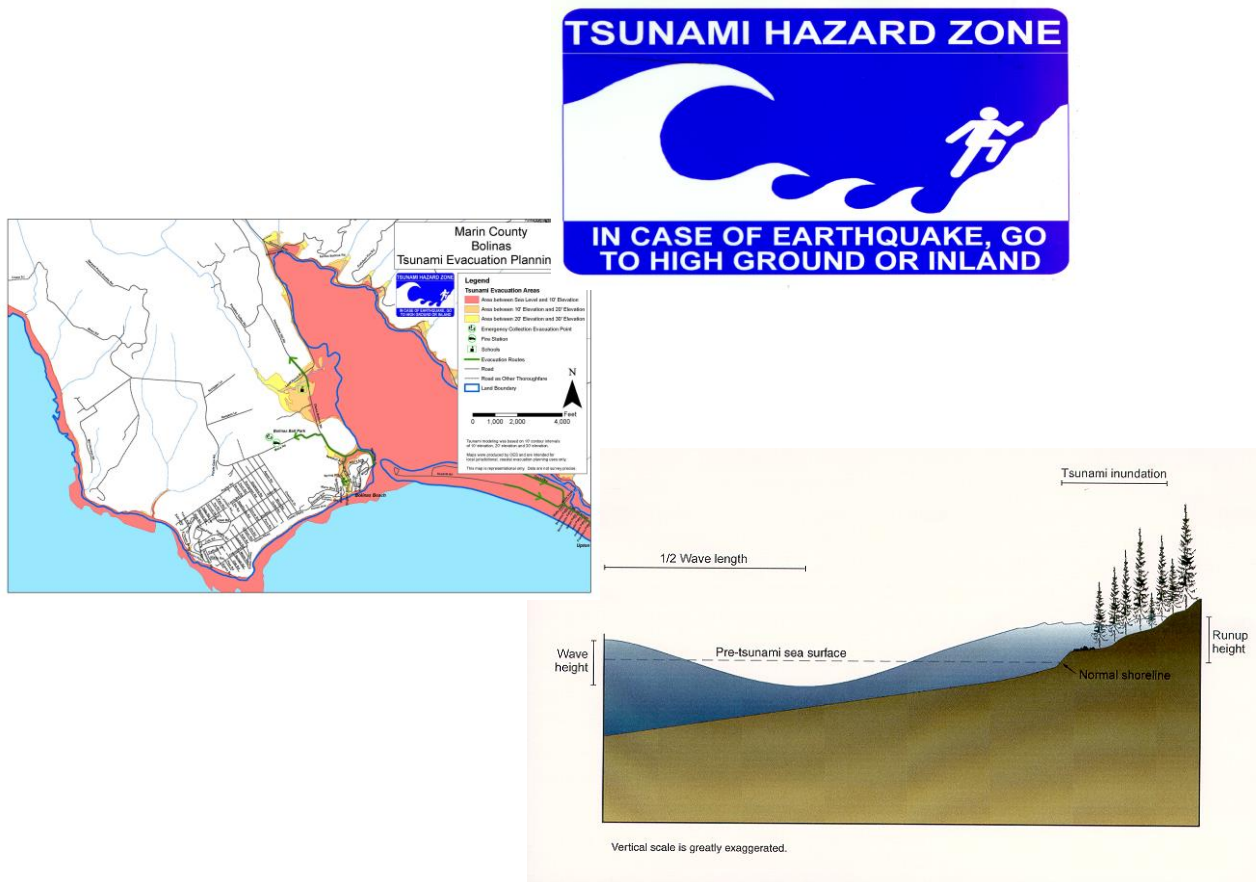


TSUNAMI ANNEX

MARIN OPERATIONAL AREA EMERGENCY OPERATIONS PLAN



JANUARY, 2015



Marin County Sheriff's Office of Emergency Services
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San Rafael, CA 94903
415/473-5039
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RESOLUTION NO. 2015-45

RESOLUTION OF THE MARIN COUNTY BOARD OF SUPERVISORS

WHEREAS, the preservation of life, property, and the environment is an inherent responsibility of local government, and

WHEREAS, a tsunami poses a significant threat to the lives and property of Marin County residents and visitors, and

WHEREAS, tsunami events can occur with little or no warning, and

WHEREAS, the Marin County Sheriff's Office of Emergency Services, in concert with local public safety organizations, in an effort to identify best practices used in response to the threat and occurrence of tsunami events, did develop an Annex to the Marin Operational Area Emergency Operations Plan, and

WHEREAS, the Marin County Disaster and Citizen Corps Council reviewed the Tsunami Annex on March 12, 2015 and voted to recommend it to the Board of Supervisors for adoption.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors of the County of Marin hereby takes the following action:

1. Adopts the 2015 Annex to the Marin County Emergency Operations Plan as presented to the Board and attached to this Resolution.
2. Delegates maintenance of the Annex to the County's Program Manager of Emergency Services as per Marin County Code Section 2.99.035.

PASSED AND ADOPTED at a regular meeting of the Board of Supervisors of the County of Marin held on this 21st day of January, 2015 by the following vote:

AYES: SUPERVISORS Judy Arnold, Steve Kinsey, Damon Connolly, Kathrin Sears, Katie Rice

NOES: NONE

ABSENT: NONE



PRESIDENT, BOARD OF SUPERVISORS

ATTEST:



CLERK

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1. INTRODUCTION/PURPOSE

Tsunamis are a series of ocean waves of extreme length and are almost always generated by undersea earthquakes, but also occasionally by volcanic eruptions, or massive undersea landslides. Their speed depends upon the depth of the water through which they are moving, and consequently the waves undergo accelerations or decelerations in passing respectively over an ocean bottom of increasing or decreasing depth. By this process the direction of the wave propagation may also change, and the wave energy can become focused or defocused. In the deep ocean, tsunami waves can travel at speeds reaching 600 miles per hour (mph). When the tsunami enters shallow coastal waters, its speed decreases to 30-50 mph and the wave height may increase as it comes onshore. These are the mechanisms and conditions which create the large wave that becomes a threat to lives and property. Following the arrival of the first wave, subsequent waves may increase in height and arrive minutes to hours later. It is important, in terms of life safety, to note that the first wave is usually not the most severe, and that a number of deaths have occurred during subsequent waves, coming many hours after the start of the tsunami.

In 1964, the tsunami resulting from the Alaskan earthquake caused eleven deaths in Crescent City, California and damaged buildings, docks, and boats in Sausalito and San Rafael. There was one recorded death from the 1964 tsunami in Marin County at Bolinas. According to a 1972 report by the National Academy of Sciences, "At Bolinas the fatality included was a death by drowning of a man swept from a reef by a "tidal surge," according to a Marin County, California, coroner's report, on the afternoon of March 28 about 1 hour after high tide while tsunami waves were still moderately high. Additionally, there were small tsunami impacts in 1946, 1960, and 2011. The 2004 Indian Ocean Tsunami caused over 225,000 deaths in 14 countries. The 2011 Japan earthquake generated a powerful tsunami that slammed into Northern California, destroying harbors from Santa Cruz to the Oregon border and washing one man out to his death at sea at the mouth of the Klamath River. Some harbor damage occurred at Loch Lomond in San Rafael.

In Marin County, residents and visitors to Pacific and San Francisco Bay coastal, shoreline areas must be aware that there may not be time or no means to provide any warning of a tsunami threat from a local earthquake. An earthquake felt by people along the coastline is a signal to move immediately to higher ground. Any associated earthquake could also damage structures and infrastructure in the potential inundation area prior to the wave's arrival. This could significantly impact warning, evacuation and emergency response operations. There are two types of tsunamis to prepare for, in terms of public safety: Those emanating from "distant" earthquake sources from around the Pacific Ocean and those emanating from a "local" earthquake source, immediately offshore.

Notable Historical Tsunamis in Marin County

Run-up amplitude, in feet, above normal tide conditions

OBS = observed tsunami activity

NR = No damage or severe conditions reported

- Distant Source -
Tsunamis without felt earthquakes

- Local Source -
Earthquake and tsunami together

Date	Magnitude-Source area	Tsunami location	Run-Up/Amp	Remarks
4/18/1906	M7.8 - San Francisco	Bolinas	1ft	NR
4/1/1946	M8.8 - Aleutian Islands	Bolinas	4 ft	NR
		Muir Beach	7 ft	NR
		Sausalito	4 ft	NR
5/22/1960	M9.5 - Chile	Stinson Beach	5 ft	Minor inundation onto beach
3/28/1964	M9.2 Alaska	Tomales Bay	3 ft	Damage to Lawson's Pier
		Bolinas	?	Man drowned 13 hours after first arrival
		Muir Beach	9 ft	NR
		Sausalito	7 ft	Damage to boats and docks; \$100k in Marin Co.
		Tiburon	?	Minor flooding in residential area
		San Rafael	4 ft	Damage to docks and numerous boats sank
9/29/2009	M8.0 - Samoa	Point Reyes	1 ft	NR
2/27/2010	M8.8 - Chile	Point Reyes	1 ft	NR
3/11/2011	M9.0 - Japan	Point Reyes	4 ft	NR
		Bolinas	3 ft	NR
		Sausalito	4 ft	Houseboats and sewer line damaged



The County of Marin has produced Tsunami Evacuation Planning Maps for the Pacific Coast areas based on work performed by the University of Southern California (USC) under contract with the California Office of Emergency Services (CalOES). The maps originally produced under this project were subsequently expanded upon in order to better describe areas that could be at risk from tsunami inundation. The maps are intended to support evacuation planning purposes only and do not necessarily reflect how a tsunami wave may actually impact the mapped areas. (Attachment A.)¹

The areas of the County which could be most impacted by a tsunami are those along the northern Marin Pacific Coast - Dillon Beach, Pt. Reyes, Bolinas, Stinson Beach, Muir Beach, Drakes Bay, Rodeo Beach, Fort Baker and Tennessee Beach in the Golden Gate National Recreation Area. The size of wave coming onshore is influenced by the local, offshore seafloor topography (bathymetry) and coastal topographic characteristics as well as the incoming direction of the tsunami.

Tsunami waves making their way inside San Francisco Bay will not be as high. However, steep and turbulent tsunami wave fronts known as “bores”, typical in river mouths, estuaries and bays, can come into SF Bay and are extremely unpredictable. In a worst-case scenario, at high tide, the shoreline of Tiburon and areas of Sausalito would be inundated. High tides would likely impact other areas, such as Tamalpais Valley.

Residents and visitors to coastal areas must be aware that there may not be time or means to provide any warning of a tsunami threat. An earthquake felt along the coastline is a signal to Move immediately to higher ground. This must be done even if there is no information or any formal tsunami warning issued.

The purpose of this Annex to the Marin Operational Area Emergency Operations Plan (EOP)² is to provide information and guidance for Tsunami Warnings, Advisories, Watches, and Information Statement bulletins, local role in alert and warning dissemination, and roles and responsibilities of all response agencies.

Additionally, the Marin Emergency Recovery Plan (ERP) provides a concept of operations for long term recovery and restoration after extensive damage due to all hazards including Tsunami.³

¹ The State is enhancing planning capability by providing “Tsunami Evacuation Playbooks” with less-than worst case scenarios and “Tsunami Maritime Playbooks” for ports and harbors with improved mapping and detailed information in the near future

² The Marin EOP addresses the planned response to extraordinary situations associated with large scale disasters affecting Marin County

³ The Marin ERP establishes procedures and aligns responsibilities to ensure the effective management of emergency recovery operations within Marin County

Tsunami Source Scenario Model Results for Marin County

Near shore tsunami heights (flow depths) for both local and distant sources scenarios,
in feet above Mean Sea Level

	TSUNAMI SOURCES	Approximate Travel Time	Dillons Beach	Preston Point (Tomales Bay)	Pt Reyes (tide gauge)	Bolinas	Stinson Beach	Muir Beach	Rodeo Cove	Horseshoe Bay	Sausalito	Belvedere	Corte Madera	San Rafael	Black Point
Local Sources	M7.3 Point Reyes Thrust Fault	10-15min	11	8	9	8	5	6	7	3	3	4	3	4	2
	M6.6 Rodgers Creek-Hayward Fault	10-15min							2	2	2	2	2	2	
	M7.1 San Gregorio Fault	10-15min							4	3	3	3	3	3	
Distant Sources	M9 Cascadia-full rupture	1hr	8	3	4	4	4	4	4	3	3	3	3	3	
	M9.2 Alaska 1964 EQ	5hr	12	4	10	10	11	11	13	7	6	8	6	6	
	M8.9 Central Aleutians I	5hr	8	3	9	7	8	11	10	7	5	6	5	6	3
	M8.9 Central Aleutians II	5hr	5	3	6	7	6	7	8	6	4	4	3	5	
	M9.2 Central Aleutians III	5hr	20	5	16	20	25	25	28	12	9	12	10	10	4
	M8.8 Kuril Islands II	9hr	4	3	3	2	3	3	3	3	3	3	3	3	
	M8.8 Kuril Islands III	9hr	4	3	5	5	4	4	4	3	3	3	3	3	
	M8.8 Kuril Islands IV	9hr	5	3	5	5	4	5	5	3	3	4	3	3	
	M8.8 Japan II	10hr	5	3	5	3	4	6	5	3	3	4	3	4	
	M8.6 Marianas Trench	11hr	3	3	4	3	3	4	4	3	3	3	3	3	2
	M9.5 Chile 1960 EQ	13hr	5	3	5	6	4	6	6	3	4	5	3	3	
M9.4 Chile North	13hr	5	3	6	5	5	5	5	4	3	4	3	4		
Maximum Runup - Local Source			12	9	10	9	6	10	7	3	3	4	3	4	2
Maximum Runup - Distant Source			22	5	17	22	27	27	29	13	10	12	11	10	4

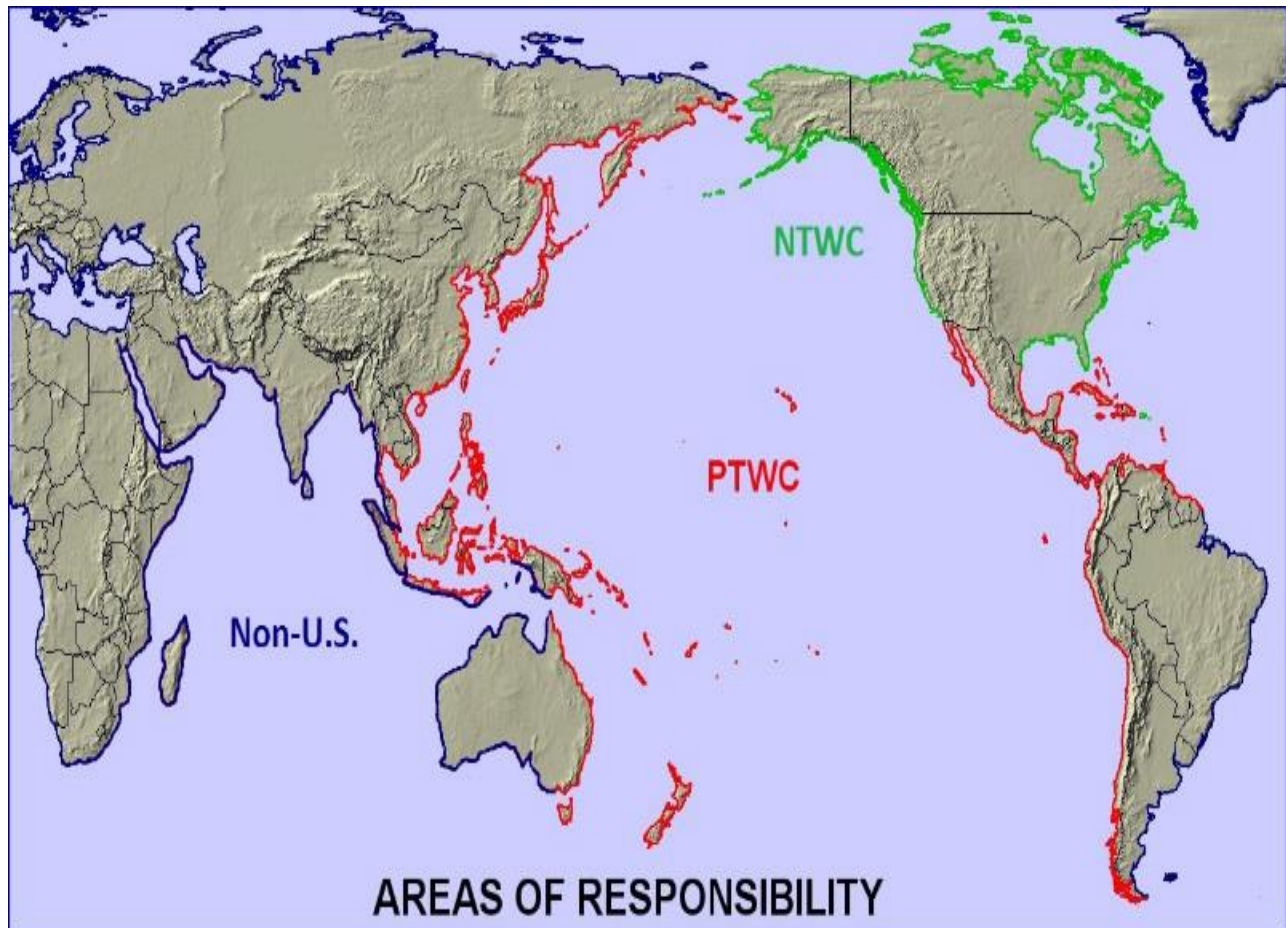


2. TSUNAMI WARNING CENTERS

Marin County receives Tsunami warning from the National Oceanic and Atmospheric Administration (NOAA) National Tsunami Warning Center, providing reliable tsunami detection, forecasts and warning.

NOAA 's two Tsunami Warning Centers, Pacific Tsunami Warning Center (PTWC) and National Tsunami Warning Center (NTWC) have separate areas of responsibility for the dissemination of messages and provision of interpretive information to emergency managers and other officials, news media and the public.

The NTWC has jurisdiction over North American and is therefore the official source of real-time tsunami alert and notification information for the State of California.



The warning centers' initial response must be issued very quickly and is based on seismic analysis and well-defined, preset criteria. Whether a Tsunami Information Statement, Advisory, Watch or Warning Bulletin is issued is based on preset criteria and the initial seismic analysis. Following the first message, the tsunami is analyzed using sea level data, forecast models, and historic data. Based on this analysis, supplemental messages are issued.

3. DEFINITIONS

Tsunami Alert Bulletins

Information Statement. Issued following an earthquake to describe the potential for a tsunami event. In most cases, this will indicate there is no threat.

Advisory Bulletin. A tsunami advisory is issued when a tsunami with the potential to generate strong currents or waves dangerous to those in or very near the water is imminent, expected, or occurring. The threat may continue for several hours after initial arrival, but significant inundation is not expected for areas under an advisory.

Appropriate actions to be taken by local officials may include closing beaches, evacuating harbors and marinas, and the repositioning of ships to deep waters when there is time to safely do so. Advisories are normally updated to continue the advisory, expand/contract affected areas, upgrade to a warning, or cancel the advisory.

Watch Bulletin. A Watch is issued when a seismic event may have caused a tsunami and is being investigated. For areas that lie within three hours of estimated time of arrival, a warning is in effect. For those areas that are between 3 and 6 hours, a watch is in effect.

Warning Bulletin. This is the highest level of alert, issued when a tsunami is imminent or has been confirmed. It will be followed by additional bulletins until it is cancelled. This will not estimate the size of the tsunami but will estimate times of arrival at key locations.

It should be noted that, unlike for weather hazards, during tsunamis both Warning and Advisory Alerts have life-safety implications.

Each of the Tsunami Bulletins has a distinct meaning (Alert Level, Impact, Recommended Action) relating to local emergency response as follows:

Information Statement	→ Minor waves at most	→ No action suggested
Advisory Bulletin	→ Strong currents likely	→ stay away from the shore
Watch Bulletin	→ Danger level not yet known	→ Stay alert for more info
Warning Bulletin	→ Inundating wave possible	→ Full evacuation suggested

A **Local-Source Tsunami** is an event which can cause destruction up to 600 miles from the source. Also known as a “near shore tsunami”, the first wave could arrive on shore within minutes of an earthquake. In Marin, such an event would most likely be caused by an earthquake at the Cape Mendocino junction near the Oregon border.

A **Distant-Source Tsunami** can cause damage across the Pacific. The 1964 Alaskan Earthquake and Tsunami as well as the 2004 Indonesian Tsunami are examples of this kind of massive, far-reaching event. Other potential sources of tsunami which could affect Marin are Chile and Japan.

The **Estimated Time of Arrival** is developed based on the origin and speed of the tsunami wave and is usually accurate to within a few minutes.

The **Run Up** is the height of the largest tsunami wave above sea level at the furthest inland point.

The **Wave Period** is the time between waves which can typically vary from 5 minutes to two hours.

The **Tsunami Hazard Inundation Area** is the area which is at risk from a tsunami event. This area is designated in order to assist in evacuation and safeguard response personnel and equipment. A tsunami may or may not actually impact the entire Area.

4. ASSUMPTIONS

The plan is based on the following assumptions:

- The tsunami threat in Marin County is primarily due to earthquakes far from California, such as Alaska and the Cape Mendocino Junction just off the coast of Oregon. Distant tsunamis, such as the 2011 Japan earthquake induced tsunami, are considered less destructive while allowing more time for implementing response plans and life-saving operations.
- For most events at least four to nine hours warning time will be available to warn the public, evacuate sensitive facilities, establish temporary shelters, and secure the coast area. However, a local or regional tsunami could result in little or no warning. Impact reports from areas closer to the epicenter may or may not be available – this may influence the decision-making process and response effort.
- For a local-source tsunami warning the West Coast/Alaska Warning Center will not modify or cancel the warning in less than 60 minutes from the initial notification. For distance-source tsunami events, the West Coast/Alaska Warning Center will issue updates approximately every hour.
- For most events the national Tsunami Warning System may take up to 10 minutes to develop and deliver a warning message via California Weather Alert Statements/California Law Enforcement Telecommunications System (CALWAS/CLETS) to the Marin County Sheriff's Communications Center. While the county emergency manager may have advance notice to some information, official bulletins regarding tsunami alert level status (warning, advisory, watch, information statement), which also includes estimated wave heights and times for start of tsunami in each area, will be received by the public and the media at the same time. Wireless Emergency Alerts (WEA) from the National Weather Services (NWS) will also be notifying via cell phone to those in affected areas.
- Local public safety agencies located in tsunami threat areas use alternate communications devices, i.e. high band radios and sirens, whenever other systems like the Marin Emergency Authority (MERA) are not effective. Muir Beach is a good example of employing the use of high-band radios to communicate with dispatch or create a relay system using a designated firefighter outside the dead zone who can use the high-band and MERA radios to relay the information to dispatch (9-1-1- Communications).⁴
- After the arrival of the first wave (or "start of tsunami" in each area), waves may continue to arrive at intervals for several hours. If no inundation or damage occurs, risk areas can be reopened for public safety access two hours after the last observed wave, or two hours after the forecast "start of tsunami" has passed without a wave coming ashore.

⁴ For on the scene communication within a dead zone at the Muir Beach, MERA radios on COVN-13 or 14 or high-band radios on designated VFIRE channel (VFIRE-21 through 26) are used.

- The first wave may not be the largest. Subsequent waves can be deadly and come many hours after the first wave, as happened in 1964.
- Intervals between successive major waves may be dissimilar. There is no regular period of time between successive waves.
- Maximum wave height to be expected in this area is approximately 20 feet, but can vary considerably from one location to another.
- The Tsunami Inundation Risk Area map shows the maximum probable potential inundation – actual events could produce more or less inundation.
- Media interest will be significant for any Tsunami Warning, Advisory, or Watch. Media coverage and Emergency Alert System messages may cause the public to call 911 or other emergency numbers for more information.
- Heavy use of telephones by the public may impact the ability of public safety agencies to communicate and to warn the public. The Marin County Telephone Emergency Notification System (TENS) may be significantly impacted.
- A Tsunami Warning may attract sightseers to the shoreline inundation risk areas. Members of the public outside the inundation risk area may seek to enter in order to check on family members or assist them in evacuating. This is in direct conflict with the need to keep people away from danger, and a challenge for law enforcement.
- The coordination and response actions from involved agencies and jurisdictions shall follow the Marin Operational Area Emergency Operations Plan (EOP).
- Within the Inundation Risk Area special institutions such as schools, hospitals, and nursing homes are identified. Special procedures for warning, evacuation, and care for occupants should be arranged by the local agency with incident command.
- This annex is a guide for Operational Area (OA) agencies, local jurisdictions, and county departments with assigned responsibilities
- As reflected in the Marin County's EOP and other threat and discipline specific guidance documents, this annex supports full consideration for people with disabilities and access and functional needs (AFN).

5. ROLES AND RESPONSIBILITIES⁵

According to the National Incident Management System (NIMS) and the Incident Command System (ICS), the Incident Command Post (ICP) is a temporary facility that signifies the physical location of the tactical-level, on-scene incident command and management organization.

In the ICS, a Unified Command is an authority structure in which the role of incident commander is shared by two or more individuals, each already having authority in a different responding agency. A Unified Command is needed for incidents involving multiple jurisdictions or agencies, allowing agencies with different legal, geographic, and functional authorities and responsibilities to work together effectively without affecting individual agency authority, responsibility or accountability.

⁵ Priorities of Roles and Responsibilities are established at the time of a tsunami event, situational dependent

Sheriff's Communications Center

- Receive and relay the tsunami warning/watch as per the Tsunami Alert/Notification Protocol (Attachment B)
- Confirm receipt of warning/watch with California State Warning Center
- Confirm receipt of warning/watch by agencies/individuals as per the Tsunami Alert/Notification Procedure
- Allocate Marin Emergency Radio Authority (MERA) talk groups as needed
- Advise 911 callers if an evacuation is occurring
- On termination of incident, notify all agencies previously alerted.

Woodacre Fire Command Center

- Receive and relay the tsunami warning/watch as per the Tsunami Alert/Notification Procedure (Attachment B)
- Confirm receipt of warning/watch by agencies/individuals as per the Tsunami Alert/Notification Procedure

Sheriff's Office of Emergency Services (OES)

- Receive and assess the threat
- Staffing for long duration events is a consideration
- Contact /advise Sheriff's Office leadership and Sheriff's Public Information Officer (PIO)
- Conduct initial emergency public warning via Telephone Emergency Notification System (TENS), and other rapid public alert and warning systems are activated as needed
- Contact and advise local, regional, state, and federal emergency management agencies⁶
- Represent the Marin Operational Area in post-warning conference calls
- Coordinate with CalOES – participate in CalOES statewide telephone briefings
- Advise County leadership regarding Proclamation of Local Emergency
- Conduct Marin County Sheriff's OES Emergency Conference Call as necessary
- Coordinate activation of the Operational Area Emergency Operations Center (EOC), as directed
- Activate Radio Amateur Civil Emergency Services (RACES/ACS) resources as needed
- Prepare to distribute MERA radio and satellite telephone caches
- Conduct initial media relations
- Coordinate the issuance of the "All Clear" as necessary

Fire Jurisdictions

- Serve as Incident Commander in Unified Command
- Serve as Branch Directors
- Stage resources out of the Tsunami Inundation Hazard Area until "All Clear" is sounded
- Provide rescue emergency medical treatment and transport
- Request fire and medical mutual aid as required
- Identify and assist individuals and organizations that may require evacuation assistance
- Consider activation of Disaster Councils and Citizens Emergency Response Teams(CERTs)

⁶ The West Marin Community Radio KWMR will work in cooperation with first responders to target many of the tsunami threatened coastal communities with verified tsunami related information

- Assist in evacuations and road closures as appropriate
- Participate in the Joint Information System(JIS), Joint Information Center (JIC)

Law Enforcement Jurisdiction

- Serve as Incident Commander in Unified Command
- Stage resources out of the Tsunami Inundation Hazard Area until “All Clear” is sounded
- Provide rescue emergency medical treatment and transport
- Direct evacuation operations
- Maintain a secure perimeter (around / inland of inundation risk area).
- Coordinate scene security, crowd control, traffic control (including hospitals as needed)
- Request law enforcement mutual aid as required
- Request closure of air space or restrictions
- Participate in the JIS, JIC

Golden Gate National Recreation Area and Point Reyes National Seashore (National Park Service)

- Notify and evacuate parks guests, visitors, employees and partners
- Coordinate with local law enforcement to support evacuation and security operations
- Serve as part of Unified Command at Incident Command Post
- Provide Liaison Officers to Incident Commanders at Pt. Reyes and Stinson Beach Branches
- Maintain contact with Sheriff’s Communication Center
- Stage resources out of the Tsunami Inundation Hazard Area until “All Clear” is sounded
- Provide rescue emergency medical treatment and transport
- Request fire and medical mutual aid as required
- Identify individuals and organizations that may require evacuation assistance
- Participate in the JIS, JIC

California State Parks

- Notify and evacuate parks guests and visitors, employees and partners
- Coordinate with local law enforcement to support evacuation and security operations
- Serve as part of Unified Command at Incident Command Post
- Stage resources out of the Tsunami Inundation Hazard Area until “All Clear” is sounded
- Provide rescue emergency medical treatment and transport
- Identify Agency Representative to the Unified Command
- Participate in the JIS, JIC

Marin County Parks

- Notify and evacuate parks guests, visitors, employees and partners
- Coordinate with local law enforcement to support evacuation and security operations
- Serve as part of Unified Command at Incident Command Post
- Stage resources out of the Tsunami Inundation Hazard Area until “All Clear” is sounded
- Provide rescue emergency medical treatment and transport
- Identify Agency Representative to the Unified Command
- Participate in the JIS, JIC

North Bay Incident Management Team

- Stage and deploy as directed
- Provide Incident Support/Management as directed
- Serve as part of Unified Command at Incident Command Post
- Participate in the JIS, JIC

Hazardous Materials (HazMat) Team

- Stage and deploy as directed
- Survey the scene
- Conduct materials field testing and analysis
- Advise Incident Commander on nature of the threat
- Serve as part of Unified Command at Incident Command Post
- Request Hazardous Materials mutual aid as necessary
- Participate in the JIS, JIC

❖ Urban Search and Rescue (USAR) Team

- Stage and deploy as directed
- Locate and extricate victims as necessary
- Provide general incident support
- Advise Incident Commander on structural and debris management issues
- Serve as part of Unified Command at Incident Command Post
- Participate in the JIS, JIC

❖ Sheriff's Search and Rescue (SAR) Team

- Stage and deploy as directed
- Locate and extricate victims as necessary
- Provide general incident support
- Serve as part of Unified Command at Incident Command Post
- Participate in the JIS, JIC

- ❖ Note: USAR and SAR use a standardized marking system to identify structures in a specific area and any hazards found within or near the structure (Attachment A)

Sheriff's Air Patrol

- Conduct aerial warning, as directed
- Monitor arrival and impact of waves
- Support damage assessment operations
- Provide general incident support
- Serve as part of Unified Command at Incident Command Post
- Participate in the JIS, JIC

Public Works and Utility/Service Districts

- Support perimeter and traffic control efforts
- Request Public Works mutual aid as necessary
- Coordinate utility issues including "render safe", repair, and restoration
- Coordinate debris management
- Coordinate and conduct emergency clearing and repairs to roads
- Serve as part of Unified Command at Incident Command Post
- Participate in the JIS, JIC

Hospitals/Clinics

- Prepare to receive patient influx
- Request law enforcement support for security as necessary
- Coordinate and track patient distribution – coordinate with the Marin MHOAC
- Request HazMat team to coordinate Decontamination as necessary
- Serve as part of Unified Command at Incident Command Post

- Participate in the JIS/JIC with Public Health

Emergency Medical Services (EMS)

- Serve as the Medical Health Operational Area Coordinator (MHOAC)
- Notify Regional Disaster Medical Health Coordinator (RDMHC)
- Obtain out-of-county EMS or other medical/health resources as necessary
- Serve as part of Unified Command at Incident Command Post
- Participate in the JIS, JIC

Environmental Health

- Evaluate the direct and indirect threats to life safety and the environment
- Advise the Incident Commander on exposure, facility, and environmental health issues
- Serve as part of Unified Command at Incident Command Post
- Participate in the JIS, JIC

Health & Human Services

- Evaluate the direct and indirect threats to public health
- Prepare to conduct mass care and shelter operations outside inundation area
- Coordinate and manage mass care and shelter operations
- Coordinate medical health response with healthcare partners
- Coordinate with coroner as necessary
- Coordinate mental health response
- Serve as part of Unified Command at Incident Command Post
- Participate in the JIS, JIC

Sheriff's Coroner

- Supervise the removal and decontamination of the deceased
- Coordinate identification of the deceased
- Manage next-of-kin notifications and release of remains
- Serve as part of Unified Command at Incident Command Post
- Participate in the JIS, JIC

Humane Society

- Coordinate and support animal rescue
- Coordinate animal shelter operations as needed
- Serve as part of Unified Command at Incident Command Post
- Participate in the JIS, JIC

Disaster Councils / CERTS

Take direction from and coordinate with local fire departments

All responsible agencies with roles in emergency readiness, response, and recovery, are accountable for consideration for people with disabilities and Access and Functional Needs (AFN). The 2011 Health and Human Services AFN Planning Guidance provides specific information of the types of populations that cannot be excluded or denied services before, during and after disaster.

6. CONCEPT OF OPERATIONS

Special Case: Local-Source Tsunami

It is the policy of the County of Marin that, should an official NOAA Tsunami Warning be issued for a potential tsunami that could impact the County within 10 minutes to 2 hours, public warning and evacuation operations will take place immediately. Warning and evacuation will not be delayed by information gathering or threat assessment.

Alert/Notification

Upon receipt of a Tsunami Watch or Warning from the California State Warning Center, the Sheriff's Communications Center will notify primary agencies as per the Tsunami Alert/Notification Protocol (Attachment C-1).

The Sheriff's OES staff will evaluate the threat and recommend many - if not all - of the following actions to the County Sheriff (or Alternate):

- Conduct public warning in the Tsunami Inundation Hazard Area
- Notify all Operational Area public safety agencies and organizations
- Activate the Operational Area EOC⁷
- Plan for and anticipate multiple shifts for public safety personnel
- Stage additional public safety resources outside of the Tsunami Inundation Hazard Area
- Begin emergency public information efforts

The OES staff will conduct post-alert information coordination via the Marin OES Emergency Conference Call and will participate in any state post-alert conference calls (Attachment C-2).

Public Warning

In the event of a Tsunami Warning, population in the designated Tsunami Inundation Hazard Areas will be warned and advised to voluntarily evacuate to higher ground or safe refuge areas. The public will be instructed to move by the quickest method available to a point no less than 30 feet above sea level. In many cases, the fastest method is to simply walk uphill if possible, and not drive inland. The expected arrival time of the tsunami will also be provided if available. After warning the general public, alerting and moving populations at campgrounds, beaches, schools or convalescent care facilities has the highest priority. Members of the public may receive warnings directly via the Telephone Emergency Notification System (TENS), Emergency Alert System (EAS) or the NOAA Weather Radio network. West Marin's Radio Station KWMR will provide follow-up messaging with verified updates to the public via airwaves and Internet streaming in their area.

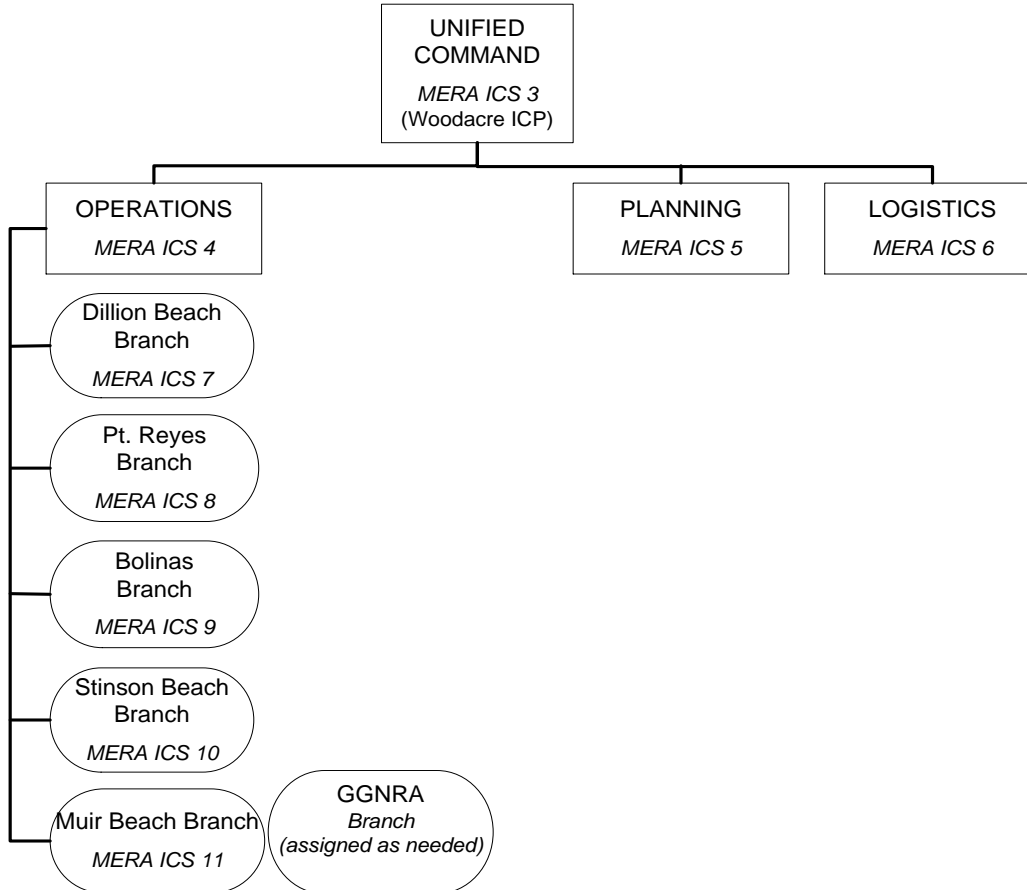
Command and Control

For the purposes of coordinating emergency evacuation and rescue operations, responders will use the Incident Command System (ICS). For the Pacific coastal areas, an Incident Command Post (ICP) will be established at the Woodacre Fire Command Center and Unified Command will

⁷ As Disaster Service Workers (DSWs), the EOC staff is trained to respond to emergencies. The County and all public employees as DSWs are subject to be impressed into many types of services during a state of emergency.

be formed with the Marin County Fire Department, the Marin County Sheriff's Department and the National Park Service. The California Highway Patrol may also support Unified Command. At the ICP, the Operations Section will coordinate the actions of five Branches.

Branch Directors will manage the response actions within their respective geographic areas. Fire, law enforcement, public works, and USAR will conduct joint operations within each Branch. Marin Emergency Radio Authority (MERA) system radio assignments for command are indicated on the organization chart below:



For incorporated areas along the San Francisco Bay, each jurisdiction will conduct operations in accordance with their Emergency Operations Plan and procedures.

Evacuation

The Marin County Sheriff's Department will lead and direct the evacuation effort in unincorporated areas. In each incident, mutual aid law enforcement resources, fire agencies and public works resources will report to the Branch Director and assist in the public warning and evacuation efforts. Evacuations are voluntary. Selected communities have designated Tsunami Evacuation Assembly Areas which are located outside of the Tsunami Inundation Hazard Area.

Note: Warning signs already in place, pre-existing maps/brochures, and evacuation drills may help facilitate successful evacuation efforts.

Public Safety agencies will evacuate themselves from the Tsunami Inundation Hazard Area at least 30 minutes prior to the expected arrival of the first wave. The public safety agencies and the public will remain outside the tsunami Inundation Hazard Area until the all clear is sounded.

Traffic Control / Security

Law Enforcement will establish traffic control along evacuation routes and perimeter security operations at selected points. Evacuated residents and sightseers will be prohibited from entering the Tsunami Inundation Hazard Area under the authority of California Penal Code 409.5.

Two Tsunami Monitoring Posts will be established on the Pacific coast to monitor the arrival of the initial and any subsequent tsunami waves. Designated Monitors will maintain contact with the Sheriff's Communication Center and report all activity. See Attachment A, Tsunami Inundation Areas and Evacuation Routes.

Inundation Hazard Area: Public Safety Agency Re-entry Policy

Tsunamis almost always produce several waves with subsequent waves larger than the first and can cause damage, creating hazardous conditions.

Therefore, it is the policy of the County of Marin that once public safety personnel and equipment have evacuated the Tsunami Hazard Inundation Area, they will not re-enter the area until the "All Clear" message is developed by the Sheriff's Office of Emergency Services and then transmitted by the Sheriff's Communication Center. If there is no inundation or damage, the "All Clear" will be transmitted two hours after the last tsunami wave has arrived or upon receipt of a Tsunami Warning Cancellation from the California State Warning Center. An "All Clear" warning cancellation is issued as the final bulletin indicating when there is no longer the threat of a damaging tsunami.

Search and Rescue

Following evacuation emergency response assets will stage outside the Hazard Area until the "All Clear" is sounded. Prior to entering the Hazard Area, communications equipment and assignments will be allocated to and coordinated within each branch.

Initial Incident Objectives:

- Conduct Search and Rescue
- Identify and Isolate Hazards
- Conduct Security Operations
- Conduct Recovery Operations

Emergency Public Information

The Public Information Officer (PIO) at the Operational Area EOC will coordinate all public information activities and will supervise field PIOs assigned to each incident. The PIO may recommend establishing a Joint Information Center (JIC) closer to the scene of the incident. The PIO may recommend activating the Emergency Public Information Hotline.

Re-Entry

Post-event only residents with proof of residency will be permitted to re-enter the area once public safety agencies have identified and eliminated hazards. Re-entry may be restricted in areas where hazards exist such as downed or submerged electrical power lines, unsafe roads, or significant public health danger.

Damage Assessment

County Emergency Management oversees the damage assessment process which begins with the Initial Damage Estimate. The next step includes a review by the state to assess and validate the

initial estimate, known as the Preliminary Damage Assessment. When the EOC is operational during this period, the Damage Assessment Unit⁸ of the Planning/Intelligence Section in the Operational Area EOC coordinates damage assessment teams and information for evaluation and consolidation. State and Federal assistance is primarily based on the magnitude and cost of damages.

7. IMMEDIATE ACTIONS:

Upon receipt of a tsunami watch, the Sheriff's Communications Center will notify agencies as per the Tsunami Watch/Advisory/Warning Protocol. Upon receipt of a tsunami warning, agencies within the Marin Operational Area will execute the following actions immediately:

Sheriff's Communications Center

- Receive tsunami warning from the California State Warning Center
- Confirm receipt of warning with California State Warning Center
- Notify the following agencies/individuals:
 - Sheriff's Office Watch Commander
 - Woodacre Emergency Command Center
 - Marin Sheriff's OES
 - All contract fire and law enforcement agencies
 - Sheriff's Leadership via MCSO Admin Page
 - San Rafael, Novato, and Twin Cities Police and Fire Communications Centers
 - Public Works Supervisor
 - Golden Gate National Recreation Area (GGNRA), Point Reyes National Seashore, National Parks, Californian State Parks, Marin County Parks
 - Hospitals and Clinics
 - Marin Sheriff's Air Patrol
 - Marin Sheriff's Search and Rescue (SAR)
 - Hazardous Materials Response Team
 - Marinas, Harbormasters
- Confirm receipt of notification by agencies
- Make "all call" broadcast on all primary radio frequencies
- Consider holding over and calling back staff
- Confirm locations of Incident Command Post, Branch Directors, and staging areas
- Maintain dedicated contact with each Tsunami Monitoring Point
- Dispatch law, fire and EMS resources as needed
- Assign MERA talk groups as needed
- Advise 911 callers if an evacuation is occurring
- On termination of incident, notify all agencies previously alerted

Woodacre Fire Emergency Command Center

- Receive tsunami warning from Sheriff's Communication Center
- Notify the following agencies/individuals:
 - Marin County Fire Department leadership, who then may activate local Disaster Councils and CERTs
 - All contract fire agencies
 - Marin County Urban Search and Rescue (USAR) Team

⁸ The trained Damage Assessment Unit staff collects/consolidates all damage assessment information, prepares reports, and provides for an initial inspection of all structures in the Marin County Operational Area

- Confirm receipt of notification by agencies
- Make “all call” broadcast on all primary radio frequencies
- Dispatch fire and EMS resources as needed
- Dispatch one Tomales Fire firefighter to the Dillon Beach Tsunami Monitoring Point
- Dispatch one Stinson Beach Fire firefighter to the Stinson Beach Tsunami Monitoring Point
- Consider holding over and calling back staff
- Confirm locations of Incident Command Post, Branch Directors, and staging areas

Sheriff’s Office of Emergency Services (OES)

- Evaluate the threat and be prepared to make recommendations as to agency staffing, EOC activation and other response actions. Consider the following factors:
 - Forecast tsunami wave heights
 - Expected time of arrival
 - Beginning of tsunami (first 5 hours) expected at high or low tide?
 - Earthquake impacts
 - Weather conditions and tides
 - Time of day and availability of response personnel
 - Expected tsunami duration
- Contact and advise Sheriff’s Leadership
- Recommend for or against public warning and/or evacuation
- Conduct initial emergency public warning via TENS as directed
- Ensure that EAS has been activated
- Recall all OES staff
- Contact and advise local jurisdictions
- Contact Sonoma and San Francisco Operational Areas
- Represent the Marin Operational Area in State OES post-alert conference calls
- Coordinate with State OES and advise on Marin actions
- Keep Sheriff’s Leadership updated and advise regarding Declaration of Local Emergency
- Conduct Marin OES Emergency Conference Call as necessary
- Coordinate activation of the Operational Area EOC as necessary
- Alert RACES leadership as necessary
- Prepare to distribute MERA radio and satellite telephone caches
- Conduct initial media relations
- Update Sheriff’s and County web site ‘Current Emergencies’ section as necessary
- Coordinate the issuance of the “All Clear” as necessary

Fire Agencies

- Serve as Incident Commander in Unified Command
- Stage resources out of the Tsunami Inundation Hazard Area until “All Clear” is sounded
- Staff the two Tsunami Monitoring Points (Tomales Fire and Stinson Beach Fire)
- Consider holding over and calling back staff
- Request fire and medical mutual aid as required
- Consider activation of Community Emergency Response Teams (CERTs)
- Appoint Operations, Planning and Logistics Section Chiefs
- Conduct rescue operations
- Provide emergency medical treatment and transport
- Appoint Public Information Officer (PIO) to manage the JIS/JIC

Law Enforcement Agencies

- Serve as Incident Commander in Unified Command
- Stage resources out of the Tsunami Inundation Hazard Area until “All Clear” is sounded

- Consider holding over and calling back staff
- Request law enforcement mutual aid as required
- Coordinate scene security, crowd control, traffic control
- Direct evacuation operations
- Request closure of air space restrictions
- Support hospital security as necessary
- Appoint Public Information Officer (PIO) to manage the JIS/JIC

Golden Gate National Recreation Area (GGNRA), Point Reyes National Seashore, National Parks, California State Parks, Marin County Parks

- Serve as Incident Commander in Unified Command
- Move resources out of the Tsunami Inundation Hazard Area
- Stage resources out of the Tsunami Inundation Hazard Area until "All Clear" is sounded
- Consider holding over and calling back staff
- Request law enforcement mutual aid as required
- Direct Evacuation operations
- Coordinate scene security, crowd control, traffic control
- Appoint Public Information Officer (PIO) to manage the JIS/JIC

Hazardous Materials (HazMat) Team

- Stage resources out of the Tsunami Inundation Hazard Area until "All Clear" is sounded
- Assess areas of inundation and/or damage
- Survey the scene
- Conduct materials field testing and analysis
- Advise Incident Commander on nature of the threat
- Request Hazardous Materials mutual aid as necessary

Urban Search and Rescue (USAR) Team

- Stage resources out of the Tsunami Inundation Hazard Area until "All Clear" is sounded
- Deploy only when given a specific assignment
- Locate and extricate victims as necessary
- Provide general incident support
- Advise Incident Commander on structural and debris management issues

Sheriff's Search and Rescue (SAR) Team

- Stage resources out of the Tsunami Inundation Hazard Area until "All Clear" is sounded
- Deploy only when given a specific assignment
- Locate and extricate victims as necessary
- Provide general incident support

Sheriff's Air Patrol

- Deploy only when given a specific assignment
- Conduct aerial warning as needed
- Monitor arrival and impact of waves
- Support damage assessment operations
- Monitor air space restrictions

Public Works

- Stage resources out of the Tsunami Inundation Hazard Area until "All Clear" is sounded
- Deploy barricades and traffic control measures as needed
- Support perimeter and traffic control efforts
- Consider holding over and calling back staff

- Request Public Works mutual aid as necessary
- Coordinate utility issues including render safe, repair, and restoration
- Coordinate debris management

Hospitals and Clinics

- Prepare to receive self-presenting victims
- Conduct decontamination as necessary
- Request law enforcement support for security as necessary
- Consider holding over and calling back staff
- Coordinate patient distribution
- Coordinate with MHOAC as needed

Emergency Medical Services (EMS)

- As the Medical Health Operational Area Coordinator (MHOAC)
- Notify Regional Disaster Medical Health Coordinator (RDMHC)
- Obtain out-of-county EMS or other medical/health resources as necessary

Environmental Health

- Evaluate the direct and indirect threats to life safety and the environment
- Advise the Incident Commander on exposure, facility, and environmental health issues

Health & Human Services/Public Health

- Evaluate the direct and indirect threats to public health
- Prepare to conduct mass care and shelter operations outside inundation Area
- Coordinate Medical Health Resources with hospitals, clinics and other partners
- Coordinate and manage mass care and shelter operations

Coroner

- Supervise the removal and decontamination of the deceased
- Coordinate identification of the deceased
- Manage next-of-kin notifications and release of remains

Humane Society

- Move resources out of the Tsunami Inundation Hazard Area
- Stage resources out of the Tsunami Inundation Hazard Area until "All Clear" is sounded
- Coordinate animal rescue and shelter

8. REFERENCES

- Tsunami inundation maps

Know your zone; know the area you live, play or work in:

<http://www.tsunamizone.org>

http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Marin/Pages/Marin.aspx

- Local Planning Guidance on Tsunami Response, Second Edition; A Supplement to the Emergency Planning Guidance for Local Governments. California Governor's Office of Emergency Services, May 1998.

-Legal Guidelines for Controlling Movement of People and Property During an Emergency. California Governor's Office of Emergency Services, July 1999.

-Legal Guidelines for Flood Evacuation. California OES 1997

-Tsunami Warning Systems and Procedures; Guidance for Local Officials. Oregon Emergency Management and the Department of Geology and Mineral Industries, 2001.

-Tsunami Glossary, Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific, and Cultural Organization (UNESCO), Intl.Tsunami Center 2006

-Marin County Emergency Operations Plan, 2014

-Marin County Emergency Recovery Plan, 2012

-Marin Mass Fatality Plan, 2013

-Marin County Mass Care and Shelter Annex, 2014

9. ACRONYMS

AFN	Access and Functional Needs
AOR	Area of Responsibility
CalOES	California Office of Emergency Services
CalCLETS	California Law Enforcement Telecommunications
CSWC	California State Warning Center
CalWAS	California Weather Alert Statements
CERTS	Community Emergency Response Teams
EAS	Emergency Alert System
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
ERP	Emergency Recovery Plan
ETA	Estimated Time of Arrival
GGNRA	Golden Gate National Recreation Area
HazMAT	Hazardous Materials
ICP	Incident Command Post
ICS	Incident Command System

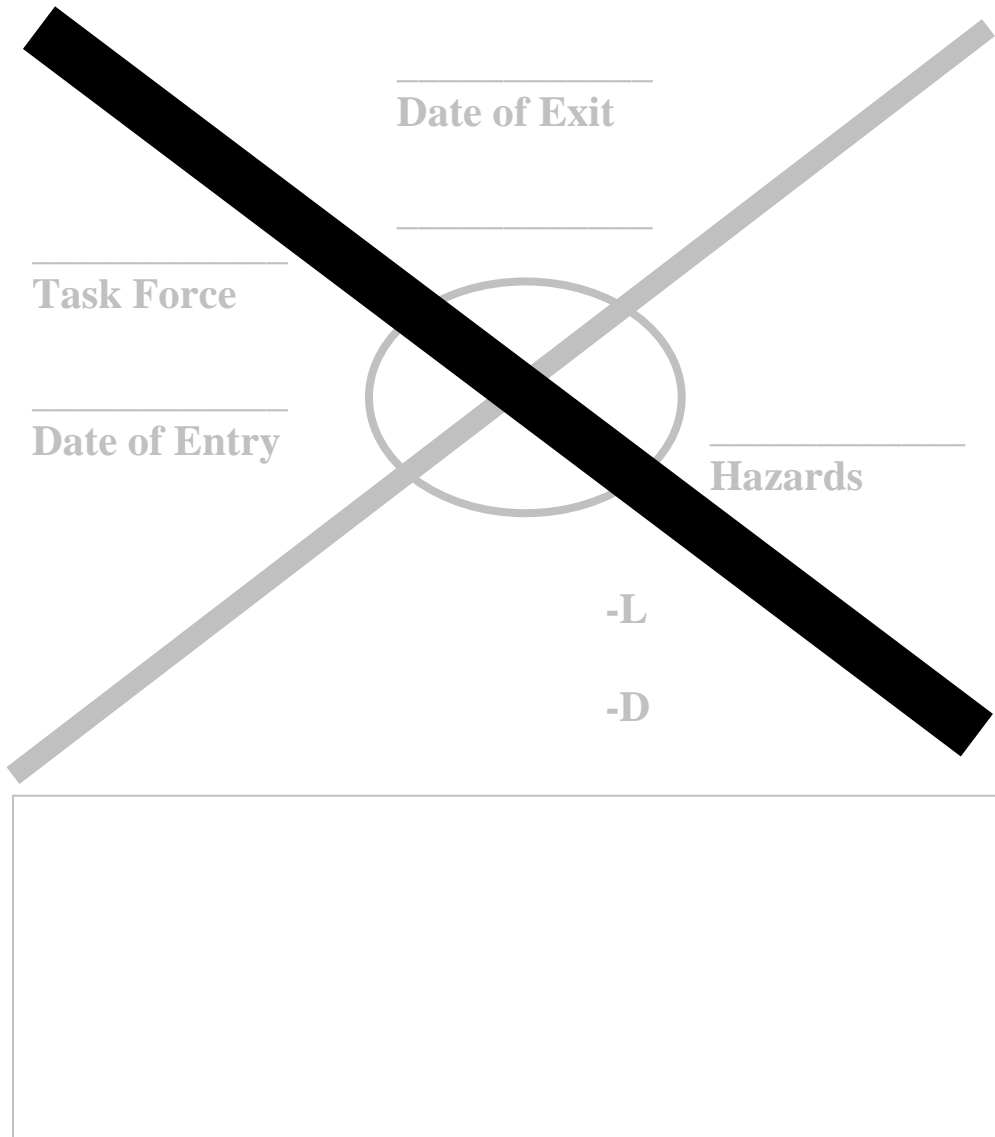
JIS	Joint Information System
JIC	Joint Information Center
MCSO	Marin County Sheriff's Office
MERA	Marin Emergency Radio Authority
MHOAC	Medical Health Operations Area Coordinator
NAWAS	National Warning System
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
OES	Office of Emergency Services
PIO	Public Information Officer
PTWC	Pacific Tsunami Warning Center
RACES/ACS	Radio Amateur Civil Emergency Services/Amateur Civil Services
RDMHC	Regional Disaster Medical Health Coordinator
SAR	Search and Rescue
SOP	Standard Operating Procedure
TENS	Telephone Emergency Notification System
USAR	Urban Search and Rescue
USC	University of Southern California
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WC/ATWC	West Coast Alaska Tsunami Warning Center
WEA – NWS	Wireless Emergency Alerts – National Weather Services

8. Annex Distribution (Available at www.marinsheriff.org)

- CalOES
- California Department of Conservation/Geological Services
- Emergency Management staff – Marin's eleven cities and towns
- Marin County's Disaster Citizens Corps Council members
- West Marin County's Disaster Council members

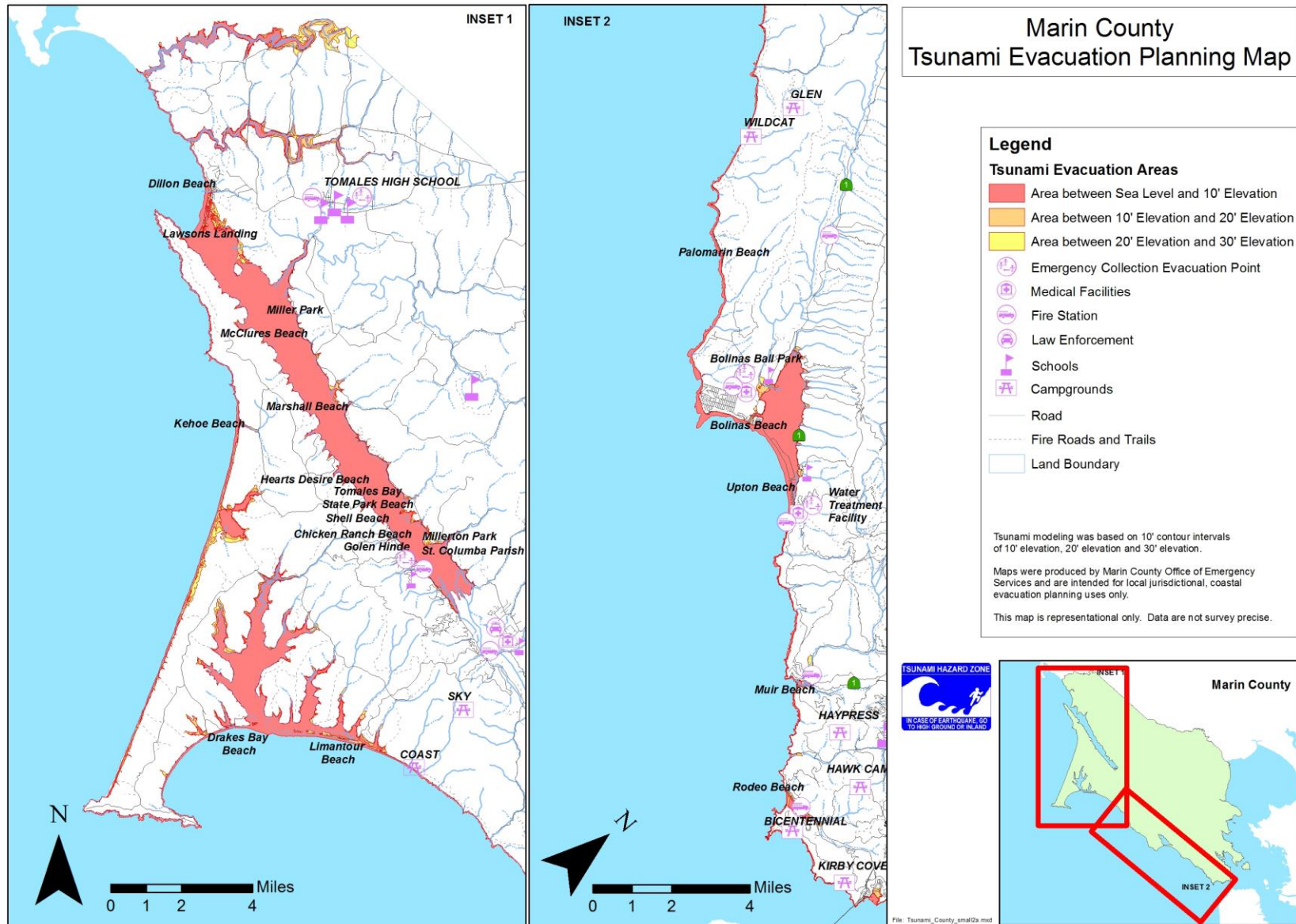
ATTACHMENTS

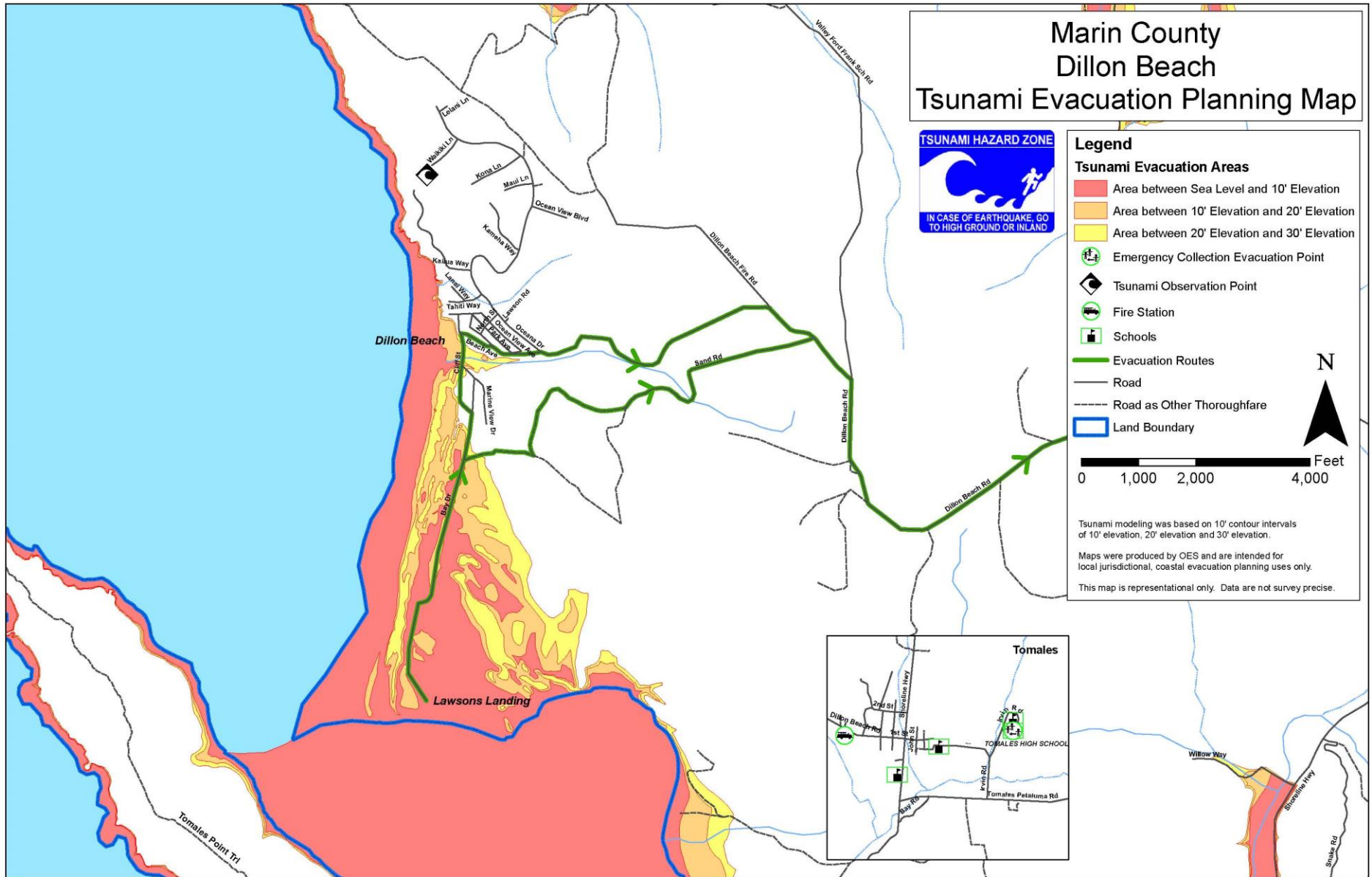
Attachment A: USAR and SAR STANDARDIZED MARKING SYSTEM

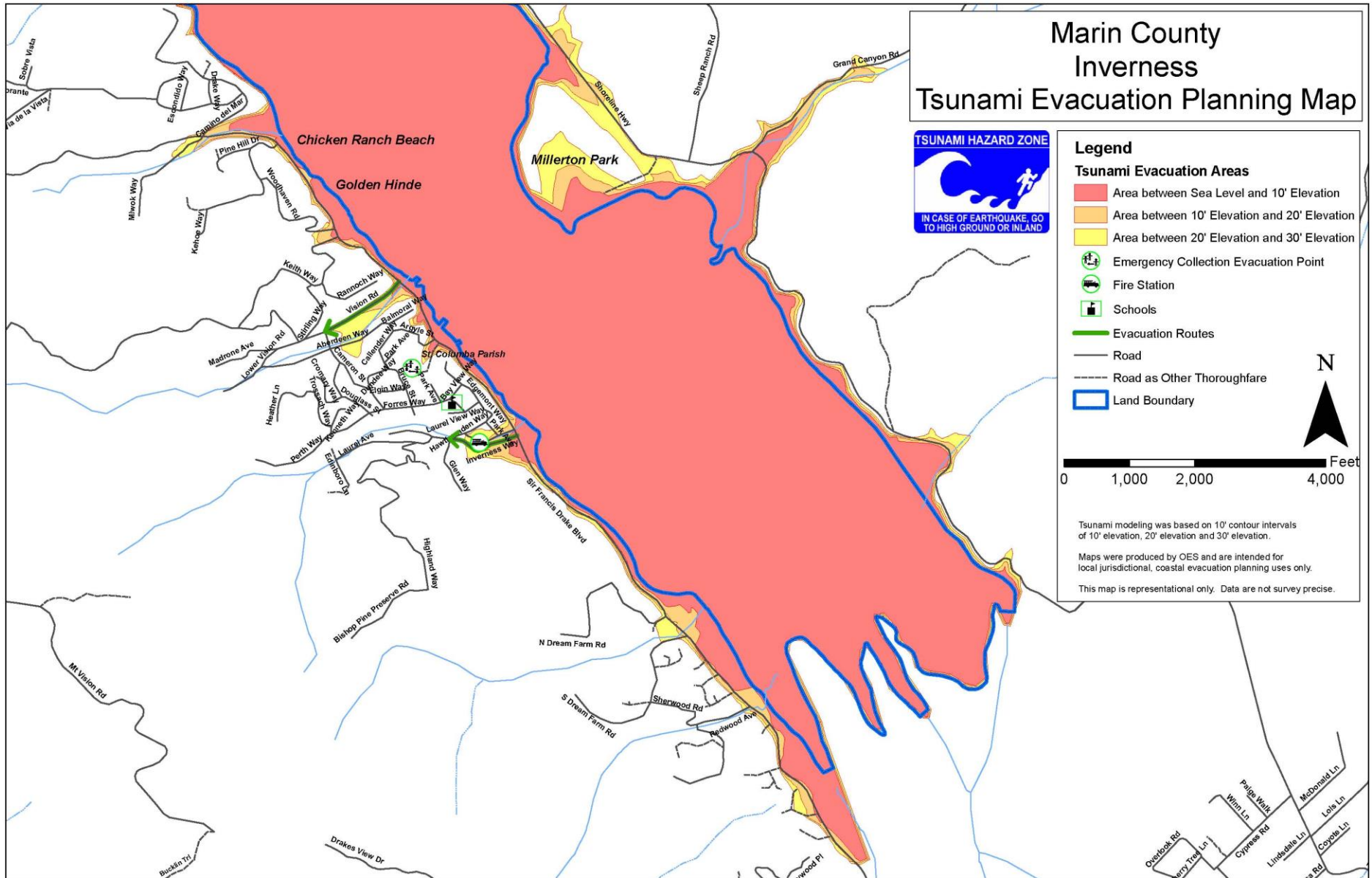


<p>***** SEARCH MARKING LEGEND *****</p>	<p>Incomplete Search/No Entry 2-24 1450 DATE Co-1 2-24 1450 2-L 2-P</p>	<p>Completed Search 2-24 1450 DATE Co-1 2-24 1450 2-L 2-P</p>
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Attachment B: Tsunami Inundation and Evacuation Route Maps









Marin County Eastshore Tsunami Evacuation Planning Map



Legend

Tsunami Evacuation Areas

- Area between Sea Level and 10' Elevation
- Area between 10' Elevation and 20' Elevation
- Area between 20' Elevation and 30' Elevation

- Emergency Collection Evacuation Point
- Fire Station
- Schools
- Road
- Fire Roads and Trails
- Land Boundary

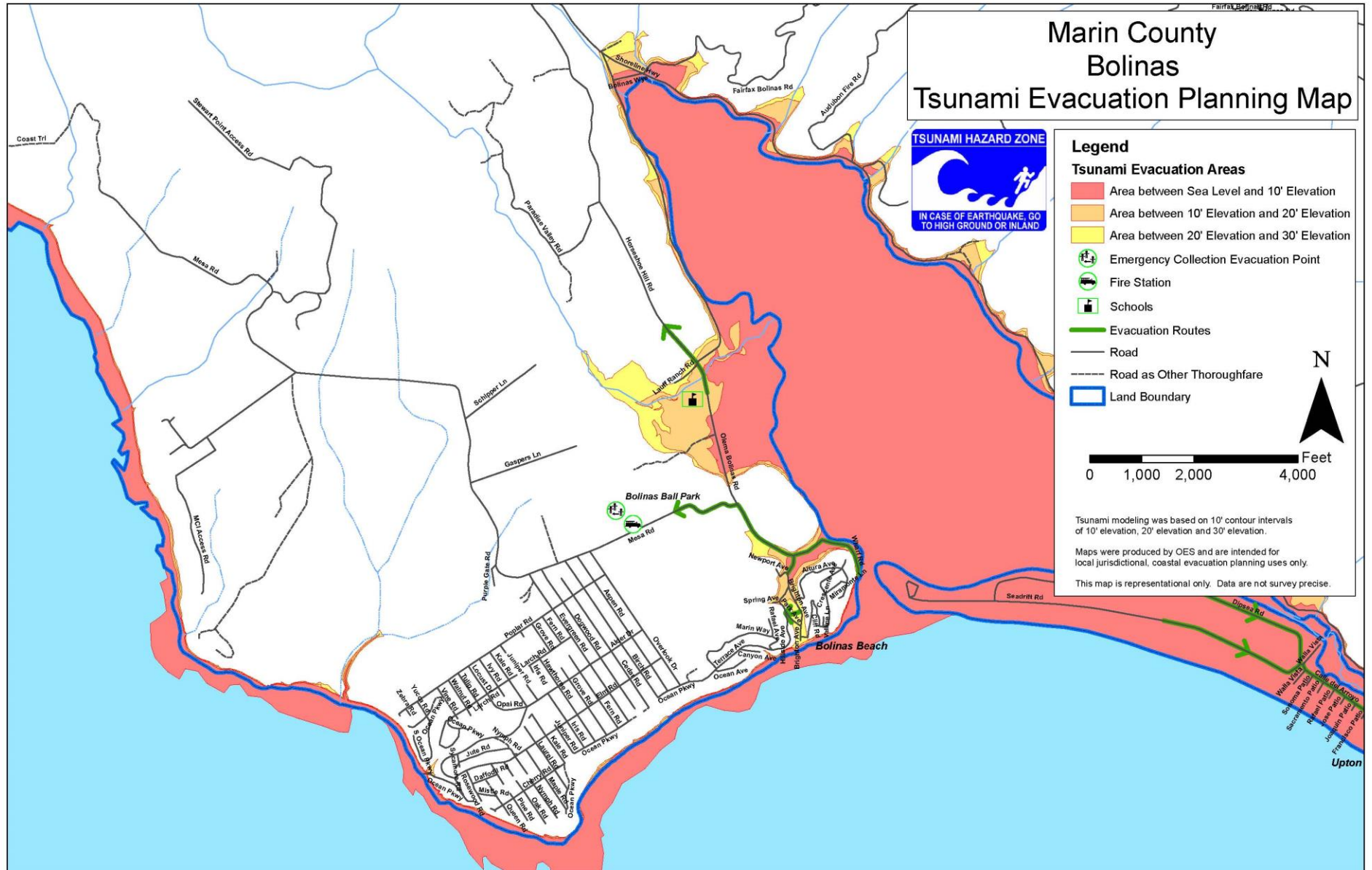
Tsunami modeling was based on 10' contour intervals of 10' elevation, 20' elevation and 30' elevation.

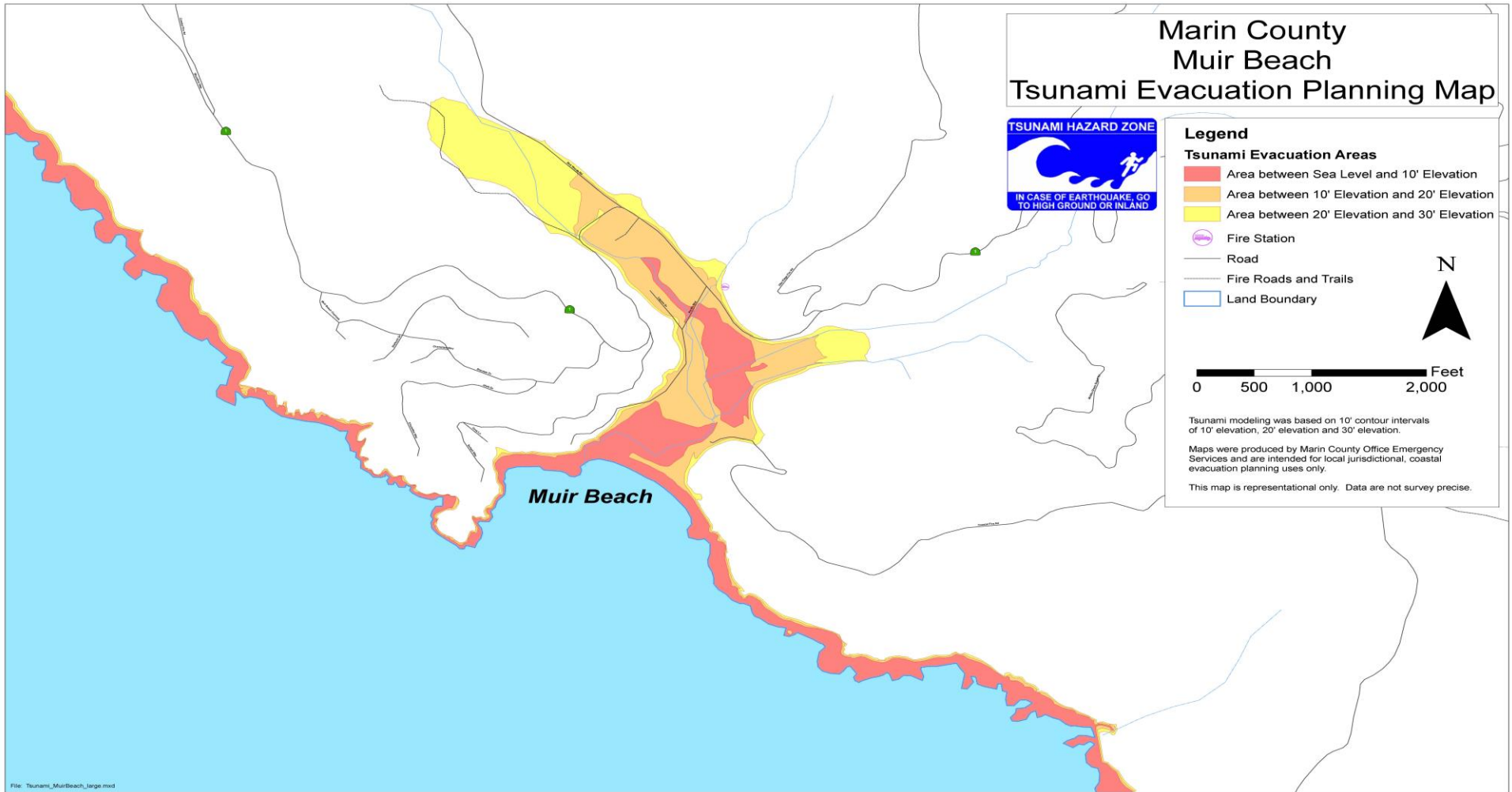
Maps were produced by Marin County Office of Emergency Services and are intended for local jurisdictional, coastal evacuation planning uses only.

This map is representational only. Data are not survey precise.



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Attachment C: Tsunami Post-Alert Information Coordination Protocol

