1	Yes
Portal Publications	201 Alameda Del Prado	Office/Manufacturing	44.67	1625	1042	4	Yes
Ignacio Hills Apt	501 Alameda Del Prado	8 unit apartment	40.67	4250	1042	4	No
Ignacio Hills Apt	511 Alameda Del Prado	10 unit apartment	43.2	4250	1042	4	No
Ignacio Hills Apt	521 Alameda Del Prado	20 unit apartment	41.87	4250	1042	4	No
Ignacio Hills Apt	531 Alameda Del Prado	10 unit apartment	41.87	4250	1042	4	No
Ignacio Hills Apt	541Alameda Del Prado	20 unit apartment	41.87	3250	1042	4	No
Ignacio Hills	551Alameda Del Prado	10 unit apartment	42.53	4250	1042	4	No
Pell Plaza	504 Redwood	Office	44.2	3000	1041.01	4	Yes
Pell Plaza	560 Redwood	Office	44.2	3000	1041.01	4	Yes

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Release 1.4
Standards of Cover

Major Risk Properties within Novato Fire District

	Address							
Building Name	**#**	**Street Name**	**Use**	**OVAP Score**	**Fire Flow (gpm)**	**Census Tract #**	**Station**	**Sprinklered**
Cheda Knolls Apts	1	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	2	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	5	Lupine Circle	Multi Family Dwelling	21.44	1500	1041.02	1	N
Cheda Knolls Apts	6	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	9	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	10	Lupine Circle	Multi Family Dwelling	23.67	1500	1041.02	1	N
Cheda Knolls Apts	13	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	14	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	17	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	18	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	21	Lupine Circle	Multi Family Dwelling	21.44	1500	1041.02	1	N
Cheda Knolls Apts	22	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	26	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	30	Lupine Circle	Multi Family Dwelling	21.44	1500	1041.02	1	N
Cheda Knolls Apts	33	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	34	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	36	Lupine Circle	Multi Family Dwelling	26.44	1500	1041.02	1	N
Good Shepard School	1180	Lynwood	School	0.38	750	1041.02	1	Y
Scottsdale Lake	2-24	Margarita	Multi Family Dwelling	26.89	750	1041.02	1	Y
Scottsdale Lake	26-44	Margarita	Multi Family Dwelling	26.44	750	1041.02	1	Y
Cheda Knolls Apts	3	Mariposa Lane	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	4	Mariposa Lane	Multi Family Dwelling	28.67	1500	1041.02	1	N
Cheda Knolls Apts	7	Mariposa Lane	Multi Family Dwelling	28.67	1500	1041.02	1	N
Cheda Knolls Apts	8	Mariposa Lane	Multi Family Dwelling	28.67	1500	1041.02	1	N
Cheda Knolls Apts	11	Mariposa Lane	Multi Family Dwelling	28.67	1500	1041.02	1	N
Cheda Knolls Apts	12	Mariposa Lane	Multi Family Dwelling	28.67	1500	1041.02	1	N
Cheda Knolls Apts	15	Mariposa Lane	Multi Family Dwelling	28.67	1500	1041.02	1	N
Cheda Knolls Apts	16	Mariposa Lane	Multi Family Dwelling	23.67	1500	1041.02	1	N
Cheda Knolls Apts	19	Mariposa Lane	Multi Family Dwelling	28.67	1500	1041.02	1	N
Cheda Knolls Apts	20	Mariposa Lane	Multi Family Dwelling	28.67	1500	1041.02	1	N
Cheda Knolls Apts	23	Mariposa Lane	Multi Family Dwelling	28.67	1500	1041.02	1	N
Cheda Knolls Apts	24	Mariposa Lane	Multi Family Dwelling	21.44	1500	1041.02	1	N
Cheda Knolls Apts	27	Mariposa Lane	Multi Family Dwelling	26.44	1500	1041.02	1	N

	Address							
Building Name	**#**	**Street Name**	**Use**	**OVAP Score**	**Fire Flow (gpm)**	**Census Tract #**	**Station**	**Sprinklered**
Cheda Knolls Apts	28	Mariposa Lane	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	31	Mariposa Lane	Multi Family Dwelling	26.44	1500	1041.02	1	N
Cheda Knolls Apts	32	Mariposa Lane	Multi Family Dwelling	25.56	1500	1041.02	1	N
Cheda Knolls Apts	35	Mariposa Lane	Multi Family Dwelling	26.44	1500	1041.02	1	N
Office Building	1682	Novato Blvd	Offices	33.73	2875	1022.01	1	Y
City Center	1701	Novato Blvd	Offices	29.82	2000	1022.01	1	Y
Redwood Building Assoc.	7075	Redwood Blvd	Offices	32.8	1750	1041.02	1	Y
North Bay Center	7200	Redwood Blvd	Offices	35.57	0	1041.02	1	Y
Dairymen's Milling	7546	Redwood Blvd	General Retail	33.85	2250	1022.01	1	N
Travel Lodge	7600	Redwood Blvd	Hotel	37.33	2500	1021	1	Y
Birkenstock	8171	Redwood Blvd	Warehouse	26	1125	1021	1	Y
Redwood Center	6090	Redwood Blvd.	Offices	25.3	1500	1041.02	1	Y
Office Building	7144	Redwood Blvd.	Offices	30.31	3500	1022.01	1	N
Color Fast	7514	Redwood Blvd.	Offices	24.32	1500	1022.01	1	Y
Redwood Crossroads	7599	Redwood Blvd.	Offices	29.2	1500	1022.01	1	Y
Day's Inn	8141	Redwood Blvd.	Hotel	35.82	2000	1021	1	Y
Apartments	842	Reichert	Multi Family Dwelling	29.33	0	1022.01	1	N
Apartments	844	Reichert	Multi Family Dwelling	25.73	0	1022.01	1	N
Apartments	845	Reichert	Multi Family Dwelling	31.73	0	1022.01	1	N
Apartments	846	Reichert	Multi Family Dwelling	32.93	0	1022.01	1	N
	325	Rowland Blvd	Multi Family Dwelling	30.4	0	1012	1	N
Rowland Cinema	44	Rowland Way	Theater	32.8	0	1012	1	Y
Phoenix Univ.	75	Rowland Way	Offices	36.83	1750	1012	1	Y
Scottsdale Lake	61-67	Scottsdale Way	Multi Family Dwelling	34.13	1375	1041.02	1	Y
Captain's Landing	100	Seagull Row	Multi Family Dwelling	29.33	0	1041.02	1	Y
Novato Gymnastics Center	950	Seventh St.	Ballroom, gymnasium	25.67	2000	1022.01	1	Y
Office Building	1559	So. Novato Blvd	Offices	23.1	2500	1032	1	Y
Office Building	1561	So. Novato Blvd	Offices	25.3	1250	1032	1	Y
Edgewater	1575	So. Novato Blvd	Multi Family Dwelling	24.44	875	1032	1	Y
Edgewater	1579	So. Novato Blvd	Multi Family Dwelling	34.13	1750	1032	1	Y
Edgewater	1587	So. Novato Blvd	Multi Family Dwelling	34.13	1750	1032	1	Y
Bridgecreek Apts	1599	So. Novato Blvd	Multi Family Dwelling	32.93	1750	1032	1	N
Green Point Mortgage	100	Wood Hollow	Offices	37.12	2000	1021	1	Y

Standards of Cover

Risk Assessment and Risk Levels

	Address							
Building Name	**#**	**Street Name**	**Use**	**OVAP Score**	**Fire Flow (gpm)**	**Census Tract #**	**Station**	**Sprinklered**
Cheda Knolls Apts	1	Yarrow Lane	Multi Family Dwelling	30.67	1500	1041.02	1	N
Cheda Knolls Apts	5	Yarrow Lane	Multi Family Dwelling	30.67	1500	1041.02	1	N
Cheda Knolls Apts	9	Yarrow Lane	Multi Family Dwelling	30.67	1500	1041.02	1	N
Cheda Knolls Apts	13	Yarrow Lane	Multi Family Dwelling	25.67	1500	1041.02	1	N
Cheda Knolls Apts	17	Yarrow Lane	Multi Family Dwelling	30.67	1500	1041.02	1	N
Cheda Knolls Apts	21	Yarrow Lane	Multi Family Dwelling	25.67	1500	1041.02	1	N
Kelleher Lumber	10	Grandview	Storage	21.63	1500	1011	2	Y
Harbor Storage	12	Harbor Dr.	Storage	16.62	2750	1011	2	Y
Trumbull Manor	50	Rica Vista	Multi Family Dwelling	23.56	1000	1022.01	3	Y
Kaiser Medical	97	San Marin Dr.	Clinic, Dr. offices	31.2	2250	1021	3	N
Marin Executive Center	505	San Marin Dr.	Offices	33.37	1750	1021	3	Y
San Marin Plaza	101-191	San Marin Dr.	General Retail	34	3750	1021	3	Y
Novato Oaks Inn	215	Alameda Del	Hotel	35.87	1750	1042	5	Y
Office Building	353	Bel Marin Keys	Offices	28.72	2000	1043	4	N
Office Building	359	Bel Marin Keys	Offices	28.72	2500	1043	4	N
Office Building	372	Bel Marin Keys	Offices	27.62	2250	1043	4	N
Office Building	378	Bel Marin Keys	Offices	28.72	2500	1043	4	N
Office Building	394	Bel Marin Keys	Offices	27.62	2000	1043	4	Y
Marin Kitchen Works	401	Bel Marin Keys	Offices	26.52	2500	1043	4	N
Oak Grove Apartments	105	Cielo Lane	Multi Family Dwelling	30.67	1125	1042	5	Y
Oak Grove Apartments	110	Cielo Lane	Multi Family Dwelling	30.67	1125	1042	5	Y
Oak Grove Apartments	115	Cielo Lane	Multi Family Dwelling	25.56	1125	1042	5	Y
Oak Grove Apartments	125	Cielo Lane	Multi Family Dwelling	25.56	1125	1042	5	Y
Oak Grove Apartments	135	Cielo Lane	Multi Family Dwelling	31.87	1125	1042	5	Y
Oak Grove Apartments	145	Cielo Lane	Multi Family Dwelling	24.56	1125	1042	5	Y
Cheda Knolls Apts	2	Columbine Lane	Multi Family Dwelling	26.56	1500	1041.02	4	N
Cheda Knolls Apts	6	Columbine Lane	Multi Family Dwelling	26.56	1500	1041.02	4	N
Cheda Knolls Apts	14	Columbine Lane	Multi Family Dwelling	26.56	1500	1041.02	4	N
Cheda Knolls Apts	15	Columbine Lane	Multi Family Dwelling	26.56	1500	1041.02	4	N
Cheda Knolls Apts	17	Columbine Lane	Multi Family Dwelling	26.56	1500	1041.02	4	N
Cheda Knolls Apts	18	Columbine Lane	Multi Family Dwelling	26.56	1500	1041.02	4	N
Cheda Knolls Apts	21	Columbine Lane	Multi Family Dwelling	26.56	1500	1041.02	4	N
Cheda Knolls Apts	22	Columbine Lane	Multi Family Dwelling	26.56	1500	1041.02	4	N

	Address							
Building Name	**#**	**Street Name**	**Use**	**OVAP Score**	**Fire Flow (gpm)**	**Census Tract #**	**Station**	**Sprinklered**
Cheda Knolls Apts	26	Columbine Lane	Multi Family Dwelling	26.56	1500	1041.02	4	N
West America Bank	7	Commercial Blvd	Bank	28.23	3500	1050	4	N
Office Building	8	Commercial Blvd	Offices	25.42	2500	1050	4	N
Office Building	14	Commercial Blvd	Offices	33.37	4500	1050	4	N
Office Building	22	Commercial Blvd	Offices	30.07	2250	1050	4	N
Office Building	24	Commercial Blvd	Offices	28.97	2250	1050	4	N
	26	Commercial Blvd	Offices	34.22	7500	1050	4	N
SBC	1	Digital Drive	Offices	31.34	1750	1050	4	Y
Pace Industries, Inc.	11	Digital Drive	Offices	30.07	3000	1050	4	N
Office Building	15	Digital Drive	Offices	31.17	2250	1050	4	N
Office Building	19	Digital Drive	Offices	31.17	2500	1050	4	N
Office Building	22	Digital Drive	Offices	30.07	3500	1050	4	N
Petri Estate	24	Digital Drive	Offices	30.07	2250	1050	4	Y
Industrial Devices	42	Digital Drive	Professional Supplies,	25.42	1750	1050	4	Y
Sunflex	64	Digital Drive	Offices	31.34	1125	1050	4	Y
Office Building	73	Digital Drive	Offices	24.93	1125	1050	4	Y
Office Building	77	Digital Drive	Offices	24.32	1125	1050	4	Y
Workrite	79	Digital Drive	Mercantile	29.82	1500	1050	4	Y
Harding Lawson & Assoc.	105	Digital Drive	Offices	31.17	2500	1050	4	Y
	250	Entrada	Multi Family Dwelling	20.44	2500	1041.01	4	N
	455-479	Entrada	Mercantile	25.13	2250	1042	4	Y
La Casa Apts	450	Entrada Building	Multi Family Dwelling	35.33	1750	1042	4	N
La Casa Apts	450	Entrada Building	Multi Family Dwelling	26.44	0	1042	4	N
Office Building	20	Galli Drive	Offices	17.72	1500	1050	4	Y
Academy Studios	70	Galli Drive	Manufacturing	27.25	2000	1043	4	Y
Ghirardo CPA	94	Galli Drive	Offices	20.17	2250	1043	4	N
Herm & Hem	106	Galli Drive	Offices	23.22	2500	1043	4	N
Hamilton Woods	1001	Green Oak Dr	Multi Family Dwelling	39.2	2250	1050	5	N
Hamilton Woods	1002	Green Oak Dr	Multi Family Dwelling	39.2	2250	1050	5	N
Hamilton Woods	1003	Green Oak Dr	Multi Family Dwelling	39.2	2250	1050	5	N
Hamilton Woods	1004	Green Oak Dr	Multi Family Dwelling	39.2	2250	1050	5	N
Hamilton Woods	1005	Green Oak Dr	Multi Family Dwelling	0.38	2250	1050	5	N
Hamilton Woods	1006	Green Oak Dr	Multi Family Dwelling	32.44	2250	1050	5	N

	Address							
Building Name	**#**	**Street Name**	**Use**	**OVAP Score**	**Fire Flow (gpm)**	**Census Tract #**	**Station**	**Sprinklered**
Hamilton Woods	1007	Green Oak Dr	Multi Family Dwelling	30.11	2250	1050	5	N
Hamilton Woods	1008	Green Oak Dr	Multi Family Dwelling	31.67	2250	1050	5	N
Hamilton Woods	1010	Green Oak Dr	Multi Family Dwelling	32.44	2250	1050	5	N
Hamilton Woods	1012	Green Oak Dr	Multi Family Dwelling	38.93	2250	1050	5	N
Office Building	19	Hamilton Dr.	Offices	28.97	2250	1050	4	N
Office Building	33	Hamilton Dr.	Offices	27.87	2250	1050	4	N
Office Building	41	Hamilton Dr.	Offices	23.22	2250	1050	4	N
Office Building	49	Hamilton Dr.	Offices	27.87	2250	1050	4	N
	57	Hamilton Dr.	Defense Military	32.76	2250	1050	4	N
Specialized Printing	166	Hamilton Dr.	Offices	23.71	2250	1050	4	Y
Hamilton Landing	100	Hamilton Landing	Offices	25.42	0	1050	5	Y
Hamilton Landing	200	Hamilton Landing	Offices	26.52	1625	1050	5	Y
Hamilton Landing	300	Hamilton Landing	Offices	27.62	1625	1050	5	Y
Hamilton Landing	400	Hamilton Landing	Offices	26.52	1625	1050	5	Y
Hamilton Landing	500	Hamilton Landing	Offices	26.52	1625	1050	5	Y
Hamilton Landing	600	Hamilton Landing	Offices	26.52	1625	1050	5	Y
Courtyard Marriott	1301	Hamilton Parkway	Hotel	34.13	2625	1050	4	Y
Bank of America PCM	350	Ignacio Blvd	Bank	31.17	1125	1042	4	Y
Ignacio Hills	401	Ignacio Blvd	Multi Family Dwelling	33.47	2250	1042	4	N
Ignacio Hills	415	Ignacio Blvd	Multi Family Dwelling	33.47	2250	1042	4	N
Ignacio Hills	445	Ignacio Blvd	Multi Family Dwelling	33.47	2250	1042	4	N
Ignacio Hills	461	Ignacio Blvd	Multi Family Dwelling	33.47	2250	1042	4	N
Ignacio Hills	475	Ignacio Blvd	Multi Family Dwelling	33.47	2250	1042	4	N
Ignacio Hills	481	Ignacio Blvd	Multi Family Dwelling	28.67	2250	1042	4	N
Ignacio Hills	495	Ignacio Blvd	Multi Family Dwelling	32.27	2250	1042	4	N
Paris Printing	15	Leveroni	Offices	31.9	1250	1050	4	Y
Ignacio Business Park	25	Leveroni	Offices	26.52	1250	1050	4	Y
Lappert's Ice Cream	32	Leveroni	Food and Beverage	20.17	1125	1050	4	Y
Office Building	60	Leveroni	Offices	32.27	1750	1050	4	Y
Office Building	15	Pamaron	Offices	30.07	2250	1050	4	N
Office Building	30	Pamaron	Offices	28.97	3500	1050	4	N
	20 A	Pimentel		24.57	2500	1050	4	N
	20C	Pimentel		25.42	2000	1050	4	Y

Appendix 6

City of Novato General Plan
(CD included in mailing)

Appendix 7
Multi-Hazard Mitigation Plan Adoption Resolution

ORIGINAL

CITY COUNCIL OF THE CITY OF NOVATO

RESOLUTION NO. 86-11

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF NOVATO ADOPTING THE HAZARD MITIGATION PLAN AND AUTHORIZING THE CITY MANAGER TO IMPLEMENT THE PLAN

WHEREAS, to strongly encourage local governments to improve mitigation planning; Congress enacted the Disaster Mitigation Act of 2000 (DMA 2000). The legislation reinforces the importance of planning for disasters before they occur and requires all state and local governments to develop comprehensive mitigation plans as a condition of eligibility for future post-disaster mitigation grants after November 4, 2004; and

WHEREAS, the City Manager created a Hazard Mitigation Planning committee which received input from the community and adjacent jurisdictions, during the preparation of the Plan.

WHEREAS, the agency's plan must include hazard identification and hazard vulnerability analysis, mitigation strategy, a prioritized action plan to address the issues identified and a maintenance plan; and

WHEREAS, the Multi-jurisdictional All-Hazard Mitigation Plan satisfies all the requirements under the law.

NOW THEREFORE, BE IT RESOLVED that:

1. The City of Novato Hazard Mitigation Plan as submitted to the City Council is approved.

2. The City Manager or his designee is authorized to submit the Plan and all necessary documents to the Federal Emergency Management Agency (FEMA), and any other appropriate government entity. Finally, in the event changes or modifications are requested by any agency, the City Manager, or his designee, is authorized to make such changes and resubmit the document.

3. The City Manger or his designee is authorized to implement the Plan once accepted by FEMA and to evaluate the Plan annually with the Hazard Mitigation Planning committee and make updates as necessary. Every five years the Plan shall be submitted to the appropriate government entities for review.

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* * * * * *

I HEREBY CERTIFY that the foregoing resolution was duly and regularly adopted by the City Council of the City of Novato, Marin County, California, at a meeting thereof, held on the 29th day of November, 2011, by the following vote, to wit:

AYES:	Councilmembers	Athas, Dillon-Knutson, Eklund, MacLeamy, Kellner
NOES:	Councilmembers	None
ABSTAIN:	Councilmembers	None
ABSENT:	Councilmembers	None

Sheri Hartz, City Clerk

Approved as to form:

City Attorney of the City of Novato

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Appendix 8

Glossary of Acronyms

ARC	American Red Cross
BFE	Base Flood Elevation (100 yr.)
BIA	Bureau of Indian Affairs
BICEP	Business and Industry Council for Emergency Preparedness
BLM	Bureau of Land Management
BOR	Bureau of Reclamation
CALTRANS	California Department of Transportation
CBSC	California Building Standards Commission
CCC	California Conservation Corp
CDC	Center for Disease Control
CDEC	California Data Exchange Center
CDF	California Dept. of Forestry and Fire Protection
CDFA	California Department of Food and Agriculture
CFSA	Consolidated Farm Service Agency
CFR	Code of Federal Regulations
CIS	Chemical Inventory System
CRDL	Chemical and Radiation Detection Laboratory
CLETS	California Law Enforcement Telecommunication System
CRS	NFIP Community Rating System
DHS	Department of Homeland Security
DMA 2000	Disaster Mitigation Act of 2000
DFG	California Department of Fish and Game
DOC/DMG	California Department of Conservation/Division of Mines and Geology
DoD	U.S. Department of Defense
DOT	U.S. Department of Transportation
DOE	U.S. Department of Energy
DPR	California Department of Parks and Recreation
DPW	Department of Public Works
DWR	California Department of Water Resources
EAL	Federal Emergency Action Levels
EIS	Early Implementation Strategy

EIS/EIR	Environmental Impact Statement & Environmental Impact Report
EMC	Emergency Management Coordinator
EPA	U.S. Environmental Protection Agency
ESA	Explosive Storage Area
EXPL	Explosives
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
GHAD	Geological Hazard Statement Districts
GIS	Geographic Information System
HMP	Hazard Mitigation Program
HMGP	Hazard Mitigation Grant Program
HUD	US Department of Housing and Urban Development
HVA	Hazard Vulnerability Analysis
IA	Individual Assistance Program
ICBO	International Congress of Building Officials
ICS	Incident Command System
IFGP	Individual Family Grant Program
IHMT	Interagency Hazard Mitigation Team
JFOC	Joint Flood Operations Center
JIC	Joint Information Center
JOC	Joint Operations Center
LACO	Marin County
LPG	Liquefied Petroleum Gas
MSDS	Material Safety Data Sheet
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Agency
NPDES	National Pollutant Discharge Elimination System
NOAA	National Oceanic and Atmospheric Administration
NMF	National Marine Fisheries
NPGA	National Propane Gas Association
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NRCS	U.S. Natural Resource Conservation Service
NSD	Novato Sanitary District

NWS	National Weather Service
OEM	Office of Emergency Management
OES	Office of Emergency Services
OMB	US Office of Management and Budget
PA	FEMA Public Assistance Program
PDA	Preliminary Damage Assessment
PG&E	Pacific Gas and Electric
RCD	Resource Conservation Districts
RFC	NWS River Forecast Center
SBA	U.S. Small Business Administration
SCCAG	Southern California Council of Governments
SEMS	Standard Emergency Management System
SOP	Standard Operating Procedure
SRB	State Reclamation Board
UBC	Uniform Building Code
USACE	US Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USFS	United States Forestry Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USNRC	U.S. Nuclear Regulatory Commission
VOLAG	Volunteer Agencies