CITY OF BELVEDERE

RESOLUTION NO. 2024-27

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BELVEDERE TO ADOPT THE 2024 MULTI JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN

WHEREAS, natural hazards, such as earthquakes, floods, and wildfires, pose a significant threat to the residents and visitors of the City of Belvedere; and

WHEREAS, disasters start and end at the local level, it is the inherent responsibility of local government to lead hazard mitigation and the reduction of risk and vulnerability to hazards; and

WHEREAS, the City of Belvedere, in coordination with neighboring jurisdictions and special districts, produced the City of Belvedere Annex to the 2023 Marin Multi-Jurisdictional Local Hazard Mitigation Plan to provide a framework for hazard mitigation; and

WHEREAS, the City Council adopted a new Safety Element into General Plan in 2023 that incorporates by reference the Marin Multi-jurisdictional Hazard Mitigation Plan by including the following language: "...the city partnered with the Marin County Sheriff's Office of Emergency Services (OES), Department of Public Works, Fire Department, Community Development Agency, and all Marin County cities and towns to produce the multi-jurisdictional LHMP..."

WHEREAS, the adoption of the 2023 MJLHMP in accordance with the California Environmental Quality Act (CEQA) and the adoption of the MJLHMP is exempt from CEQA because it is not considered a project pursuant to CEQA guidelines section 15378(b) in that it does not involve any commitment to any specific project which may result in potentially significant physical impact on the environment. In addition, or in the alternative, adoption of the 2023 MJLHMP is exempt from CEQA pursuant to CEQA guidelines Section 15061 (b)3 in that it can be seen with certainty that there is no possibility that activities in question may have a significant effect on the environment and therefore are not subject to CEQA; and

NOW, THEREFORE, BE IT RESOLVED that the Council of the City of Belvedere does hereby adopt the 2023 Marin County Multi-Jurisdictional Local Hazard Mitigation Plan, including the Belvedere Annex (Exhibit A).

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Belvedere held on this 12th day of August 2024, by the following vote:

AYES: Cooper, Kemnitzer, Lynch, Mayor Mark
NOES: None
ABSENT: Wilkinson
ABSTAIN: None

APPROVED: _____
Peter Mark, Mayor

ATTEST: _____
Beth Haener, City Clerk

EXHIBIT A

CITY OF BELVEDERE COMMUNITY PROFILE

Marin County Multi-Jurisdictional Hazard Mitigation Plan 2023

CITY OF BELVEDERE

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ACKNOWLEDGEMENTS

The City of Belvedere and Preparative Consulting would like to thank those collaborators and partners who participated in the planning and development of this document.

The official Marin County hazard mitigation Steering Committee provided the oversight and dedication to this project that was required, and without their commitment, this project would not be possible.

As with any working plan, this document represents planning strategies and guidance as understood as of the date of this plan's release. This plan identifies natural hazards and risks and identifies the hazard mitigation strategy to reduce vulnerability and make the communities of the City of Belvedere more disaster resistant and sustainable.

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SECTION 1.0: INTRODUCTION

1.1 INTRODUCTION

The City of Belvedere, Community Profile has been prepared in conjunction with the Marin County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), establishing an inter-jurisdictional process for the development and implementation of effective hazard mitigation strategies in association with identified hazards that pose real or potential threats to the City of Belvedere.

1.2 PLANNING PROCESS

The majority of Marin County is unincorporated sparsely populated rural and protected lands. Most of the 262,000 county population is consolidated into the Eastern portion of the county. The Marin County MJHMP Steering Committee and broader Planning Team approached the development of the Marin County MJHMP and the associated jurisdictional and district profiles from a coordinated and collaborative planning and public engagement unity of effort.

The Marin County and City of Belvedere Steering Committee felt a unified effort, led by the County Office of Emergency Management (OEM), would be the most effective approach for this planning process. This approach allowed the small participating jurisdictions and districts with limited staffing and resources to take advantage of the combined efforts of the County, the City of Belvedere and the other participating planning areas to reach a broader segment of each of their own populations and do so in a way to ensure greater equity and inclusion of the public in this planning process. Extensive and coordinated public outreach was done involving the City of Belvedere and all participating jurisdictions and districts with an eye towards equity, inclusion, openness, accessibility, and ensuring they meet the population where they live, work, or recreate to provide the public convenience of access and ease of participation in this planning process.

Marin County is very different from most California Counties in that the populated portion of the County where the participating jurisdictions and district's planning areas are located has the same climate, similar topography, and are exposed to many of the same hazards. Only three jurisdictions, Larkspur, Ross, and San Anselmo, are not coastal jurisdictions and are not impacted by Tsunami or Sea Level Rise.

This unity of effort approach allowed the Marin County and City of Belvedere Steering Committee to establish a more robust Planning Team representing local Belvedere, countywide, regional, state, and federal stakeholders servicing the Marin County and City of Belvedere planning area. These stakeholders were in a unique position to provide informed and specific information and recommendations on hazard mitigation goals and actions, as well as population needs and social vulnerability for each of the jurisdictional and district planning areas. This united effort allowed the planning team to attend fewer meetings than they would have been required to attend if they were required to attend separate meetings for each participating jurisdiction and district. The reduced number of meetings allowed the planning team the opportunity and time to provide more detailed and thoughtful contributions to the planning effort.

In addition to providing representation on the coordinated Marin County and City of Belvedere Multi-Jurisdictional Hazard Mitigation Plan Steering Committee, the City of Belvedere involved additional internal planning team members to support the broader planning process. The City of Belvedere jurisdictional representatives for the coordinated Marin County Multi-Jurisdictional

Hazard Mitigation Plans Steering Committee and the Planning Team Members are represented below.

1.2.1 Steering Committee Members (Jurisdictional Representatives)

Primary Point of Contact
Robert Zadnik, City Manager
Telephone: 415-435-8906
E-mail: rzadnik@cityofbelvedere.org

Alternate Point of Contact
Laurie Nilsen, Emergency Svs, Coord.
Telephone: 415-789-2805
E-mail: lnilsen@tiburonpd.org

This annex was developed by the primary point of contact with assistance from the members of the local mitigation planning team listed in Table 1 and Table 2.

Table 1: Local Hazard Mitigation Planning Team Members

Jurisdiction	Name	Title/ Department	Phone	Email
Belvedere	Robert Zadnik	City Manager	415-435-8906	rzadnik@cityofbelvedere.org
Belvedere	Laurie Nilsen	Emergency Svs, Coord.	415-789-2805	lnilsen@tiburonpd.org
Belvedere	Rebecca Markwick	Planning Director	415-435-8907	rmarkwick@cityofbelvedere.org
Belvedere	Samie Malakiman	Associate Planner	415-435-8931	smalakiman@cityofbelvedere.org

Table 1: Local Hazard Mitigation Planning Team Members

This 2023 Marin County Operational Area (OA) MJHMP is a comprehensive update of the 2018 Marin County OA MJHMP. The planning area and participating jurisdictions and organizations were defined to consist of unincorporated Marin County, five special districts, and the eleven incorporated jurisdictions to include the City of Belvedere. All participating jurisdictions are within the geographical boundary of Marin County and have jurisdictional authority within this planning area.

The Marin County and City of Belvedere Steering Committee led the planning process based on the contribution and input from the whole community stakeholders who identified the community's concerns, values, and priorities. The Steering Committee met and reviewed the mitigation recommendations and strategies identified within this plan. Each participating local jurisdiction established a mechanism for the development and implementation of jurisdictional mitigation projects, as identified within this plan and associated locally specific supporting documents. As deemed necessary and appropriate, participating jurisdictions will organize local mitigation groups to facilitate and administer internal activities.

The Marin County and City of Belvedere Steering Committee assisted with the planning process in the following ways:

- Attending and participating in the Steering Committee meetings.
- Identification of potential mitigation actions.
- Updating the status of mitigation actions from the 2018 Marin County OA MJHMP.
- Collecting and providing other requested data (as available).
- Making decisions on plan process and content.
- Reviewing and providing comments on plan drafts; including annexes.

- Informing the public, local officials, and other interested stakeholders about the planning process and providing opportunity for them to be involved and provide comment.
- Coordinating, and participating in the public input process.
- Coordinating the formal adoption of the plan by the governing boards.

1.2.2 Steering Committee Planning Process

The Marin County and City of Belvedere Steering Committee met monthly to develop the plan. Email notifications were sent out to each Steering Committee member to solicit their participation in the Steering Committee meetings. The meetings were conducted using a Zoom platform videoconferencing. Meeting attendees signed in using the chat feature to record their attendance.

The Marin County and City of Belvedere Steering Committee agreed to make and pass plan-based general policy recommendations by a vote of a simple majority of those members present. The Steering Committee will also seek input on future hazard mitigation programs and strategies from the mitigation planning team by focusing on the following:

- Identify new hazard mitigation strategies to be pursued on a state and regional basis, and review the progress and implementation of those programs already identified.
- Review the progress of the Hazard Mitigation program and bring forth community input on new strategies.
- Coordinate with and support the efforts of the Marin County OEM to promote and identify resources and grant money for implementation of recommended hazard mitigation Strategies within local jurisdictions and participating public agencies.

During the planning process, the Marin County and City of Belvedere Steering Committee communicated through videoconferencing, face-to-face meetings, email, telephone conversations, and through the County and City websites. The County and City website included information for all stakeholders on the MJHMP update process. Hannah Tarling of the Marin County Office of Emergency Management and Preparative Consulting established a Microsoft 365 SharePoint folder which allowed the Steering Committee members and Marin OEM and Preparative Consulting to share planning documents and provide a format for the planning partners to submit completed documents and access other planning related documents and forms. Draft documents were also posted on this platform and the Marin County OES website so that the Steering Committee members and the public could easily access and review them.

1.2.3 Coordination with Stakeholders and Agencies

Opportunities for involvement in the planning process must be provided to neighboring communities, local and regional agencies involved in hazard mitigation, agencies with authority to regulate development, businesses, academia, and other private and nonprofit interests (44 CFR, Section 201.6(b)(2)).

Early in the planning process, the Marin County and City of Belvedere Steering Committee reached out to the following Local and Regional Agencies involved in hazard mitigation activities to invite them to participate in this planning process as a member of the Planning Team. These individuals work with Marin County and the City of Belvedere communities and could provide subject matter expertise and relevant information to the planning process

regarding the community history, hazard risk, vulnerability, and impact, mitigations efforts, community needs, demographics, and social vulnerability, economic concerns, ecology, and other community services and needs.

The Marin County and City of Belvedere Steering also determined that data collection, risk assessment analyses, mitigation strategy development, and plan approval would be greatly enhanced by inviting other local, state and federal agencies and organizations to participate in the process. Based on their involvement in hazard mitigation planning, their landowner status in the County, the City of Belvedere and/or their interest as a neighboring jurisdiction, representatives from the following groups were invited to participate on the Planning Team:

Eighty-five planning partners participated in this update, as listed in Table 2.

Table 2: 2023 MJHMP Planning Team Members

No.	Agency	Point of Contact	Title
1	Belvedere	Laurie Nilsen	Emergency Svs, Coord.
2	Belvedere	Rebecca Markwick	Planning Director
3	Belvedere	Samie Malakiman	Associate Planner
4	Bolinas Com. PUD	Jennifer Blackman	General Manager
5	Bolinas Fire Protection Dist.	Stephen Marcotte	Asst. Fire Chief
6	Central Marin Fire District	Matt Cobb	Battalion Chief/Fire
7	Central Marin Fire District	Ezra Colman	Battalion Chief/Fire
8	Central Marin Fire District	Rubin Martin	Fire Chief
9	Corte Madera	RJ Suokko	Director of Public Works
10	Corte Madera	Chris Good	Senior Civil Engineer
11	Sanitary District No. 2	RJ Suokko	District Manager
12	Fairfax	Loren Umbertis	Public Works Director
13	Fairfax	Mark Lockaby	Building Official
14	Larkspur	Dan Schwarz	City Manager
15	Larkspur	Julian Skinner	Public Works Director/ City Engineer
16	Larkspur	Robert Quinn	Public Works Superintendent
17	Las Gallinas Valley Sanitary District	Dale McDonald	Administrative Services Mgr.
18	Las Gallinas Valley Sanitary District	Greg Pease	Safety Manager
19	Marin County	Steven Torrence	OEM Director
20	Marin County	Hannah Tarling	Emergency Management Coordinator
21	Marin County	Chris Reilly	OEM Project Manager
22	Marin County	Woody Baker-Cohn	Senior Emergency Management Coordinator
23	Marin County	Leslie Lacko	Community Development Agency
24	Marin County	Hannah Lee	Senior Civil Engineer
25	Marin County	Felix Meneau	Project Mgr./ FCWCD
26	Marin County	Julia Elkin	Department of Public Works
27	Marin County	Beb Skye	Department of Public Works
28	Marin County	Scott Alber	Battalion Chief, Marin County Fire Dept.
29	Marin County	Lisa Santora	Deputy Public Health Officer, Marin Health & Human Services

Table 2: 2023 MJHMP Planning Team Members			
No.	**Agency**	**Point of Contact**	**Title**
30	Marin County	Koblick, Kathleen	Marin Health & Human Services
31	Marin County	Amber Davis	Public Health Preparedness
32	Mill Valley	Patrick Kelly	Department of Public Works
33	Mill Valley	Ahmed A Aly	Project Manager
34	Mill Valley	Jared Barrilleaux	Deputy Director of Engineering
35	Mill Valley	Daisy Allen	Senior Planner
36	Southern Marin Fire District	Tom Welch	Deputy Chief/South Marin Fire Dist.
37	Southern Marin Fire District	Marshall Nau	Fire Marshall/South Marin Fire Dist.
38	North Marin Water District	Eric Miller	Asst. General Manager
39	North Marin Water District	Tim Fuette	Senior Engineer
40	Novato	David Dammuller	Engineering Services Mgr.
41	Novato	Dave Jeffries	Consultant/JPSC
42	Ross	Richard Simonitch	Public Works Director
43	San Anselmo	Sean Condry	Public Works & Building Director
44	San Anselmo	Erica Freeman	Building Official
45	San Anselmo	Scott Schneider	Asst. PW Director
46	San Rafael	Quinn Gardner	Deputy Emergency Services Coord.
47	San Rafael	Cory Bytof	Sustainability
48	San Rafael	Joanna Kwok	Senior Civil Engineer
49	San Rafael	Kate Hagemann	Climate Adaptation & Resilience Planner
50	Sausalito	Andrew Davidson	Senior Engineer/ DPW
51	Sausalito	Kevin McGowan	Director of Public Works
52	Sausalito	Brandon Phipps	Planning Director
53	Tiburon	Sam Bonifacio	Assistant Planner
54	Tiburon	Dina Tasini	Director of Community Development
55	Tiburon	Laurie Nilsen	Emergency Svs, Coord.
		Special Districts & Partner Agencies	
56	County of Marin Disability Access Program	Laney Davidson	Disability Access Manager/ ADA Coordinator
57	County of Marin Disability Access Program	Peter Mendoza	Disability Access Manager/ ADA Coordinator
58	Emergency Medical Svcs	Chris Le Baudour	EMS Authority
59	Fire Departments	Jason Weber	Fire Chiefs
60	Golden Gate Bridge, Highway & Transportation District	Daniel Rodriguez	Security, Emergency Management Specialist
61	Golden Gate Bridge, Highway & Transportation District	Dennis Mulligan	General Manager & CEO,
62	Marin City Climate Resilience and Health Justice	Terrie Green	Executive Director
63	Marin Center for Independent Living	Peter Mendoza	Director of Advocacy and Special Projects
64	Marin City Community Services District	Juanita Edwards	Interim General Manager

Table 2: 2023 MJHMP Planning Team Members			
No.	Agency	Point of Contact	Title
65	Marin County Community Development Agency	Leslie Lacko	Community Development Agency
66	Marin County Flood Control & Water Conservation District	Garry Lion	Advisory Board Member
67	Marin County Office of Education	Michael Grant	Director, Marin County Office of Education
68	Marin County Parks	Max Korten	General Manager and Director
69	PG&E	Mark Van Gorder	Government Affairs, North Bay
70	PG&E	Ron Karlen	PG&E Public Safety Specialist
71	Sonoma Marin Area Rail Transit (SMART)	Jennifer McGill	Chief of Police
72	Transportation Authority of Marin (TAM)	Anne Richmond	Executive Director
73	Willow Creek School	Itoco Garcia	Superintendent
	State Partners		
74	Cal OES - ESC	Sarah Finnigan	Cal OES Emergency Services Coordinator
75	Cal OES, Division of Safety of Dams	Danielle Jessup	Coordinator/ Dam Safety Planning Division
76	California Department of Public Health	Svetlana Smorodinsky	Disaster Epidemiologist/ Environmental & Occupational Emergency Preparedness Team
77	California Department of Public Health	Patrice Chamberlain	Health Program Specialist II
78	California Department of Water Resources	Julia Ekstrom, PhD	Supervisor, Urban Unit Water Use Efficiency Branch
79	Caltrans	Trang Hoang	Senior Transportation Engr/ Office of Advance Planning
80	Caltrans	Markus Lansdowne	Caltrans D4 Emergency Coordinator
	Federal Partners		
81	Army Corps of Engineers	Jessica Ludy	Flood Risk Management, Equity, and Environmental Justice
82	National Park Service	Stephen Kasierski	OneTam
83	US Coast Guard	LT Tony Solares	Sector SF Waterways Safety Branch
84	US Coast Guard	MST1 Brandon M. Ward	Emergency Management Specialist
85	US Coast Guard	LT William K. Harris	USCG SEC San Francisco

Table 2: 2023 MJHMP Planning Team Members

Several opportunities were provided for the groups listed above to participate in the City of Belvedere's planning process. At the beginning of the planning process, invitations were extended to these groups to actively participate on the Planning Team. Participants from these groups assisted in the process by attending several videoconferencing meetings where hazard vulnerability and risk were discussed along with hazard mitigation strategies and actions. Planning Team members provided data and other applicable information directly as requested in meetings, emails, telephone calls, videoconferencing, worksheets, or through data contained

on their websites or as maintained by their offices. This information was used to develop hazard vulnerability and risk profiles along with mitigation actions.

These key agencies, organizations, and advisory groups received meeting announcements, agendas, and minutes by e-mail throughout the plan update process. They supported the effort by attending meetings or providing feedback on issues. All the agencies were provided with an opportunity to comment on this plan update and were provided with a copy of the plan to review and offer edits and revisions. They were also provided access to the Marin County OEM hazard mitigation plan website to review all planning documents and hazard mapping tools.

Each was sent an e-mail message informing them that draft portions of the plan were available for review. In addition, the complete draft plan was sent to the California Governor's Office of Emergency Services (Cal OES) and FEMA Region IX for a pre-adoption review to ensure program compliance.

In addition, through the public meetings conducted at the beginning of the planning process, members of the planning team, the public, and other key stakeholders were invited to participate in the planning process through public outreach activities.

Further as part of the public outreach process, all planning areas engaged in public outreach and education by providing information on their City of Belvedere website or though press releases directing the public to the main Marin County OEM website that provided coordinated and detailed public information of the planning process and how the public could participate. All planning areas were invited to attend the public meetings and to review and comment on the plan prior to submittal to Cal OES and FEMA. Additional public outreach action is detailed in the 1.2.4 PUBLIC ENGAGEMENT section of this annex.

The following planning meetings were held with the planning team:

Table 3: City of Belvedere & Marin County MJHMP Planning Meetings

No.	Date	Attendees	Meeting	Planning Meeting Objectives
1	10/26/22	Steering Committee	Project Overview Meeting	• Plan Overview – Steps and Timeline • Planning Process • Steering Committee Role
2	11/9/22	Steering Committee	Steering Committee Kickoff Meeting	• Hazard Mitigation and Emergency Management Overview • Plan Overview – Steps and Timeline • Community Overview • Planning Process • Hazard Identification and Risk Assessment • Stakeholders and Planning Team Identification
3	12/6/22	Steering Committee, Planning Team	Planning Team Kickoff Meeting	• Hazard Mitigation and Emergency Management Overview • Plan Overview – Steps and Timeline • Community Overview

Table 3: City of Belvedere & Marin County MJHMP Planning Meetings

No.	Date	Attendees	Meeting	Planning Meeting Objectives
				• Planning Process • Hazard Identification and Risk Assessment
4	02/07/23	Steering Committee	Steering Committee Hazard Profile Meeting	• Jurisdictional Letter of Commitment • Identify Planning Team Members • Hazard Risk Ranking Worksheets • Jurisdictional Profiles • Jurisdictional/ District Capability Assessment • 2018 Hazard Mitigation Project Status Update
5	03/07/23	Steering Committee/ Planning Team	Planning Team Public Outreach Strategy Meeting	• Planning Goals and Objectives • Hazard Risk Ranking Worksheets • Jurisdictional Profiles • Jurisdictional/ District Capability Assessment • 2018 Hazard Mitigation Project Status Update • Public Outreach Strategy
6	04/04/23	Steering Committee	Steering Committee Meeting	• HMGP (DR-4683) Funding Timeline • Public Outreach • Planning Goals and Objectives • Jurisdictional Hazard Vulnerability Maps • Jurisdictional Profiles • Jurisdictional/ District Capability Assessment • 2018 Hazard Mitigation Project Status Update
7	04/13/23	General Public, Steering Committee, Planning Team	Public Outreach Town Hall Meeting #1 (In-person and virtual on Zoom) Thursday, 6:00 pm to 7:30 pm Marin County BOS Chambers	• Meeting translated live in Spanish with 29 language subtitle capability for virtual participants. • Meeting also interpreted in American Sign Language • Meeting recorded and posted on Hazard Mitigation website. • Hazard Mitigation and Emergency Management Overview • Planning Process • Hazard Identification and Risk Assessment • Planning Goals and Objectives • Hazard Mitigation Projects

Table 3: City of Belvedere & Marin County MJHMP Planning Meetings

No.	Date	Attendees	Meeting	Planning Meeting Objectives
				• Community Input
8	04/29/23	General Public, Steering Committee, Planning Team	Public Outreach Town Hall Meeting #2 (In-person and virtual on Zoom) Saturday, 10:00 am to 11:30 am Marin County Health and Wellness Center	• Meeting translated live in Spanish with 29 language subtitle capability for virtual participants. • Meeting also interpreted in American Sign Language • Meeting recorded and posted on Hazard Mitigation website. • Hazard Mitigation and Emergency Management Overview • Planning Process • Hazard Identification and Risk Assessment • Planning Goals and Objectives • Hazard Mitigation Projects • Community Input
9	05/31/23	Steering Committee	Steering Committee Hazard Ranking Meeting	• HMGP (DR-4683) Funding Timeline • Public Outreach Status • Jurisdictional Hazard Vulnerability Maps • OEM Overview of Hazard Maps and Marin Maps • Marin Co. MJHMP Risk Assessment Tool Overview • 2018 Hazard Mitigation Project Status Update • Hazard Working Groups
10	06/27/23	Steering Committee, Planning Team	Marin County Planning Team Meeting	• HMGP (DR-4683) & BRIC Grant Funding Timeline • Public Outreach Status • Jurisdictional Hazard Risk Assessment Tool • OEM Overview of Hazard Maps and Marin Maps • Marin County Hazards over the Last 5-Years • 2018 Hazard Mitigation Project Status Update • 2023 Hazard Mitigation Projects/Capital Improvement Projects • Hazard Working Groups
11	07/01/23-09/01/23	Steering Committee Members	Steering Committee Members Plan	• Individual phone or conference calls with planning jurisdictions and districts to answer specific

Table 3: City of Belvedere & Marin County MJHMP Planning Meetings				
No.	Date	Attendees	Meeting	Planning Meeting Objectives
			Development Sessions	questions and assist them in developing their profile annex.
12	11/27/23	Steering Committee, Planning Team	Marin County Planning Team Meeting	• Presentation and review of the Draft Marin County OA MJHMP and Jurisdictional/District Annexes
13	11/28/23	General Public	Public Outreach Presentation on Marin County Office of Emergency Management Website	• Presentation and review of the Draft Marin County OA MJHMP and Jurisdictional/District Annexes. • Opportunity for public comment and questions and answers.

Table 3: City of Belvedere & Marin County MJHMP Planning Meetings

1.2.4 Public Engagement

Early discussions with the Marin County OEM established the initial plan for public engagement to ensure a meaningful and inclusive public process with a focus on equity and accessible to the whole community. The Public Outreach efforts mirrored the Planning Team approach with a unified effort, led by the County OEM and the City of Belvedere, involving all participating jurisdictions and districts. Public outreach for this plan update began at the beginning of the plan development process with a detailed press release from Marin County and the City of Belvedere informing the community of the purpose of the hazard mitigation planning process for the Marin County OA planning area and to invite the public to participate in the process.

Public involvement activities for this plan update were conducted by Marin County, the City of Belvedere, and all participating jurisdictions and districts and included press releases; website postings; a community survey; stakeholder and public meetings; and the collection of public and stakeholder comments on the draft plan which was posted on the Marin County and City of Belvedere website. Information provided to the public included an overview of the mitigation status and successes resulting from implementation of the 2018 plan as well as information on the processes, new risk assessment data, and proposed mitigation strategies for the plan update.

Equity and Whole Community Approach

The Marin County OEM and the Marin County and City of Belvedere Steering Committee prioritized equity and engagement of the whole community in the development of the Marin County OA MJHMP by establishing a framework with key actions for each step of the planning process. Elements of the equity approach included:

Engaging hard-to-reach populations

This effort was to ensure the greatest equity and access to the public to enable participation in the process. The Marin County OEM outreach strategy is to "meet people where they are." The Town Hall meetings were conducted at different familiar locations within the county where people could easily access them and were conducted on both a weekday and weekend, and in the evening and during the daytime. The meetings were offered in-person with a virtual

broadcast using Zoom videoconferencing and streamed live on Marin County OEM Facebook account. After the meeting, Marin County OEM uploaded the recorded meeting to their website to allow the public on demand access to the meeting.

Translation and Interpretation Services

The survey and outreach materials were provided in both English and Spanish to improve accessibility among populations with limited English proficiency. The website uses Google Translate for accessibility in multiple languages. Interpretation services were offered for both town hall meetings. Each town hall meeting included live Spanish translation and subtitles, Live American Sign Language (ASL/CDI) interpretation, the ability for the Zoom videoconferencing attendee to activate subtitles in 29 different languages, and vision accessible PowerPoint slide.

Three stakeholder and public meetings were held, two at the beginning of the plan development process and one prior to finalizing the updated plan. Where appropriate, stakeholder and public comments and recommendations were incorporated into the final plan, including the sections that address mitigation goals and strategies. Specifically, public comments were obtained during the plan development process and prior to plan finalization.

All press releases and website postings are on file with the Marin County OEM. Public meetings were advertised in a variety of ways to maximize outreach efforts to both targeted groups and to the public at large. Advertisement mechanisms for these meetings and for involvement in the overall MJHMP development process include:

- Development and publishing of an MJHMP public outreach article
- Providing press releases to local newspapers and radio stations
- Posting meeting announcements on the local County MJHMP website
- Email to established email lists
- Personal phone calls

The public outreach activities were conducted with participation from and on behalf of all jurisdictions participating in this plan.

The Marin County and City of Belvedere Steering Committee has made the commitment to periodically bring this plan before the public through public meetings and community posting so that citizens may make input as strategies and implementation actions change. Public meetings will continue to be held twice a year after the first and third MJHMP meetings. Public meetings will continue to be stand-alone meetings but may also follow a council meeting or other official government meeting. The public will continue to be invited to public meetings via social media messaging, newspaper invitations, and through the website for each jurisdiction participating in the plan. Each jurisdiction is responsible for assuring that their citizenry is informed when deemed appropriate by the Steering Committee.

WEBSITE

At the beginning of the plan update process, Marin County OEM established a hazard mitigation website https://emergency.marincounty.org/pages/lhmp on behalf of all the planning areas to ensure consistent messaging and information, to keep the public posted on plan development milestones, and to solicit relevant input. The website also provided information on signing up for Alert Marin, provided detailed information about the hazard mitigation process and plan

development, provided a URL and QR code link to the survey in both English and Spanish, and provided information about upcoming town hall meetings. (See Figure 1)

The site's address was publicized in all press releases, surveys and public town hall meetings. Each planning partner also established a link on their own agency website. Information on the plan development process, the Steering Committee, a link to the Hazard Mitigation survey, and drafts of the plan were made available to the public on the site. Marin County intends to keep a website active after the plan's completion to keep the public informed about successful mitigation projects and future plan updates.

Figure 1: Marin County OEM MJHMP Website

PUBLIC MEETINGS

Two separate Marin County MJHMP Public Town Hall Meeting were conducted at different locations within the County, on different days of the week and during different times of the day. This effort was to ensure the greatest equity and access by the public to enable participation in the process. The Marin County OEM outreach strategy is to "meet people where they are." Each Town Hall Meeting included live Spanish translation and subtitles, Live American Sign Language (ASL/CDI) interpretation, the ability for the Zoom videoconferencing attendee to activate subtitles in 29 different languages, and vision accessible PowerPoint slide.

The first Town Hall Meeting was conducted on Thursday, April 13, 2023, from 6:00 pm to 7:30 pm, at the Marin County Board of Supervisors Chambers, Marin County Civic Center, 3501 Civic Center Drive, Room #330 San Rafael, CA 94903. The in-person meeting was also broadcast virtually using Zoom videoconferencing and streamed live on Marin County OEM Facebook account. Each of the jurisdictions participating in the MJHMP released a Press Release on their respective websites announcing the Public Town Hall Meeting and providing the date, time, and URL link to the Zoom Meeting for the public to log in and attend the Zoom Meeting. Marin County OEM also posted a notice for the Public Town Hall Meeting

on their Facebook account. At the conclusion of the presentation, a question and answer session was held to answer questions from the attendees.

The second Town Hall Meeting was conducted on Saturday, April 29, 2023, from 10:00 am to 11:30 am, at the Marin County Health and Wellness Center, 3240 Kerner Ave. Rooms #109 and #110 San Rafael, CA. 94903. The meeting followed the same format as the first and hosted the same access level of equity and accessibility.

The Marin County MJHMP Public Town Hall Meeting was recorded and downloaded from Zoom and made available to all of the jurisdictions and districts to place on their websites and local Access TV for the public to view.

Meeting participants were also invited to complete the Hazard Mitigation Survey and were provide the URL link to the Survey Monkey website to complete the survey.

Figure 2: Marin County OEM MJHMP Public Town Hall Meeting

SOCIAL MEDIA

Marin County and its participating jurisdictions utilized several forms of social media to reach residents and customers. Information about the Hazard Mitigation Planning process was communicated to the public via Facebook, Twitter, and local access TV. Residents and customers were invited to complete the Hazard Mitigation Plan survey which was accessible via an attached URL or QR Code and provide feedback on potential hazard mitigation projects or programs.

The results of the survey were provided to each of the planning partners and used to support the jurisdictional annex process. Each planning partner was able to use the survey results to help identify actions as follows:

- Gauge the public's perception of risk and identify what citizens are concerned about.
- Identify the best ways to communicate with the public.
- Determine the level of public support for different mitigation strategies.
- Understand the public's willingness to invest in hazard mitigation.

PRESS RELEASES

Press releases were distributed over the course of the plan's development as key milestones were achieved and prior to each Marin County MJHMP Public Town Hall Meeting. All press releases were made available to the community in both English and Spanish.

Figure 3: Hazard Mitigation Plan Public Outreach Press Release

SURVEY

A hazard mitigation plan survey (see Figure 4) was developed by the Steering Committee and made available to the public in both English and Spanish. The survey was used to gauge household preparedness for natural hazards and the level of knowledge of tools and techniques that assist in reducing risk and loss from natural hazards. This survey was designed to help identify areas vulnerable to one or more natural hazards. The answers to its ten questions helped guide the Steering Committee in defining our hazards, and selecting goals, objectives, and mitigation strategies. The survey was available on the hazard mitigation plan website, advertised in press releases, and at town hall meetings. Finally, the survey and the process of public input was advertised throughout the course of the planning process. The survey was available to the public on March 13, 2023, and closed on June 12, 2023. At the conclusion of the planning process 293 surveys were completed by the public.

Public Comments Considered by the Planning Team

The Planning Team used the following information gathered from the Public Outreach Survey to inform decisions regarding hazard mitigation strategies, actions, and priorities.

- Climate Change, Wildfire, and Drought were the top hazards of concern for the public.
- Text messages, mail, and the County website were the preferred methods for receiving hazard mitigation information.
- 48% of respondents expressed that they were "Very Much" concerned and 31% were "Moderately" concerned that a natural disaster could impact their home or place of residence.
- 85% of respondents own their own home.
- 99% of respondents have access to the internet.

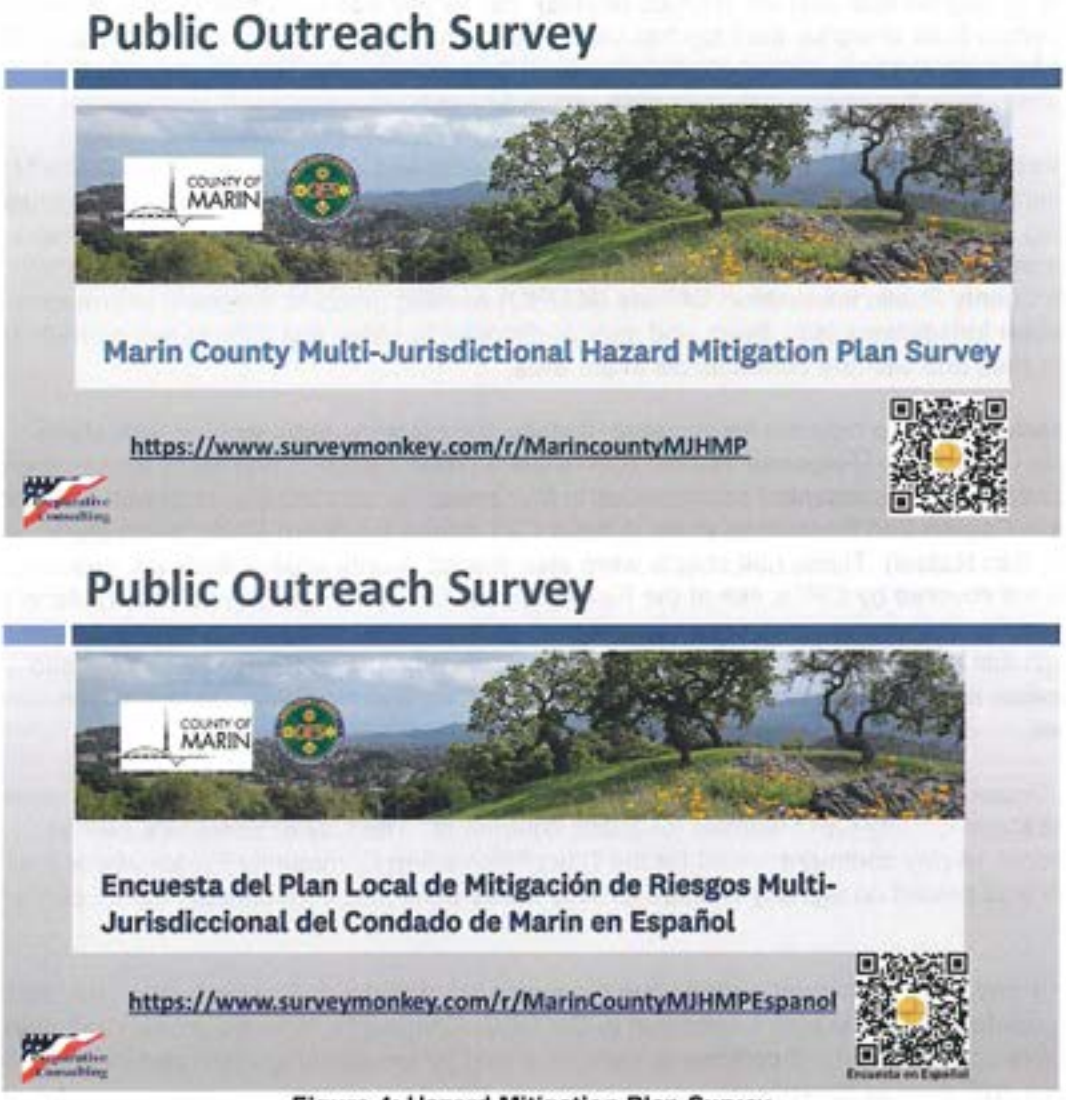

Figure 4: Hazard Mitigation Plan Survey

PUBLIC COMMENT ON THE PLAN

To solicit public feedback on the draft plan, Marin OEM engaged in a multi-faceted approach intended to reach as many Marin residents as possible, including members of the community who are under-served and under-represented. All members of the community had the opportunity to provide initial comments on the plan during a two-week period from Wednesday, December 4, 2023, to Wednesday, December 18, 2023. Although the initial comment period was listed as two weeks, the public could submit comments indefinitely via the County's website to support the County's continuous improvement efforts. The base plan, as well as city, town and special district annexes, were available for download on emergency.marincounty.org (include photos). The website additionally asked for feedback in a survey in English and Spanish (include photos), the survey was designed to establish where that person lives or works, their top hazards of concern, elicit feedback on the plan and offer a place for them to share projects to reduce risk in their community. The survey collected responses from the community in English and in Spanish.

The website and survey were shared through traditional and social media (photos) The Marin Independent Journal (Marin IJ) used the press release to write an article (hopefully; include photos). Social media accounts were updated four times with an initial ask, two reminders, and a closing announcement. The Marin OEM Public Information Officer coordinated with the Marin County Public Information Officers (MAPIO) working group to distribute information to partner jurisdictions (city, town, and special districts) to share this information on their social media sites and with the communities in the area.

To reach those who may not be engaged digitally, the planning team worked with Marin County Community Response Teams, (CRTs are a collaboration of non-profit organizations supporting underrepresented communities in four zones) to conduct outreach with half-sheet flyers in English and Spanish to share in the 4 CRT zones (southern Marin, north Marin, west Marin, San Rafael). These half sheets were also shared county-wide at libraries, including in areas not covered by CRTs, like at the Fairfax library. CRTs are designed to reach Marin's traditionally underserved and underrepresented communities, so by conducting outreach through this method, we were able to inform residents who may not have been engaged otherwise, including residents in Marin City, West Marin, and the Canal District of San Rafael.

After December 18, 2023, the various participating jurisdiction and district profiles remained on the Marin County OEM website for public comments. The City of Belvedere had an additional 14-day comment period for the City of Belvedere Community Profile where their profile was posted on the City website for final public comment from January 29 – February 5, 2024.

The 14-day public comment period gave the public an opportunity to comment on the draft plan update prior to the plan's submittal to Cal OES. Comments received on the draft plan are available upon request. All comments were reviewed by the planning team and incorporated into the draft plan as appropriate.

Public Comments Considered by the Planning Team

The Marin County OEM posted the draft Hazard Mitigation Plan and hazard mitigation actions on their website and solicited public comments on the content. The City of Belvedere

distributed press releases directing the community to the Marin County OEM website to review the draft plans. The Planning Team gathered public comments and information on the Marin County OEM website regarding proposed and current Hazard Mitigation Actions. The Planning Team used the comments and suggestions to inform decisions regarding hazard mitigation strategies, actions, and priorities. Most comments included ideas for hazard mitigation projects and comments on the effectiveness of current mitigation projects. These comments were used to revise the proposed hazard mitigation actions which resulted in the final list of hazard mitigation actions listed in 3.5 Hazard Mitigation Actions.

1.3 Overview and History

Approximately seven miles north of San Francisco and at the tip of the Tiburon Peninsula, Belvedere is flanked by the Richardson Bay to the west and north, Belvedere Cove and Raccoon Straits to the south, and the Town of Tiburon to the east. In addition to being surrounded by water, Belvedere also has an interior lagoon and two land "bridges" that connect the largest portion of the City to the rest of the Tiburon Peninsula. Regional access to the Tiburon Peninsula is provided by U.S Highway 101 (U.S. 101), a major north-south freeway linking Marin County with Sonoma County (north) and San Francisco (south). There are two main gateways into the City of Belvedere: San Rafael Avenue at Tiburon Boulevard and Beach Road at Tiburon Boulevard. Bus service to the Tiburon Peninsula is provided by Golden Gate Transit, which is operated by the Golden Gate Bridge, Highway, and Transportation District. Just outside of the Planning Area, the ferry terminal in Tiburon provides Marin residents with ferry access to San Francisco. Two nearby creeks, Arroyo Corte Madera del Presidio and Corte Madera Creek, empty into the Richardson and San Francisco bays.

Home to approximately 2,100 residents, the City of Belvedere is the smallest jurisdiction in Marin County. The City encompasses just 2.2 square miles, of which 1.75 square miles is water. This leaves only 0.45 square miles (287 acres) of developable land. Belvedere can be represented by four distinct districts. Belvedere Island has the largest land area and is the most varied in terms of topography and landforms. Belvedere Lagoon forms a second, flatter portion of the City that surrounds the interior waterway. West Shore Road borders Richardson Bay and is a third characteristically different area, with Bayfront homes along the western edge of Belvedere Island. A final area is located on Corinthian Island facing Belvedere Cove, where the island's residents share borders with the Town of Tiburon.

Belvedere is predominantly a residential community, with well over 90 percent of its land area either in residential use or zoned residential. Nearly all employment needs, and most residential service needs, are met outside Belvedere. Commercial uses within the City consist only of the portion of the Boardwalk Shopping Center area that lies within the City boundary and the office spaces found along Beach Road near the San Francisco Yacht Club. Overall, residential uses account for 231.4 acres, commercial uses occupy 25.2 acres, utilities and institutional uses occupy 5.7 acres, while parks and open spaces occupy 15.1 acres. Vacant land accounts for 9.8 acres. Utilities, roads, and right-of-way uses compose 59.3 acres of the City.

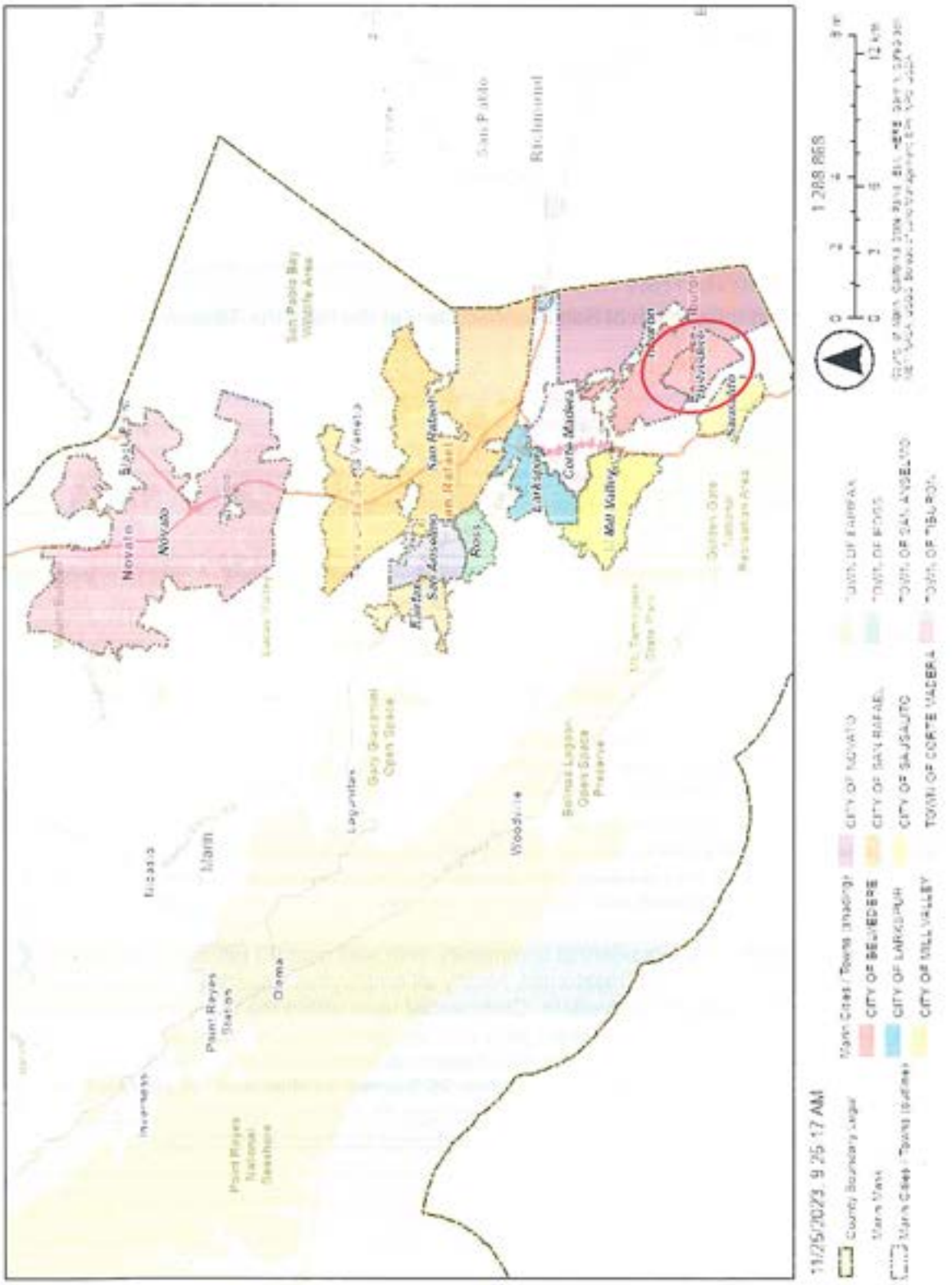

Figure 5: Map of City of Belvedere in Marin County
Source: Marin County OEM

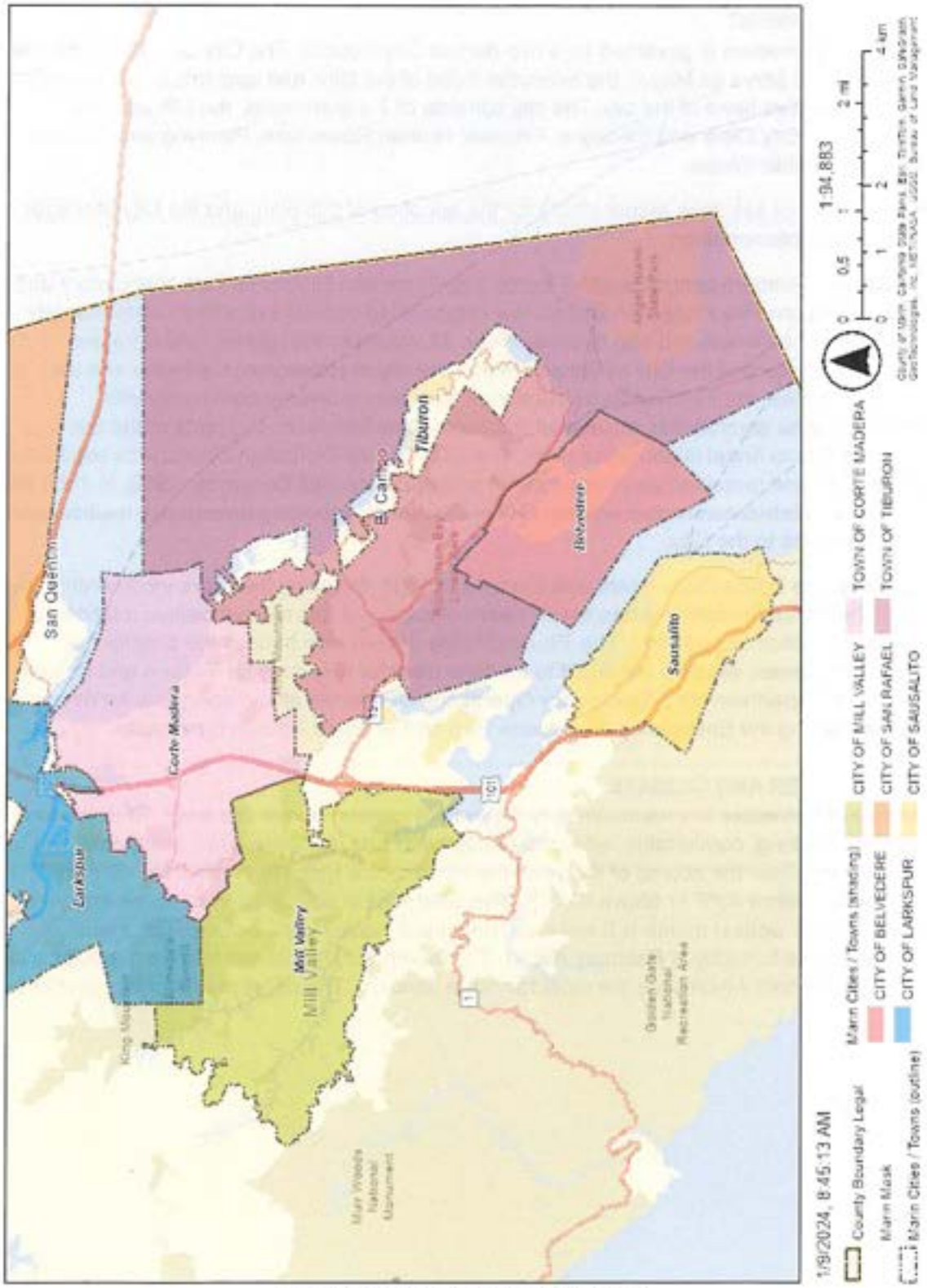

Figure 6: Map of the City of Belvedere
Source: Marin County OEM

1.4 GOVERNMENT

The City of Belvedere is governed by a five-person City Council. The City Council elects one of its members to serve as Mayor, the executive head of the City; and appoints a City Manager, the administrative head of the city. The city consists of 7 departments: the Climate and Environment, City Clerk and Elections, Finance, Human Resources, Planning and Building, Police, and Public Works.

The City Council assumes responsibility for the adoption of this plan; and the City Manager will oversee its implementation.

The City of Belvedere contracts with Tiburon Fire Protection District for both ambulatory and fire services. Tiburon Fire Protection District is a combination department with 21 career safety employees, one clerical and one finance officer, 13 volunteer firefighters, and 6 trainee firefighters. Protecting the City of Belvedere and the city of Belvedere, California and the surrounding area, the Fire District's boundaries represent a diverse community with responsibility for commercial, residential, wildland/urban interface, and parts of the San Francisco Bay to Angel Island State Park. The Tiburon Fire Protection District was established in April 1941 and remained an all-volunteer fire department until December 1959. In 1981 the Tiburon Fire District contracted with the City of Belvedere, providing emergency medical and fire related services to the City.

The Belvedere Police Department was founded in 1897. following the City's incorporation by 1896. The Police Department has seven sworn officers and has a collaborative relationship with the Tiburon Police Department. The Tiburon Police Station also houses the Emergency Operations Center, which is equipped to manage disaster response for Tiburon and Belvedere. The Police Department and Emergency Operations Center are also responsible for developing and maintaining the Emergency Operations Plan for the entire Tiburon Peninsula.

1.5 WEATHER AND CLIMATE

The City of Belvedere lies approximately 62 feet (19 meters) above sea level. In Belvedere, the summers are long, comfortable, arid, and mostly clear and the winters are short, cold, wet, and partly cloudy. Over the course of the year, the temperature typically varies from 48°F to 73.1°F and is rarely below 43°F or above 62.3°F. The difference in precipitation between the driest month and the wettest month is 8 inches. The annual rainfall is 42 inches. The month of highest relative humidity is February (80%). The month with the lowest relative humidity is June (69%). The month which sees the most rainfall is January. The driest month of the year is July.

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	9.4 °C (48.9) °F	10.2 °C (50.3) °F	11.3 °C (52.4) °F	12.3 °C (54.1) °F	14 °C (57.2) °F	15.9 °C (60.7) °F	16.3 °C (61.3) °F	16.7 °C (62) °F	16.8 °C (62.3) °F	15.3 °C (59.6) °F	12.2 °C (53.9) °F	9.6 °C (49.4) °F
Min. Temperature °C (°F)	6.1 °C (43) °F	6.9 °C (44.4) °F	7.9 °C (46.2) °F	8.6 °C (47.6) °F	10.2 °C (50.3) °F	11.7 °C (53) °F	12.4 °C (54.3) °F	12.9 °C (55.2) °F	12.6 °C (54.7) °F	11.4 °C (52.5) °F	8.7 °C (47.7) °F	6.6 °C (43.9) °F
Max. Temperature °C (°F)	13.7 °C (56.7) °F	14.5 °C (58.1) °F	15.9 °C (60.6) °F	17 °C (62.7) °F	18.9 °C (66.1) °F	21.5 °C (70.6) °F	21.8 °C (71.3) °F	22.2 °C (72) °F	22.8 °C (73.1) °F	20.9 °C (69.6) °F	16.8 °C (62.2) °F	13.6 °C (56.5) °F
Precipitation / Rainfall mm (in)	113 (4)	118 (4)	83 (3)	40 (1)	21 (0)	6 (0)	2 (0)	2 (0)	3 (0)	25 (0)	57 (2)	111 (4)
Humidity(%)	78%	80%	77%	72%	71%	69%	74%	75%	72%	71%	75%	77%
Rainy days (d)	8	7	6	4	2	1	0	0	0	2	5	7
avg. Sun hours (hours)	5.9	6.5	7.8	9.1	9.1	9.3	7.4	6.8	7.6	7.3	6.8	5.8

Figure 7: The City of Belvedere Precipitation and Monthly Temperatures
Source: en.Climate-Data.org

1.6 DEMOGRAPHICS

The California Department of Finance shows an overall estimated decrease in the population of Marin County and the City of Belvedere since the last plan update in 2018. Of the total estimated 257,135 residents of Marin County in 2022 based on the 2020 U.S. Census Survey, 190,148 residents live in the incorporated county and 66,987 residents live in the unincorporated county.

The City of Belvedere had an estimated population of 9,542 in the 2018 plan. 2020 U.S. Census Survey estimated the City's population at 9,146. However, revised estimates for 2022 estimated the population to decrease to 8,956 population.

Table 4: City of Belvedere Estimated Jurisdictional Population				
Jurisdiction	Population 2022 (Estimate)	Population 2020	Population 2018 (Estimate)	Percent Change 2018-2022
Marin County	257,135	262,321	262,179	-1.92%
City of Belvedere	2,080	2,126	2,102	-1.04%

Table 4: City of Belvedere Estimated Jurisdictional Population
Source: California Department of Finance

Table 5: Population Change of The City of Belvedere				
Jurisdiction	Total Population		Change, 2010-2020	
	April 1, 2010	April 1, 2020	Number	Percent
California	37,253,956	39,538,223	2,284,267	6.1%
Marin County	252,409	262,321	9,912	3.9%
Belvedere, City	2,102	2,126	24	-1.04%

Table 5: Population Change of The City of Belvedere
Source: City of Belvedere Housing Element, US Census Bureau, California Department of Finance

Table 6 lists the various languages spoken in the City of Belvedere.

Table 6: Languages Spoken in Belvedere	
Primary Language Spoken	% of Population
English only	88.8%
Spanish	3.4%
Other Indo-European languages	4.5%
Asian and Pacific Islander languages	3.3%
Other languages	0.0%

Table 6: Languages Spoken in Belvedere
Source: US Census Bureau (2020)

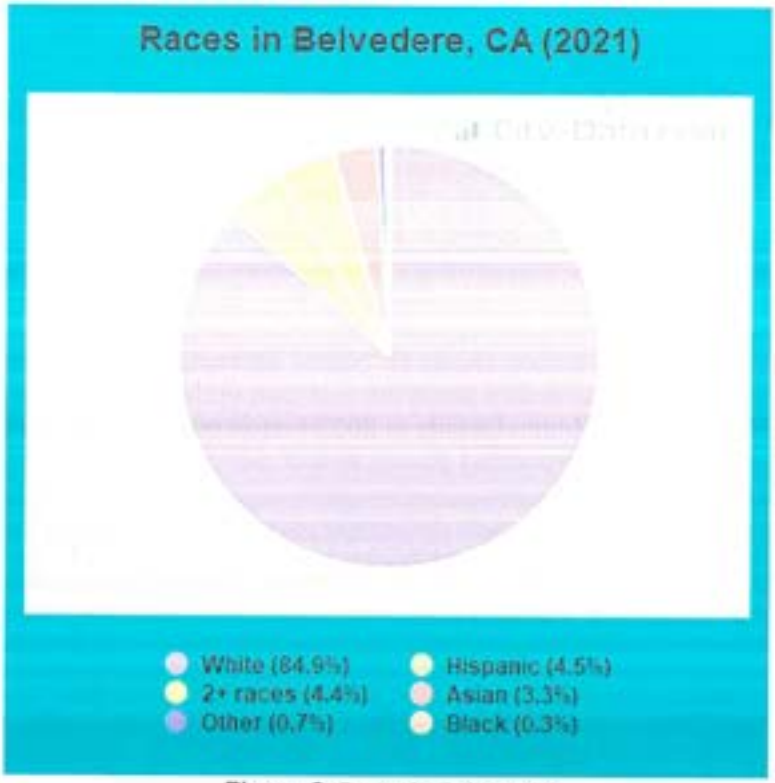

Figure 8: Races in Belvedere
Source: City-Data.com

Table 7: Marin County Jurisdictional Housing Stock							
2022 and 2018							
Year		Total Units	Single Family		Multi-Family		Mobile Homes
			Detached	Attached	2 to 4	5 plus	
California							
2022	Number	14,583,998	8,341,577	1,010,851	1,168,669	3,500,674	562,223
	Percent	100.0%	57.2%	6.9%	8.0%	24.0%	3.9%
2018	Number	14,157,502	8,160,864	985,926	1,129,761	3,318,946	562,005
	Percent	100.0%	57.6%	7.0%	8.0%	23.4%	4.0%
Marin County							
2022	Number	111,879	68,004	11,314	8,524	22,013	1,984
	Percent	100.0%	60.8%	10.1%	7.6%	19.7%	1.8%
2018	Number	112,294	68,697	11,318	8,307	21,986	1,986
	Percent	100.0%	61.2%	10.1%	7.4%	19.6%	1.8%
City of Belvedere							
2022	Number	1,062	890	51	84	37	0
	Percent	100.00%	83.80%	4.80%	7.91%	3.48%	0.00%
2018	Number	1,048	881	49	81	37	0
	Percent	100.00%	84.06%	4.68%	7.73%	3.53%	0.00%

Table 7: Marin County Jurisdictional Housing Stock
Source: California Department of Finance

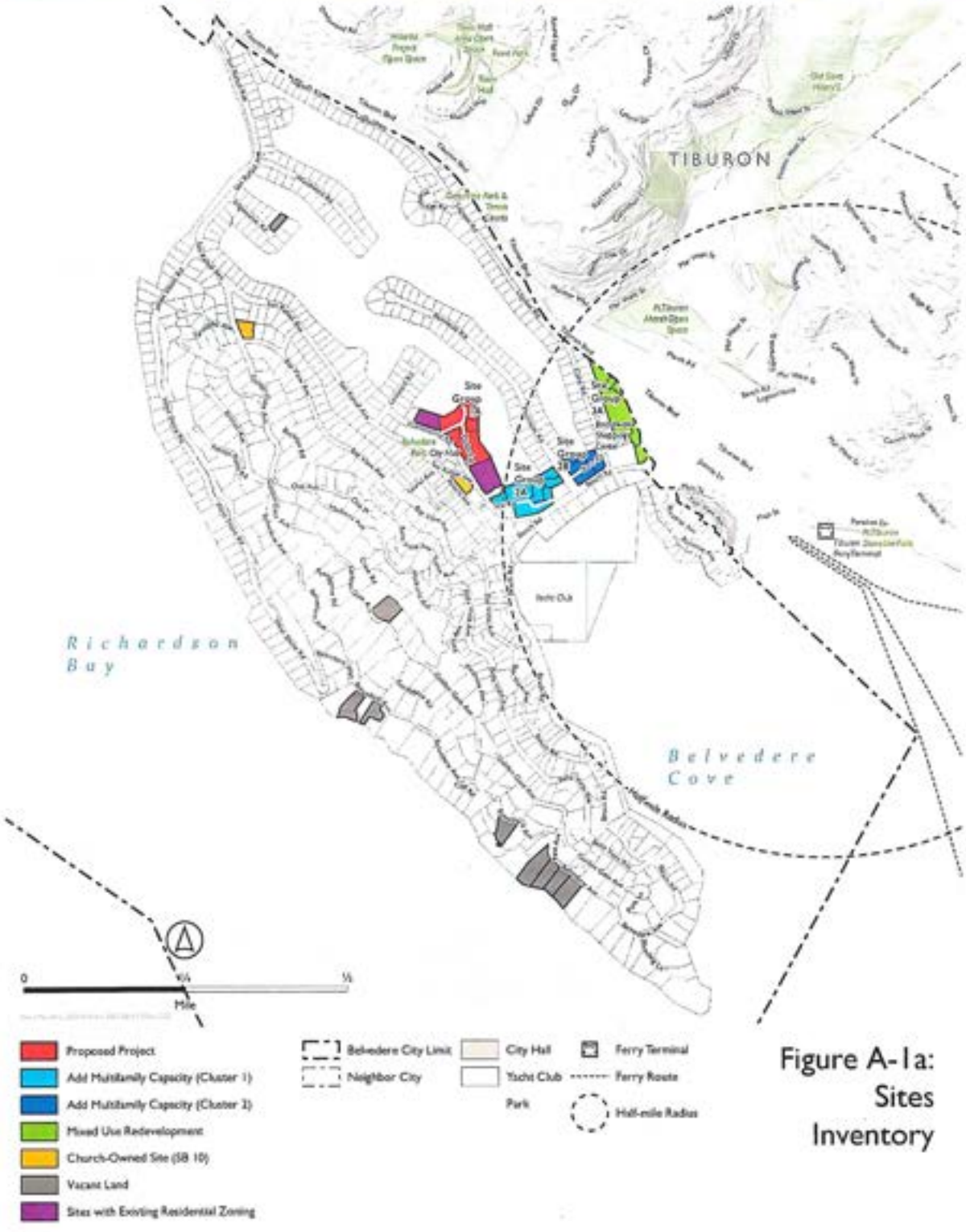

Figure A-1a: Sites Inventory

Figure 9: City of Belvedere Land Use Map
Source: City of Belvedere 2009 General Plan

1.7 Social Vulnerability and Risk

The California Governor's Office of Emergency Services (Cal OES) has initiated the "Prepare California" grant program focused on building community resilience amongst vulnerable individuals living in the areas of the state most susceptible to natural disasters. The Prepare California Initiative is aimed at reducing long-term risks from natural disasters by investing in local capacity building and mitigation projects designed to protect communities.

Prepare California leverages funds approved in Governor Gavin Newsom's 2021-22 State Budget and is designed to unlock federal matching funds for community mitigation projects that vulnerable communities would otherwise be unable to access. This program is intended for communities that are the most socially vulnerable and at the highest risk for future natural hazard events. The state identified communities by prioritizing California census tracts according to their estimated hazard exposures and social vulnerability.

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather.

For purposes of this plan the following National Risk Index (NRI) hazards are profiled in support of eight of the twelve Marin County OA MJHMP Hazards. NRI data was not available for Dam Failure, Land Subsidence, Levee Failure, or Sea Level Rise.

Table 8: NRI Hazards and Marin County MJHMP Hazards

NRI Hazards	Marin County MJHMP Hazards
Earthquake	Earthquake
Riverine Flooding	Flooding
Coastal Flooding	Flooding
Wildfire	Wildfire
Landslide	Debris Flow
Drought	Drought
Heat Wave	Severe Weather -Extreme Heat
Tsunami	Tsunami
Strong Wind	Severe Weather – Wind, Tornado

Table 8: NRI Hazards and Marin County MJHMP Hazards
Source: FEMA National Risk Index 2023

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Calculating the Risk Index

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience:

Risk Index = Expected Annual Loss × Social Vulnerability ÷ Community Resilience

Hazard Type Risk Index

Hazard type Risk Index scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value. Table 9 illustrates the NRI Hazard Type Risk Index for Belvedere Census Tract 1230.00.

Table 9: NRI Hazard Type Risk Index for Belvedere Census Tract 1230.00

Hazard Type	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Score
Riverine Flooding	$744,354	Very Low	Very High	0.64	$474,190	96.3
Earthquake	$543,579	Very Low	Very High	0.64	$346,287	84.7
Coastal Flooding	$68,722	Very Low	Very High	0.64	$43,780	94.3
Tornado	$2,697	Very Low	Very High	0.64	$1,718	4.2
Tsunami	$1,347	Very Low	Very High	0.64	$858	96
Landslide	$1,288	Very Low	Very High	0.64	$821	61.7
Strong Wind	$131	Very Low	Very High	0.64	$84	4.1
Drought	$0	Very Low	Very High	0.64	$0	0
Heat Wave	$0	Very Low	Very High	0.64	$0	0
Wildfire	$0	Very Low	Very High	0.64	$0	0

Table 9: NRI Hazard Type Risk Index for Belvedere Census Tract 1230.00
Source: FEMA National Risk Index 2023

Figure 10 illustrates the Social Vulnerability Map for Belvedere Census Tract 1230.00.

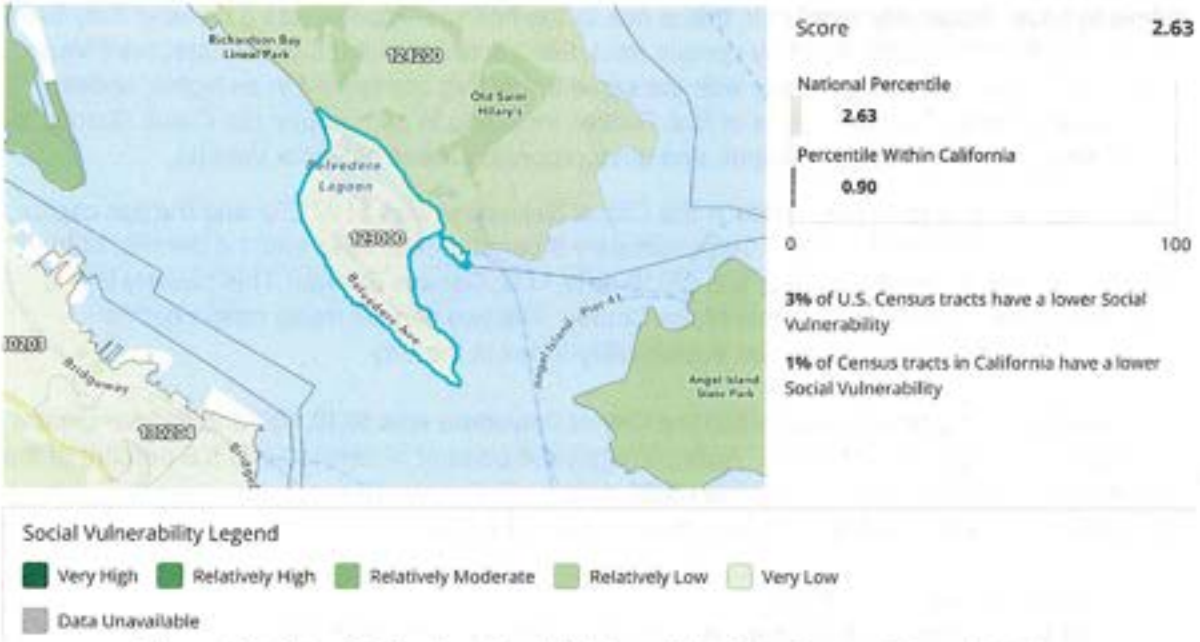

Figure 10: City of Belvedere Social Vulnerability Map Census Tract 1230.00
Source: FEMA National Risk Index 2023

Most socially vulnerable residents in Marin County reside in parts of Novato, parts of San Rafael, including in and around the Canal District, the Greenbrae neighborhood of Larkspur, and the unincorporated areas of Marin City and Santa Venetia. This aligns with what the County knows about Marin residents. However, discrepancy lies in the western, more rural area of the county. West Marin is comprised of seven villages, and other populated areas, that are distanced from the centralized resources in the eastern part of the county. At three local elementary school in West Marin (2022-2023 school year), students eligible for free and reduced lunch program are, 62%, 41%, and 52%, a reflection of the financial capacity of local families. West Marin is home to many farms that may employ and house underrecognized workers that may not have taken part in a census survey, what the SVI is calculated from. In the fourth quarter of FY 2021/22 the bus routes traveling to West Marin (Rural Routes) were the only service category to have increased in ridership since pre-COVID (increase 0.1%; Marin Transit, 2022) showing the reliance of West Marin residents on public transportation; however, this data continues to adjust based upon the increase in alternate methods of mass transportation. Considering this, the County of Marin acknowledges that unique social factors in West Marin require different approaches than other parts of the County.

Looking to the community resilience index (CRI) results, the data is only calculated at the county-level and compared across the nation. As a whole, Marin County is considered to have a "very high" ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions when compared to the rest of the U.S. Unfortunately, this metric does not give us the distinct experiences of the diverse communities across Marin.

When the Estimated Annual Loss Index, Social Vulnerability Index, and Community Resilience Index are aggregated as one, final results of the National Risk Index show Marin County as a

whole to have "Relatively High" risk, this is due to the financial implications a disaster may have on the county. When broken out by census tract, five tracts are in the highest category ("Very High Risk"), this matches generally with the same tracts that are ranked in as higher social vulnerability; parts of Novato, parts of San Rafael, including in and around the Canal District, the Greenbrae neighborhood of Larkspur, and unincorporated areas of Santa Venetia.

The median income for a household in the City of Belvedere was $192,292 and the per capita income for the City was $119,477. Approximately 0 percent of families and 1.3 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).This poverty line is lower than other communities within Marin County. The two census tracts reflect both a Relatively Low and Very Low Social Vulnerability Index in the City.

The median income for a household in the City of Belvedere was $246,500 and the per capita income for the City was $153,697. Approximately 4.4 percent of families and 5.8 percent of the population were below the poverty line (2020 data, U.S. Census Bureau). However, the census tract reflects a Very Low Social Vulnerability Index in the City.

1.8 Economy and Tax Base

Table 10 shows income by household in The City of Belvedere as of 2021.

Table 10: Household Income for The City of Belvedere as of 2021

Household Income	Number	Percent
Total Households	900	-
Less than $10,000	42	4.7
$10,000 to $14,999	10	1.1
$15,000 to $24,999	43	4.8
$25,000 to $34,999	18	2.0
$35,000 to $49,999	24	2.7
$50,000 to $74,999	43	4.8
$75,000 to $99,999	61	6.8
$100,000 to $149,999	85	9.4
$150,000 to $199,999	62	6.9
$200,000 or more	512	56.9
Median household income (dollars)	$246,500	
Mean household income (dollars)	$389,540	

Table 10: Household Income for The City of Belvedere as of 2021
Source: US Census Bureau American Community Survey 2021 Estimates

Table 11 shows the percentage of people in The City of Belvedere over the age of 16 employed by industry.

Table 11: City of Belvedere Civilian Employed Population 16 years+ by Industry		
Industry	Estimated Employed	Percent
Civilian employed population 16 years and over	917	-
Agriculture, forestry, fishing and hunting, and mining	0	0%
Construction	24	2.62%
Manufacturing	68	7.42%
Wholesale trade	10	1.09%
Retail trade	59	6.43%
Transportation and warehousing, and utilities	7	0.76%
Information	25	2.73%
Finance and insurance, and real estate and rental and leasing	293	31.95%
Professional, scientific, and management, and administrative and waste management services	228	24.86%
Educational services, and health care and social assistance	85	9.27%
Arts, entertainment, and recreation, and accommodation and food services	38	4.14%
Other services, except public administration	66	7.20%
Public administration	14	1.53%

Table 11: City of Belvedere Civilian Employed Population 16 years+ by Industry
Source: US Census Bureau American Community Survey 2019 Estimates

1.9 CRITICAL FACILITIES

The following list of facilities has been determined to be critical to the ability of the City of Belvedere to fulfill the requirements of its mission during an emergency:

Table 12: City of Belvedere Critical Facilities

	Category	Name	Address	Fire Severity Zone	Flood Zone
Critical Facilities					
1.	Law	Belvedere Police Department	450 San Rafael Ave	None	None
2.	Local Government	Belvedere City Hall	450 San Rafael Ave	None	None
3.	Evacuation Shelter	St. Stephens Church	3 Bayview Ave	None	None
4.	Evacuation Shelter	San Francisco Yacht Club	98 Beach Rd	None	X
5.	Evacuation Shelter	Corinthian Yacht Club	43 Main Street	None	X
6.	Local Government	Belvedere Lagoon Pump Station	Cove/Lagoon	None	X

Table 12: City of Belvedere Critical Facilities
Source: City of Belvedere

Figure 11: City of Belvedere Critical Facilities Map
Source: Marin County OEM

1.10 Historical Properties

The City of Belvedere has one registered historically significant homes, public buildings, or landmarks. To inventory these resources, the Marin County OA MJHMP Planning Team collected information from a number of sources:

- California Department of Parks and Recreation Office of Historic Preservation (OHP) OHP is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of California's irreplaceable archaeological and historical resources. OHP administers the National Register of Historic Places, the California Register of Historical Resources, California Historical Landmarks, and the California Points of Historical Interest programs.
- City of Belvedere Chamber of Commerce.
- City of Belvedere website.

As defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a potential historic resource and is potentially eligible for the National or California Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation. Similar regulations exist for buildings under the California Environmental Quality Act (CEQA)

Table 13: Historic Sites in Belvedere

Name/Landmark State Plaque Number	National Register (NR)	State Landmark	California Register	Date Listed (NR)	Jurisdiction
Valentine Rey House	X			4/22/1982	Belvedere

Table 13: Historic Sites in Belvedere
Source: California Office of Historic Preservation and the National Register of Historic Places

SECTION 2.0: HAZARD IDENTIFICATION AND RISK ASSESSMENT

The City of Belvedere identified hazards that affect the city and developed natural hazard profiles based upon the countywide risk assessment, past events and their impacts. Figure 12 shows the top hazards that the Jurisdiction is at risk from according to the hazard mitigation Steering Committee.

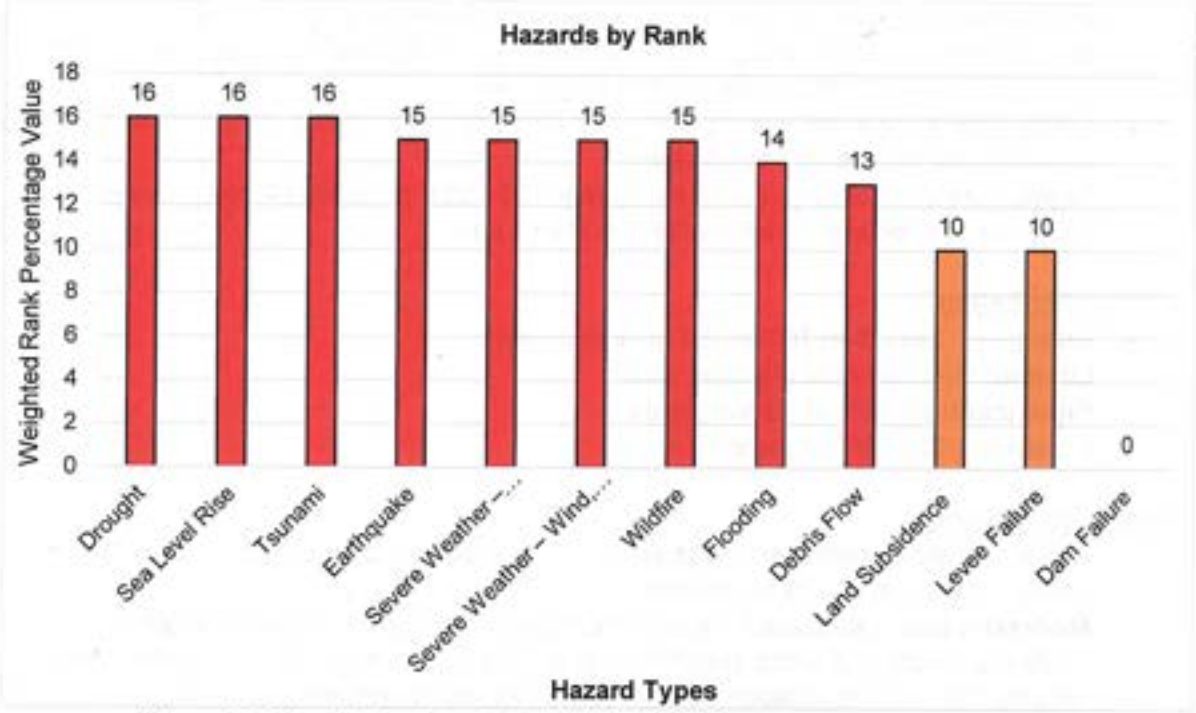

Figure 12: City of Belvedere Risk Assessment – Planning Team Top Hazards

Figure 13: Risk Rank Categorization	
Risk Level	Risk Numerical Score
High Risk	12 - 16
Serious Risk	8 - 11
Moderate Risk	4 - 7
Low Risk	1 - 3

Figure 13: Hazard Risk Categorization

Each Marin County MJHMP participating jurisdiction and organization reviewed and approved the Top Hazards identified by the Planning Team. Each participating jurisdiction and district then completed a more complex assessment tool to further develop their hazard assessment and prioritization.

The planning process used the available FEMA tools to evaluate all the possible threats faced. The primary tool selected was the Hazard Assessment and Prioritization Tool. This matrix allowed the participating jurisdiction or organization to assess their own level of vulnerability and mitigation capability. Each participating Jurisdiction and organization assessed the top hazards for:

- Probability/ Likelihood of Future Events
- Geographic Extent
- Magnitude/ Severity
- Climate Change Influence
- Significance

Probability/ Likelihood of Future Events

- **Unlikely:** Occurs in intervals greater than 100 years - Less than 1% probability of occurrence in the next year or a recurrence interval greater than 100 years.
- **Occasional:** Occurring every 11 to 100 years - 1-10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years.
- **Likely:** Occurring every 1 to 10 years - 10-90% probability of occurrence in the next year or recurrence interval of 1 to 10 years.
- **Highly Likely:** Occurring almost every year - 90-100% probability of occurrence in the next year or a recurrence interval of less than 1 year.

Geographic Extent

- **Negligible:** Less than 10% of the planning area
- **Limited:** 10-25% of the planning area
- **Significant:** 25-75% of planning area
- **Extensive:** 75-100% of planning area

Magnitude/ Severity

- **Weak:** Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage.
- **Moderate:** Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days.
- **Severe:** Severe classification on scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months.
- **Extreme:** Extreme classification on scientific scale, immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.

Table 14: Select Hazards Magnitude and Severity Scale

Hazard	Scale/Index	Weak	Moderate	Severe	Extreme
Drought	Palmer Drought Severity Index	+1.99 to -1.99	-2.00 to -2.99	-3.00 to -3.99	-4.00 and below
Earthquake	Modified Mercalli	I to IV	V to VII	VIII	IX to XII
	Richter Magnitude	2,3	4,5	6	7,8
Tornado	Fujita Tornado Damage Scale	FO	F1, F2	F3	F4, F5

Table 14: Select Hazards Magnitude/ Severity Scale or Index

Climate Change Influence

- **Low:** Minimal potential impact

- **Medium:** Moderate potential impact
- **High:** Widespread potential impact

Significance

- **Low:** Minimal potential impact - Two or more criteria fall in lower classifications, or the event has a minimal impact on the planning area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential.
- **Medium:** Moderate potential impact - The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.
- **High:** Widespread potential impact - The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with.

2.1 Climate Change

The County of Marin and associated jurisdictions profiled jointly recognize that the earth's climate is forcibly being augmented due to humans' reliance on fossil fuels and non-natural resources which pose negative impacts on the earth's climate. Reliance on fossil fuels and non-natural products results in the climate shifting to include unseasonable temperatures, more frequent and intense storms, prolonged heat and cold events, and a greater reliance on technological advancements to maintain the wellbeing of community members and balance of the environment. The forced adaptation to climatic shifts is necessary for the County and jurisdictions to understand and include with these assessments.

Locally to Marin, drought and rain events have already had devastating impacts to critical infrastructure, agriculture, and water resources; and globally, unseasonable temperatures have been identified as the cause for enhanced wildfires, severe droughts, ice sheets and glaciers disappearing, and persons emigrating from their countries due to a lack of sustainable, local resources. Melting land ice contributes additional water to the oceans and as ocean temperatures rise the water expands, both of which contribute to increase rates of sea level rise. Marin is bordered on the west by the Pacific Ocean and on the east by San Francisco Bay, making it particularly vulnerable to flooding and erosion caused by sea level rise.

The cause of current climate change is largely human activity, burning fossil fuels, natural gas, oil, and coal. Burning these materials releases greenhouse gases into Earth's atmosphere. Greenhouse gases trap heat from the sun's rays inside the atmosphere causing Earth's average temperature to rise. This rise in the planet's temperature was formerly called, "global warming", but climate change has shown to include both intense heat and cold shifts. The warming of the planet impacts local and regional climates. Throughout Earth's history, climate has continually changed; however, when occurring naturally, this is a slower process that has taken place over hundreds and thousands of years. The human influenced climate change that is happening now is occurring at an abnormally faster rate with devastating results.

GLOBAL OBSERVED AND PROJECTED IMPACTS AND RISKS

Source: Intergovernmental Panel on Climate Change, Headline Statements from the Summary for Policymakers, 2022

- Human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability.
- Global warming, reaching 1.5°C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans.
- Beyond 2040 and depending on the level of global warming, climate change will lead to numerous risks to natural and human systems.
- The magnitude and rate of climate change and associated risks depend strongly on near-term mitigation and adaptation actions, and projected adverse impacts and related losses and damages escalate with every increment of global warming.
- Multiple climate hazards will occur simultaneously, and multiple climatic and non-climatic risks will interact, resulting in compounding overall risk and risks cascading across sectors and regions.

FUTURE TRENDS/ IMPACTS

Source: Study Confirms Climate Models are Getting Future Warming Projections Right – Climate Change: Vital Signs of the Planet (nasa.gov)

Global Warming

- If global warming transiently exceeds 1.5°C in the coming decades or later, then many human and natural systems will face additional severe risks.
- An estimated 60% of today's methane emissions are the result of human activities. The largest sources of methane are agriculture, fossil fuels, and decomposition of landfill waste.
- The concentration of methane in the atmosphere has more than doubled over the past 200 years. Scientists estimate that this increase is responsible for 20 to 30% of climate warming since the Industrial Revolution (which began in 1750).
- According to the most recent National Climate Assessment, droughts in the Southwest and heat waves (periods of abnormally hot weather lasting days to weeks) are projected to become more intense, and cold waves less intense and less frequent.
- The last eight years have been the hottest years on record for the globe.

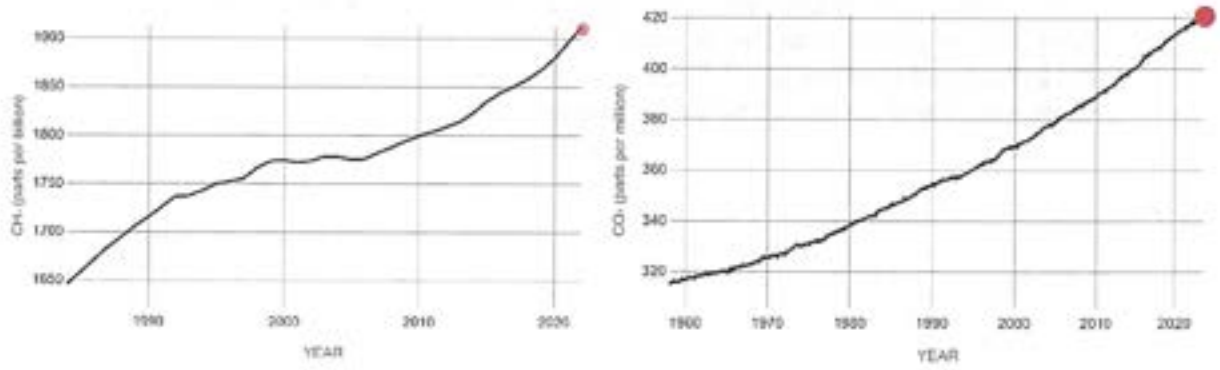

Figure 14: NASA Global Temperature Change CO2 Gas
Source: NASA Global Climate Change, 2022

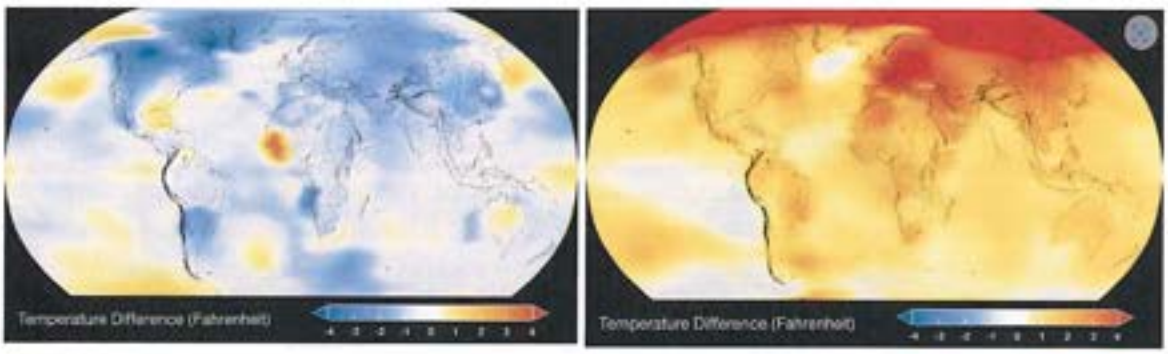

Figure 15: NASA Global Temperature Change 1884 to 2022
Source: NASA Global Climate Change, 2022

Drought

- A NASA-led study in 2022 concluded that the 22-year-long megadrought in southwestern US was the driest the territory had experienced in at least 1,200 years and was expected to persist through at least 2022.

Sea Level Rise

- Global sea levels are rising as a result of human-caused global warming, with recent rates being unprecedented over the past 2,500-plus years.
- U.S. Sea Level Likely to Rise 1 to 6.6 Feet by 2100.

- Global sea level has risen about 8 inches (0.2 meters) since reliable record-keeping began in 1880. By 2100, scientists project that it will rise at least another foot (0.3 meters), but possibly as high as 6.6 feet (2 meters) in a high-emissions scenario.
- Sea ice cover in the Arctic Ocean is expected to continue decreasing, and the Arctic Ocean will very likely become essentially ice-free in late summer if current projections hold. This change is expected to occur before mid-century.
- An indicator of changes in the Arctic sea ice minimum over time. Arctic sea ice extent both affects and is affected by global climate change.

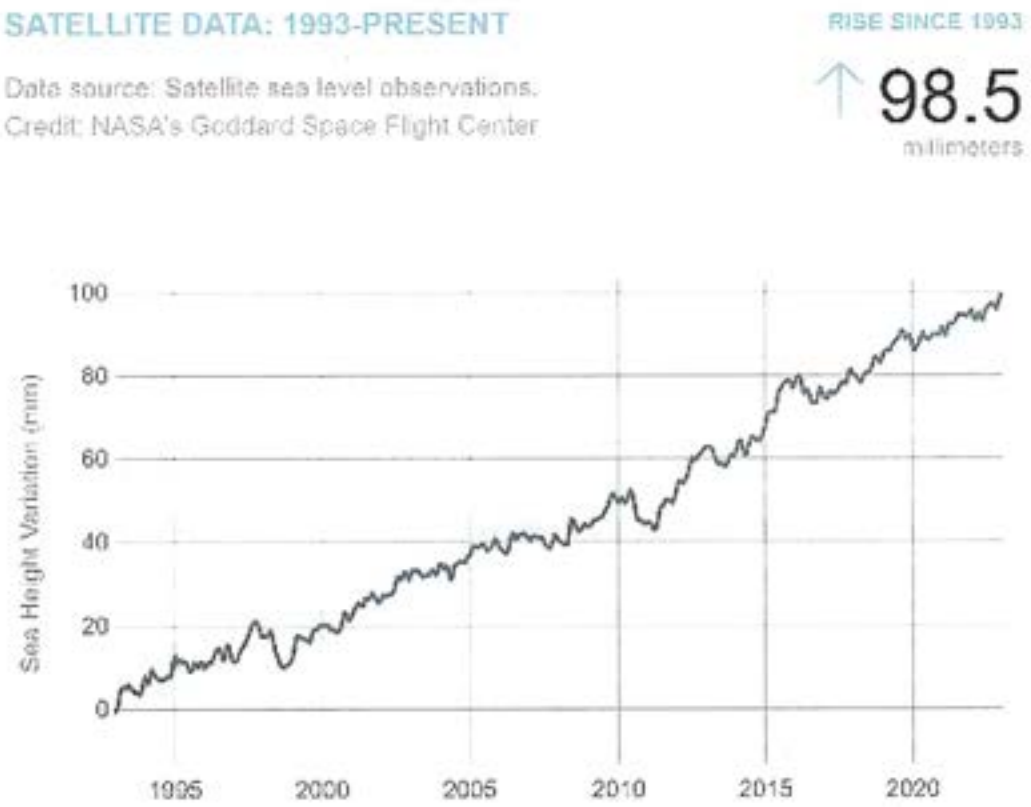

Figure 16: NASA Global Temperature Change Sea Level
Source: NASA Global Climate Change, 2022

Wildfire

- Warming temperatures have extended and intensified wildfire season in the West, where long-term drought in the region has heightened the risk of fires.
- Scientists estimate that human-caused climate change has already doubled the area of forest burned in recent decades. By around 2050, the amount of land consumed by wildfires in Western states is projected to further increase by two to six times.
- Even in traditionally rainy regions like the Southeast, wildfires are projected to increase by about 30%.

Flooding (Precipitation)

- Climate change is having an uneven effect on precipitation (rain and snow) in the United States, with some locations experiencing increased precipitation and flooding, while others suffer from drought.
- On average, more winter and spring precipitation is projected for the northern United States, and less for the Southwest, over this century.
- Projections of future climate over the U.S. suggest that the recent trend toward increased heavy precipitation events will continue. This means that while it may rain less frequently in some regions (such as the Southwest), when it does rain, heavy downpours will be more common.

Extreme Cold

- The length of the frost-free season, and the corresponding growing season, has been increasing since the 1980s, with the largest increases occurring in the western United States.

According to the California Natural Resource Agency (CNRA), climate change is already affecting California and is projected to continue to do so well into the foreseeable future. Current and projected changes include increased temperatures, sea level rise, a reduced winter snowpack, altered precipitation patterns, and more frequent storm events. Over the long term, reducing greenhouse gases can help make these changes less severe, but the changes cannot be avoided entirely. Unavoidable climate impacts result in a variety of secondary consequences including detrimental impacts on human health and safety, economic continuity, ecosystem integrity and provision of basic services. Climate change is being profiled in the 2023 Marin County OA MJHMP as a standalone hazard while addressing each of the other natural hazards. The Marin County OA is considering climate change issues when identifying future mitigation actions.

California is experiencing a climate crisis that is increasingly taking a toll on the health and well-being of its people and on its unique and diverse ecosystems. Every Californian has suffered from the effects of record high temperatures, dry winters, prolonged drought, and proliferating wildfires in recent years. California's biodiversity is threatened as alterations to habitat conditions brought about by a changing climate are occurring at a pace that could overwhelm the ability of plant and animal species to adapt.

Indicators of Climate Change in California
Source: 2022 Report: Indicators of Climate Change in California | OEHHA

- Since 1895, annual average air temperatures in California have increased by about 2.5 degrees Fahrenheit (°F). Warming occurred at a faster rate beginning in the 1980s.
- Recent years have been especially warm: Eight of the ten warmest years on record occurred between 2012 and 2022; 2014 was the warmest year on record.
- Of all the Western states, California endured the hottest temperatures for the longest time, driving the average statewide temperature to the second warmest over the past 128 years.
- Extreme heat ranks among the deadliest of all climate-driven hazards in California, with physical, social, political, and economic factors effecting the capacity of individuals,

workers, and communities to adapt, and with the most severe impacts often on communities who experience the greatest social and health inequities.

- Glaciers have essentially disappeared from the Trinity Alps in Northern California
- In 2020, wildfire smoke plumes were present in each county for at least 46 days.
- The 2022 fire season saw more fires than the previous fire season along with continued extreme drought and heat conditions.
- The drought, begun in 2019, was the third statewide drought declared in California since 2000.
- This drought has been marked by extreme swings; the state received record-breaking amounts of precipitation in October and December 2021 that were offset by the driest January, February, and March 2022 dating back more than 100 years. The year 2023 opened with California simultaneously managing both drought and flood emergencies.
- A series of storms in late December 2022 and early January 2023 broke rural levees, disrupted power, flooded roads, downed trees, and eroded coastal land.
- Sea level rise accelerates coastal erosion, worsens coastal flooding during large storms and peak tidal events, and impacts important infrastructure positioned along our state's 1,100-mile coast.
- The western drought which impacted all of California and the western United States was nearly lifted due to unseasonably heavy rains in late 2022 and early 2023.

The graph below shows the relative change, in millimeters, in sea levels at Crescent City (1933-2020), San Francisco (1900-2020), and La Jolla (1925-2020).

Figure 17: Annual Mean Sea Level Trends
Source: 2022 Report: Indicators of Climate Change in California | OEHHA

Climate Change in the Marin County Operational Area

Climate change is already having significant impacts across California. Temperatures are warming, heat waves are more frequent, and precipitation has become increasingly variable. Climate change will continue to alter Marin County OA ecosystems as a result of rising temperatures, changes in precipitation, and sea level rise, which will increase the severity and occurrence of natural hazards across the Marin County OA well into the future. Coastal cooling processes that keep temperatures down, such as fog, will continue to decrease. Rising temperatures will exacerbate drought conditions and raise the potential for significant wildfires

and associated smoke as vegetation becomes drier and tree mortality increases. Forested woodlands that play a major role in carbon reduction will gradually transition into chaparral and shrublands. There will be more extreme storms and weather events, including expanded heat waves and increased rain events with changes in precipitation. Significant rain events will lead to an increase in flooding and the potential for severe landslides. Shoreline communities will become inundated with sea level rise and high tide events. Marshlands and wetlands that act as natural storm barriers will disappear as they transition into open water.
Notable impacts from climate change that are already evident in the Marin County OA and surrounding region as identified in a 2020 Marin County Civil Grand Jury Report include:

- From 1895-2018, the average temperature in Marin County increased by 2.3 degrees Fahrenheit.
- Over the past century, sea level rise in the San Francisco Bay Area rose by eight inches and has accelerated rapidly since 2011.
- The threat of wildfires in 2019 was so severe that Pacific Gas and Electric shut off electric power to the County for multiple days.

Climate change will continue to affect homes, businesses, infrastructure, utilities, transportation systems and agriculture across the Marin County OA. The risk to socially vulnerable populations will increase as they feel the immediate impacts of climate change more significantly and are less able to adapt to climate change and recover from its impacts.

The Marin County OA has adopted numerous planning initiatives and mitigation measures to help combat the effects of climate change across the OA. The Marin Climate Energy Partnership (MCEP), which is a partnership program of Marin County jurisdictions, the County, and Marin County regional agencies, adapted a model Climate Action Plan (CAP) that is intended to support countywide implementation efforts and is currently being used to update additional climate action plans for other jurisdictions in Marin County. The CAP supports the Climate Action Plan for the unincorporated County, which was completed in 2020. The MCEP also collects data and report on progress in meeting each County jurisdictions' individual greenhouse gas emission targets. In June 2023, the County published the Greenhouse Gas Inventory for Unincorporated Community Emissions for the Year 2021. Marin County OA jurisdictions have already met their greenhouse reduction goals for 2020 and are about halfway to meeting the statewide goal to reduce emissions 40% below 1990 levels by the year 2030. Marin County also formed a Sea Level Marin Adaptation Response Team in 2018 and had a Sea Level Rise Vulnerability Assessment and associated Adaptation Report completed for the County and each of its jurisdictions in 2017 as part of their Bay Waterfront Adaptation and Vulnerability Evaluation. Additional Marin County OA climate change mitigation initiatives include Marin Clean Energy, Electrify Marin, the Marin Solar Project, the Marin Energy Watch Partnership, Resilient Neighborhoods, and Drawdown: Marin.

2.2 HAZARDS

Of the hazards profiled in the Marin County MJHMP, those noted in the table are specific for the City of Belvedere as per the planning team.

Table 15: City of Belvedere Hazard Risk Assessment						
Hazard	Probability/ Likelihood of Future Events	Extent	Magnitude/ Severity	Climate Change Influence	Significance	Risk Score
Debris Flow	Occasional	Extensive	Severe	Medium	Medium	**13.00**
Drought	Highly Likely	Extensive	Moderate	High	High	**16.00**
Earthquake	Highly Likely	Extensive	Extreme	None	High	**15.00**
Flooding	Highly Likely	Limited	Severe	High	Medium	**14.00**
Land Subsidence (Sinkhole)	Occasional	Limited	Moderate	Medium	Medium	**10.00**
Levee Failure	Occasional	Limited	Moderate	Medium	Medium	**10.00**
Sea Level Rise	Highly Likely	Limited	Extreme	High	High	**16.00**
Severe Weather – Extreme Heat	Highly Likely	Extensive	Moderate	High	Medium	**15.00**
Severe Weather – Wind, Tornado	Highly Likely	Extensive	Moderate	High	Medium	**15.00**
Tsunami	Highly Likely	Significant	Severe	High	High	**16.00**
Wildfire	Highly Likely	Limited	Extreme	Medium	High	**15.00**

Table 15: City of Belvedere Hazard Risk Assessment
Source: City of Belvedere

Omitted Hazards

Dam Failure: The City of Belvedere does not have any exposure to flood water inundation resulting from a dam failure.

Table 16: County of Marin Hazard Risk Assessment						
Hazard	Probability/ Likelihood of Future Events	Geographic Extent	Magnitude/ Severity	Climate Change Influence	Significance	Risk Score
Dam Failure	Unlikely	Negligible	Extreme	Low	Medium	**9.00**
Debris Flow	Occasional	Extensive	Severe	Medium	Medium	**13.00**
Drought	Highly Likely	Extensive	Moderate	High	High	**16.00**
Earthquake	Highly Likely	Extensive	Extreme	None	High	**15.00**
Flooding	Highly Likely	Limited	Severe	High	Medium	**14.00**
Land Subsidence	Occasional	Limited	Moderate	Medium	Medium	**10.00**
Levee Failure	Unlikely	Negligible	Moderate	None	High	**7.00**
Sea Level Rise	Highly Likely	Limited	Extreme	High	High	**16.00**
Severe Weather – Extreme Heat	Highly Likely	Extensive	Moderate	High	Medium	**15.00**
Severe Weather – High Wind/Tornado	Highly Likely	Extensive	Moderate	High	Medium	**15.00**
Tsunami	Highly Likely	Limited	Extreme	Medium	High	**15.00**
Wildfire	Highly Likely	Significant	Severe	High	High	**16.00**

Table 16: Hazard Risk Assessment
Source: Marin County

2.2.1 Debris Flows

For the purposes of the Marin County OA MJHMP, debris flows are classified as landslides (including rockslides) and mud flows.

A landside is the breaking away and gravity-driven downward movement of hill slope materials, which can travel at speeds ranging from fractions of an inch per year to tens of miles per hour depending on the slope steepness and water content of the rock/soil mass. Landslides range from the size of an automobile to a mile or more in length and width and, due to their sheer weight and speed, can cause serious damage and loss of life. The rate of a landslide is affected by the type and extent of vegetation, slope angle, degree of water saturation, strength of the rocks, and the mass and thickness of the deposit. Some of the natural causes of this instability are earthquakes, weak materials, stream and coastal erosion, and heavy rainfall. In addition, certain human activities tend to make the earth materials less stable and increase the chance of ground failure. These activities include extensive irrigation, poor drainage or groundwater withdrawal, removal of stabilizing vegetation and over-steepening of slopes by undercutting them or overloading them with artificial fill. These activities can cause slope failure, which normally produce landslides.

Landslide material types are often broadly categorized as either rock or soil, or a combination of

the two for complex movements. Rock refers to hard or firm bedrock that was intact and in place prior to slope movement. Soil, either residual or transported material, means unconsolidated particles. The distinction between rock and soil is most often based on interpretation of geomorphic characteristics within landslide deposits but can also be inferred from geologic characteristics of the parent material described on maps or in the field. Landslide movements are also based on the geomorphic expression of the landslide deposit and source area, and are categorized as falls, topples, spreads, slides, or flows. Falls are masses of soil or rock that dislodge from steep slopes and free fall. Topples move by the forward pivoting of a mass around an axis below the displaced mass. Lateral spreads move by horizontal extension and shear or tensile fractures. Slides displace masses of material along one or more discrete planes and can either be rotational or transitional. Flows mobilize as a deforming, viscous mass without a discrete failure plane.

Natural conditions that contribute to landslide include the following:

- Degree of slope
- Water (heavy rain, river flows, or wave action)
- Unconsolidated soil or soft rock and sediments
- Lack of vegetation (no stabilizing root structure)
- Previous wildfires and other forest disturbances
- Road building, excavation and grading
- Earthquake

In addition, many human activities tend to make the earth materials less stable and, thus, increase the chance of ground movement. Human activities contribute to soil instability through grading of steep slopes or overloading them with artificial fill, by extensive irrigation, construction of impermeable surfaces, excessive groundwater withdrawal, and removal of stabilizing vegetation.

Another hazard related to landslide and erosion is the fall of a detached mass of rock from a cliff or down a very steep slope (rockfall). Weathering and decomposition of geological materials produce conditions favorable to rockfalls. Other causes include ice wedging, root growth, or ground shaking (earthquake). Destructive landslides and rockfalls usually occur very suddenly with little or no warning time and are short in duration.

Landslide susceptibly can be characterized by looking at both slope class and rock strength. Landslide susceptibility classes express the generalization that on very low slopes, landslide susceptibility is low even in weak rock, and that landslide susceptibility increases with slope and in weaker rocks. Very high landslide susceptibility includes very steep slopes in hard rocks and moderate to very steep slopes in weak rocks. Figure 18 shows landslide susceptibility classes.

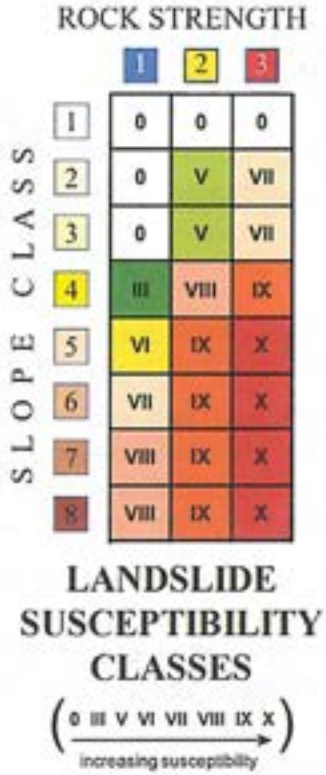

Figure 18: Landslide Susceptibility Classes
Source: USGS

A mud flow is a general term for a mass-movement landform and process characterized by a flowing mass of fine-grained earth material with a high degree of fluidity. Heavy rainfall, snowmelt, or high levels of groundwater flowing through cracked bedrock may trigger a movement of soil or sediments. Floods and debris flows may also occur when strong rains on hill or mountain slopes cause extensive erosion and/or what is known as "channel scour." Some broad mud flows are rather viscous and therefore slow; others begin very quickly and continue like an avalanche. Mud flows are composed of at least 50% silt and clay-sized materials and up to 30% water.

The point where a muddy material begins to flow depends on its grain size and the water content. Fine grainy material or soil has a smaller friction angle than a coarse sediment or a debris flow, but falling rock pieces can trigger a material flow, too. When a mud flow occurs it is given four named areas, the 'main scarp', in bigger mud flows the 'upper and lower shelves', and the 'toe'. See Figure 19 for the typical areas of a mud flow, with shelves (right) and without (left). The main scarp will be the original area of incidence, the toe is the last affected area(s). The upper and lower shelves are located wherever there is a large dip (due to mountain or natural drop) in the mud flow's path. A mud flow can have many shelves.

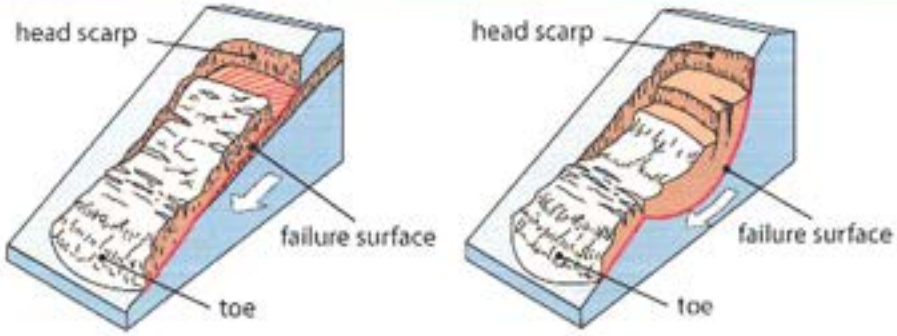

Figure 19: Mud Flow Areas
Source: Washington Department of Natural Resources

If large enough, mud flows can devastate villages and country-sides. Mud flows are common in mountain areas prone to wildfire, where they have destroyed many homes built on hillsides without sufficient support after fires destroy vegetation holding the land. The area most generally recognized as being at risk of a dangerous mud flow are:

- Areas where wildfires or human modification of the land have destroyed vegetation
- Areas where landslides have occurred before
- Steep slopes and areas at the bottom of slopes or canyons
- Slopes that have been altered for construction of buildings and roads
- Channels along streams and rivers
- Areas where surface runoff is directed

A landslide in Belvedere would most likely occur in areas where the terrain is steeper and is more susceptible to movement of hill slope materials. Most of Belvedere south of San Rafael Avenue and the area around Bellevue Avenue has areas of steeper terrain and has high susceptibility to a landslide. These areas are primarily residential and consist of numerous winding streets and hillside homes that could be damaged or destroyed by a landslide. The area around Bellevue Avenue near the Corinthian Yach Club also has high landslide susceptibility and consists of numerous homes that could be susceptible to a landslide. The perimeter of the Belvedere Lagoon and areas along Beach Road where there are numerous homes have some susceptibility to a landslide. Both Tiburon Boulevard and Paradise Drive, the only two primary access points to the Tiburon Peninsula, both have sections with high landslide susceptible. The Belvedere Police Department, City Hall and Community Center building lies in an area with little to no landslide susceptibility.

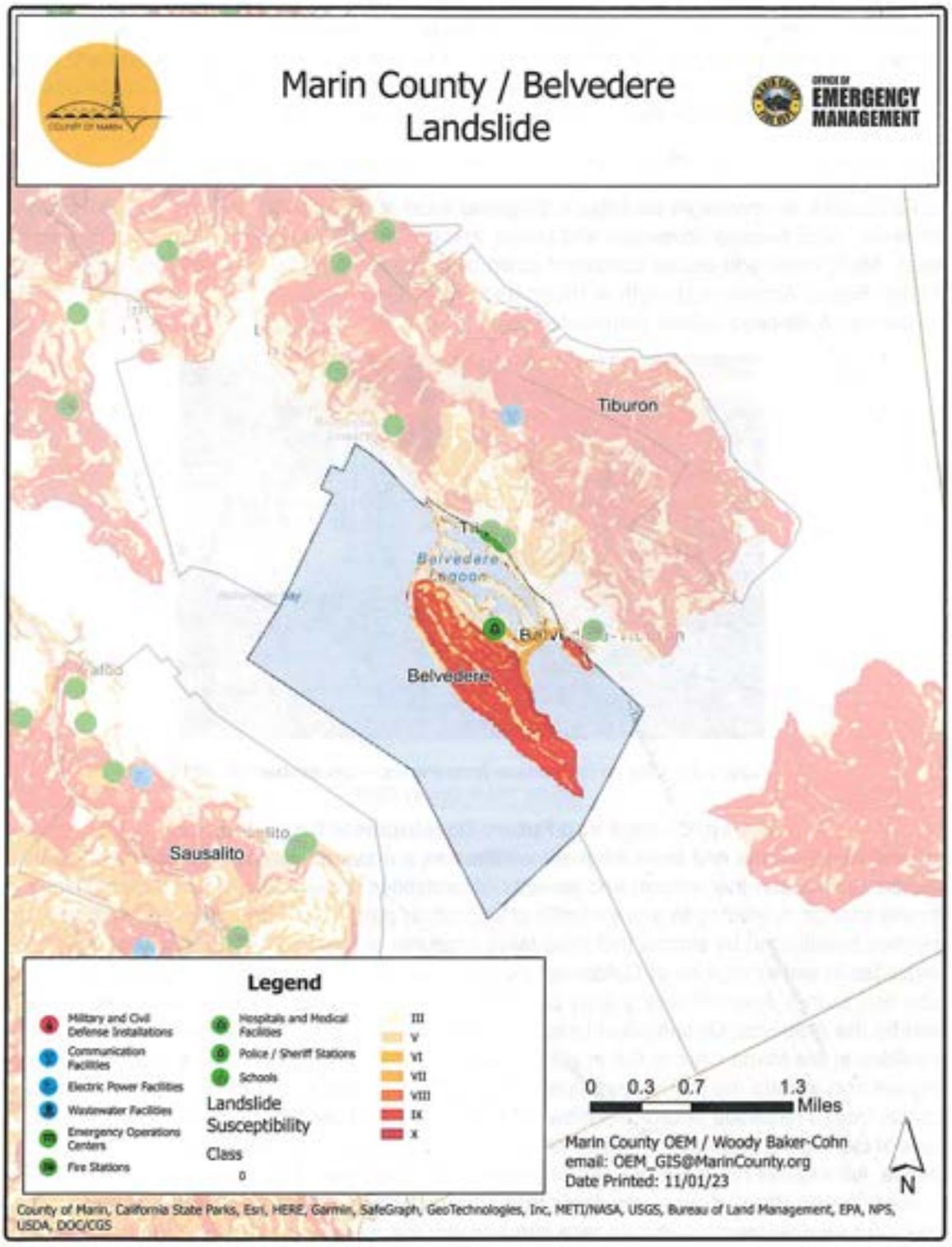

Figure 20: City of Belvedere Debris Flow Critical Facilities and Infrastructure
Source: Marin County OEM

A landslide having major impacts on any of the roads in Belvedere could affect the ability of residents to reach their homes and could affect the provision of emergency and essential services. An earthquake has the potential to cause landslides in the areas of Belvedere with landslide susceptibility. A rain event in Belvedere could potentially contribute to mudslides that could impact homes in Belvedere. There are no creeks that flow directly into Belvedere.

There have been no major debris flows in Belvedere since the last plan update.

On 12/16/2014, an overnight cloudburst triggered flood and mudslide damage on the Tiburon Peninsula. Mud flooded driveways and lawns, and garbage cans floated away on a Belvedere Street. Mud, water and debris cascaded down a short stretch of the road that angles southward into San Rafael Avenue just north of Richardson Bay. One driveway was 6 inches deep in mud and leaves. A blocked culvert contributed to the mud flows.

Figure 21: City of Belvedere Mud Flows – December 16, 2014
Source: Marin County OEM

Climate Change and Future Development Considerations

Extreme storm events and more frequent wildfires as a result of climate change have the potential to increase the amount and severity of landslides, including disastrous debris flows. Climate change is leading to more volatile precipitation patterns around the world with very dry stretches punctuated by storms that drop large amounts of rain in a short amount of time. Landslides in wetter regions of California, including the Marin County OA, move on average faster and farther downhill during rainy periods compared to drought years, according to a 2022 study by the American Geophysical Union (AGU)[1], showing the increased potential for landslides in the Marin County OA in rainy years. As development increases in the numerous canyons and around the many open spaces of the Marin County OA, the potential for significant impacts from a landslide and/or mudflow increases. Further development of the residential areas of Belvedere that have a higher landslide susceptibility, including south of San Rafael Avenue, will expose more people and property to landslide risk. With increased rain events as a result of climate change, more residents throughout Belvedere could be susceptible to mud flows. Future development should take into account the movement of mud and debris after a

[1] Landslide Sensitivity and Response to Precipitation Changes in Wet and Dry Climates. https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2022GL099499

major rain event, particularly down streets and driveways in areas where there are no natural water channels.

2.2.2 DROUGHT

A drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is a normal recurrent feature of climate that occurs in virtually all climate zones, from very wet to very dry. Drought is a temporary aberration from normal climatic conditions and can thus vary significantly from one region to another. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends. Drought is a complex issue involving many factors—it occurs when a normal amount of moisture is not available to satisfy an area's usual water-consuming activities.

There are several types of drought which can often be defined regionally based on its effects:

- Meteorological drought is usually defined by a period of below average water supply, based on the degree of dryness (in comparison to normal or average) and the duration of the dry period. Drought onset generally occurs with a meteorological drought.
- Agricultural drought occurs when there is an inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock. Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, soil water deficits, reduced ground water or reservoir levels needed for irrigation.
- Hydrological drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as stream flow, snowpack, and as lake, reservoir, and groundwater levels. Hydrological drought usually occurs following periods of extended precipitation shortfalls.
- Socioeconomic drought occurs when a drought impacts health, well-being, and quality of life, or when a drought starts to have an adverse economic impact on a region.

Drought can occur in all areas of Belvedere, though its effects would be most felt in the hilly areas and the area along the Tiburon Boulevard bike path where the risk of brush fires and tree mortality would increase. Dry trees in public spaces and in the tree-lined hillside neighborhoods of Belvedere can become a safety hazard to the public due to falling limbs or the toppling of the tree itself. An increase in brush fires as a result of drought could impact residences in the area.

Climate Change and Future Development Considerations

Climate change increases the odds of worsening drought. Warmer temperatures enhance evaporation, which reduces surface water and dries out soils and vegetation. This makes periods with low precipitation in the summer drier than they would be in cooler conditions. Climate also alters the timing of water availability as warmer winter temperatures cause less precipitation to fall. During droughts, communities in the Marin County OA including Belvedere may have limited access to water for household use, including drinking, cooking, cleaning, and watering plants, as well as for agriculture, transportation, and power generation. Drought may lead to higher water costs, rationing, or even the decimation of important water sources like

wells in the Marin County OA. As more people move into the Marin County OA and Belvedere, additional strain will be placed on the OA's water supply. Drought can affect livestock and crops in the Marin County OA, impacting its economy. Drought can increase the occurrence and severity of wildfires and tree mortality in the Marin County OA including in the open spaces around Belvedere. Impacts to residents and infrastructure from wildfire as a result of drought will increase as more development occurs in the mountainous and hilly areas of the Marin County OA including Belvedere where wildfires are more likely to occur. Drought also increases the amount of carbon dioxide in the atmosphere, including by decreasing land productivity, which reduces the amount of vegetation storing carbon dioxide. In addition, increases in drought-related wildfire and soil erosion can release carbon dioxide sequestered in trees and plants back into the atmosphere. This will only worsen climate change for the Marin County OA into the future. When considering future development, the Marin County OA including Belvedere can help prepare for both future droughts and climate change by practicing and promoting water conservation and enhancing water efficiency throughout landscapes, city plans, and water infrastructure. The Marin County OA can also identify alternative water supplies, create drought emergency plans, and encourage farmers to plant drought-resistant crops.

2.2.3 Earthquake

Earthquakes are sudden rolling or shaking events caused by movement under the earth's surface. Earthquakes happen along cracks in the earth's surface, called fault lines, and can be felt over large areas, although they usually last less than one minute.

The amount of energy released during an earthquake is usually expressed as a magnitude and is currently measured by seismologists on the Moment Magnitude (Mw Scale). The Mw Scale was developed to succeed the previously used Richter Scale and is measured on a scale of zero to ten with increasing values reflecting increasing intensity.

The other commonly used measure of earthquake severity is intensity, which is an expression of the amount of shaking at any given location on the ground service. Intensity is most commonly measured on the Modified Mercalli Intensity (MMI) Scale (see Figure 22).

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest,especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Figure 22: Modified Mercalli Intensity Scale
Source: USGS

Figure 23 gives intensities (measured on the MMI scale) that are typically observed at locations near the epicenter or earthquakes of different magnitudes.

Richter Magnitude Scale	Typical Maximum Modified Mercalli Intensity Scale
1.0 – 2.9	I
3.0 – 3.9	II – III
4.0 – 4.9	IV – V
5.0 – 5.9	VI – VII
6.0 – 6.9	VII – IX
7.0 or higher	VIII or higher

Figure 23: Mercalli Scale vs. Magnitude
Source: USGS

The extent of ground shaking also depends in large part on how soft the underlying soil is. Soft soils amplify ground shaking (see Figure 24). This was observed during the 1989 Loma Prieta Earthquake when the most significant damages experienced in San Francisco were in the Marina District, which was built on fill.

Soil type A	Vs > 1500 m/sec	Includes unweathered intrusive igneous rock. Occurs infrequently in the bay area. We consider it with type B (both A and B are represented by the color blue on the map). Soil types A and B do not contribute greatly to shaking amplification.
Soil type B	1500 m/sec > Vs > 750 m/sec	Includes volcanics, most Mesozoic bedrock, and some Franciscan bedrock. (Mesozoic rocks are between 245 and 64 million years old. The Franciscan Complex is a Mesozoic unit that is common in the Bay Area.)
Soil Type C	750 m/sec > Vs > 350 m/sec	Includes some Quaternary (less than 1.8 million years old) sands, sandstones and mudstones, some Upper Tertiary (1.8 to 24 million years old) sandstones, mudstones and limestone, some Lower Tertiary (24 to 64 million years old) mudstones and sandstones, and Franciscan melange and serpentinite.
Soil Type D	350 m/sec > Vs > 200 m/sec	Includes some Quaternary muds, sands, gravels, silts and mud. Significant amplification of shaking by these soils is generally expected.
Soil Type E	200 m/sec > Vs	Includes water-saturated mud and artificial fill. The strongest amplification of shaking due is expected for this soil type.

Figure 24: Soil Types
Source: USGS

An earthquake fault is defined as "a fracture or fracture zone in the earth's crust along which there has been displacement of the sides relative to one another." For the purpose of planning there are two types of faults, active and inactive. Active faults have experienced displacement in historic time, suggesting that future displacement may be expected. Inactive faults show no evidence of movement in recent geologic time, suggesting that these faults are dormant.

Two types of fault movement represent possible hazards to structures in the immediate vicinity of the fault: fault creep and sudden fault displacement. Fault creep, a slow movement of one side of a fault relative to the other, can cause cracking and buckling of sidewalks and foundations even without perceptible ground shaking. Sudden fault displacement occurs during an earthquake event and may result in the collapse of buildings or other structures that are found along the fault zone when fault displacement exceeds an inch or two. The only protection against damage caused directly by fault displacement is to prohibit construction in the fault zone.

An earthquake could occur anywhere in and around Belvedere due to the number of active faults within and near Marin County.

Earthquake Shake Intensity

The colors on Figures 25 and 26 represent the level of ground shaking intensity of a potential future earthquake. The result is expressed as the level of ground shaking (**expressed as a percentage of gravity**) that on average occurs every 500 years.

This map shows the expected relative intensity of ground shaking and damage in California from anticipated future earthquakes. The shaking potential is calculated as the level of ground motion that has a 2% chance of being exceeded in 50 years, which is the same as the level of ground-shaking with about a 2500 year average repeat time. The relatively long-period (1.0 second) earthquake shaking is shown here. Long period-shaking affects tall, relatively flexible buildings, but also correlates well with overall earthquake damage.

Earthquake Shaking Potential Maps for California depict expected intermediate period (1s or 1hz) ground motions with 2% exceedance probability in 50 years.

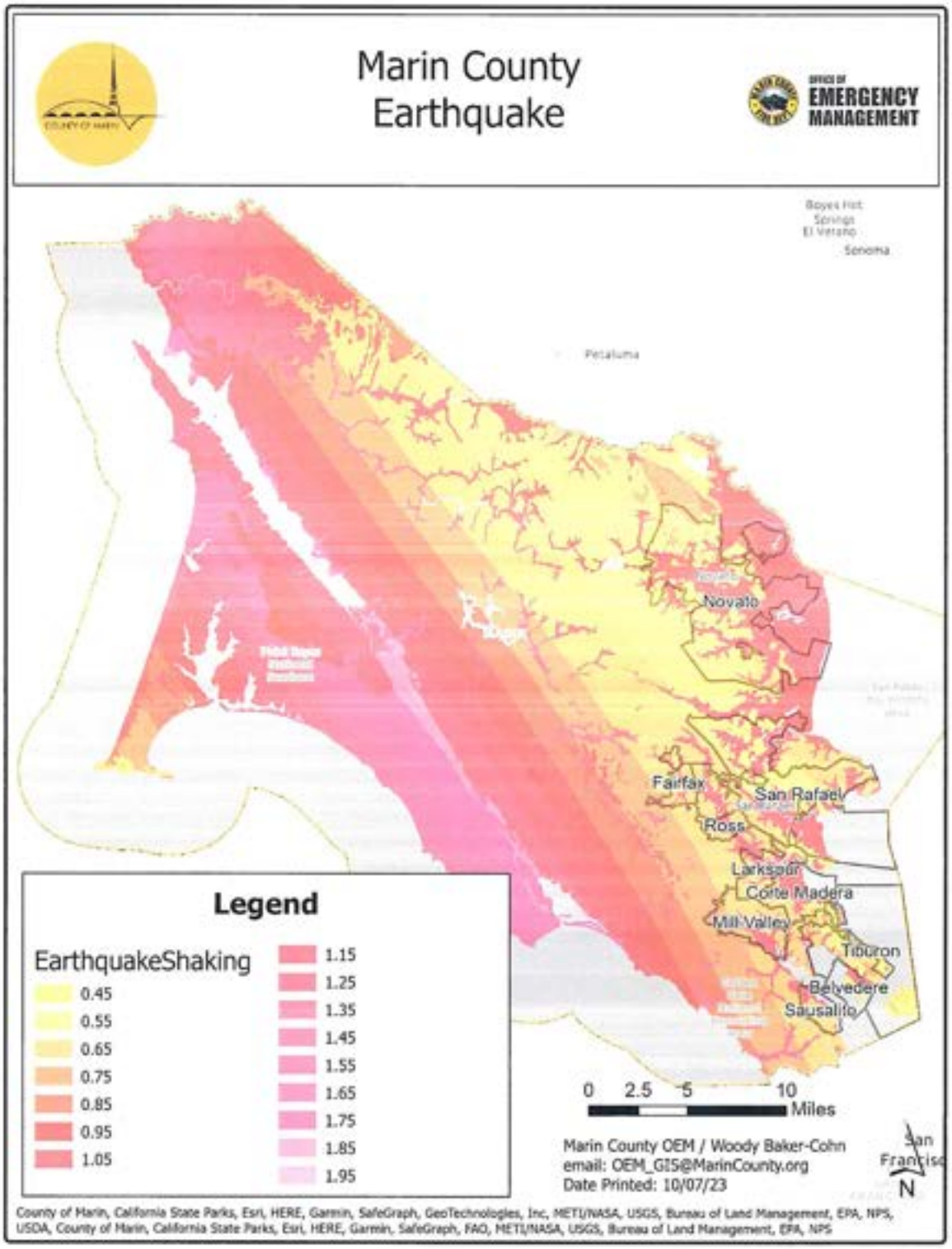

Figure 25: Marin County Earthquake Impact and Fault Lines
Source: Marin County OEM

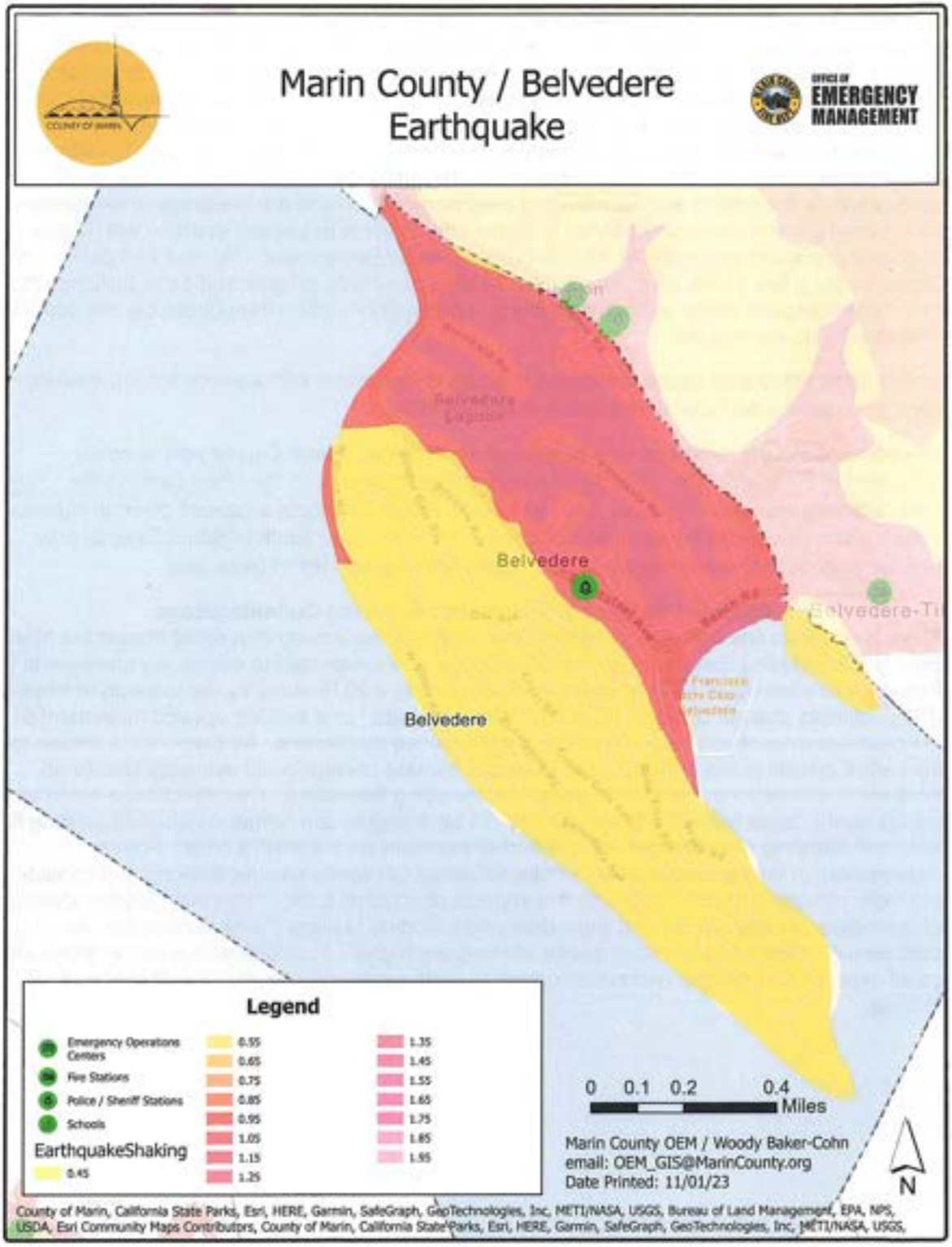

Figure 26: City of Belvedere Earthquake Critical Facilities and Infrastructure
Source: Marin County OEM

Belvedere is located directly between the San Andreas and Hayward faults. A moderate to extreme earthquake originating from either of these major faults or any of the other faults in the region could have major impacts to the city. All buildings located in Belvedere are vulnerable to earthquake damage, but depending upon construction, some buildings are expected to perform better than others. There is increased risk of shaking and liquefaction in lowland areas of Belvedere from an earthquake, particularly in the area around the Belvedere Lagoon where superficial deposits and fill are more prevalent. Belvedere used to be an island before fill was used to create the lagoon and surrounding neighborhood. There are hundreds of residences and several commercial buildings that lie around the Belvedere Lagoon in areas with higher earthquake shaking vulnerability. Tthe Belvedere Police Department, City Hall and Community Center building lies in this area. Vulnerable structures include bridges and older buildings that have not undergone major seismic retrofitting. Utility infrastructure throughout the city could be impacted by an earthquake.

Earthquakes could also cause landslides in areas of Belvedere with steeper terrain, causing damage to homes and roads as a result of shifting soils.

Belvedere hasn't yet experienced a significant earthquake. Marin County was sparsely populated at the time of the 1906 San Francisco Earthquake, and the effects across the County were relatively minimal. Likewise, the 1989 Loma Prieta Earthquake caused minimal impacts across Marin County as the epicenter of the quake was further south in Santa Cruz County. Smaller earthquakes with minimal to no impacts are routinely felt in Belvedere.

Climate Change and Future Development Considerations

There is no direct link between climate change and seismic activity that could impact the Marin County OA including Belvedere, so climate change is not expected to cause any changes to the frequency or intensity of seismic shaking. According to a 2018 study by the Institute of Physics (IOP)[2], climate change could result in "isostatic rebounds," or a sudden upward movement of the crust because of reduced downward weight caused by glaciers. As glaciers are known to melt when overall global temperatures increase, climate change could indirectly lead to an increase in seismicity in the Marin County OA including Belvedere. Climate change could also impact earthquakes felt in the Marin County OA as droughts can further deteriorate existing fault lines and pumping groundwater can put further pressure on the earth's crust. Future development in the populated areas of Marin County OA where seismic shaking and subsidence are more prevalent could exacerbate the impacts of an earthquake. This includes the lowlands of Belvedere, particularly around Belvedere and including Mallard Pointe, where the risk of subsidence and subsequent earthquake shaking are higher. Future development in these areas could expose more people and infrastructure to earthquake shaking as a result of climate change.

[2] An Enhanced Seismic Activity Observed Due to Climate Change: Preliminary Results from Alaska. https://iopscience.iop.org/article/10.1088/1755-1315/167/1/012018

2.2.4 FLOODING

Flooding is the rising and overflowing of a body of water onto normally dry land. Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. The area adjacent to a channel is the floodplain. Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage, the floodplain most often refers to that area that is inundated by the 100-year flood, the flood that has a one percent chance in any given year of being equaled or exceeded. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program. The 200-year flood is one that has 0.5% chance of being equaled or exceeded each year. The 500-year flood is a flood that has a 0.2 percent chance of being equaled or exceeded in any given year. The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity such as construction of bridges or channels. In areas where flow contains high sediment load, such as Easkoot Creek in Stinson Beach (due to an active landslide upstream), the flow carrying capacity of the channel may be reduced dramatically during a single flood event. Coastal floodplains may also change over time as waves and currents alter the coastline (especially wetlands) and sea levels rise.

Flooding can occur in several ways:

Riverine flooding – Riverine flooding, defined as when a watercourse exceeds its "bank-full" capacity, generally occurs as a result of prolonged rainfall, or rainfall that is combined with snowmelt and/or already saturated soils from previous rain events. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. The onset and duration of riverine floods may vary from a few hours to many days and is often characterized by high peak flows combined with a large volume of runoff. Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water-resistance of the surface due to urbanization. In the Marin County OA, riverine flooding can occur anytime from November through April and is largely caused by heavy and continued rains, sometimes combined with snowmelt, increased outflows from upstream dams, and heavy flow from tributary streams. These intense storms can overwhelm the local waterways as well as the integrity of flood control structures. Flooding is more severe when antecedent rainfall has resulted in saturated ground conditions. The warning time associated with slow rise riverine floods assists in life and property protection.

Flash flooding – Flash flooding describes localized floods of great volume and short duration. This type of flood usually results from a heavy rainfall on a relatively small drainage area. Precipitation of this sort usually occurs in the winter and spring. Flash floods often require immediate evacuation within the hour and thus early threat identification and warning is critical for saving lives.

Localized/Stormwater flooding – Localized flooding problems are often caused by flash flooding, severe weather, or an unusual amount of rainfall. Flooding from these intense weather events usually occurs in areas experiencing an increase in runoff from impervious surfaces associated with development and urbanization as well as inadequate storm drainage systems.

Tidal flooding – Tidal flooding develops when high tides exceed either the top of bank elevation of tidal sloughs and channels, or the crest of bay levees. An especially high tide event that occurs during alignment of the gravitational pull between the sun and the moon, causing tidal water levels to rise to higher-than normal levels. King tides are normal, predictable events that occur semi-annually during winter months. Typically storms in which high tides coincide with peak stormwater flow may be damaging to municipal infrastructure and private property.

The area is also at risk to flooding resulting from levee failures and dam failures. Dam failure flooding is discussed separately in the Dam Failure Section of this document; levee failure flooding is discussed separately in the Levee Failure Section of this document. Regardless of the type of flood, the cause is often the result of severe weather and excessive rainfall, either in the flood area or upstream reach.

A weather pattern called the "Atmospheric River" contributes to the flooding potential of the area. An Atmospheric River brings warm air and rain to the West. A relatively common weather pattern brings southwest winds to the Pacific Northwest or California, along with warm, moist air. The moisture sometimes produces many days of heavy rain, which can cause extensive flooding. The warm air also can melt the snowpack in the mountains, which further aggravates the flooding potential. In the colder parts of the year, the warm air can be cooled enough to produce heavy, upslope snow as it rises into the higher elevations of the Sierra Nevada or Cascades. Forecasters and others on the West Coast often used to refer to this warm, moist air as the "Pineapple Express" because it comes from around Hawaii where pineapples are grown. A diagram of an atmospheric river event is shown in Figure 27.

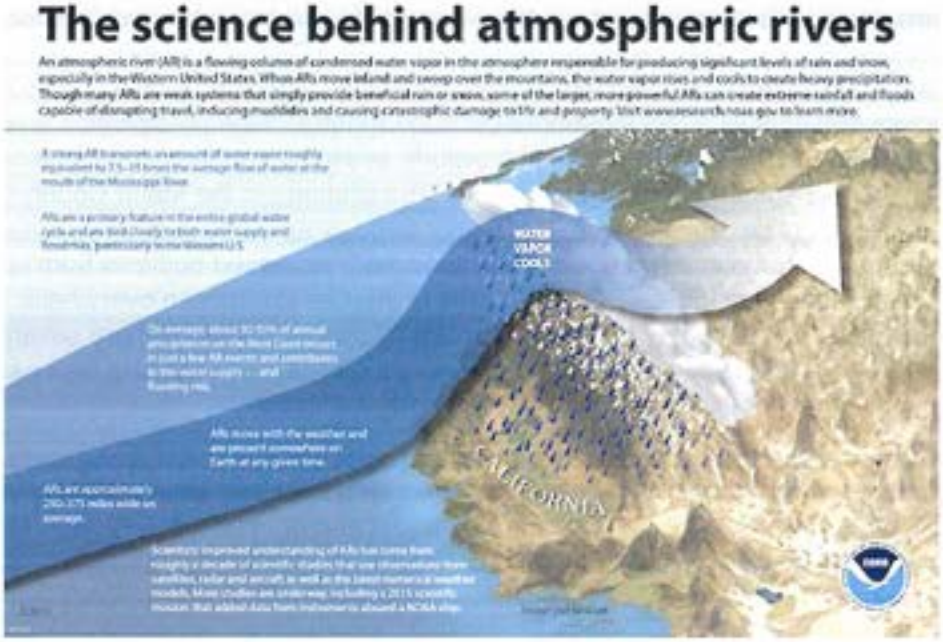

Figure 27: Diagram of an Atmospheric River Event
Source: NOAA

The Marin County OA is susceptible to various types of flood events. In coastal areas, flooding may occur when strong winds or tides result in a surge of seawater into areas that are above

the normal high tide line. Other types of flooding in Marin include isolated ponding and stormwater overflow. Isolated ponding is when pools form on the ground and can occur in any area that doesn't drain effectively – for example, in a natural depression in the landscape. Stormwater overflow is when storm drains back up. Stormwater drainage systems quickly convey rainwater through underground pipes to creeks and the Bay. When the storm drains are obstructed or broken or when the water bodies to which they lead to are already full, water backs up onto the streets. Although stormwater overflow and isolated ponding also occur throughout the County, the effects are typically not widespread or significantly damaging.

Flooding in Belvedere generally results from a combination of high tides from Richardson Bay and San Francisco Bay and from storm runoff in low-lying areas around the Belvedere Lagoon. There are no creeks in Belvedere, though significant flooding events can cause flooding and mud flows down local roads. Most of the lowland areas in Belvedere, including around the Belvedere Lagoon, are in the 100-year floodplain, with a few areas along West Shore Road and San Rafael Avenue in the 500-year floodplain. Hundreds of residences and several commercial buildings around the Belvedere lagoon lie in the 100-year floodplain and could be susceptible to flooding. Both San Rafael Avenue and Beach Road lie in the 100-year floodplain. Dozens of residences and the Belvedere Police Department, City Hall and Community Center building lie in the 500-year floodplain and could be susceptible to flooding. The Tiburon Fire Protection District Station #11 lies in the 100-year floodplain.

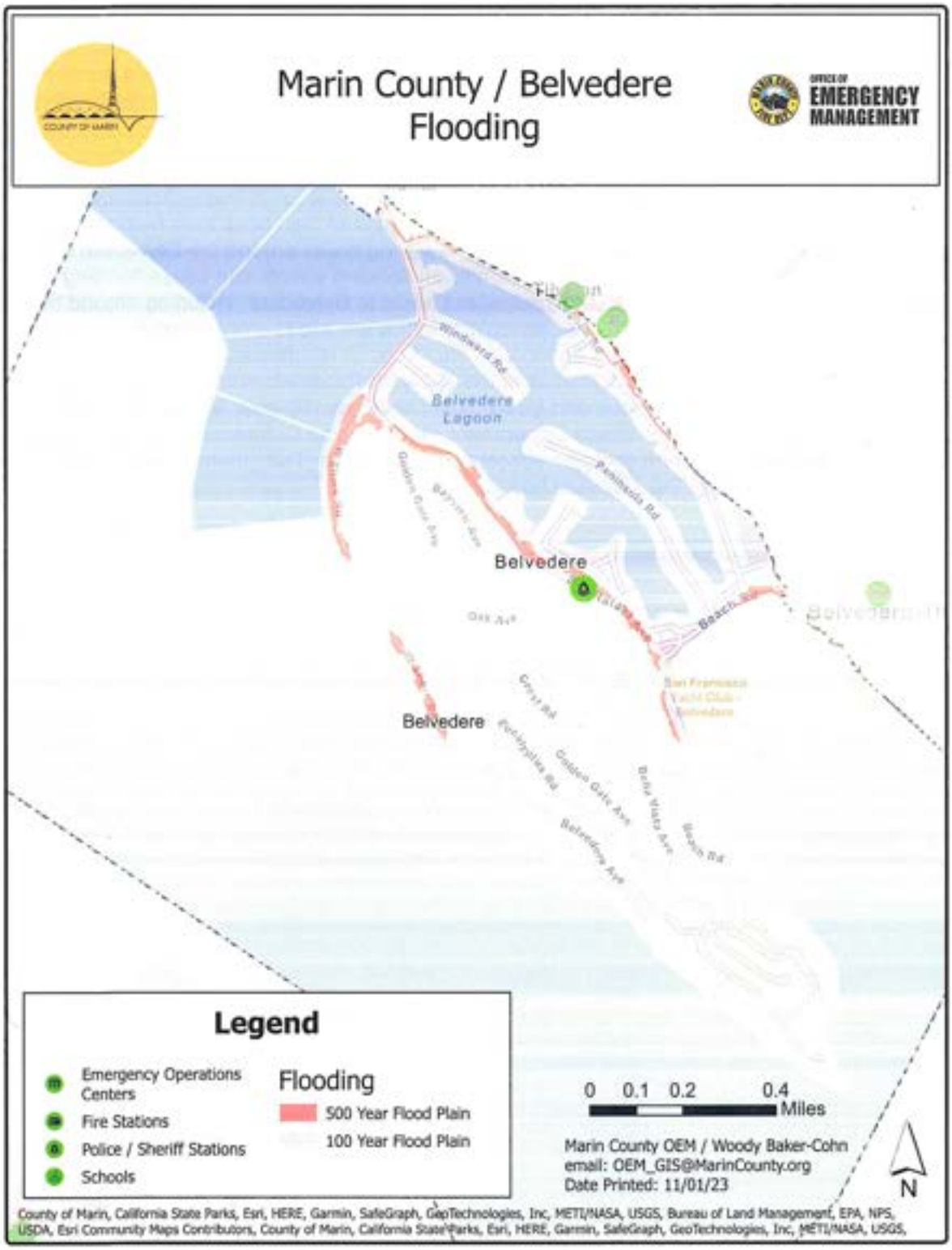

Figure 28: City of Belvedere Flooding Critical Facilities and Infrastructure
Source: Marin County OEM

Table 17 shows the number of residential structures by flood zone in the City of Belvedere.

Table 17: Residential Structures in The City of Belvedere by Flood Zone		
Flood Zone	FEMA Flood Zone Designations	Improved Residential Parcels
	High Risk Areas	
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.	
AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.	**1245**
A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).	
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.	
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.	
AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.	
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.	
	High Risk - Coastal Areas	
V	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.	
VE, V1 - 30	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.	**17**

	Moderate to Low-Risk Areas	
B and X (shaded)	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile	**2390**
C and X (unshaded)	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.	
	Undetermined Risk Areas	
D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.	
Total		**3,652**

Table 17: Residential Structures in The City of Belvedere by Flood Zone
Source: FEMA

Table 18 shows the number of City of Belvedere critical facilities by flood zone.

Table 18: City of Belvedere Critical Facilities in the Flood Zones

#	Category	Name	Address	Flood Zone
		Critical Facilities		
1.	Law	Belvedere Police Department	450 San Rafael Ave Belvedere, CA 94920	None
2.	Local Government	Belvedere City Hall	450 San Rafael Ave Belvedere, CA 94920	None
3.	Evacuation Shelter	St. Stephens Church	3 Bayview Ave Belvedere, CA 94920	None
4.	Evacuation Shelter	San Francisco Yacht Club	98 Beach Rd Belvedere, CA 94920	X
5.	Evacuation Shelter	Corinthian Yacht Club	43 Main Street Belvedere, CA 94920	X
6.	Local Government	Belvedere Lagoon Pump Station	Cove/Lagoon Belvedere, CA 94920	X

Table 18: City of Belvedere Critical Facilities in the Flood Zones
Source: Marin County/FEMA DFIRM

Although the City of Belvedere has not experienced recent catastrophic flooding, floodwaters can be deep enough to drown people and move fast enough to sweep people and vehicles away, lift buildings off foundations, and carry debris that smashes into buildings and other property. Flood waters can cause significant erosion which can lead to slope instability, severely damaging transportation and utility infrastructure by undermining foundations or washing away pavement. If water levels rise high enough to get inside buildings, flooding can cause extensive damage to personal property and the structure itself. Flood events that develop very quickly are especially dangerous because there may be little advance warning. Flooding may occur when

strong winds or tides result in a surge of seawater into areas that are above the normal high tide line. Tide elevations within Richardson Bay and San Francisco Bay have the potential to significantly impact the Belvedere storm drain system. Belvedere sees flooding from king tides in Richardson Bay and San Francisco Bay and this is only expected to increase with sea level rise and climate change, placing increased stress on Belvedere's San Rafael Avenue sea wall. Flooding of both San Rafael Avenue and Beach Road simultaneously could impact ingress and egress into the residential area of Belvedere south of San Rafael Avenue, including the Belvedere Police Department, City Hall and Community Center, and potentially cut off access into the area entirely.

The Tiburon Peninsula saw nearly 40 inches of rain between October 2022 and March 2023, including nearly 24 inches between 12/29/2022 and 1/15/2023 that wreaked havoc, with storms frequently downing trees and power lines and flooding roads.

Climate Change and Future Development Considerations

Climate change is expected to affect California's precipitation patterns, which are likely to influence future flood events. A 2017 study[3] found that the number of very intense precipitation days in California is projected to more than double by the end of the century, increasing 117 percent, making it likely that flood events will become more frequent in the Marin County OA including Belvedere. Climate change is expected to alter rainfall patterns in Northern California, including the Marin County OA. As the climate warms, rain events are predicted to become more intense. The Marin County OA including Belvedere will likely experience more rain inundation events that lead to flooding and increase the potential threat of levee failure, tree mortality, and other potential hazards. Sea level rise as a result of climate change will exacerbate the impacts of tidal flooding in the lowland areas of the Marin County OA including around the Belvedere Lagoon. Future development in these areas including in Mallard Pointe will expose more people and infrastructure to the effects of tidal flooding and storm surge as a result of climate change.

2.2.5 Land Subsidence

Land subsidence is a gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials. The principal causes are aquifer-system compaction, drainage of organic soils through groundwater pumping, underground mining, hydro-compaction, natural compaction, sinkholes, and thawing permafrost. More than 80 percent of the identified subsidence in the United States is a consequence of underground water exploitation. The increasing development of land and water resources threatens to exacerbate existing land-subsidence problems and initiate new ones.

Sinkholes can form in three primary ways. Dissolution sinkholes form when dissolution of the limestone or dolomite is most intensive where the water first contacts the rock surface. Aggressive dissolution also occurs where flow is focused in preexisting openings in the rock, such as along joints, fractures, and bedding planes, and in the zone of water-table fluctuation where groundwater is in contact with the atmosphere. See Figure 29 for a picture and description of how dissolution sinkholes form.

[3] Precipitation in a Warming World: Assessing Projected Hydro-Climate Changes in California and other Mediterranean Regaions. https://www.nature.com/articles/s41598-017-11285-y

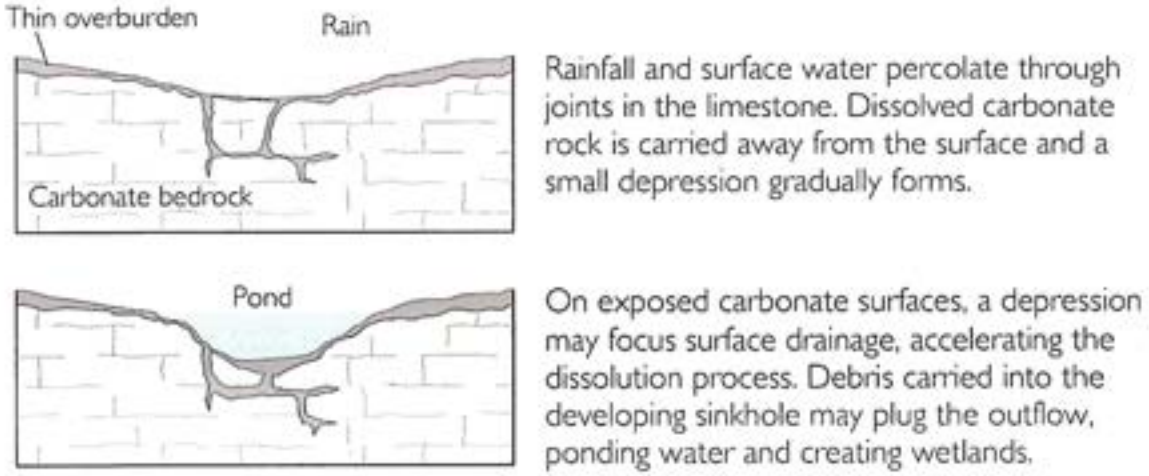

Figure 29: Dissolution Sinkhole Formation
Source: USGS

Cover-subsidence sinkholes tend to develop gradually where the covering sediments are permeable and contain sand. In areas where cover material is thicker, or sediments contain more clay, cover-subsidence sinkholes are relatively uncommon, are smaller, and may go undetected for long periods. See Figure 30 for a picture and description of how cover-subsidence sinkholes form.

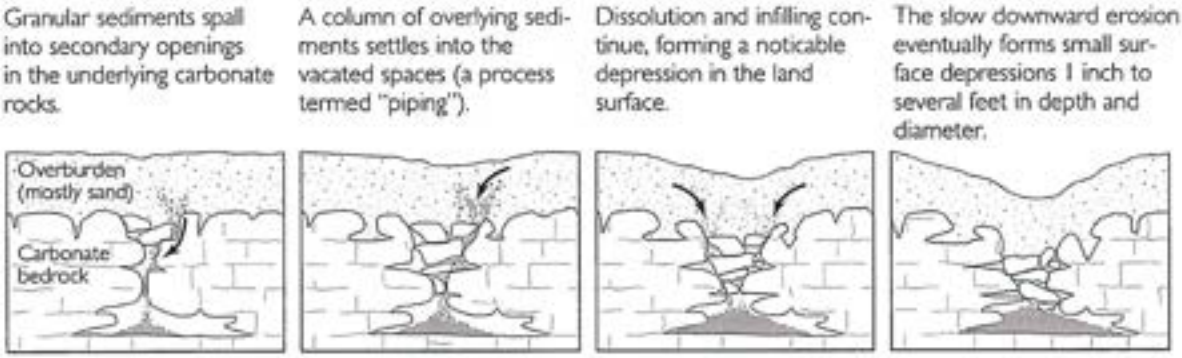

Figure 30: Cover-Subsidence Sinkhole Formation
Source: USGS

Cover-collapse sinkholes may develop abruptly over a period of hours and cause catastrophic damages. They occur where the covering sediments contain a significant amount of clay. Over time, surface drainage, erosion, and deposition of sediment transform the steep-walled sinkhole into a shallower bowl-shaped depression. See Figure 31 for a picture and description of how cover-collapse sinkholes form.

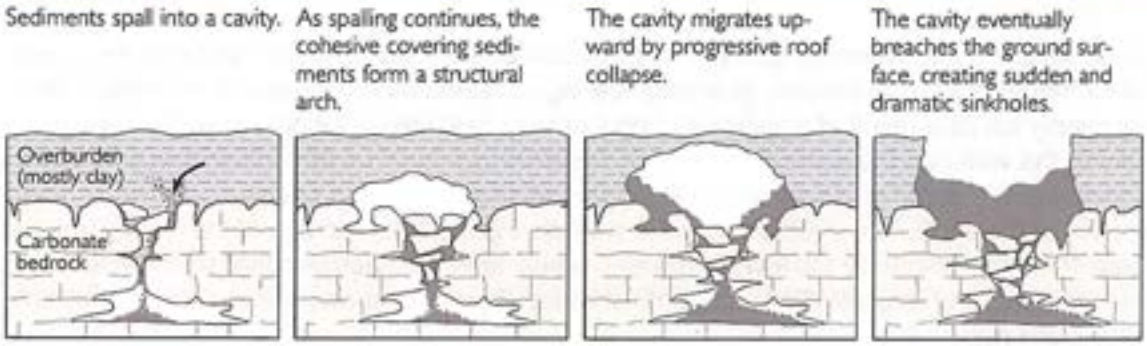

Figure 31: Cover-Collapse Sinkhole Formation
Source: USGS

New sinkholes have been correlated to land-use practices, especially from groundwater pumping and from construction and development practices that cause land subsidence. Sinkholes can also form when natural water-drainage patterns are changed and new water-diversion systems are developed. Some sinkholes form when the land surface is changed, such as when industrial and runoff-storage ponds are created. The substantial weight of the new material can trigger an underground collapse of supporting material, thus causing a sinkhole.

The overburden sediments that cover buried cavities in the aquifer systems are delicately balanced by groundwater fluid pressure. The water below ground helps to keep the surface soil in place. Groundwater pumping for urban water supply and for irrigation can produce new sinkholes in sinkhole-prone areas. If pumping results in a lowering of groundwater levels, then underground structural failure, and thus, sinkholes, can occur.

Areas in Belvedere designated with very high potential for land subsidence are generally located the Belvedere Lagoon. This area consists of hundreds of residences, several commercial buildings and the Belvedere Police Department, City Hall and Community Center building. Land subsidence could have numerous impacts for Belvedere, including the settling of businesses and homes as well as the shifting of roadways and utility infrastructure that run through the city. The lowland areas of Belvedere could anticipate increased rates of subsidence as bay waters saturate the soil from below.

There have been no major sinkholes recorded in Belvedere.

Climate Change and Future Development Considerations

Climate change could indirectly influence land subsidence as more severe and prolonged periods of drought may encourage more groundwater withdrawals. In coastal areas like the Marin County OA including Belvedere, land subsidence leads to higher sea levels and increased flood risk. The rate of land subsidence could increase across the Marin County OA including the lowland areas of Belvedere as a result of climate change. The impacts of land subsidence on infrastructure, including roads and underground utilities, in Belvedere could increase with future development in the lowland populated areas of the city, particularly the area around the Belvedere Lagoon and including Mallard Pointe, where land subsidence is more likely to occur.

2.2.6 Levee Failure

Levee failure is the overtopping, breach or collapse of the levee. Levees can fail in the event of an earthquake, internal erosion, poor engineering/construction or landslides, but levees most commonly fail as a result of significant rainfall or very high tides. During a period of heavy rainfall, the water on the water-body side of the levee can build up and either flow over the top ("overtopping") or put pressure on the structure causing quickening seepage and subsequent erosion of the earth. The overflow of water washes away the top portion of the levee, creating deep grooves. Eventually the levee weakens, resulting in a breach or collapse of the levee wall and the release of uncontrollable amounts of water. Figure 32 shows a levee and the multiple ways it can fail.

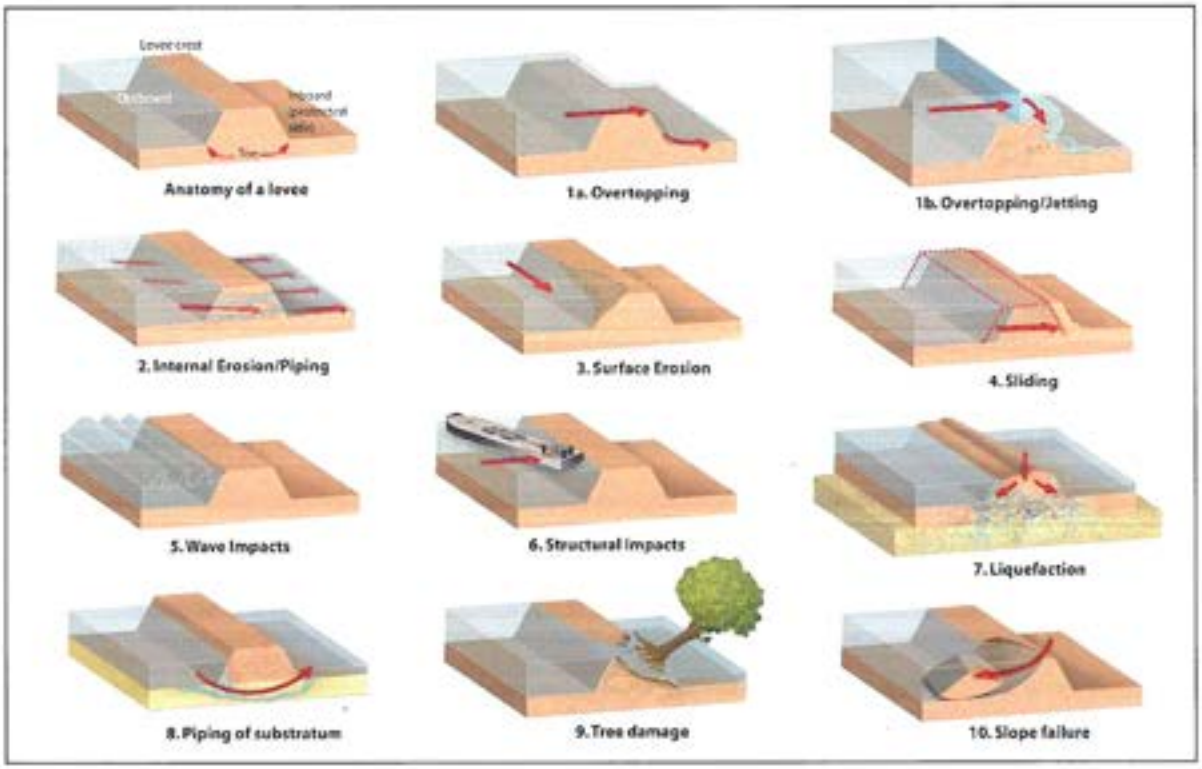

Figure 32: Levee Failure Mechanisms
Source: University of California

Belvedere is protected by one levee, the San Rafael Avenue sea wall along Richardson Bay. The seawall is 0.4 miles long with an undocumented height. Approximately 1,266 people and 349 buildings with a property value of $347 million in both the Town of Tiburon and Belvedere combined are at risk of a failure of the sea wall, including the area around the Belvedere Lagoon. The Belvedere Police Department, City Hall and Community Center building does not lie in the area at risk of a failure of the sea wall, though it lies just outside the area. A failure of the seawall during a high rain event could cause flooding across San Rafael Avenue and Beach Road. This could impact ingress and egress into the southern area of the city south of San Rafael Avenue, which includes the Belvedere Police Department, City Hall and Community Center building, and could potentially cut off access to this area entirely if both roads flood simultaneously.

On 10/10/2018, Belvedere declared a state of emergency due to increased shifting of the San Rafael Avenue sea wall. An inspection of the sea wall in 2017 revealed that portions of the concrete had crumbled and cracked and that a portion of the sea wall was sagging toward the water. The most problematic section directly across from Peninsula Road was at a high risk for failure. The levee had to be shored up.

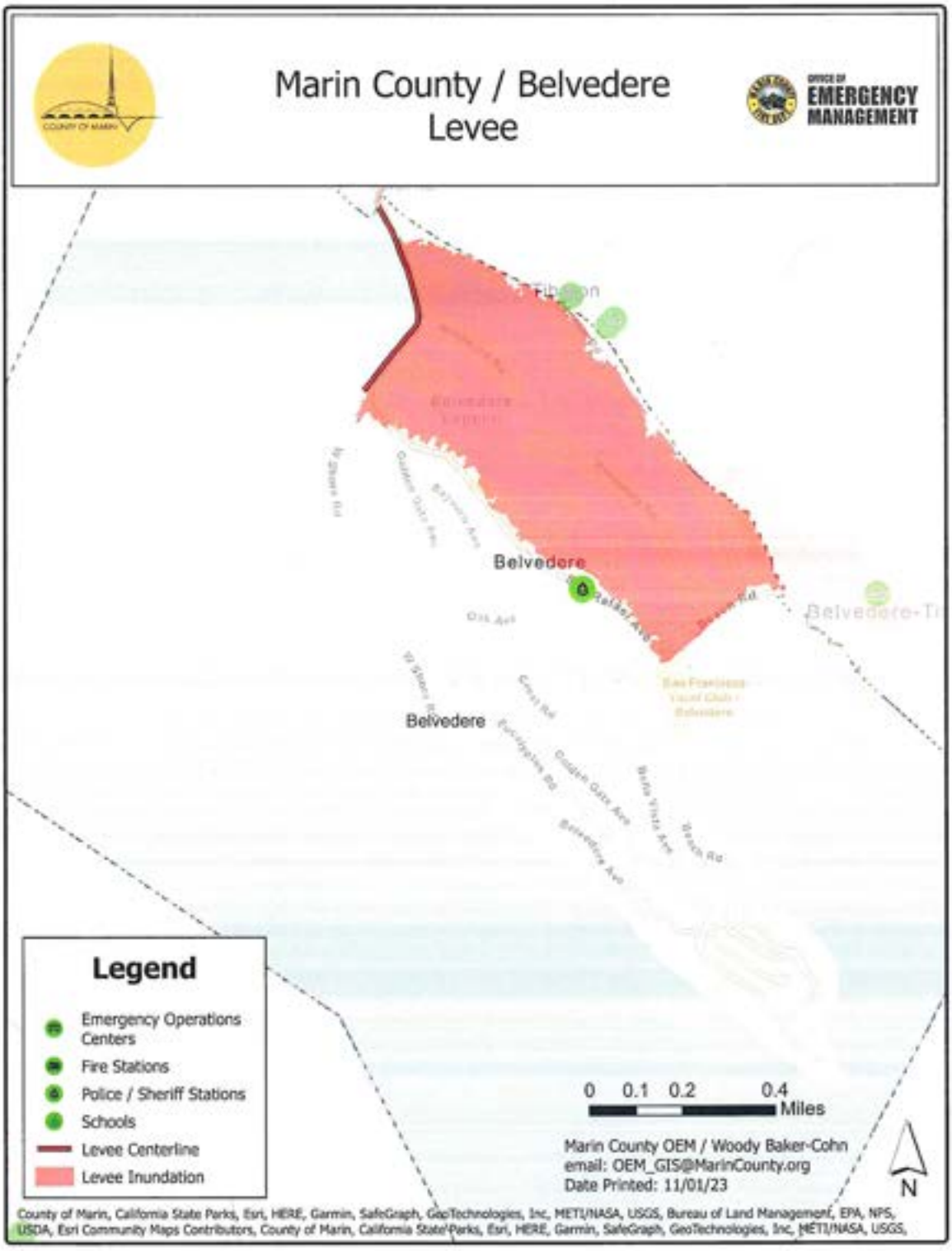

Figure 33: City of Belvedere Levee inundation and Critical Facilities Map
Source: Marin County OEM

Climate Change and Future Development Considerations

Climate change is expected to lead to an increase in the frequency and severity of major storm events, which can place added strain on levee systems. An increase in rainfall and runoff as a result of climate change will increase the potential for higher water levels in leveed areas across the Marin County OA including in Belvedere, increasing the potential for a levee failure. Rising seas will lead to increased stress on the levees around the Marin County OA shoreline including in Belvedere, particularly during a major tidal event and potential tsunami. As development increases in the populated areas of Belvedere, particularly around the Belvedere Lagoon including Mallard Pointe, the potential for significant impacts to residences, businesses and infrastructure will only increase.

2.2.7 Sea Level Rise

Climate change is the distinct change in measures of weather patterns over a long period of time, ranging from decades to millions of years. More specifically, it may be a change in average weather conditions such as temperature, rainfall, snow, ocean and atmospheric circulation, or in the distribution of weather around the average. While the Earth's climate has cycled over its 4.5-billion-year age, these natural cycles have taken place gradually over millennia, and the Holocene, the most recent epoch in which human civilization developed, has been characterized by a highly stable climate until recently.

The Marin County OA MJHMP is concerned with human-induced climate change that has been rapidly warming the Earth at rates unprecedented in the last 1,000 years. Since industrialization began, the burning of fossil fuels (coal, oil, and natural gas) at escalating quantities has released vast amounts of carbon dioxide and other greenhouse gases responsible for trapping heat in the atmosphere, increasing the average temperature of the Earth. Secondary impacts include changes in precipitation patterns, the global water cycle, melting glaciers and ice caps, and rising sea levels. According to the Intergovernmental Panel on Climate Change (IPCC), climate change will "increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems" if unchecked.

Through changes to oceanic and atmospheric circulation cycles and increasing heat, climate change affects weather systems around the world. Climate change increases the likelihood and exacerbates the severity of extreme weather – more frequent or intense storms, floods, droughts, and heat waves. Consequences for human society include loss of life and injury, damaged infrastructure, long-term health effects, loss of agricultural crops, disrupted transport and freight, and more. Climate change is not a discrete event but a long-term hazard, the effects of which communities are already experiencing.

Climate change adaptation is a key priority of the State of California. The 2013 State of California Multi- Hazard Mitigation Plan stated that climate change is already affecting California. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

Rising sea levels are considered a secondary effect of climate change due to warming ocean temperatures and melting glacial ice sheets into the ocean. The California coast has already seen a rise in sea level of four to eight inches over the 20th century due to climate change. Sea level rise impacts can be exacerbated during coastal storms, which often bring increased tidal elevations called "storm surge." The large waves associated with such storm surges can cause flooding in low-lying areas, erosion of coastal wetlands, saltwater contamination of drinking water, disruption of septic system operations, impacts on roads and bridges, and increased stress on levees. In addition, rising sea levels results in coastal erosion as shoreline sediment is re-deposited back into the ocean. Evidence shows that winter storms have increased in frequency and intensity since 1948 in the North Pacific, increasing regional wave heights and water levels during storm events.

According to the 2017 "Rising Seas in California, An Update on Sea-Level Rise Science" report Marin County may experience impacts from Sea Level Rise over defined periods of time, to include long-term changes (second half of this century and beyond), and short- to mid-term projections (within the next two or three decades).

Parts of Belvedere are at a lower elevation than many of the coastal areas in Marin County. As such, the lowland areas in Belvedere, including the area around the Belvedere Lagoon that was built with fill, are particularly vulnerable to sea level rise and could experience between one and six feet of inundation (Mean High Water (MHW)), especially as these neighborhoods continue to subside over time. (Marin Shoreline Sea Level Rise Vulnerability Assessment, 2017). Hundreds of residences, several commercial buildings, and the Belvedere Police Department, City Hall and Community Center, lie in areas of Belvedere susceptible to sea level rise.

The following are key issues related to Belvedere sea level rise and a 100-year storm surge:

- San Rafael Avenue could be impacted after the medium-term, cutting off the first access point to the area of Belvedere south of it.
- Shoreline homes along West Shore and Beach Roads could expect impacts to utilities in the near and medium-terms, and potential structural impacts to any in water structures during storms, especially in the long-term.
- Residences around Belvedere Lagoon would be vulnerable to sea level rise flooding if the San Rafael Avenue sea wall is overtopped. These residences are also vulnerable to worsening subsidence.
- The Belvedere Corp Yard could be vulnerable to storm surge flooding in the near-term and tidal flooding in the long-term.
- Belvedere's Police Department, City Hall and Community Center building could expect impacts in the long-term, especially during storms. The park facility and roads fronting the building could expect flood waters sooner, creating potential access issues.

The assets most vulnerable to sea level rise and storm surges in Belvedere are single-family residential homes and San Rafael Avenue. Because the Belvedere Lagoon area was built on fill, several homes in the neighborhood around the lagoon could be vulnerable to subsidence. Several residences have already sunk below mean sea level, exposing them to additional potential flooding from sea level rise. Much of the Belvedere Lagoon area is protected from Richardson Bay by the San Rafael Avenue sea wall on the north and a wall with tides gates to the south. Some of the residences around the lagoon have vents and other utility lines under

the homes that could be vulnerable to increased saltwater exposure. Even if the lagoon is managed well enough to keep those homes bordering it dry, these homes may become isolated if tidewaters overtop the San Rafael Avenue sea wall or Beach Road. The lagoon area roads may experience increasing subsidence issues in addition to, and even before, flooding. In time, several additional roads in the lagoon area could be impacted by high tides on a regular basis. If the low-lying roads are compromised, people who live in the homes south of San Rafael Avenue could become isolated or prevented through travel for several hours or even several days a month. People with mobility or health constraints will be affected. If sea level rise occurs at the worst-case scenario predicted of five feet of sea level rise and a 100-year storm, much of the Belvedere Lagoon area could be lost to the sea, rendering the rest of Belvedere a potential island as it used to be. This would present major complications for those who travel through the lagoon area to get to their homes or jobs in the area of Belvedere south of San Rafael Avenue. The largest threat to emergency services is lost emergency vehicle access to Belvedere. High tides and storms could flood the roads in front of the Belvedere Police Department and, in the long-term, up to four feet of flooding could impact the property and the vehicles. In addition, though technically in Tiburon, the Tiburon Fire Department serves Belvedere and could be blocked from providing service if roads are severely flooded or if the station itself is flooded. Water transportation for recreational purposes is a major use of the San Francisco Yacht Club Marina off Belvedere. As sea level rises, the facility may need to make some adjustments or relocate. Several private piers and docks could also be damaged in storms and/or may need to be elevated.

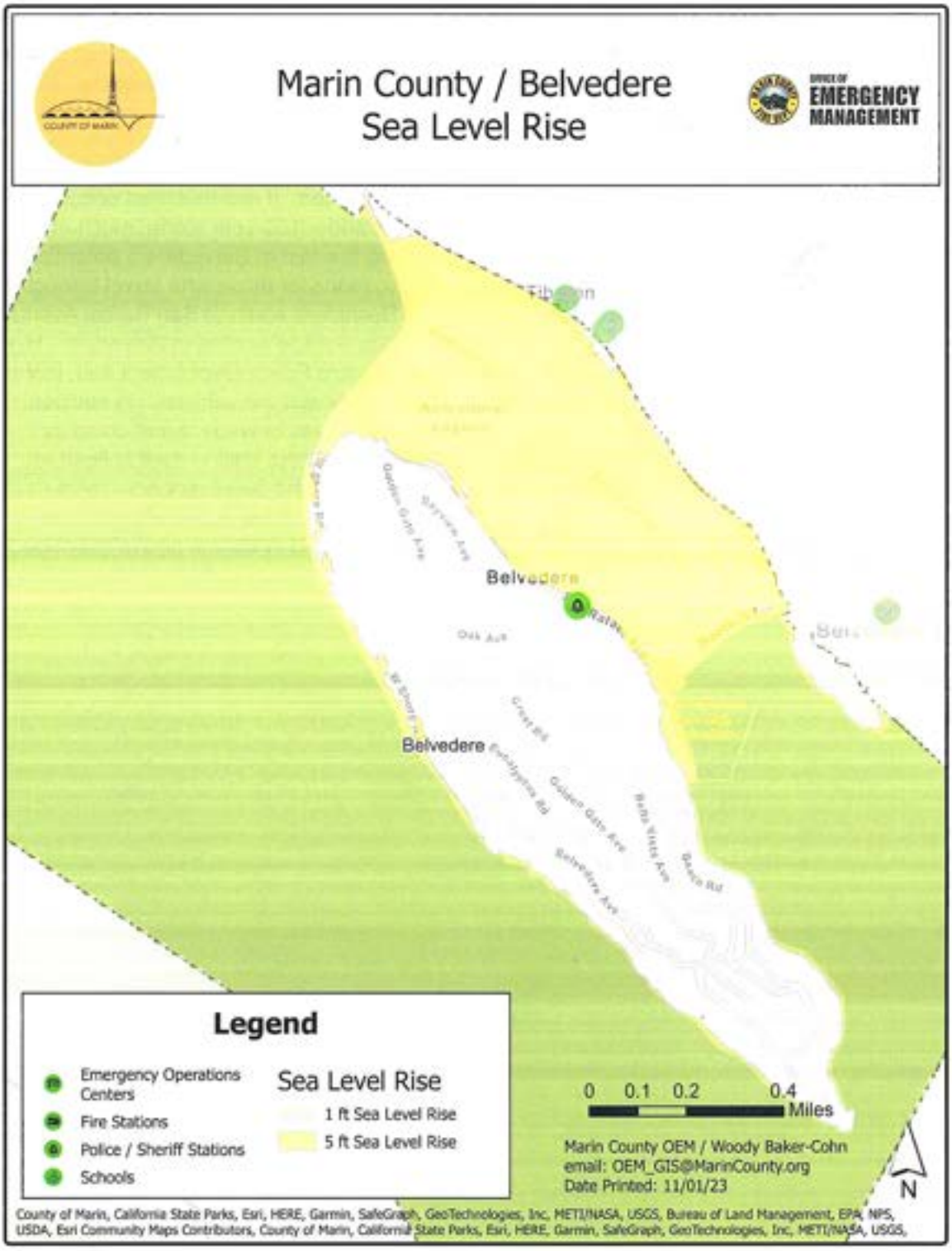

Figure 34: City of Belvedere Sea Level Rise
Source: Marin County OEM

The 2017 Marin Shoreline Sea Level Rise Vulnerably Assessment estimates that Belvedere could anticipate impacts to over 2,000 people and 550 living units with over $8.6 million in assessed property value as a result of a 100-year sea level rise scenario and including storm surge. Structures throughout the city can become damaged extensively with their foundations compromised over time. Of particular concern are those structures and infrastructure that have not been elevated to projected sea level rise heights over the next century. Sea level rise in Belvedere has the potential to exacerbate inland flooding when a significant rain or tidal event occurs, pushing water from the bays over their banks and into adjacent neighborhoods. Sea level rise can also cause increased subsidence along Belvedere's shoreline, which may damage underground water and wastewater pipelines and disrupt services. Belvedere would begin to experience seasonal, king tide, and storm surge flooding more frequently in the future.

Climate Change and Future Development Considerations

The two major causes of global sea level rise are thermal expansion of warming oceans and the melting of land-based glaciers and polar ice caps. Climate change is affecting natural and built systems around the world, including the California coast. In the past century, average global temperature has increased about 1.4°F, and average global sea level has increased 7 to 8 inches. Sea level rise in the San Francisco Bay Area is projected to increase by eight inches MHW in 2050 and could reach 4.5 to eight feet by 2021 if greenhouse gas emissions aren't reduced.

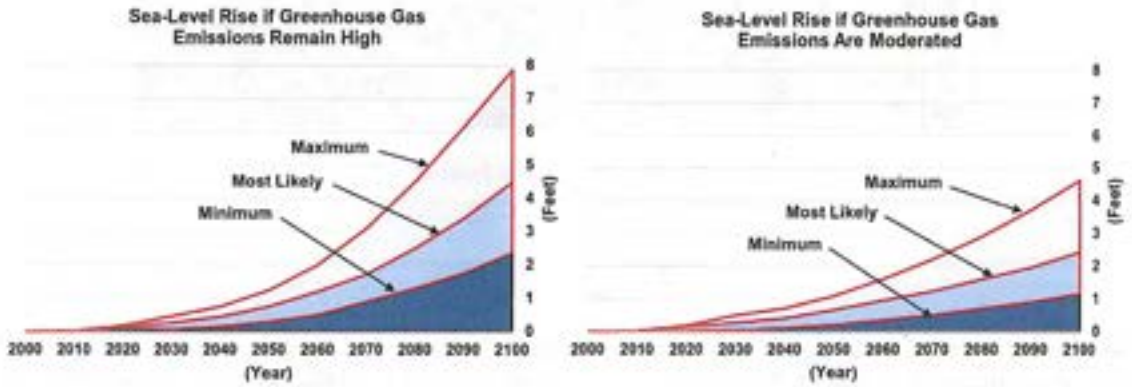

Figure 35: Projections of Sea Level Rise in the San Francisco Bay Area, 2000-2100
Source: 2019–2020 Marin County Civil Grand Jury, Climate Change: How Will Marin Adapt?

While the Marin County OA shoreline including around Belvedere already experiences regular erosion, flooding, and significant storm events, sea level rise will exacerbate these natural processes, leading to significant social, environmental, and economic impacts. The third National Climate Assessment cites strong evidence that the cost of doing nothing exceeds the costs associated with adapting to sea level rise by 4 to 10 times. Sea level rise will continue to affect the Marin County OA including Belvedere with increased tidal flooding and storm surge during severe weather events, and future development along the Marin County OA shoreline including around the Belvedere Lagoon will only amplify these impacts. Sea level can also lead to increased land subsidence and the potential of levee failure, particularly with the San Rafael Avenue sea wall. The impacts of a tsunami would also be magnified with rising seas. Future development in the coastal and lowland areas of Belvedere, including the Belvedere Lagoon area, will put more people and property at risk from flooding as a result of sea level rise. Roads

and utility infrastructure across Belvedere will continue to become inundated, impacting ingress and egress into the area of Belvedere south of San Rafael Avenue.

2.2.8 Severe Weather – Extreme Heat

Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. A heat wave is an extended period of extreme heat, often with high humidity. When relative humidity is factored in, the temperature can feel much hotter as reflected in the Heat Index (see Figure 36):

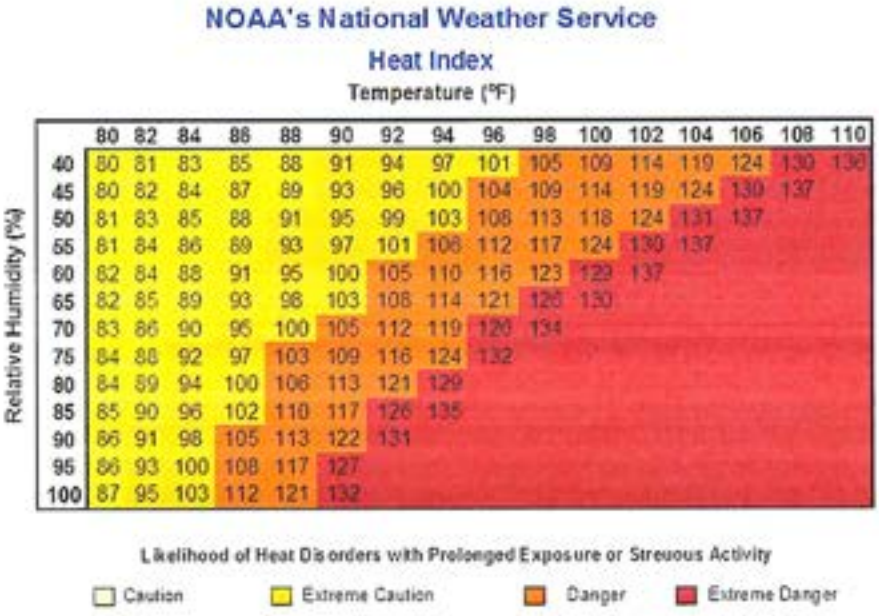

Figure 36: Heat Index
Source: NOAA

Heat kills by taxing the human body beyond its abilities. In a normal year, about 1,300 Americans succumb to the demands of summer heat. Heat is the leading weather-related cause of mortalities in the US. In 2006, California reported a high of 204 heat related deaths, with 98 reported in 2017 and 93 deaths reported in 2018.

Extreme heat has the potential to impact all areas of Belvedere and would be felt more at lower elevations in the city closer to the Town of Tiburon. Temperatures can feel warmer in this area due to the widespread presence of concrete and asphalt, which stores heat longer. Heat waves can cause power outages and can sicken people who are exposed to high temperatures too long, particularly infants and the elderly.

In September 2022 the Marin County OA experienced an Extreme Heat Event with temperatures exceeding 103 degrees.

Climate Change and Future Development Considerations

The primary effect of climate change is warmer average temperatures. The annual average daily high temperatures in California are expected to rise by 2.7°F by 2040, 5.8°F by 2070, and 8.8°F by 2100 compared to observed and modeled historical conditions. At the current rate,

annual average temperatures in the Marin County OA region and Bay Area will likely increase by approximately 4.4 degrees by 2050 and 7.2 degree by the end of the century unless significant efforts are made to reduce greenhouse emotions according to California's latest climate change assessment.

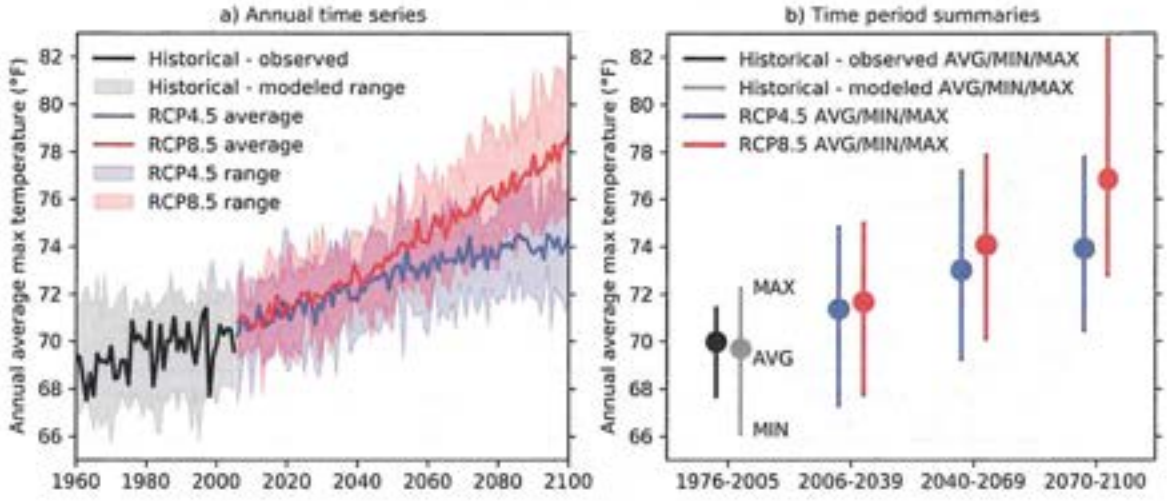

Figure 37: Annual Average Temperatures in the San Francisco Bay Area, 2000-2100
Source: California Climate Change Assessment (Fourth Edition)

As climate change accelerates in the 21st century, it is anticipated that extreme heat events will become more frequent and intense across the Marin County OA including in Belvedere. There will be increased residential and business needs for cooling and addressing heat-related issues. These effects would primarily be felt in the lowland areas of Belvedere where heat builds in developed areas. Heat waves also tax the energy grid. Future development in the Marin County OA including Belvedere could exacerbate the impacts from heat related events, particularly in electricity provision and water delivery. Increased temperatures will also lead to an increase in the occurrence and severity of wildfires across the Marin County OA including Belvedere as conditions become hotter and drier. These effects will primarily be felt in the open space areas of Belvedere including along the Tiburon Boulevard bike path where hotter and drier conditions are more apt to lead to wildfires. Future development near the open spaces around Belvedere could expose more people and infrastructure to the threat of wildfire as a result of increasing temperatures.

2.2.9 Severe Weather – High Wind & Tornado

High Wind

High wind is defined as a one-minute average of surface winds 40 miles per hour or greater lasting for one hour or longer, or winds gusting to 58 miles per hour or greater regardless of duration that are either expected or observed over land. These winds may occur as part of a seasonal climate pattern or in relation to other severe weather events such as thunderstorms. The Beaufort scale is an empirical measure that relates wind speed to observed conditions on land and is a common measure of wind intensity (see Figure 38).

Beaufort number	Description	Wind speed		Land conditions
		kts	km/h	
0	Calm	< 1	< 1	Calm. Smoke rises vertically.
1	Light air	1 – 2	1 – 5	Wind motion visible in smoke.
2	Light breeze	3 – 6	6 – 11	Wind felt on exposed skin. Leaves rustle.
3	Gentle breeze	7 – 10	12 – 19	Leaves and smaller twigs in constant motion.
4	Moderate breeze	11 – 15	20 – 28	Dust and loose paper raised. Small branches begin to move.
5	Fresh breeze	16 – 20	29 – 38	Branches of a moderate size move. Small trees begin to sway.
6	Strong breeze	21 – 26	39 – 49	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic garbage cans tip over.
7	High wind, Moderate gale, Near gale	27 – 33	50 – 61	Whole trees in motion. Effort needed to walk against the wind. Swaying of skyscrapers may be felt, especially by people on upper floors.
8	Gale, Fresh gale	34 – 40	62 – 74	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.
9	Strong gale	41 – 47	75 – 88	Some branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over. Damage to circus tents and canopies.
10	Storm, Whole gale	48 – 55	89 – 102	Trees are broken off or uprooted, saplings bent and deformed. Poorly attached asphalt shingles and shingles in poor condition peel off roofs.
11	Violent storm	56 – 63	103 – 117	Widespread vegetation damage. Many roofing surfaces are damaged; asphalt tiles that have curled up and/or fractured due to age may break away completely.
12	Hurricane	≥ 64	≥ 118	Very widespread damage to vegetation. Some windows may break; mobile homes and poorly constructed sheds and barns are damaged. Debris may be hurled about.

Figure 38: Beaufort Wind Scale
Source: NOAA

Windstorms in the Marin County OA are typically straight-line winds. Straight-line winds are generally any thunderstorm wind that is not associated with rotation (i.e., is not a tornado). It is these winds, which can exceed 100 mph, which represent the most common type of severe weather and are responsible for most wind damage related to thunderstorms.

Tornado

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes are the most powerful storms that exist, and damage paths can be in excess of one mile wide and 50 miles long. The Enhanced Fujita Scale (see Figure 39) is commonly used to rate the intensity of tornadoes in the United States based on the damages that they cause.

Enhanced Fujita Scale	
EF-0	65-85 mph winds
EF-1	86-110 mph winds
EF-2	111-135 mph winds
EF-3	136-165 mph winds
EF-4	166-200 mph winds
EF-5	>200 mph winds

Figure 39: Enhanced Fujita Scale
Source: NOAA

Tornadic waterspouts are tornadoes that form over water or move from land to water. They have the same characteristics as a land tornado. They are associated with severe thunderstorms, and are often accompanied by high winds and seas, large hail, and frequent dangerous lightning.

Figure 40: Waterspout Formation
Source: MarineInsights

All of Belvedere is susceptible to storms and damage from wind and tornadoes particularly those areas throughout the city that have increased susceptibility due to a higher presence of trees. Drought can increase the susceptibility of trees toppling over in a high wind event. Fallen trees could damage homes and other facilities. Power lines could be impacted by fallen trees

and wind, causing power outages. Roadways could also become blocked by fallen trees, affecting the ability of residents to reach their homes.

Belvedere has not experience a high wind event or tornado that caused notable damage.

Climate Change and Future Development Considerations

It is anticipated that the atmospheric rivers that deliver storms to Northern California may intensify because of climate change. This increase in storm intensity may bring more intense winds and potential tornados to Northern California, including the Marin County OA and Belvedere. Significant wind events and tornados can topple trees, particularly those that may be saturated, or drought stressed as a result of climate change. An increase in fallen trees in Belvedere as a result of increased storms due to climate change can lead to an increase in power outages. Future development in any of the areas of high tree cover throughout Belvedere including in residential areas will increase the effects of severe wind events.

2.2.10 Tsunami

Tsunamis consist of waves generated by large disturbances of the sea floor, which are caused by volcanic eruptions, landslides or earthquakes. Shallow earthquakes along dip slip faults are more likely to be sources of tsunami than those along strike slip faults. The West Coast/Alaska Tsunami Warning Center (WC/ATWC) is responsible for tsunami warnings. Tsunamis are often incorrectly referred to as tidal waves. They are actually a series of waves that can travel at speeds averaging 450 (and up to 600) miles per hour with unusual wave heights. Tsunamis can reach the beach before warnings are issued.

A tsunami experienced by Belvedere would most likely occur from an earthquake, the location of which would determine the amount of time that the tsunami waves would reach the city. Areas of Belvedere in the 100 and 500-year floodplain are at a lower elevation and lie in a tsunami hazard area, including most of the area around the Belvedere Lagoon. This area includes hundreds of residences, several commercial buildings and the Belvedere Police Department, City Hall and Community Center. Both San Rafael Avenue and Beach Road, the two access points into Belvedere, lie in a tsunami inundation zone. The California Geological Survey and the California Office of Emergency Services estimate that a thirteen-foot wall of water could impact the Belvedere Lagoon area in a major tsunami event. The tsunami inundation zone extends into the Town of Tiburon and includes the Tiburon Fire Protection District Station #11 that serves Belvedere. Belvedere could essentially become isolated in a major tsunami event, affecting the provision of emergency services to Belvedere residents. A major tsunami event could place increased stress on the San Rafael Avenue sea wall in Belvedere.

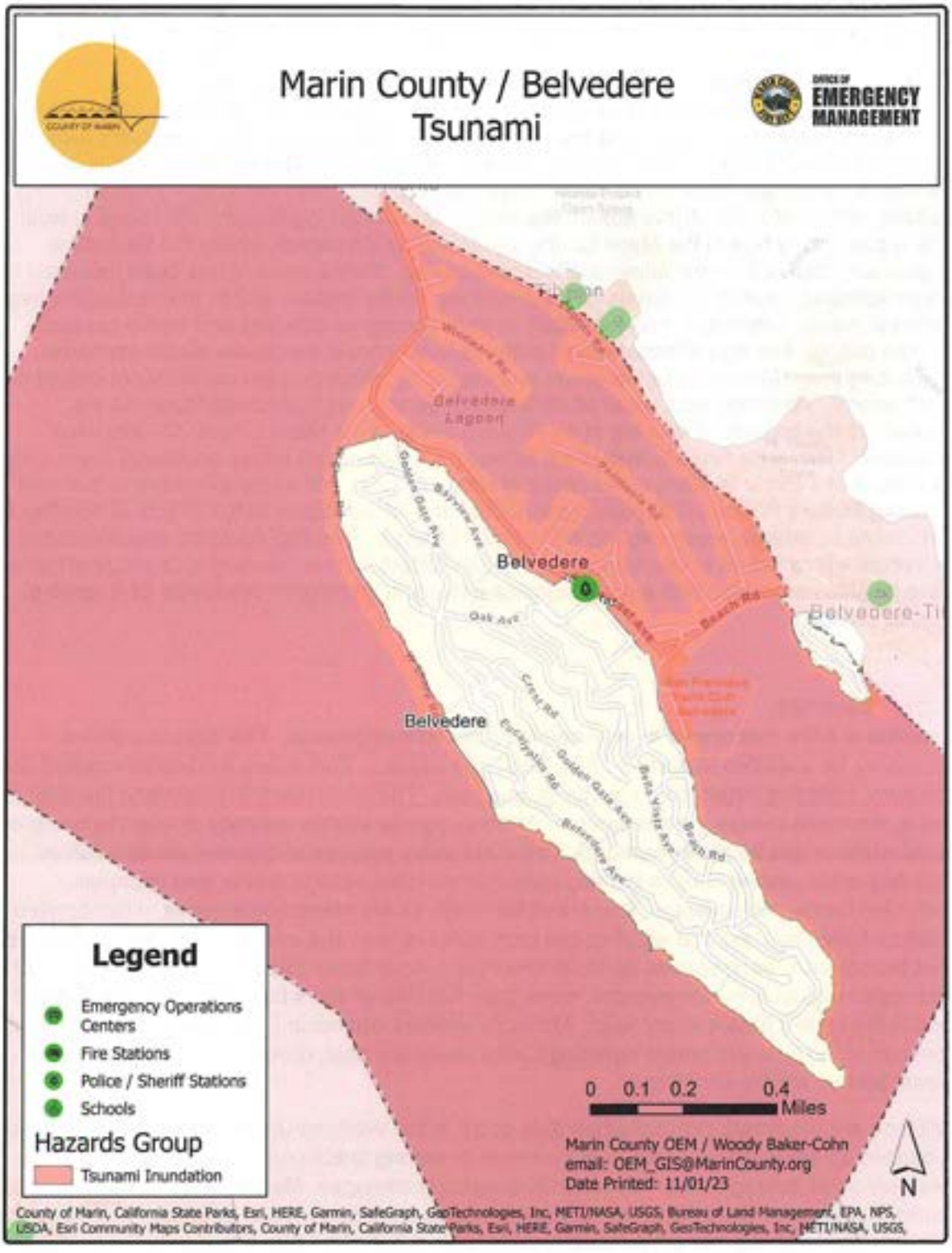

Figure 41: City of Belvedere Tsunami Critical Facilities and Infrastructure
Source: Marin County OEM

Belvedere has never experienced a tsunami, however, given its proximity to Richardson Bay and San Francisco Bay, it could potentially experience the impacts of one.

Climate Change and Future Development Considerations

The biggest threat to tsunamis is sea level rise which is a direct result of climate change. Sea level rise can make tsunamis worse than they already are because higher sea levels allow for tsunamis to travel further inland and cause even more damage. Sea level rise results in more vulnerable coastlines which make coastal communities even more vulnerable to an incoming tsunami as the natural buffer to absorb the energy of an incoming tsunami will cease to exist. This is particularly true in the Marin County OA including Belvedere, where the Belvedere Lagoon area lies in an area vulnerable to sea level rise. Furthermore, it has been theorized that ocean warming, caused by climate change, can impact the tectonic plates that rest below large bodies of water. Ultimately, this can result in more geological activities and worse tsunamis. Climate change has also affected ocean patterns, which could eventually lead to tsunamis distributing themselves across the ocean and impacting areas that are currently not susceptible to a tsunami. Tsunamis as a result of climate change and associated sea level rise will exacerbate the impacts of flooding in the lowland areas of the Marin County OA including Belvedere. This is particularly true in the Belvedere Lagoon area where additional storm surge as a result of a larger tsunami could cause greater impacts. Future development in this area including Mallard Pointe will expose more people and infrastructure to the effects of flooding in as tsunami inundation areas expand with climate change. Flooding could be exacerbated in Belvedere with a failure or overtopping of the San Rafael Avenue sea wall as a result of higher wave heights associated with a more significant tsunami and higher sea levels as a result of climate change.

2.2.11 Wildfire

A wildfire is a fire that occurs in an area of combustible vegetation. The three conditions necessary for a wildfire to burn are fuel, heat, and oxygen. Fuel is any flammable material that can burn, including vegetation, structures, and cars. The more fuel that exists and the drier that fuel is, the more intense the fire can be. Wildfires can be started naturally through lightning or combustion or can be set by humans. There are many sources of human-caused wildfires including arson, power lines, a burning campfire, an idling vehicle, trains, and escaped controlled burns. On average, four out of five wildfires are started by humans. Uncontrolled wildfires fueled by wind and weather can burn acres of land and everything in their path in mere minutes and can reach speeds up to 15 miles per hour or faster depending upon wind speed and ember distribution. On average, more than 100,000 wildfires burn 4 to 5 million acres of land in the United States every year. Although wildfires can occur in any state, they are most common in the Western states including California where heat, drought, and thunderstorms create perfect wildfire conditions.

Wildfires are of primary concern when they occur in the Wildland Urban Interface (WUI), which is defined as areas where homes are built near or among lands prone to wildfire. Even relatively small acreage fires may result in disastrous damages. Most structures in the WUI are not destroyed from direct flame impingement, but from embers carried by wind. The damages can be widely varying, but are primarily reported as damage to infrastructure, built environment, and injuries to people.

The pattern of increased damages is directly related to increased urban spread into historical forested areas that have wildfire as part of the natural ecosystem. Many WUI fire areas have long histories of wildland fires that burned only vegetation in the past. However, with new development, a wildland fire following a historical pattern may now burn these newly developed areas. WUI fires can occur where there is a distinct boundary between the built and natural areas or where development or infrastructure has encroached or is intermixed in the natural area. WUI fires may include fires that occur in remote areas that have critical infrastructure easements through them, including electrical transmission towers, railroads, water reservoirs, communications relay sites or other infrastructure assets.

Consequently, wildland fires that burn in natural settings with little or no development are part of a natural ecological cycle and may actually be beneficial to the landscape. Century old policies of fire exclusion and aggressive suppression have given way to better understanding of the importance fire plays in the natural cycle of certain forest types.

Warning times are usually adequate to ensure public safety, provided that evacuation recommendations and orders are heeded in a timely manner. While in most cases wildfires are contained within a week or two of outbreak, in certain cases, they have been known to burn for months, or until they are completely extinguished by fall rains.

Wildfire poses the greatest risk to human life and property in the Marin County OA's densely populated WUI, which holds an estimated 69,000 living units. The Marin County OA is home to 23 communities listed on CAL FIRE's Communities at Risk list, with approximately 80% of the total land area in the county designated as having moderate to very high fire hazard severity ratings. The county has a long fire history with many large fires over the past decades, several of which have occurred in the WUI. To compound the issue, national fire suppression policies and practices have contributed to the continuous growth (and overgrowth) of vegetation resulting in dangerously high fuel loads. The Community Wildfire Protection Plan (CWPP) provides a scientifically based assessment of wildfire threat in the WUI of the Marin County OA.

Fire protection in California is the responsibility of either the federal, state, or local government depending upon the location of the incident. On federally owned land, or federal responsibility areas (FRA), fire protection is provided by the federal government, and or in partnership with local agreements. In state responsibility areas (SRA), CAL FIRE typically provides fire protection. However, in some counties CAL FIRE contracts with county fire departments to provide protection of the SRA – this is the case in the Marin County OA, where CAL FIRE contracts with MCFD. Local responsibility areas (LRA) include incorporated cities and cultivated agriculture lands, and fire protection is typically provided by city fire departments, fire protection districts, counties, and by CAL FIRE under contract to local government.

CAL FIRE contracts with MCFD to provide wildland fire protection and associated fire prevention activities for lands designated by the State Board of Forestry as SRA.. The MCFD is responsible for the protection of approximately 200,000 acres of SRA within the county and is the primary agency that handles wildland fires. MCFD also provides similar protection services to approximately 100,000 acres of FRA in the Golden Gate National Recreation Area (GGNRA), the Muir Woods National Monument, and the Point Reyes National Seashore.

Figure 42 indicates the federal responsibility areas, state responsibility areas and local responsibility areas in the Marin County OA.

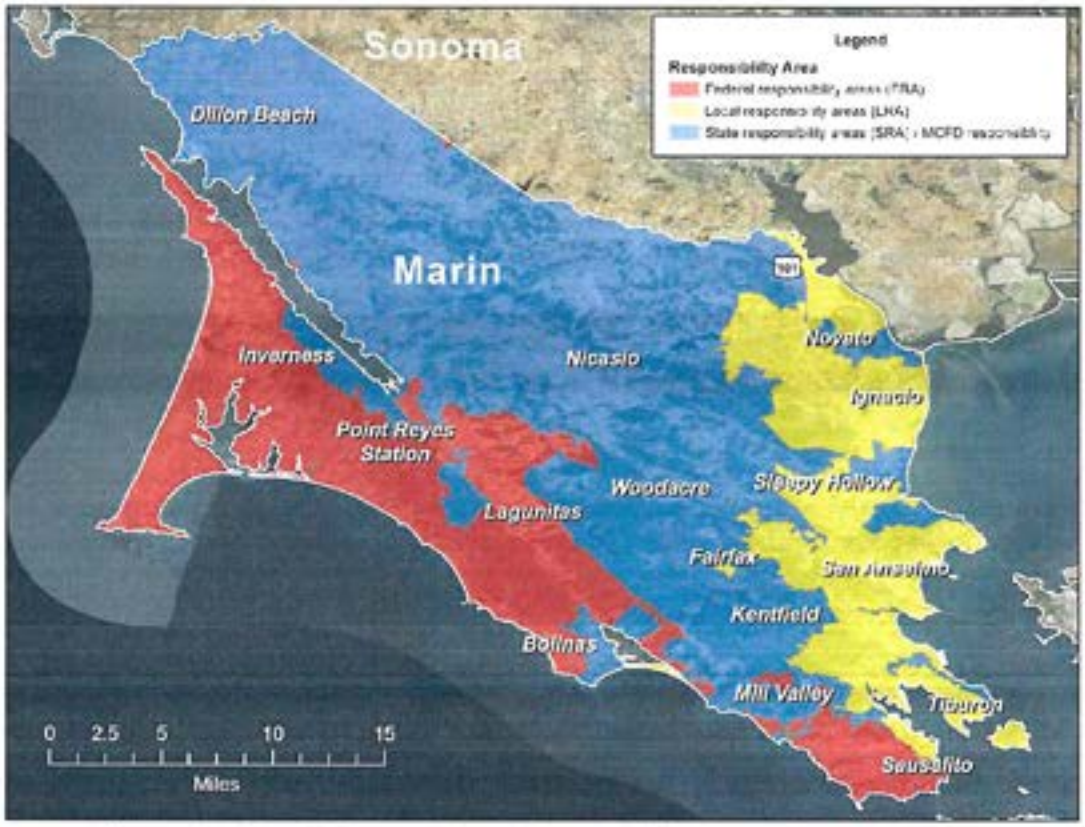

Figure 42: Federal, State and Local Responsibility Areas in the Marin County OA
Source: Marin Community Wildfire Protection Plan, 11/27/23

The mix of weather, diverse vegetation and fuel characteristics, complex topography, and land use and development patterns in the Marin County OA are important contributors to the fire environment. The MCFD Woodacre ECC currently manages the data from four Remote Automated Weather Stations (RAWS) for predicting fire danger utilizing the National Fire Danger Rating System (NFDRS) during the fire season. The RAWS are located in Woodacre, Middle Peak, Barnabe, Big Rock and a new station will be coming online in Novato.

The Marin County OA is bounded by the cool waters of the Pacific Ocean to the west, the San Francisco and Richardson Bays to the southeast, the San Pablo Bay to the east, and Sonoma County agricultural lands to the north. The combination of these large bodies of water, location in the mid-latitudes, and the persistent high pressure over the eastern Pacific Ocean results in several micro-climates. Weather in the OA consists of warm, dry summers and cool, wet winters. The climate in early fall and late spring is generally similar to the summer, and late fall is similar to winter. Spring is generally cool, but not as wet as the winter. While these general weather conditions are fairly representative of the typical Marin County OA weather, complex topography, annual variability of weather patterns, and less frequent and transient weather patterns are important to fire conditions.

In the late spring through early fall, the combination of frequent and strong high-pressure systems (known as the Pacific High) over California combined with the cool waters of the ocean/bays results in persistent fog and low clouds along the coast (including over the southern

Marin County OA near the San Francisco Bay) with winds. The fog often penetrates into the inland valleys of the northern and central Marin County OA, especially during overnight hours. At the coastline, mist from fog can keep the land surfaces modestly moist while inland land surfaces above the fog or inversion are often very dry.

The Pacific High that persists from late spring through early fall over the eastern Pacific, combined with a thermal low pressure over the Central Valley of California, results in an almost continuous sea breeze. These winds usher in cool and moist air and can be strong at times (15 to 25 mph), especially over the ridge tops and through northwest to southeast lying valleys, including San Geronimo/Ross, Hicks, Lucas Valleys, and Mill Valley and the Marin Headlands. These westerly winds are usually highest in the afternoon, decrease in the evening, and are light overnight before increasing again in the late morning/early afternoon.

Occasionally in the summer and more often in the fall, the Pacific High moves inland and centers over Oregon and Idaho, while low pressure moves from the Central Valley of California to southern California and Arizona. The resulting north-to-south pressure gradient can be strong enough to retard the typical sea breeze and can even result in winds blowing from the land to the ocean (offshore winds). As the offshore winds move air from the Central Valley to the coastal areas of California, the air descends and compresses, which greatly warms and dries the air. Under these "Diablo" wind conditions, temperatures in the Marin County OA can reach 100°F in the inland areas and even 80°F at the coast, and relative humidity can be very low. In addition, wind speeds can be high (20 to 40 mph), gusty and are often much faster over the mountains and ridge tops such as Mt. Tamalpais, Loma Alta, Marin Headlands and Mt. Burdell compared to low-lying areas. Wind speeds can be high over the ridges and mountains at all times of day under this "offshore" wind pattern and are often much slower or even calm at night in low-lying areas because nighttime cooling decouples the aloft winds from the surface winds. It is during these Diablo wind events that there is a high potential for large, wind-driven fires should there be an ignition. Historically, the largest and most destructive fires have occurred during these offshore (also known as Foehn) wind events including the Angel Island and the Vision fires which were located in West Marin.

A few times per year in the summer and early fall, monsoonal flow from Mexico may bring in moist and unstable air over central and northern California, which can result in thunderstorms with or without precipitation. With the otherwise dry summer conditions, lightning from this type of weather pattern can ignite fires. These monsoonal flow patterns are usually only one to two-day events.

Beginning in late November and lasting through the end of March, the Pacific High moves south and weakens, allowing storms that originate in the Gulf of Alaska to move over California.

These storms bring precipitation and, at times, strong winds out of the south. Each storm usually results in one fourth inch to several inches of rain over a day or so. Near Mt. Tamalpais, rainfall amounts are enhanced by orographic lifting, resulting in higher rain amounts in the Kentfield and Fairfax areas compared to the rest of the county. Typically, after the first rain in November, the cool weather and occasional storm keeps the ground wet through late Spring. However, in some years, significant rain does not occur until later in the year (e.g., early-to-late December) and there can be several weeks without any storms and rain. During storms, temperatures are usually mild.

When there are no storms over California, a land-breeze typically forms (i.e., winds blowing from the Central Valley to the Pacific Ocean). These winds can reach 30 mph, and travel through the southeast to northwest lying valleys, over low-lying ridges such as the Marin Headlands, and through the Golden Gate. These winds are usually highest in the mid-morning hours and decrease in the afternoon as the Central Valley warms during the day. The winds are associated with cold and modestly moist air.

In late February/early March through late April, the Pacific High strengthens and moves north, and storms impacting the county become less frequent. During this time of year there is often a low-pressure area over the desert in southwest California. The combination of the Pacific High to the north and low-pressure to the southwest results in strong winds blowing from the northwest to the southeast. Like the sea breeze, these winds bring in cool, moist air and are usually highest in the afternoon hours. Because of winter and spring rains, the land is wet and there is little danger of wildland fire despite the strong winds and only occasional precipitation. There is often little coastal fog this time of year.

Vegetation, which is also known as fuel, plays a major role in fire behavior and potential fire hazards. A fuel's composition, including moisture level, chemical make-up, and density, determines its degree of flammability. Of these, fuel moisture level is the most important consideration. Generally, live trees contain a great deal of moisture while dead logs contain very little. The moisture content and distribution of fuels define how quickly a fire can spread and how intense or hot it may become. High moisture content will slow the burning process since heat from the fire must first eliminate moisture.

In addition to moisture, a fuel's chemical makeup determines how readily it will burn. Some plants, shrubs, and trees such as chamise and eucalyptus (both present in the Marin County OA) contain oils or resins that promote combustion, causing them to burn more easily, quickly, and intensely.

Finally, the density of a fuel influences its flammability; when fuels are close together but not too dense, they will ignite each other, causing the fuel to spread readily. However, if fuels are so close that air cannot circulate easily, the fuel will not burn freely.

The Marin County OA has extensive topographic diversity that supports a variety of vegetation types. Marin County's OA has significant changes in topography with steep vegetated slopes which can also add to the ability of the fuel to further expand a wildfire.

Environmental factors, such as temperature, precipitation, soil type, aspect, slope, and land use history, all help determine the existing vegetation at any given location. In the central and eastern parts of the county, north facing slopes are usually densely wooded from lower elevations to ridge peaks with a mixture of mostly hardwood tree species such as coast live oak, California bay, Pacific madrone, and other oak species. Marshlands are also present throughout the county; once ignited marsh fires can be difficult to contain and extinguish.

Grasslands with a mixture of native and nonnative annual and perennial plant species occur most often in the northern and western parts of the county due to a combination of soil type, lower rainfall, and a long history of ranching. The southern and western facing slopes tend to have a higher percentage of grasslands, which in turn have the potential to experience higher rates of fire spread. Grassland fires are dangerous even without extreme fire weather scenarios

due to the rapid rate of fire spread; in some cases, fires spread so quickly that large areas can burn before response resources are able to arrive.

In the west portion of the county closer to the coast, where precipitation is higher and marine influence is greater, most areas are densely forested with conifer species (i.e., Bishop pine, Douglas-fir, and coast redwood) and associated hardwood species. Chaparral vegetation also occurs in parts of the county, especially on steeper south and west facing slopes. This mix of densely forested areas mixed with chaparral results in higher fuel loads and potentially higher fire intensity. Expansion of the residential community into areas of heavier vegetation has resulted in homes existing in close proximity to dense natural foliage; these homes are often completely surrounded by highly combustible or tall vegetation, increasing the potential that wildland fires could impact them.

As part of the development of the Marin Community Wildfire Protection Plan (CWPP), an updated vegetation map layer was created using the most recent vegetation information available from a variety of state and local data sources.

Vegetation distribution in the Marin County OA is characterized by approximately 20 different types of vegetation which have been classified into 15 fire behavior fuel models.

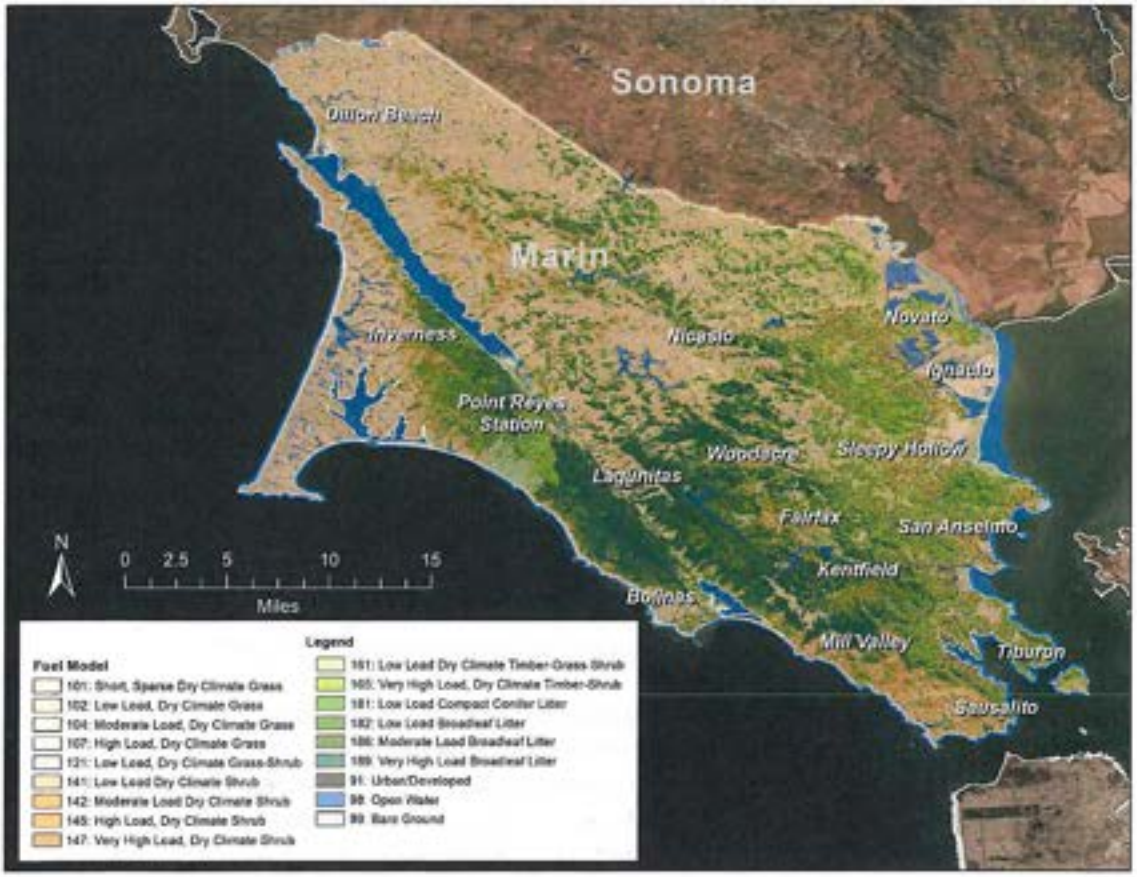

Figure 43: Fuel Model Map for the Marin County OA
Source: Marin CWPP, 11/27/23

Insect infestations and plant diseases, such as California oak mortality syndrome (sudden oak death), are increasing and threaten to change the structure and overall health of native plant communities in Marin County. Sudden oak death has no known cure and is the biggest concern; this syndrome is caused by the fungus-like Phytophthora ramorum, which has led to widespread mortality of several tree species in California since the mid-1990s; the tanoak (Lithocarpus densiflorus) in particular appears to have little or no resistance to the disease. Sudden oak death has resulted in stands of essentially dead trees with very low fuel moistures.

Studies examining the impacts of sudden oak death on fire behavior indicate that while predicted surface fire behavior in sudden oak death stands seems to conform to a common fuel model already in use for hardwood stands, the very low moisture content of dead tanoak leaves may lead to crown ignitions more often during fires of "normal" intensity.

Two other plant diseases prevalent in the Marin County OA are pitch canker (which affects conifers such as Bishop pine and other pine species) and madrone twig dieback (which affects Pacific madrones). Pitch canker is caused by the fungus Fusarium circinatum (F. subglutinans, F. sp. pini), which enters the tree through wounds caused by insects. While some trees do recover, most infected trees are eventually killed by the fungus. Management of this disease largely focuses on containment to reduce the fungus spreading to other trees. Pitch canker is a particular issue in the NPS lands of Pt. Reyes National Seashore, where many acres of young Bishop Pines that were seeded on the Inverness Ridge by the Mount Vision Fire of 1995 have been infected.

These dead and dying trees have created large swaths of land with dense and dry fuel loads. Madrone twig dieback is caused by the native fungus Botryosphaeria dothidea and appears to be getting worse throughout the county due to drought effects on Pacific madrones. Three additional threats to trees common to the Marin County OA include:

- Bark and ambrosia beetles (Monarthrum dentiger and monarthrum scutellare), which target oak and tanoak trees. Sudden oak death may be exacerbating the effects of beetle infestations which prey on trees already weakened by this disease.
- Root rot, caused by oak root fungus (Armillaria mellea), is primarily associated with oaks and other hardwoods but also attacks conifers. These fungal infestations cause canopy thinning and branch dieback and can kill mature trees. As with the beetle infestations, sudden oak death may be exacerbating the effects of root rot fungus in the county forests.
- Velvet-top fungus (Phaeolus schweinitzii) is a root rot fungus affecting Douglas-fir and other conifers, with the infection typically occurring through a wound.

Topography characterizes the land surface features of an area in terms of elevation, aspect, and slope. Aspect is the compass direction that a slope faces, which can have a strong influence on surface temperature, and more importantly on fuel moistures. Both elevation and aspect play an important role in the type of vegetation present, the length of the growing season, and the amount of sunlight absorbed by vegetation. Generally, southern aspects receive more solar radiation than northern aspects; the result is that soil and vegetation on southern aspects is warmer and dryer than soil and vegetation on northern aspects. Slope is a measure of land steepness and can significantly influence fire behavior as fire tends to spread

more rapidly on steeper slopes. For example, as slope increases from 20 – 40%, flame heights can double and rates of fire spread can increase fourfold; from 40 – 60%, flame heights can become three times higher and rates of spread can increase eightfold.

The Marin County OA is topographically diverse, with rolling hills, valleys and ridges that trend from northwest to southeast. Elevation throughout the county varies considerably, with Mt. Tamalpais' peak resting at 2,574 feet above sea level and many communities at or near sea level. Correspondingly, there is considerable diversity in slope percentages. The San Geronimo Valley slopes run from level (in the valley itself) to near 70%. Mt. Barnabe has slopes that run from 20 to 70%, and Throckmorton ridge has slopes that range in steepness from 40 – 100%. These slope changes can make fighting fires extremely difficult.

In the WUI where natural fuels and structure fuels are intermixed, fire behavior is complex and difficult to predict. Research based on modeling, observations, and case studies in the WUI indicates that structure ignitability during wildland fires depends largely on the characteristics and building materials of the home and its immediate surroundings.

The dispersion of burning embers from wildfires is the most likely cause of home ignitions. When embers land near or on a structure, they can ignite near-by vegetation or accumulated debris on the roof or in the gutter. Embers can also enter the structure through openings such as an open window or vent and could ignite the interior of the structure or debris in the attic.

Wildfire can further ignite structures through direct flame contact and/or radiant heat. For this reason, it is important that structures and property in the WUI are less prone to ignition by ember dispersion, direct flame contact, and radiant heat.

Public Safety Power Shutoff (PSPS) Events

As a result of the 2017 Northern California Wildfires, the 2018 Camp Fire in Butte County and other wildfires caused by power line infrastructure, Pacific Gas & Electric (PG&E) began initiating Public Safety Power Shutoff (PSPS) events in their service areas (including Marin County) to help prevent the start of future wildfires. PG&E will initiate a PSPS if conditions indicate potentially dangerous weather conditions in fire-prone areas due to strong winds, low humidity, and dry vegetation. During these events, PG&E will proactively turn off power in high fire risk areas to reduce the threat of wildfires. The most likely electric lines to be considered for a public safety power outage will be those that pass through areas that have been designated by the California Public Utilities Commission (CPUC) High Fire-Threat District at elevated (Tier 2) or extreme risk (Tier 3) for wildfire. Customers outside of these areas could have their power shut off, though, if their community relies upon a line that passes through a high fire-threat area or an area experiencing severe weather. PG&E will consider numerous factors and analyze historical data to help predict the likelihood of a wildfire occurring, and closely monitoring weather watch alerts from the National Weather Service (NWS). These factors generally include, but are not limited to:

- A Red Flag Warning declared by the National Weather Service
- Low humidity levels, generally 20 percent and below
- Forecasted sustained winds generally above 25 mph and wind gusts in excess of approximately 45 mph, depending on location and site-specific conditions such as temperature, terrain and local climate
- Condition of dry material on the ground and live vegetation (moisture content)

- On-the-ground, real-time observations from PG&E's Wildfire Safety Operations Center and field crews

Pacific Gas & Electric Company (PG&E) operates a total of 1,179 miles of overhead electricity transmission and distribution lines in the Marin County OA. Overhead electricity lines and poles can be damaged or downed under severe weather conditions, particularly severe wind conditions, which increases the potential for wildfire ignition. 52 percent of PG&E's overhead distribution lines and 41 percent of its overhead transmission lines are located in CPUC-identified High-Fire Threat Districts subject to elevated or extreme fire risk. PG&E is currently planning and implementing safety measures to prevent wildfires and reduce the impacts of Public Safety Power Shutoff (PSPS) events on communities in the Marin County OA and throughout California.

In October 2019 Marin County and the City of Belvedere experienced two PSPS events.

These measures include installing weather stations; installing high-definition cameras; installing sectionalizing devices on its overhead lines to separate the grid into smaller sections; hardening the system by installing stronger power poles, covering lines, and undergrounding lines in targeted areas; creating temporary microgrids to provide electricity during PSPS events; and enhancing existing vegetation management activities. From 2018 to July 2021, PG&E hardened three miles of overhead lines, installed 68 transmission and distribution sectionalizing devices, completed enhanced vegetation management on approximately 51 of overhead line miles, installed 28 weather stations, and installed 12 high-definition cameras in the Marin County OA. PG&E has also begun undergrounding several overhead transmission lines throughout California.

A wildfire in Belvedere would most likely occur in any of the open spaces throughout Belvedere. While there are not many open spaces in Belvedere, there are open patches of land in Belvedere's hillside areas and along the Tiburon Boulevard bike path where a brush fire could occur. These areas of Belvedere are primarily residential and consist of numerous winding streets and hillside homes that could be damaged or destroyed by wildfire. Only a very small fraction of Belvedere lies in an a high FHSZ. This area lies in the northwest corner of Belvedere along the Tiburon Boulevard bike path and consists of five residences that could be susceptible to a brush fire. A small area adjacent to this area along Lagoon Road and San Rafael Avenue lies in a moderate FHSZ with ten residences that could be susceptible to a brush fire. No other area of the Belvedere Lagoon, including the Belvedere Police Department, City Hall and Community Center building, lie in a FHSZ. Another moderate FHSZ lies in the southern area of Belvedere, and there are several dozen residences in this area that could be susceptible to a brush fire.

All of Belvedere could be impacted by a Public Safety Power Shutoff (PSPS) event and/or suffer poor air quality from smoke as a result of a wildfire in Marin County or the surrounding region. As open areas around Belvedere become drier due to climate change, the risk of a wildfire occurring and impacting the city will continue to increase. Brush fires in the city may increase over time as parks and other open spaces experience drier conditions.

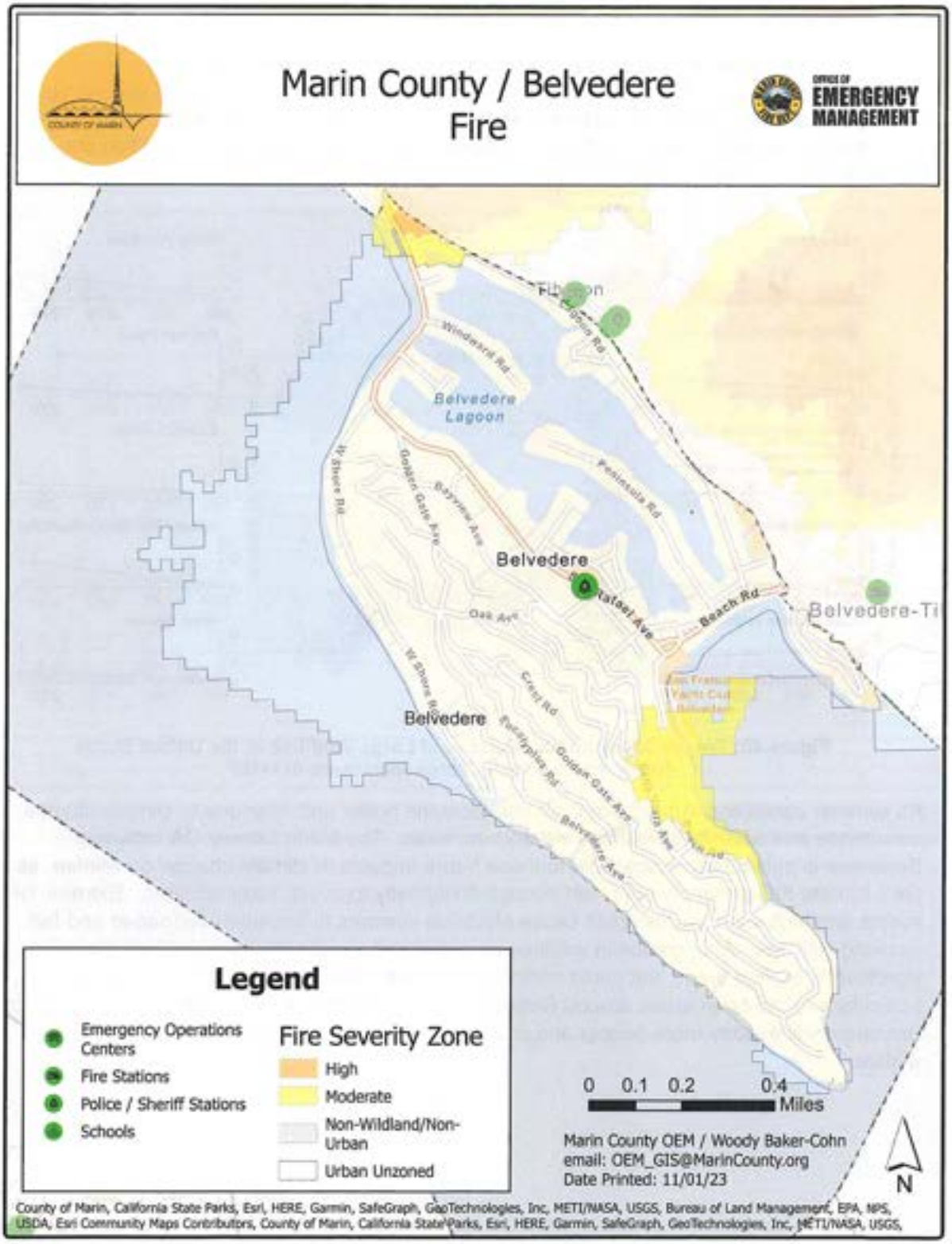

Figure 44: City of Belvedere Wildfire Critical Facilities and Infrastructure
Source: Marin County OEM

Belvedere has never experienced a significant wildfire of note.

Climate Change and Future Development Considerations

Climate change can lead to an increase in wildfire events. Climate change has been a key factor in increasing the risk and extent of wildfires in the western United States. Changes in climate create warmer, drier conditions. Increased drought, and a longer fire season are boosting these increases in wildfire risk.

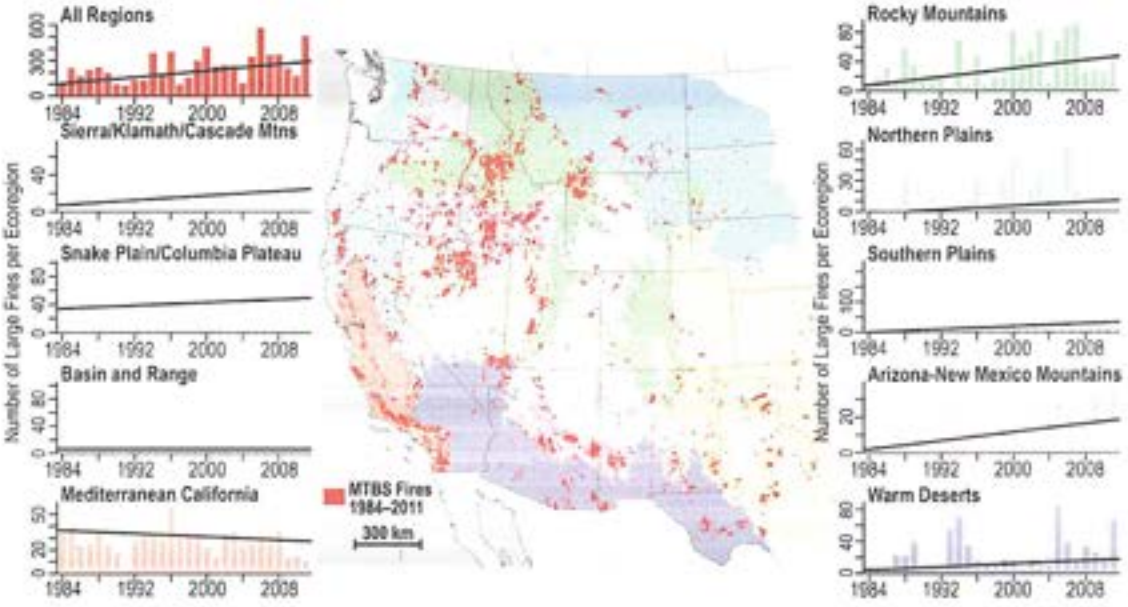

Figure 45: Trends in the Annual Number of Large Wildfires in the United States
Source: Fourth Climate Change Assessment, 01/04/23

As summer conditions in Northern California become hotter and drier due to climate change, the occurrence and severity of wildfires will only increase. The Marin County OA including Belvedere is particularly susceptible to these future impacts of climate change on wildfire, as the OA's climate has generally been wet enough historically to avoid major wildfires. Extreme heat events and high wind events could cause electrical systems to become overloaded and fail, sparking wildfires. An increase in wildfires as a result of climate change could lead to more significantly burned areas that could contribute to debris flows after a significant storm event, particularly in the open areas around Belvedere. Future development in the open areas around Belvedere will expose more people and property to the impacts of a potentially significant wildfire.

SECTION 3.0: MITIGATION STRATEGY

3.1 CHANGES IN DEVELOPMENT

The various Marin County Jurisdiction's General Plans guide growth and development across the County based on maintaining the County's small communities with their own unique character.

The City of Belvedere's lack of housing production overall has resulted in limited affordable housing opportunities at all income levels, and a lack of housing type choices has prevented low- and moderate-income households in the county and broader region from residing in the City. Belvedere is com-mitted to playing its part in meeting this growing demand for housing, and the Housing Element includes strategies to expand the development of housing as well as the availability of housing types at a more diverse range of price points and promote more equitable housing opportunities.

The Plan Bay Area 2050 Final Blueprint forecasts that the nine-county Bay Area will add 1.4 million new households between 2015 and 2050. For the eight-year time frame covered by the City of Belvedere Housing Element Update, the Department of Housing and Community Development has identified the region's housing need as 441,176 units. The total number of housing units assigned by HCD is separated into four income categories that cover housing types for all income levels. For the 2023-2031 period, Belvedere must identify sites sufficient to accommodate 160 new housing units with the following number of units designated as affordable to each income category: Extremely Low-Income (24), Very Low- income (25), Low-Income (28), Moderate-Income (23), and Above Moderate-Income (60).

Table 19: City of Belvedere Future Growth Areas

Development	# of Units	# of Parcels	Project Date	Acres	Fire Severity Zone	Flood Zone
Mallard Pointe	40	3	Submitted 6/18/2021 Under Planning Review	2.8	No	AE
Total	**40**	**3**		**2.8**		

Table 19: City of Belvedere Future Growth Areas
Source: City of Belvedere

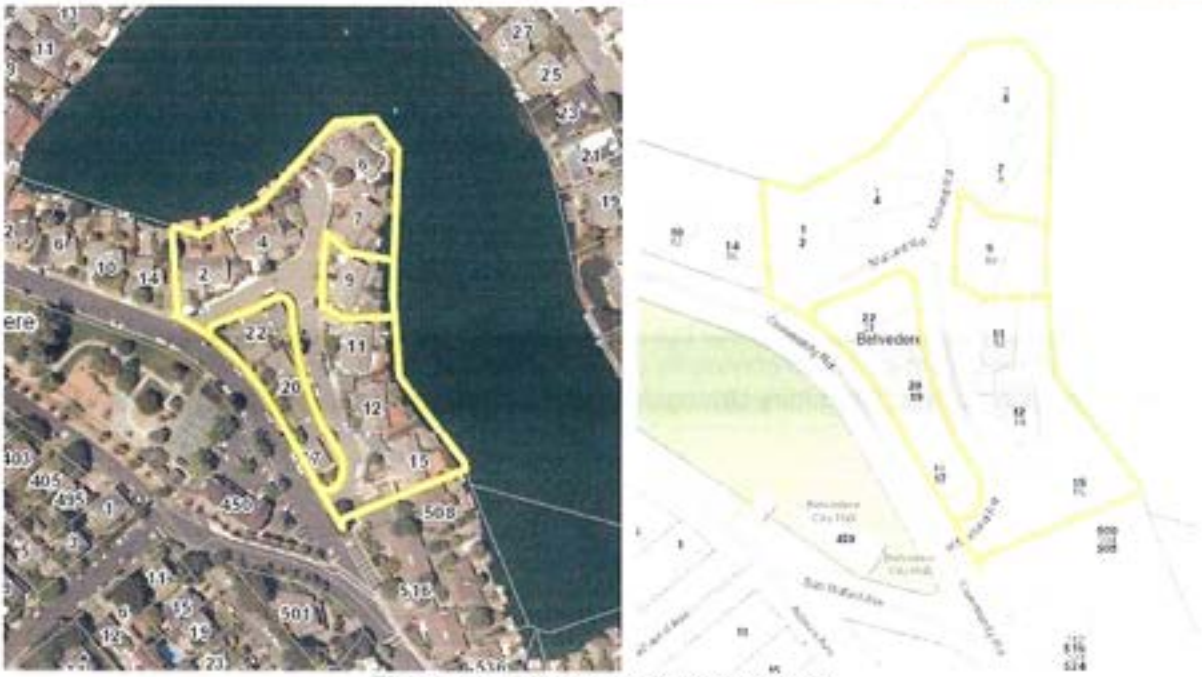

Figure 46: Mallard Pointe Project Map
Source: City of Belvedere General Plan, 6th Cycle Housing Element Update, 2023

On June 18, 2021, a preliminary application was received for a proposed residential redevelopment submitted is a "SB 330 preliminary housing application" for a housing development on three parcels, currently developed with 22 residential units (duplexes).

The project proposal includes demolition of the existing residential units and construction of forty (40) new residential units, which include single-family dwellings, accessory dwelling units, duplexes and apartments. As submitted, the project would contain sixteen (16) single-family and duplex units, one (1) ADU, and twenty-three (23) apartments. Based on its SB 330 application, the project will include 36 market rate and 2 very low- and 2 moderate-income (deed-restricted) units. Five units will be one-bedroom apartments presumed to be affordable to moderate incomes. In accounting for existing units, the project represents a total net gain of eighteen (18) units.

The project submitted its application prior to the City's adoption of objective design and development standards (ODDS), so requirements of the R-2 zone apply. The project has requested a density bonus for waivers of development standards and a cost concession related to the allowable housing choices in the R-2 zone.

3.2 Capability Assessment

The overall priorities in the City of Belvedere have not changed since the 2018 MJHMP update. However, the strategies in which to support the overall City priorities have changed and are reflected in the sections below. There were many projects that were either ongoing day-to-day business activities or were response related that were completed or deleted from the 2018 MJHMP project list and not carried over to this plan update. Several actions were completed and new projects were added to coincide with the changes in priorities, progress in local mitigation efforts and changes in development.

Capabilities are the programs and polices currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capability assessment identifies the local planning mechanisms where information from the 2018 MJHMP is incorporated and where updated hazard mitigation information from this 2023 MJHMP will be incorporated once approved. The 2018 capability assessments have been successfully incorporated into the City of Belvedere General Plan to include the Public Safety Element, Land Use Element, and Housing Element and the 2023 capability assessments will also be incorporated into the General Plan and these Elements. The capability assessment is divided into four sections: regulatory, administrative and technical, fiscal, and outreach and partnerships.

3.2.1 Regulatory Capabilities

The legal and regulatory capabilities include existing ordinances and codes that affect the City's physical or built environment. Examples of legal and/or regulatory capabilities can include: a jurisdiction's building codes, zoning ordinances, subdivision ordnances, special purpose ordinances, growth management ordinances, site plan review, general plans, capital improvement plans, economic development plans, emergency response plans, and real estate disclosure plans. The table below lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place.

Table 20: Legal and Regulatory Capabilities

Plans	Yes/No Latest Update	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
General Plan/Master Plan	Y 2023	The City is completing the 6th cycle housing element update which is a component of the General Plan. Additionally we will start the process of updating our Safety Element.
Strategic Plan	N	
Capital Improvements Plan	Y 2022	The Capital Improvement Plan provides an annual 5-year forecast of capital infrastructure. It includes funding for a variety of hazard mitigation projects, including flood protection, fire-fuel reduction, hillside stability, and drainage.
Economic Development Plan	N	
Local Emergency Operations Plan	Y 2022	The plan addresses hazards and resources that can be used to mitigate disasters and emergencies. The plan can be used to implement mitigation actions.
Continuity of Operations Plan	N	
Flood Mitigation Plan (FMP)	N	
Engineering Studies for Streams	N	
Open Space Management Plan	N	
Regional Transportation Plan (RTP)	Y	The City participated in the Marin County Travel Safety

	2018	Plan – Systematic Safety Analysis.
Stormwater Management Plan/Program	Y 2022	The City partners with the Marin County Stormwater Pollution Prevention Program (MCSTOPPP) to manage the City's stormwater discharge permit.
Community Wildfire Protection Plan	Y 2020	The City, through TFPD, is a member of the Marin Community Wildfire Protection Plan
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	N	
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	Y	Yes. Projects are reviewed for compliance with building code standards. Building permit applications are routed to various departments for review (Building, Planning, Fire, and Public Works) as necessary to ensure compliance with applicable codes and standards.
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	
Fire department ISO rating:	Y	The Central Marin Fire Department has an ISO rating of 2.
Site plan review requirements	Y	Yes. Projects are reviewed for compliance with development standards, including required setbacks. The majority of building permit applications submitted to the City are required to provide a site plan.
Land Use Planning and Ordinances	**Y/N**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Municipal Code	Y	Yes
Zoning ordinance	Y	Yes
Subdivision ordinance	Y	Yes
Floodplain ordinance	Y	Yes
Natural hazard specific ordinance (stormwater, steep slope, wildfire)		
Flood insurance rate maps	Y	Yes
Elevation Certificates	Y	Yes
Acquisition of land for open space and public recreation uses	N	
Erosion or sediment control program	Y	Yes

Table 20: City of Belvedere Legal and Regulatory Capabilities
Source: City of Belvedere

City of Belvedere General Plan or Master Plan

California Government Code 65300 requires that every City and County in the state have a General Plan. The City of Belvedere General Plan, adopted in May 22, 2023, was prepared over a one year period that included an extensive public review process. The General Plan is the most important policy and planning document in the City and is used by virtually every department. The General Plan is the City's statement of its vision for the future. The General Plan contains policies covering every aspect of the City: land use (how land can be developed), circulation, noise, air quality, housing, open space and conservation, and health and safety. The Housing, Land Use, and Safety Elements of the General Plan were updated in 2023.

City of Belvedere specific goals and policies related to mitigation of natural hazards are as follows:

Table 21: City of Belvedere General Plan

Goal/Policy/ Program	Explanation
Land Use Element	
Goal LU-2	Maintain the character of Belvedere Island with refinement of development standards.
Policy LU-2.5	Review opportunities to repair or mitigate environmental hazards such as pyrophytic plants and trees, sub-standard retaining walls and foundations, hazardous site access and obstructions, and roadway repair at time of development review.
Program LU-2.5.1	The Planning Commission shall consider amendments to the Zoning Ordinance and Architectural and Environmental Design Review Ordinance to mitigate or remove hazards at the time of development review that are related to fire protection, hillside stability, safe traffic and circulation, site line obstruction, and other issues that have been identified in the Environmental Hazards Element associated with private improvements.
Conservation and Open Space Element	
Goal REC-1	Support ongoing efforts to maintain Belvedere's public parks and open spaces. Belvedere's existing public spaces, including Community Park, Tom Price Park, Centennial Park, Belvedere Cove, Land Company Park, and the community's many lanes and paths, are appreciated and well-utilized by the community.
Policy REC-1.2	Support the ongoing maintenance of Belvedere's historic lanes and steps.
Program REC 1.2.1	Facilitate improvements to lanes that have fallen into disrepair or are no longer open. Consider the installation of low-impact lighting on some lanes to encourage their use and also to provide safer access down Belvedere Island in the event of necessary evacuation.
Public Safety	
Goal HAZ-1	Strive to protect the community from injury and damage resulting from injury and damage resulting from natural catastrophes and other hazard conditions
Policy HAZ1.1	Construction shall be located and designed to avoid or minimize the hazards from earthquake, erosion, landslides, floods, and fire.
Program HAZ-1.1.1	Institutionalize the Environmental Hazards policies through review for possible amendment of the grading, subdivision, zoning, building code, design review, and other sections of the Belvedere Municipal Code. Particular attention should be paid to the adequacy of building setbacks with respect to fire safety concerns.
Program HAZ	All new construction in the City shall ensure that it follows current seismic codes as set

Table 21: City of Belvedere General Plan	
Goal/Policy/ Program	**Explanation**
1.1.2	forth by the California Building Code (CBC).
Program HAZ 1.1.4	New construction must not compromise public infrastructure which is key to emergency access, egress, and flood prevention.
Policy HAZ 1.2	Require thorough field investigation of geologic hazards as a prerequisite to Design Review and construction approval and require site stabilization to minimize such risks.
Program HAZ-1.2.3	Investigate potential landslide hazards associated with specific project locations as part of Design Review for project applications.
Policy HAZ-1.3	Maintain adequate roadway clearances for emergency vehicles and evacuation and plan for safe pedestrian evacuation.
Policy HAZ 1.4	Ensure that the City is equipped for disaster, evacuation, and survival thereafter.
Policy HAZ-1.4.2	Ensure that risk to public lifeline utilities, such as those along Beach Road and San Rafael Avenue, be reduced by installing excess flow valves, bracing, flexible materials, flexible joints and connections, joint restraint, strengthening of support structures, or other means.

Table 21: City of Belvedere General Plan
Source: **City of Belvedere** General Plan

3.2.2 Administrative and Technical Capabilities

The administrative and technical capability identifies the City personnel responsible for activities related to mitigation and loss prevention. Many positions are full time and/or filled by the same person.

Table 22: Administrative and Technical Capabilities		
Administrative	Yes/No	Is coordination effective?
Planning Commission	Yes	Yes. The Planning Commission reviews planning applications for conformance with town policies, ordinances, and design standards.
Administrative Services	Yes	Yes. The Admin Services Department oversees finance and purchasing, budgets, risk management and human resources.
Hazard Mitigation Planning Committee	Yes	Yes, the City participates in the county-wide hazard mitigation planning process and team.
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	Vegetation clearing and replanting work coordinated annually with city, fire department, utility agencies and residents.
Mutual aid agreements	No	
Technical	Yes/No	Has capability been used to assess/mitigate risk in the past?
Warning systems/services (Reverse 911, outdoor	Yes	Alert Marin Emergency Notification system sends text, phone and email notifications to residents or community

warning signals)		members that opt in to receive information
Hazard data and information	Yes	Regional and local GIS database of flood hazard
Grant writing	Yes	Department heads conduct grant writing with support of consultants when necessary.
Hazus analysis	No	
Staff/Personnel Resources	Yes/No FT/ PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	Y/FT	Yes
Floodplain Administrator	Y/FT	Yes
Emergency Manager	Y/PT	Yes
Community Planner	Y/FT	Yes
Civil Engineer	Y/FT	Yes
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Y/FT and PT	Yes
GIS Coordinator	No	The City is a JPA member of Main Map for GIS.
Community Development Staff	Y/FT	Yes
Town Planning, Building, and Public Works Staff	Y/FT	Yes
Police Department Staff	Y/FT	Yes
Fire Protection District Staff	Y/FT	Yes
Community Development Staff	Y/FT	Yes

Table 22: City of Belvedere Administrative and Technical Capabilities
Source: **City of Belvedere**

3.2.3 Fiscal Capabilities

The fiscal capability assessment shows specific financial and budgetary tools available to the jurisdictions such as community development block grants; capital improvements project funding; authority to levy taxes for specific purposes; fees for water, sewer, gas, or electric services; impact fees for homebuyers or developers for new development; ability to incur debt through general obligations bonds; and withholding spending in hazard-prone areas.

Table 23: Fiscal Capabilities

Financial	Yes/No	Has the funding resource been used in the past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Y	Funding has not been used in the past for mitigation but could possibly fund future mitigation activities.
Authority to levy taxes for specific purposes	Y	Yes, through voter-approved tax measures.
Fees for water, sewer, gas, or electric services	N	
Impact fees for new development	Y	Funding has not been used in the past for mitigation but could possibly fund future mitigation activities.
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	Funding has not been used in the past for mitigation but could possibly fund future mitigation activities.
Incur debt through private activities	N	
Community Development Block Grant	Y	Funding has not been used in the past for mitigation but could possibly fund future mitigation activities.
Other federal funding programs	Y	Funding has not been used in the past for mitigation but could possibly fund future mitigation activities.
State funding programs	Y	Funding has not been used in the past for mitigation but could possibly fund future mitigation activities.

Table 23: City of Belvedere Fiscal Capabilities
Source: **City of Belvedere**

3.2.4 Community Outreach

The outreach and partnerships capability assessment shows outreach and public education programs available to the City of Belvedere and the City of Belvedere partnerships utilized to promote those programs.

Table 24: City of Belvedere Community Outreach

Outreach and Partnerships	Yes/No	Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	The Belvedere Block Captains are trained to assist neighbors with preparedness and emergency response.
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	The Get Ready disaster preparedness program teaches how to prepare for, respond to and recover from all kinds of disasters.
Natural disaster or safety related school programs	Yes	The Get Ready program was modified for 5th grade students and is called GR5. The 5th graders are taught about natural disasters as part of their curriculum and then the GR5 program teaches them how to prepare their family and home for any disaster. Homework given to the students takes the information into their home.
StormReady certification	Yes	
Firewise Communities certification	No	
Community Rating System	No	
Public-private partnership initiatives addressing disaster-related issues	Yes	The City of Belvedere works closely with the Belvedere Block Captains and residents, assisting with training and information.

Table 24: City of Belvedere Community Outreach
Source: **City of Belvedere**

3.2.5 Participation in the National Flood Insurance Program

Given the flood hazard in the planning area, an emphasis will be placed on continued compliance with the National Flood Insurance Program (NFIP). Detailed below is a description of City of Belvedere flood management program to ensure continued compliance with the NFIP.

City of Belvedere has participated in the Regular Phase of the NFIP since May 16, 1977. Since then, the City of Belvedere has administered floodplain management regulations that meet or exceed the minimum requirements of the NFIP. Under that arrangement, residents and businesses paid the same flood insurance premium rates as most other communities in the City

of Belvedere. The Community Rating System (CRS) was created in 1990. It is designed to recognize floodplain management activities that are above and beyond the NFIP's minimum requirements. City of Belvedere are not currently CRS participants.

In addition to the capabilities in the municipal code regarding floodplains, the City of Belvedere has additional capabilities. Table 25 shows the City of Belvedere participation in and continued compliance with the NFIP, as well as identify areas for improvement that could be potential mitigation actions.

Table 25: City of Belvedere NFIP Status

NFIP Topic	Comments
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	There are 200 active policies. The total premium is $340,778 and coverage is $75,270,000.
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	There has been a total of 54 claims with $597,578.58 paid on those claims. There are # of substantial damage claims.
How many structures are exposed to flood risk within the community? *"flood risk" is defined as the 1% annual chance flood (100-year flood. Numbers are from overlay of FEMA SFHA and building stock data.	364
Describe any areas of flood risk with limited NFIP policy coverage	None
Staff Resources	
Is the Community Floodplain Administrator or NFIP Coordinator certified?	No
Is floodplain management an auxiliary function?	No, it is a primary function of plan review and inspection
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Plan review, inspections, engineering review, and public outreach and information.
What are the barriers to running an effective NFIP program in the community, if any?	Having the community understand these requirements/statutes are for public safety and wellbeing and buy into the process.
Compliance History	
Is the community in good standing with the NFIP?	Yes
Are there any outstanding compliance issues (i.e., current violations)?	No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	2019
Is a CAV or CAC scheduled or needed?	No

Regulation	
When did the community enter the NFIP?	05/02/1977
Are the FIRMs digital or paper?	Both
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Floodplain regulations meet the standards of State and Federal regulations through the adoption of the California Building Codes and local Municipal Codes complying with these standards
Provide an explanation of the permitting process.	Applicant submits permit application and supplemental construction documents to the Building Dept. Should the proposed project be located within one of the local, designated Floodplains, the plan review is conducted through the Floodplain prism. The proposed project would then be reviewed for local Municipal Floodplain Code compliance, as well as State Building Code and Federal Code compliance. Once the project is deemed compliant with the applicable Codes, permit fees would be paid, and the building permit issued.
Community Rating System (CRS)	
Does the community participate in CRS?	No
What is the community's CRS Class Ranking?	N/A
What categories and activities provide CRS points and how can the class be improved?	N/A
Does the plan include CRS planning requirements	N/A

Table 25: City of Belvedere NFIP Status
Source: FEMA, City of Belvedere

NFIP Insurance Coverage Details

City of Belvedere joined the NFIP on May 2, 1977. The City of Belvedere does not participate in the Community Rating System. NFIP insurance data provided by DWR indicates that as of 2023 there were 200 policies in force in the City of Belvedere with $340,778 in premiums, resulting in $75,270,000 of insurance in force. There have been 54 closed paid losses totaling $597,578.58. None of the claims were considered substantial damage losses. There were no repetitive loss structures in the City. There were no severe repetitive loss properties in the City of Belvedere.

Repetitive Loss Properties

- Repetitive Loss (RL) Residential Structures: 0
- Repetitive Loss (RL) Non-Residential Structures: 0
- Severe Repetitive Loss (SRL) Residential Structures: 0
- Severe Repetitive Loss (SRL) Non-Residential Structures: 0

3.3 Mitigation Goals

44 CFR Requirement § 201.6(c)(3)(i) [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long - term vulnerabilities to the identified hazards.

The information developed from the risk assessment was used as the primary basis for developing mitigation goals and objectives. Mitigation goals are defined as general guidelines explaining what each jurisdiction wants to achieve in terms of hazard and loss prevention.

Hazard Risk Prioritization
↓
Mitigation Goals & Objectives
↓
Mitigation Project Identification
↓
Mitigation Project Implementation

Goal statements are typically long-range, policy-oriented statements representing jurisdiction-wide visions. Objectives are statements that detail how each jurisdiction's goals will be achieved, and typically define strategies or implementation steps to attain identified goals. Other important inputs to the development of jurisdiction-level goals and objectives include performing reviews of existing local plans, policy documents, and regulations for consistency and complementary goals, as well as soliciting input from the public.

The following represents overarching strategic goals associated with the identification and eventual implementation of appropriate and meaningful hazard mitigation efforts in relation to prioritized hazards and threats confronting Marin County. These goals form the basis for specific supporting process objectives and are shown from the highest priority, at the top of the list, to those of lesser importance.

The establishment of hazard mitigation goals represents both individual and collective strategies that have been mutually agreed upon by the Steering Committee and have changed with the 2023 MJHMP update. Objectives were added to Goals 2 and 5. Eventually, these goals have been adopted by Marin County and its participating jurisdictions as the guiding policy behind local hazard mitigation efforts, in conjunction with other associated principles.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of community, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

Goals are stated without regard to implementation. Implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. Goal statements form the basis for objectives

and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable.

Goal 1: Minimize risk and vulnerability of the community to the impacts of natural hazards and protect lives and reduce damages and losses to property, economy, and environment in Marin County.

- Minimize economic and resource impacts and promote long-term viability and sustainability of resources throughout Marin County.
- Minimize impact to both existing and future development.
- Provide protection for public health.
- Prevent and reduce wildfire risk and related losses.

Goal 2: Provide protection for critical facilities, infrastructure, utilities, and services from hazard impacts.

- Incorporate defensible space and reduce hazard vulnerability.
- Develop redundancies in utilities and services.
- Enhance resilience through enhanced construction.

Goal 3: Improve public awareness, education, and preparedness for hazards that threaten our communities.

- Enhance public outreach and participation in the Alert Marin Emergency Notification System.
- Enhance public outreach, education, and preparedness program to include all hazards of concern.
- Increase public knowledge about the risk and vulnerability to identified hazards and their recommended responses to disaster events, including evacuation and sheltering options.
- Provide planning and coordination for "At-Risk" populations.
- Provide planning and coordination for companion animals, livestock, and other animal populations.
- Increase community awareness and participation in hazard mitigation projects and activities.

Goal 4: Increase communities' capabilities to be prepared for, respond to, and recover from a disaster event.

- Improve interagency (local, state, federal) emergency coordination, planning, training, and communication to ensure effective community preparedness, response and recovery.
- Enhance collaboration and coordination of disaster-related plans, exercises, and training with local, state, and federal agencies, neighboring communities, private partners, and volunteers.
- Enhance the use of shared resources/Develop a strong mutual aid support system.
- Create and maintain a fully functional, interoperable radio and communication system with all regional public safety partners.

Goal 5: Maintain FEMA Eligibility/Position the communities for grant funding.

- Review hazard events and ongoing hazard mitigation projects annually.
- Assess the need to pursue or adjust hazard mitigation projects after significant hazard events.

Goal 6: Reduce exposure to High Hazard Dams that pose an unacceptable risk to the public.

- Improve alert and warning systems to provide residents downstream of a High Hazard Dam to receive timely warning to evacuation when threatened by potential or imminent dam failure.
- Enhance overall community preparedness to respond and evacuate a potential or imminent dam failure.
- Increase public awareness of the risk posed by High Hazard Dams and the potential for relocation of housing outside a possible inundation zone.
- Prioritize High Hazard Dam Mitigation projects and programs.

3.4 Status of Previous Mitigation Actions

Table 26 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 26: Status of Previous Hazard Mitigation Actions

Action Number / Name	Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan
Lane Design & Engineering: Lanes are critical egress and evacuation routes for all types of hazard, disaster.		X			X
Lane Maintenance, Minor Repairs: Lanes are critical egress and evacuation routes for all types of hazard, disaster.		X			X
Park Lane Stairs: Upgrade of section of stairs on this lane, including new landing/seating area.		X			X
Hawthorne Lane Stairs: Upgrades to stairs and seating area in Centennial Park section of Hawthorne Lane.		X			X
Retaining Walls Evaluation: Failure of retaining walls along roads would result in blocked access in an emergency. Evaluation project is to identify any vulnerable walls .		X			X
Wooden Retaining Walls Repairs: Identify needed repairs on wooden retaining walls and make repairs.		X			X
Corrugated Metal Pipe Replacement: CMP pipes are critical drainage infrastructure, some of these are in poor condition and need repair/replacement.		X			X
Emergency Drainage Repairs: Fund to be used in case of emergency.		X			X
Levee evaluation – EIR completion: Completion of EIR process that was initiated as part of a potential levee/sea wall repair and		X			X

Table 26: Status of Previous Hazard Mitigation Actions					
Action Number / Name	Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan
upgrade project, which is currently on hold as no funding has been identified.					
Community Center Founder's Room Furniture Replacement: CC is a potential cooling center, project is planned to install suitable furniture for this purpose.		X			X
Vegetation/Fire Fuel Reduction: City properties with high amounts of dead, brushy and other fire prone vegetation to have work done to remove this material.		X			X

Table 26: Status of Previous Hazard Mitigation Actions
Source: City of Belvedere

3.5 Hazard Mitigation Actions

The 2023 Marin County MJHMP and City of Belvedere Annex were revised to reflect progress in local mitigation efforts. Mitigation projects were selected for each hazard and for the City of Belvedere based off the hazard risk assessment. The projects are supported by the mitigation goals and objectives, and are ranked using the following criteria; approximate cost, timeframe of completion, whether the project requires City Council regulatory action, and an assumption as to whether or not the project would be subject to CEQA or NEPA requirements. Funding sources are identified for all projects. All projects consider new, future, and existing development. Project worksheets are used by the Planning Team and Marin County and City of Belvedere Steering Committee to describe criteria for each project.

Based on the hazard profiles, threat assessment, capabilities assessment, community survey results, discussions among the Planning Team members, and existing best practices, a set of potential mitigation actions was developed and then evaluated based on the following criteria:

- FEMA requires local governments to evaluate the monetary and non-monetary costs and benefits of potential mitigation actions. Although local governments are not required to assign specific dollar values to each action, they should identify the general size of costs and benefits.
- The Planning Team may elect to include measures with a high cost or low benefits, but such measures should be clearly beneficial to the community and an appropriate use of local resources.

In addition, FEMA directs local governments to consider the following questions as part of the financial analysis:

- What is the frequency and severity of the hazard type to be addressed by the action, and how vulnerable is the community to this hazard?
- What impacts of the hazard will the action reduce or avoid?
- What benefits will the action provide to the community?

The Planning Team also chose to review and revise the potential hazard mitigation actions with consideration for climate impact and social vulnerability. Projects and programs were assessed with consideration of these variables.

Prioritization

As part of the mitigation actions development and review, the Planning Team also prioritized the actions. The prioritization efforts looked at the risks and threats from each hazard; lifesaving, life safety, property protection and lastly environmental protection; financial costs and benefits; technical feasibility; consideration for climate impact, and social vulnerability, and community values. Planning Team members were asked to identify their priority actions using the following criteria.

Implementation priority ratings were assigned as follows:

- **High Priority** - An action that meets multiple objectives, is linked to a high risk hazard, has benefits that exceed costs, and has a potential source of funding. Action can begin within the short term (1 to 5 years).
- **Medium Priority** - An action that meets multiple objectives, is linked to a high or medium risk hazard, has benefits that exceed costs, and is eligible for funding though no funding has yet been secured for it. Action can begin within the short term (1 to 5 years) once funding is secured.
- **Low Priority** - An action that will mitigate the risk of a hazard, has benefits that do not exceed the costs or are difficult to quantify, has no secured source of funding, and is not eligible for any known grant funding. Action can be completed in the long term (1 to 10 years). Low-priority actions may be eligible for grant funding from programs that have not yet been identified.

Table 27 lists the Current Hazard Mitigation Actions for the City of Belvedere.

Table 27: City of Belvedere Current Hazard Mitigation Actions

No.	Mitigation Actions	Hazards Mitigated/ Goals Met	Jurisdiction/ Responsible Agency	New, Existing, Completed, Removed	Estimated Cost and Potential Funding Source	Timeline/ Priority	Comments/ Progress
B-1	Lane Design & Engineering: Lanes are critical egress and evacuation routes for all types of hazards or a disaster.	All Hazards/ 1, 2, 4, 5	Marin County and City of Belvedere	Existing	Cost TBD; State and/or Federal grants, existing budgets	Ongoing/ High	
B-2	Lane Maintenance, Minor Repairs: Lanes are critical egress and evacuation routes for all types of hazard, disaster.	All Hazards/ 1, 2, 4, 5	Marin County and City of Belvedere	Existing	Cost TBD; State and/or Federal grants, existing budgets	Ongoing/ High	
B-3	Park Lane Stairs Alternate Pedestrian Evacuation Route	All Hazards/ 1, 2, 4, 5	City of Belvedere	Existing	Cost TBD; State and/or Federal grants, existing budgets	Ongoing/ High	Upgrade of section of stairs on this lane, including new landing.
B-4	Hawthorne Lane Stairs Alternate Pedestrian Evacuation Route	All Hazards/ 1, 2, 4, 5	City of Belvedere	Existing	Cost TBD; State and/or Federal grants, existing budgets	Ongoing/ High	Upgrades to stairs and seating area in Centennial Park section of Hawthorne Lane.
B-5	Retaining Walls Evaluation Route	All Hazards/ 1, 2, 4, 5	City of Belvedere	Existing	Cost TBD; State and/or Federal grants, existing budgets	Ongoing/ High	Failure of retaining walls along roads would result in blocked access in an emergency. Evaluation project is to identify any vulnerable walls .
B-6	Corrugated Metal Pipe Replacement for flood control	Flooding; Sea Level Rise; Tsunami; Levee Failure/ 1, 2, 4, 5	City of Belvedere	Existing	Cost: General Fund; FEMA BRIC	Ongoing/ High	CMP pipes are critical drainage infrastructure, some of these are in poor condition and need repair/replacement.
B-7	Emergency Drainage Repairs	Flooding; Sea Level Rise; Tsunami;	City of Belvedere	Existing	Cost: General Fund; FEMA BRIC	Ongoing/ High	Fund to be used in case of emergency.

Table 27: City of Belvedere Current Hazard Mitigation Actions

No.	Mitigation Actions	Hazards Mitigated/ Goals Met	Jurisdiction/ Responsible Agency	New, Existing, Completed, Removed	Estimated Cost and Potential Funding Source	Timeline/ Priority	Comments/ Progress
		Levee Failure/ 1, 2, 4, 5					
B-8	Levee evaluation – EIR completion	Flooding; Sea Level Rise; Tsunami; Levee Failure/ 1, 2, 4, 5	City of Belvedere	Existing	Cost: General Fund; FEMA BRIC	Ongoing/ High	Completion of EIR process that was initiated as part of a potential levee/sea wall repair and upgrade project, which is currently on hold as no funding has been identified.
B-9	Enhance Community facilities to support the socially vulnerable population during extreme weather events.	Severe Weather – Heat, All Hazards/ 1, 2, 4, 5	City of Belvedere, Marin County, Fire Districts	New (2023)	Cost TBD: HMGP, BRIC, CDAA, Private Local Grants	1 - 2 years/ High	Community Center Founder's Room
B-10	Vegetation Management around at risk PG&E power lines and electrical line undergrounding projects by PG&E.	Wildfire, Drought, Severe Weather – Heat & Wind 1, 2, 4, 5,	City of Belvedere, Marin County, Fire Districts	New (2023)	Cost TBD: HMGP, BRIC, Fire Safe Marin, Private Local Grants	1 - 2 years/ High	City properties with high amounts of dead, brushy and other fire prone vegetation to have work done to remove this material.
B-11	Shoreline adaptation project to protect against flooding, sea level rise and earthquake; strengthen existing levees and raise vulnerable above-ground critical infrastructure out of the flood zone.	Flooding; Sea Level Rise; Tsunami, Debris Flow/ 1, 2, 4, 5	City of Belvedere	Existing	Cost: General Fund; FEMA BRIC	Ongoing/ High	Seismic Upgrade Component EIR Completed and Certified
B-12	Earthquake natural gas valves are required in new construction or during substantial remodel work.	Earthquake/ 1, 2, 4, 5	City of Belvedere	New (2023)	Cost: TBD HMGP, BRIC, CDAA	2 -5 Years/ High	

Table 27: City of Belvedere Current Hazard Mitigation Actions

No.	Mitigation Actions	Hazards Mitigated/ Goals Met	Jurisdiction/ Responsible Agency	New, Existing, Completed, Removed	Estimated Cost and Potential Funding Source	Timeline/ Priority	Comments/ Progress
B-13	Increase height and retrofit existing levees in town	Levee Failure/ 1, 2, 4, 5	City of Belvedere	New (2023)	Cost: TBD HMGP, FMA, BRIC, CDAA Grants	5-20 Years/ High	
B-14	Enhance and promote community and individual emergency preparedness.	All Hazards/ 1, 2, 3, 4, 5	City of Belvedere; Tiburon Fire Protection District	Existing	Cost: General Fund	1 - 2 years/ High	Focus on signing residents up for Alert Marin and establish a personal evacuation kit and plan.
B-15	Update Safety Element of the General Plan.	All Hazards/ 1, 2, 4, 5	City of Belvedere	Existing	Cost: General Fund	Ongoing/ 1-2 years High	City Adopted. Awaiting certification from State of California
B-16	Review and adopt current California Building codes for seismic, flood, fire and other disaster. Adopt and Enforce Building Codes	All Hazards/ 1, 2, 4, 5	City of Belvedere	Existing	Cost: General Fund	3 - 5 years/ Medium	The City continues to review and adopt current California Building codes.
B-17	Vegetation Management Plan to include the removal of exotic, invasive, and hazardous species.	Wildfire, Severe Weather-Wind, Drought, Debris Flow/ 1, 2, 4, 5	City of Belvedere; Tiburon Fire Protection District	Existing	Cost: TBD	1 - 5 years/ High	Reduces the chance of a wildland fire igniting the structure(s) and reciprocally, wildland ignition from a structure fire. Supports environmental restoration.
B-18	Updating or enhancing flood control pump stations, storm force mains, and gravity storm lines around city. This will also include maintaining and dredging existing flood control open channels, canals, and lagoons.	Flooding, Sea Level Rise, Levee, Tsunami/ 1, 2, 4, 5	City of Belvedere; Belvedere Lagoon Property Owners Association	Existing	Cost: TBD	1 -5 Years; High	Stormwater Pumping Stations in the Lagoon Upgraded for Capacity, Reliability and Redundancy

Table 27: City of Belvedere Current Hazard Mitigation Actions							
No.	Mitigation Actions	Hazards Mitigated/ Goals Met	Jurisdiction/ Responsible Agency	New, Existing, Completed, Removed	Estimated Cost and Potential Funding Source	Timeline/ Priority	Comments/ Progress
B-19	Marin Emergency Radio Authority (MERA) Upgrades.	All Hazards/ 1, 2, 4, 5	Marin County and City of Belvedere	Existing	Cost TBD; State and/or Federal grants, existing budgets	Ongoing/ High	City as Participant

Table 27: City of Belvedere Current Hazard Mitigation Actions

3.6 Progress in Local Mitigation Efforts

This plan has been created as a "living" document with input from the population and professionals within the City of Belvedere. Based on the planning meetings and the progress monitored by the steering committee members several mitigation actions were accomplished since the last planning cycle. Table 26 provides a brief description of the progress made in the local mitigation efforts and the plan for those mitigation actions that were not completed or are ongoing.

The planning team for the City of Belvedere identified and prioritized the mitigation actions as detailed in Table 27, based on the risk assessment and in accordance with the process outline in Section 3, Mitigation Strategy, of the base plan. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included. General processes and information on plan implementation and maintenance of this LHMP by all participating jurisdictions is included in Section 4.0: Plan Review, Evaluation, and Implementation.

3.7 Plan Integration

For hazard mitigation planning, "integration" means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning, capital facilities planning, emergency management, hazard specific planning, and that relevant information from those sources is also used in hazard mitigation. This section identifies where such integration is already in place from the 2018 MJHMP, and where the 2023 MJHMP will be used for further integration.

The planning team for the City of Belvedere will maintain this plan and will serve as a lead staff for grant project applications on City projects selected for application under the Hazard Mitigation Assistance grant programs.

An important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into City plans and mechanisms. Where possible the City of Belvedere will use existing plans and/or programs to implement hazard mitigation actions. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. As described in this plan's capability assessment, the City of Belvedere already implements policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. These existing mechanisms include Integration opportunities for the 2023 Marin County MJHMP:

City General Plan - Integrates hazard mitigation through the consideration of hazards most likely to impact the City. These hazards are considered in the Safety Element, Housing Element and Open Space Element.

City Emergency Operations Plans – Integrates hazard mitigation through the consideration of the City's planned response to hazards most likely to impact the City.

County, City and Town Ordinances - Integrates hazard mitigation through the consideration of plans and policies outlined in the capability assessments in the jurisdictional annexes.

Flood/Storm Water Management/Master Plans - Integrates hazard mitigation through the consideration of strategies to reduce flood risk and storm water management for the protection of life and property.

Community Wildfire Protection Plan - Integrates hazard mitigation through the consideration of strategies to reduce fire hazard and the risk of catastrophic wildfires in the WUI, while promoting the protection and enhancement of the county's economic assets and ecological resources.

The successful implementation of this mitigation strategy will require review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community. A few examples of incorporation of the MJHMP into existing planning mechanisms include:

1. As recommended by Assembly Bill 2140, each community should adopt (by reference or incorporation) this MJHMP into the Safety Element of their General Plans. Evidence of adoption (by formal, certified resolution) shall be provided to CalOES and FEMA
2. Integration of flood actions identified in this mitigation strategy with the actions and implementation priorities established in existing Flood Management Programs
3. Using the risk assessment information to update the hazards section in the County, City and City Emergency Operations Plans

Efforts should continuously be made to monitor the progress of mitigation actions implemented through these other planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this hazard mitigation plan.

3.8 Future Development Trends

Belvedere residents are more affluent than the regional population as a whole. In Belvedere, 72.7 percent of households make more than 100 percent of the Area Median Income (AMI), compared to 8.5 percent making less than 30 percent of AMI, which is considered extremely low-income. Many households with multiple wage earners, including food service workers, full-time students, teachers, farmworkers and healthcare professionals, can fall into lower AMI categories due to relatively stagnant wages in many industries.

The number of residents who own their homes compared to those who rent can help identify the level of housing insecurity (i.e., ability for individuals to stay in their homes) in a city and region. Generally, renters may be displaced more quickly if prices increase. In Belvedere, there are a total of 895 households (2019 American Community Survey estimate), and the majority of households own their homes rather than rent: 76.3 percent versus 23.7 percent. By comparison, 36.3 percent of households in Marin County are renters, while 44.0 percent of Bay Area households rent their homes.

In recent years, most housing produced in the region and across the state consisted of single-family homes and larger multi-unit buildings. However, some households are increasingly interested in "missing middle housing," including duplexes, triplexes, townhomes, cottage clusters and accessory dwelling units. These housing types may open up more options across incomes and tenure, from young households seeking more affordable homeownership options

to seniors looking to downsize and age-in-place. Zoning districts in Belvedere, including R-2 and R-3, offer some flexibility for new construction. Some in the community have suggested that new single-family uses could be prohibited in these zones.

Availability of a variety of housing types is important in order to meet the needs of a community today and in the future. In 2020 Belvedere's mix of housing types was as follows:

- 84.0 percent of homes were single-family detached;
- 4.8 percent were single-family attached;
- 7.7 percent were small multifamily (2-4 units);
- 3.5 percent were medium or large multifamily (5+ units); and
- There were no mobile homes in Belvedere.

SECTION 4.0: PLAN REVIEW, EVALUATION, AND IMPLEMENTATION

The strategies presented are deemed appropriate and effective by recommendation of the City of Belvedere.

4.1 PLAN ADOPTION

Upon submission to the California Office of Emergency Services (CalOES) for review, and subsequent approval by the Federal Emergency Management Agency (FEMA), the Marin County MJHMP will be presented to local government for formal adoption. As appropriate, the adopted plan and accompanying City of Belvedere Community Profile will then be incorporated into local general plans for integration into organizational policy.

4.2 PLAN MONITORING

The process of hazard mitigation does not end with the completion, approval, and adoption of the Marin County OA MJHMP. During the five-year lifespan the Marin County and City of Belvedere plan, the County, cities, towns and special districts, along with community-based organizations will ensure that the mitigation goals and strategies identified are exercised and monitored under a collaborative and cooperative umbrella, and that the document itself is properly maintained.

The Marin County Office of Emergency Management, as lead coordinating agency for hazard mitigation planning within the Marin County OA, leads the Marin Operational Area Hazard Mitigation Working Group that meets quarterly to review and manage the plan, projects, and programs. The City of Belvedere is a participating member of the Marin Operational Area Hazard Mitigation Working Group. The City of Belvedere Public Works Director will monitor and update the City of Belvedere Annex to the Marin County OA MJHMP.

The review will identify changing community priorities, updated or new planning documents and the progress or status of the mitigation actions as detailed in the mitigation strategy. Additional questions to complete the review will be considered as follows:

- Do the goals address current and expected conditions?
- Are the goals and objectives consistent with changes in the local, state, and federal policy?
- Status updates on all mitigation actions?
- Have the hazards or risks changed?
- Are current resources appropriate for implementing the MJHMP?
- Have the outcomes occurred as expected?
- Is the County and jurisdictions or districts participating in the plan implementation process as expected?

The Working Group is a subgroup of the Marin Disaster and Citizens Corps Council. During the five-year update cycle, the Marin Operational Area Hazard Mitigation Working Group will have quarterly update meetings with the Hazard Mitigation Planning Committee and local stakeholders to discuss revisions to the plan and progress updates for the hazard mitigation actions. Further, Marin OEM will host an annual one-day mitigation summit to increase engagement and enhance collaboration on the plan and projects. The summit will also have the

goal to educate stakeholders on innovative approaches to mitigation, trends, and new plan requirements. Marin OEM, as the host, will seek subject matter experts, state and federal officials, and representatives from within the Marin OA to speak to mitigation and planning. The knowledge gathered and the coordination facilitated during the summit will be used to update the base plan and annexes.

Marin OEM has the capacity to lead the Working Group and Multi-Jurisdictional Planning with one coordinator assigned with direct maintenance of the plan, a department analyst assigned to support the coordinator with project and grant tracking, and a community preparedness coordinator assigned with conducting regular public outreach on the plan and education on mitigation. Community feedback and integration will continue through outreach events and OEM website, where residents and visitors are invited to provide feedback through a survey, available in English or Spanish.

Specific plan maintenance activities by the Marin County Office of Emergency Management and its participating jurisdictions/special districts may include:

- Hold quarterly update meetings with the Hazard Mitigation Planning Committee and local stakeholders to discuss revisions to the plan and progress updates for the hazard mitigation actions.
- Annual Hazard Mitigation Summit
- Holding public meetings after the first quarter and third quarter update meetings.
- Maintaining the Marin County OEM Hazard Mitigation Website, which provides the public with the ability to access identified hazard impact maps, location address search capability, and a listing of hazard mitigation actions.
- Monitoring of the Marin County and all participating jurisdiction mitigation project activities and dissemination of status reports.
- Generation of reports relative to plan status, project management, and revision updates to executive leadership.
  Preparations for the plan's future revision and updating.

4.3 Plan Evaluation

Upon approval and adoption by the City of Belvedere, the prioritized mitigation strategies will be further developed for funding and implementation by the lead agencies. The plan describes the potential sources of hazard mitigation funding, and general procedures to obtain that funding.

The mitigation strategies represented and adopted within this plan are recommendations only and must be approved and funded in order to be implemented as official mitigation solutions. Ultimately, it is the responsibility of jurisdictional and agency officials within the Marin County to undertake project implementation based upon identified mitigation strategies, funding availability, and local need when it arises. The Marin County Office of Emergency Management will meet with the Marin Operational Area Hazard Mitigation Working Group, including the City of Belvedere, to evaluate the plan after each update meeting.

4.4 Plan Update

The City of Belvedere Public Works Director will monitor and update the City of Belvedere Annex to the Marin County OA MJHMP. During the five-year update cycle, the City of Belvedere and the Marin County Office of Emergency Management will hold quarterly update meetings with the Marin Operational Area Hazard Mitigation Working Group and local stakeholders to discuss revisions to the plan and progress updates for the hazard mitigation actions. The Marin

County Office of Emergency Management and all participating jurisdictions and special districts will continue to hold public meetings after the first quarter and third quarter update meetings annually and will continue to invite public participation in the update process via updated public surveys.

FIGURES AND TABLES

Figures

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ACRONYMS/ABBREVIATIONS

Acronym	Definition
ABAG	Association Bay Area of Governments
ADU	Accessory Dwelling Units
AMI	Area Median Income
AQI	Air Quality Index
ARP	Address Resolution Protocol
ASL	American Sign Language
ATSDR	Agency for Toxic Substances and Disease Registry
BAAQMD	Bay Area Air Quality Management District
BCDC	Bay Conservation and Development Commission
BCEGS	Building Code Effectiveness Grading Schedule
BCPUD	Bolinas Community Public Utility District
BFE	Base Flood Elevation
BRIC	Building Resilient Infrastructure and Communities
CA	California
CAC	Community Assistance Contact
CAL FIRE	California Department of Forestry and Fire Protection
Cal OES	California Office of Emergency Services
CAP	Climate Action Plan
CASPER	Community Assessment for Public Health Emergency Response - California Department of Public Health
CAV	Community Assistance Visit
CDAA	California Disaster Assistance Act
CDC	Centers for Disease Control and Prevention
CDI	Certified Deaf Interpreter
CEQA	California Environmental Quality Act
CERT	Community Emergency Response Team
CGS	California Geological Survey
CIP	Capital Improvement Plan
CIR	Conservation Incentive Rate
CITR	Conservation Incentive Tier Rate
CMFD	Central Marin Fire District
CMSA	Central Marin Sanitation Agency

CNRA	California Natural Resource Agency
CO	Carbon Monoxide
COVID-19	Coronavirus Disease 2019
COYL	Coyote Creek Left Bank Levee
CPUC	California Public Utilities Commission
CRF	Community Risk Factor
CRI	Community Resilience Index
CRS	Community Rating System
CRT	Community Response Team
CSA	County Service Area
C-SMART	Sea-level Marin Adaption Response Team
CWPP	Community Wildfire Protection Plan
DDoS	Distributed Denial of Service
DMA	Disaster Mitigation Act
DNS	Domain Name System
DOF	California Department of Finance
DoS	Denial-of-Service
DPW	Department of Public Works
DR	Disaster Relief
DSOD	Division of Safety of Dams - California Department of Water Resources
DWR	California Department of Water Resources
EAL	Expected Annual Loss
EAS	Emergency Alert System
ECC	Emergency Command Center
EOC	Emergency Operation Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
EPC	Emergency Preparedness Commission
ESHA	Environmentally Sensitive Habitat Areas
FD	Fire Department
FEMA	Federal Emergency Management Agency
FHSV	Fire Hazard Severity Zones
FIRM	Flood Insurance Rate Maps
FMA	Flood Mitigation Assistance

FMP	Flood Mitigation Plan
FOG	Fats, Oils, & Grease
FPA	Floodplain Administrator
FRA	Federal Responsibility Areas
FY	Fiscal Year
GGBHTD	Golden Gate Bridge, Highway and Transportation District
GGNRA	Golden Gate National Recreation Area
GGNRA	Golden Gate National Recreation Area
GIS	Geographic Information System
Gov	Government
GPAC	General Plan Advisory Committee
H2S	Hydrogen Sulfide
HFHSZ	High Fire Severity Zone
HIRA	Hazard Identification and Risk Assessment
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HLR	Historic Loss Ratio
HMGP	Hazard Mitigation Grant Program
IoT	Internet of Things
IP	Intellectual Property
IPAWS	Integrated Public Alert and Warning System
IPCC	Intergovernmental Panel on Climate Change
ISEPA	Identified Site Emergency Planning Application
JPA	Joint Powers Agreement
LCP	Local Coastal Program
LGVSD	Las Gallinas Valley Sanitary District
LHMP	Local Hazard Mitigation Plan
LOMA	Letters of Map Amendment
LOMR	Letters of Map Revision
LRA	Local Responsibility Areas
LRAD	Long-Range Acoustic Device
LSAC	Levee Safety Action Classification
Marin IJ	Marin Independent Journal
MCEP	Marin Climate Energy Partnership
MCFD	Marin County Fire Department

MCOSD	Marin County Open Space District
MCPIO	Marin County Public Information Officers
MCSTOPP	Marin County Stormwater Pollution Prevention Program
MERA	Marin Emergency Radio Authority
MERS	Middle Eastern Respiratory Syndrome
MFHSZ	Moderate Fire Severity Zone
MG	Million Gallons
MGD	Million Gallons Per Day
MHOAC	Medical/Health Operational Area Coordinator
MHW	Mean High Water
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
MMI	Modified Mercalli Intensity
MMRC	Marin Medical Reserve Corps
MMWD	Marin Municipal Water District
MRZ	Mineral Resource Zones
MV2040	Mill Valley General Plan 2040
Mw Scale	Moment Magnitude Scale
MWPA	Marin Wildfire Prevention Authority
NASA	National Aeronautics and Space Administration
NCDC	National Climatic Data Center
NEPA	National Environmental Policy Act
NFDRS	National Fire Danger Rating System
NFIP	National Flood Insurance Program
NID	National Inventory of Dams
NIH	National Institute for Health
NMWD	North Marin Water District
NPDES	National Pollutant Discharge Elimination System
NPR	Northwestern Pacific Railroad
NR	National Register of Historic Places
NRI	National Risk Index
NWS	National Weather Service
O3	Ozone
OA	Operational Area
OEM	Office of Emergency Management

OHP	Office of Historic Preservation
OWTA	On-Site Wastewater Treatment Systems
PD	Police Department
PG&E	Pacific Gas & Electric
PM10	Particulate Matter Less Than 10 Microns In Aerodynamic Diameter
PSPS	Public Safety Power shutoffs
PtH	Pass the hash
PUD	Public Utility District
PW	Public Works
RACES	Radio Amateur Civil Emergency Service
RAWS	Remote Automated Weather Stations
RCD	Resource Conservation District
RHNA	Regional Housing Needs Assessment
RTP	Regional Transportation Plan
SASM	Sewerage Agency of Southern Marin
SFBRA	San Francisco Bay Restoration Authority
SFHA	Special Flood Hazard Area
SFHA	Special Flood Hazard Areas - FEMA
SFHA	Special Flood Hazard Area
SHMP	State Hazard Mitigation Plan
SHSGP	State Homeland Security Grant Program
SMART	Sonoma Marin Area Rail Transit
SMCSD	Sausalito Marin City Sanitary District
SMFD	Southern Marin Fire District
SOD	Sudden Oak Death
SOX	Sulfur Oxides
SQL	Structured Query Language
SR	State Route
SRA	State Responsibility Areas
SSMP	Sewer System Management Plan
SVI	Social Vulnerability Index
TAM	Transportation Authority of Marin
TBD	To Be Determined
TENS	Telephone Emergency Notification System

UCERF2	Uniform California Earthquake Rupture Forecast, Version 2
UCERF3	Uniform California Earthquake Rupture Forecast, Version 3
USACE	U.S. Army Corps of Engineers
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
VHFHSV	Very High Fire Severity Zone
VMP	Vegetation Management Plans
WC/ATWC	West Coast/Alaska Tsunami Warning Center
WHO	World Health Organization
WSCP	Water Shortage Contingency Plan
WUI	Wildland Urban Interface
WWTP	Waste Water Treatment Plant
XSS	Cross-Site Scripting