

Unified County of Orange  
and  
Orange County  
Operational Area



Tsunami Annex  
May 2018

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## Operational Area Executive Board and Emergency Management Council Letter of Approval

### Orange County Operational Area Executive Board County of Orange Emergency Management Council

Representatives of Law Enforcement Mutual Aid, Police Chiefs' and Sheriff's Association, Fire and Rescue Mutual Aid, Fire Chiefs' Association, Public Works Mutual Aid, City Engineers and Public Works Directors Association, Orange County Board of Supervisors, Health Care Mutual Aid, City Manager's Association, League of Cities, County Agencies, School Districts, and Special Districts.

May 9, 2018

Members of the Operational Area  
Members of the Board of Supervisors  
County of Orange Department Heads  
American Red Cross of Orange County  
California Office of Emergency Services

Dear Orange County Emergency Response and Recovery Officials:

Herewith is presented the Unified County of Orange and Orange County Operational Area Tsunami Annex. This Annex is the foundation for the response and recovery operations from the Operational Area (OA) and County's perspective.

The County of Orange Emergency Management Council (EMC), which governs the County of Orange Emergency Organization, has approved and concurs with this Annex. The Orange County Operational Area Executive Board has approved and concurs with this Annex on behalf of the OA Members. This Annex continues to enhance the County of Orange and Orange County Operational Area's response and recovery capabilities and includes: the Standardized Emergency Management System (SEMS), the National Incident Management System (NIMS), the Incident Command System (ICS) and the duties and responsibilities of the County and its departments in preparedness, response, and recovery procedures. A copy of the Unified County of Orange and Orange County Operational Area Tsunami Annex. may be obtained through the Orange County Sheriff's Department, Emergency Management Division.

This Annex is a compilation of multiple public agencies, special districts, private partners and nonprofit organizations, all with disaster response interests. The Unified County of Orange and Orange County Operational Area Tsunami Annex. is linked to jurisdiction, discipline and mutual aid plans and standard operational procedures through the County of Orange and Orange County Operational Area Emergency Operations Plans.

This Annex is designed as a reference and guidance document. Its successful implementation is, as always, dependent upon the skills and abilities of the County participants. Continued revision and testing of this plan will ensure its viability and appropriateness in future events. We look to you as members of the County of Orange and Orange County's Operational Area Emergency Response Organization to assist in the ongoing process of program and capability improvement. Use of this Annex when responding to the EOC and during exercises will continue to enhance our ability to respond.

Sincerely,  
  
County of Orange  
Emergency Management Council  
Chair

Sincerely,  
  
Orange County  
Operational Area Executive Board  
Chair

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## Record of Changes

<b>Date of Revision</b>	<b>Revision Description</b>	<b>Section/Component</b>	<b>Revision Completed By</b>
3/2010	Notification Lists	Attachments	Emergency Management Division
4/2011	Notification Lists include additional jurisdictions and agencies	Attachments	Emergency Management Division
4/2011	Position Checklists	Attachments	Emergency Management Division
4/2011	Conference Call procedures	Attachments	Emergency Management Division
3/2014	Plan revision utilizing new format	Plan and attachments	Emergency Management Division
6/2014	Notifications and Tsunami specific position checklists	Attachments	Emergency Management Division
7/2014	Update reference to Disabilities and Access and Functional Needs laws and regulations	Throughout the Tsunami Annex	Emergency Management Division
3/2017	Control One Notification listings	Attachments	Emergency Management Division
11/2017	California Tsunami Evacuation Playbooks	Added city evacuation playbooks to attachments	Emergency Management Division
3/2018	California Maritime Tsunami Playbooks	Added maritime playbooks to attachments	Emergency Management Division

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## Plan Distribution

The Orange County Sheriff's Department, Emergency Management Division (EMD) is responsible for developing, maintaining and distributing the Tsunami Annex.

EMD will make the Tsunami Annex available to all county departments, OA jurisdictions, California Office of Emergency Services (Cal OES) and other partner organizations as necessary and upon request. An electronic version is available through WebEOC in PrepareOC. Additionally hard copies are available at the EOC and EMD staff have remote access to all plans and annexes.

## Disclosure Exemptions

Portions of this document contain sensitive information pertaining to the deployment, mobilization, and operations of the County, OA and OA jurisdictions in response to emergencies. The majority of this plan is available for public review however, portions that include personal privacy information or information with significant implications on city, regional, state, or national security are placed in attachments that are exempt from public disclosure under the provisions of the California Public Records Act §6254.

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## Chapter 1 Introduction

### 1.1 Purpose

The Orange County Emergency Management Organization (OCEMO) and the Emergency Management Sub-Committee (EMC Sub Committee) created the Tsunami Planning Sub-Committee under the authority of the Orange County Operational Area Executive Board and the County of Orange Emergency Management Council to develop a Tsunami Annex to address the issues of mutual interest to the members of the Operational Area (OA) and the County of Orange in response to a tsunami incident.

The County and the Operational Area Tsunami Annex is a document intended to be used in support of and in conjunction with local jurisdictional and State emergency plans. Its purpose is to provide an overview of the tsunami threat and the existing plans, procedures and response protocols within the County and Operational Area that would be implemented in the event of a tsunami affecting the coastal areas within Orange County.

The concepts and procedures within this document conform to guidelines delineated by:

- National Oceanic and Atmospheric Administration's (NOAA) National Tsunami Hazard Mitigation Program.
- U.S. Department of Homeland Security's National Incident Management System (NIMS).
- California Standardized Emergency Management System (SEMS).
- California Office of Emergency Services (Cal OES) Local Planning Guidance on Tsunami Response.
- TsunamiReady™ Guidelines.
- Unified County of Orange and Orange County Operational Area Emergency Operations Plan.

This plan will only address tsunami specific issues and those items that are different from normal operations and procedures outlined in the Unified County of Orange and Orange County Operational Area Emergency Operations Plan.

### 1.2 Situation Overview

A tsunami (seismic sea wave) is a series of waves most commonly caused by an earthquake beneath the sea floor or by a large undersea landslide. In the open ocean, tsunami waves travel at speeds of up to 600 miles per hour but their wave height is generally too small to be observed. As the waves enter shallow water, they slow down and may rise to several feet or, in rare cases, tens of feet. Tsunamis can cause great loss of life and property damage where they come ashore. The first wave is almost never the largest; successive waves may be spaced tens of minutes or longer apart and continue arriving for many hours. Since 1812, the California coast has had 14 tsunamis with wave heights higher than three feet; six of these were destructive. The Channel Islands were hit by a damaging tsunami in the early 1800s. The worst tsunami resulted from the 1964 Alaskan earthquake and caused 12 deaths and at least \$17 million in damage to northern California. Two general types of tsunamis could affect the coastal areas of California:

- ***Local tsunami (also called near-source):*** If a large earthquake or undersea landslide occurs at or near the California coast, the first waves may reach coastal communities within minutes. There may be little or no time for authorities to issue a warning. Mitigation requires an understanding of areas at risk, areas of safety, evacuation routes, trained first responders and a trained public that understands the need to immediately move inland or to higher ground. Though infrequent,

California has experienced local tsunamis in the past and paleotsunami evidence shows major tsunami impact in the recent geologic past. Risk is considered high along the north coast of California, from Crescent City to Cape Mendocino; moderate south of Cape Mendocino to north of Monterey; high south of Monterey to Palos Verdes; and moderate south of Palos Verdes to San Diego.

An off-shore earthquake or landslide with a magnitude of 6.8 has the potential to create a local source tsunami which could reach the Orange County coast in 15 minutes.

- ***Distant tsunami (also called distant-source):*** Very large earthquakes in other areas of the Pacific Rim may also cause tsunamis which could impact California's coast. The first waves would reach Orange County's coastline many hours after the earthquake occurred. Tsunami Warning Centers are responsible for alerting local officials and it is the local officials who may order evacuations. Effective mitigation requires an understanding of the tsunami warning system, local areas of risk, public education, and evacuation planning and exercises.

### 1.2.1 The Tsunami Threat in Southern California

History has shown that the probability of a tsunami in Orange County is low. However, if a tsunami should occur, the consequences would be great. As shown on the tsunami run-up maps, the entire 42 miles of the Orange County coastline could be impacted. Coastal communities are densely populated, making evacuations especially difficult. Local jurisdictions must determine the number of residents who will require evacuation. Other factors impacting evacuation include the time of day, the time of year, road conditions, tourist population, and sporting and social events. The impact could cause loss of life, destroy thousands of homes, greatly affect coastal businesses, and impact tourism. Even if all residents and visitors were safely evacuated, the damage to property in this densely populated, high property value area would still be tremendous.

There is concern that a Cascadia event may have significant impact on Southern California, similar to those experienced in Crescent City after the 1964 Alaskan earthquake, since the distance between Cascadia and Southern California is about the same as the distance from Alaska to Crescent City. Indeed, tide gauges in Santa Barbara detected the tsunami generated by the April 25, 1992 Cape Mendocino earthquake. While not damaging, this event indicates that the Southern California coastline is vulnerable to Cascadia events. Several poorly documented local tsunamis caused some damage to southern California communities in the 1800s. Historic records suggest that three tsunamis produced flooding in the Santa Barbara area during this period.

In addition, the Working Group on California Earthquake Probabilities of the Southern California Earthquake Center (SCEC) had identified the Palos Verdes, Santa Cruz Island and Santa Rosa Island faults as active and potentially tsunamigenic. The displacement between the North American and Pacific plate is accommodated in part by the movements along strike-slip faults, some of which are in the offshore borderland. Strike-slip faults were not believed capable of generating damaging tsunamis before the 1994 Mindoro, Philippines event when a strike-slip onshore fault generated a tsunami large enough to move a 6,000-ton barge one mile inland. There is also suggestive evidence of episodes of vertical displacement capable of conventional tsunami generation associated with the offshore extension in the Palos Verdes fault.

The impacts of an earthquake on the Palos Verdes fault, and the resulting tsunami, may affect the Ports of Long Beach and Los Angeles, like the 1964 Alaska earthquake affected Anchorage. The resulting damage would be far larger than the \$17 million in damage seen in 1964 in Crescent City. Recent field surveys and modeling (1992-1996) by Professor Costas Synolakis of the University of Southern California

have projected a 4 meter (13 feet) tsunami that would cause extensive damage and flooding along flat coastlines such as those in Santa Monica Bay or in Orange and San Diego Counties. Communities that are sandwiched between the ocean and other bodies of water such as wetlands, river inlets, or salinas are at very high risk due to the possible overland flow and simultaneous tsunami attacks from multiple directions.

The dense land use in Southern California and the continued development in areas exposed to coastal and riverine inundations have increased the risk of property damage and loss of life from future tsunamis. Even in locales where the tsunami hazard may be small, the land use development in areas subject to inundation and ground subsidence increases the overall risk. The rapid arrival of waves from a local event and the long duration of tsunami wave action intensify the risk from local events. Future tsunamis may cause economic losses in coastal communities' dependent on marine or harbor commerce. Losses to the tourist industry, harbor facilities in the Ports of Los Angeles, Long Beach, and San Diego as well as small craft harbors in Orange County could be very high, even in small events. Seiching would occur in harbors magnifying the effect of the Tsunami. Additional risk is posed by the potential release of toxic pollutants due to the failure of marine oil-transfer facilities and terminals.

Coastal jurisdictions within Orange County that could be directly impacted by a tsunami include, from north to south:

- Seal Beach
- Huntington Beach
- Newport Beach
- Laguna Beach
- Emerald Bay (County unincorporated area)
- Dana Point
- San Clemente
- County Beaches

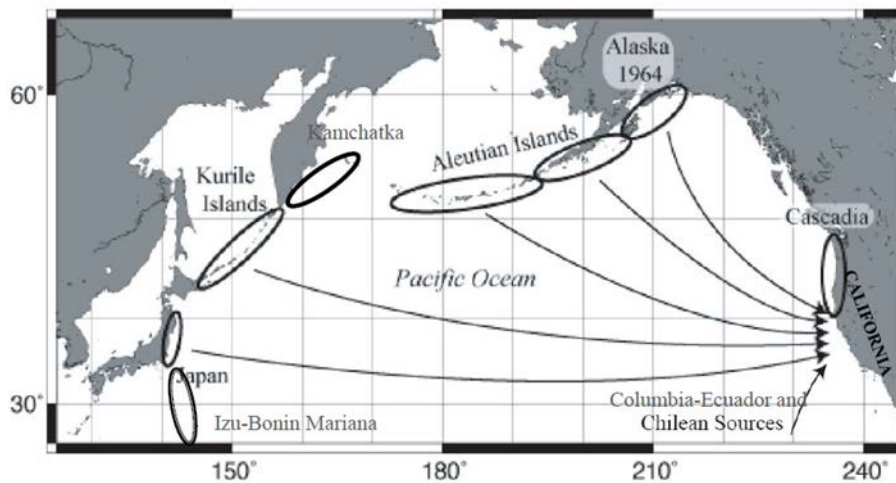
Other potentially impacted jurisdictions or agencies include:

- State of California Parks and Recreation
- Orange County Sanitation District
- Orange County Water District

## Tsunami Source Scenario Model Results for Orange County

Near shore tsunami heights (flow depths) for both local and distant source scenarios, in FEET above Mean Sea Level. NOTE: The projections do not include any adjustments for ambient conditions, such as storm surge and tidal fluctuations, and model error (it is very important to note this difference, as those numbers can increase the projected water height during an event).

	TSUNAMI SOURCES	Approximate Travel Time	Seal Beach	Seal B. Naval Harbor	Sunset Beach	Hunt. Beach	Newport Beach	Crystal Cove	Laguna Beach	Aliso Beach	Dana Point	San Clemente
Local Sources	M7 Newport-Inglewood Fault	10-15min	2	3	3	2	2	2				
	M7.1 San Mateo Thrust Fault	10-15min								7	13	16
	M7.1 Oceanside Thrust Fault	15-20min								6	4	
	Palos Verdes Landslide 1	15-20min	5	5	10	10	3	3				
	Palos Verdes Landslide 2	15-20min	5	5	13	11	3	3	3	3		
	M7.7 Catalina Fault	20-30min	8	8	7	11	13	11	10	7	7	7
Distant Sources	M9 Cascadia-full rupture	2hr	4	4	3	3				3	3	3
	M9.2 Alaska 1964 EQ	6hr	10	6	6	6	3	4	4	4	6	5
	M8.9 Central Aleutians I	6hr	5	5	4	4				3	4	4
	M8.9 Central Aleutians II	6hr	3	3	3	3				3	3	3
	M9.2 Central Aleutians III	6hr	14	10	9	9	6	6	6	7	8	6
	M9 Kamchatka 1952 EQ	9hr								3		3
	M8.8 Kuril Islands II	10hr	2	3	2	2				2	3	2
	M8.8 Kuril Islands III	10hr	2	3	2	2				2	3	2
	M8.8 Kuril Islands IV	10hr	3	3	2	2				2	3	2
	M8.8 Japan II	11hr	3	3	3	2				2	3	2
	M9.5 Chile 1960 EQ	13hr	10	5	5	5	3	3	3	3	4	4
M9.4 Chile North	13hr	10	6	7	8	4	4	4	4	4	4	
<b>Maximum Runup - Local Source</b>			<b>9</b>	<b>9</b>	<b>14</b>	<b>12</b>	<b>14</b>	<b>12</b>	<b>11</b>	<b>8</b>	<b>15</b>	<b>17</b>
<b>Maximum Runup - Distant Source</b>			<b>15</b>	<b>11</b>	<b>10</b>	<b>10</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>8</b>	<b>10</b>	<b>8</b>



### 1.3 Scope

[OVA1] Response organization representatives supporting the County and OA Emergency Operations Center (EOC) during a tsunami event should:

- Know what they and other organizations are responsible for doing,
- Know how to perform their functions,
- Avoid inefficiencies, duplications and oversights in performing functions, and
- Be able to effectively coordinate response operations across organizations and jurisdictions.

### 1.4 Planning Assumptions

- History has shown the probability of a tsunami in Orange County is low. However, if a sizeable tsunami should occur, there is potential for the consequences to result in catastrophic damage to life and property.
- There are two types of tsunamis: local (sometimes called near-source), and distant (sometimes called distant-source). To eliminate confusion this plan will use these two terms.
- For most distant tsunami events, at least five to nine hours warning time may be available to warn the public, evacuate critical facilities, establish temporary shelters, and secure the coastal areas.
- A local tsunami could strike with little or no warning. An Orange County off shore fault could cause a tsunami that impacts Orange County coastline in as little as 15 minutes.
- For most events, the National Tsunami Warning System will take several minutes to develop and deliver a warning message via California Law Enforcement Teletype (CLETS) to the Orange County Sheriff's Department Emergency Communications Bureau (ECB), Control One. It will take several minutes for the National Weather Service to activate the Emergency Alert System (EAS). Local public safety agencies will initiate response upon receipt of the warning.
- After the arrival of the first wave, waves may continue to arrive at intervals for several hours. Risk areas can be reopened for public safety access two hours after the last observed wave, or two hours after the Expected Time of Arrival (ETA) has passed without a wave coming ashore.
- The first wave may not be the largest. The largest usually occurs within the first ten waves.
- 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 32 feet or 10 meters, but can vary considerably from one location to another.
- Media interest will be significant for any Tsunami Watch, Advisory or Warning. Media coverage and alert and warning messages may cause the public to call 911 or other emergency numbers for more information.
- A Tsunami Advisory or Warning may attract sightseers to the beaches.
- Within the Inundation Risk Area, special institutions such as schools, hospitals, and nursing homes are located within risk areas. Local jurisdictions should plan with these special institutions to ensure they are prepared to respond to a tsunami incident.

- Using this Annex as a guide, county departments and coastal jurisdictions with assigned responsibilities should prepare standard operating procedures and checklists to support this Annex.
- In planning for a potential tsunami, a regional approach fits the needs of the County and the OA.
- As the Warning Point for all of Orange County, Orange County Sheriff's Department, Emergency Communications Bureau, Control One is tasked with notification and early warning upon receipt of a tsunami watch, advisory and warning.
- The County and OA Tsunami Annex is:
  - Linked to jurisdiction, discipline, and mutual aid plans and standard operational procedures.
  - An operating plan including checklists, resource lists with actual response capability, support needs, time frames, and contact lists.
  - Based on the Unified County and OA Emergency Operations Plan, procedures and organizations.
  - Focused on issues unique to the tsunami hazard including alert and warning, public notification and evacuation.
  - Based on Standardized Emergency Management System (SEMS), National Incident Management System (NIMS) and the Incident Command System (ICS).

## 1.5 Preparing and Responding with the Whole Community Strategy<sup>[OVA2]</sup>

The County of Orange strives to incorporate the Whole Community perspective in its emergency planning and encourages Operational Area jurisdictions to do the same. By planning for the Whole Community, complexities in the diversity in Orange County are assimilated into the County planning strategy.

Orange County's definition of disabilities and access and functional needs is as follows:

*Populations whose members may have additional needs before, during, and after an incident in functional areas, including but not limited to: maintaining independence and the ability to perform the activities of daily living, communication, transportation, supervision, and medical care. Individuals in need of additional response assistance may include those who have disabilities; who live in institutionalized settings; who are elderly; who are children; who are from diverse cultures; who have limited English proficiency or are non-English speaking; or who are transportation disadvantaged.*

Having recognized the need to be inclusive in its emergency planning, the County of Orange, Emergency Management Council and the Orange County Operational Area Executive Board formed the Orange County Disabilities and Access and Functional Needs (DAFN) Working Group in 2011 to strengthen partnerships with the disability community and others with access and functional needs. This team includes representatives from county agencies, local jurisdictions and nonprofit organizations serving people with disabilities and access and functional needs in Orange County. This group's instrumental efforts have turned the Operational Area towards more inclusive emergency planning for the Whole Community. This group reviewed the *Tsunami Annex* in March 2018 and provided valuable feedback.

In order to meet the unique needs of children in disasters, the Operational Area formed the Kids in Disasters (KIDS) Working Group as a sub-committee of the Disabilities and Access and Functional Needs Working Group. The mission of the working group is to engage public and private community,



government and healthcare organizations and individuals to promote coordinated efforts and partnerships to ensure that infants' and children's needs are met before, during, and after disasters. Integrating children (0-18) into disaster planning requires special emergency preparedness and planning. Disasters have proven evident that children are vulnerable and require additional support during emergency situations, especially when displaced from their parents or guardians. The physical and psychological damage sustained by children can far outweigh the same effects inflicted on grown members of society, including children with disabilities and access and/or functional needs. The KIDS Working Group will assist in identifying and supporting community programs that help meet the physical, mental, and emotional needs of children in disasters.

Furthermore, the County of Orange is committed to maximizing compliance with the Americans with Disabilities Act and providing the best service to Orange County Residents and visitors. As such, the County of Orange adheres to and encourages Operational Area jurisdictions to follow the policy below:

- Disability will not prevent accessibility to services or facilities provided.
- Will not exclude or deny benefits of any sort.
- Work to accommodate people with disabilities and access and functional needs in the most integrated setting possible.
- During all phases of disaster response, reasonable modifications will be made to policies, practices and procedures, if necessary, to ensure programmatic and architectural access to all.
- Shelter people with disabilities and access and functional needs with their families, friends and/or neighbors and in the most integrated setting possible.[OVA3]

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## Chapter 2 Concept of Operations

The Concept of Operations addresses the potential issues associated with tsunamis occurring in or affecting the County and OA. The Concept of Operations outlines the roles and responsibilities of the County and OA in order to reduce loss of life. The document outlines actions and notifications associated with “triggers.” These “triggers” are based on the categories of tsunami messages issued by the National Tsunami Warning Center (NTWC), National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS): tsunami information statement, watch, advisory or warning.

The goal is to ensure a coordinated response to tsunami related emergencies in Orange County and provide support to jurisdictions of the Operational Area, using interagency coordination in accordance with the Unified County and OA Emergency Operations Plan, the California Emergency Services Act, SEMS and NIMS.

### 2.1 Direction, Control, and Coordination

A tsunami event will require multi-agency, multi-discipline coordination at all levels, including first responders. A unified command will be established from the various agencies with responsibility for the incident. The unified command will facilitate coordination among agencies and disciplines.

#### 2.1.1 Objectives

- Protection of life, property and the environment.
- Alerting and warning the public including people with disabilities and those with access and functional needs.
- Evacuation of the public and people with disabilities and those with access and functional needs.
- Care and shelter of large numbers of people.
- Search and rescue operations including water rescues.
- Environmental and public health concerns.
- Debris removal.
- Animal care issues, including care, shelter, and possible public health concerns.

### 2.2 Notifications

Time sensitive and accurate alerts and notifications are critical in the event of a tsunami. In order to get the emergency message out in as timely a manner as possible there are multiple communications systems available to government agencies.

#### 2.2.1 National Oceanic and Atmospheric Administration (NOAA)

The tsunami warning system for the United States is a function of NOAA NWS.

NOAA has two warning centers that cover the Pacific Ocean:

- National Tsunami Warning Center (NTWC) in Palmer, Alaska \*\* This is the only center that issues information for the California Coast.
- Pacific Tsunami Warning Center (PTWC) in Ewa Beach, Hawaii, this center issues information for the Pacific Ocean, Hawaii, Caribbean and the Indian Ocean.

To accomplish its mission of providing accurate and timely tsunami bulletins to its area of responsibility which includes Canadian coastal regions and ocean coasts of all U.S. States except, Hawaii, the NTWC detects, locates, sizes and analyzes earthquakes throughout the Pacific, Atlantic and Arctic basins. Earthquakes that activate the center’s alarm system initiate a earthquake and tsunami investigations which includes the following four basic steps:

- Automatic locating and sizing the earthquake.
- Earthquake analysis and review.
- Sea level data analysis to verify the existence of a tsunami and to calibrate models.
- Disseminating information to the appropriate emergency management officials.

Tsunami bulletins are issued to state departments of emergency services, federal disaster preparedness agencies, National Weather Service offices, Canada’s Atlantic Storm Prediction Center, Federal Aviation Administration offices, and the U.S. Coast Guard, military bases, local emergency managers, United States Geological Survey offices and many other recipients located in the U.S and Canada. Earthquakes large enough to be felt near the coast, but below the tsunami warning threshold size, prompt informational statements to the same recipients to help prevent needless evacuations.

<http://ntwc.arh.noaa.gov>

NOAA issues four categories of tsunami messages:



- *Tsunami Information Statement* – A tsunami information statement is issued when an earthquake or tsunami has occurred of interest to the message recipients. In most cases, information statements are issued to indicate there is no threat of a destructive basin-wide tsunami and to prevent unnecessary evacuations. Information statements for distant events requiring evaluation may be upgraded to a warning, advisory, or watch based on updated information and analysis.
- *Tsunami Watch* –A tsunami watch is issued when a tsunami may later impact the watch area. The watch may be upgraded to a warning or advisory or canceled based on updated information and analysis. Emergency management officials and the public should prepare to take action.

- *Tsunami Advisory* – 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 may be updated, adjusted geographically, upgraded to a warning, or cancelled based on updated information and analysis.
- *Tsunami Warning* – A tsunami warning is issued when a tsunami with the potential to generate widespread inundation is imminent, expected, or occurring. Warnings alert the public that dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after initial arrival. Warnings alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas, and the repositioning of ships to deep waters when there is time to safely do so. Warnings may be updated, adjusted geographically, downgraded, or canceled based on updated information and analysis. The National Weather Service will activate the Emergency Alert System (EAS) automatically in the event of a Tsunami Warning.
- A *cancellation* is issued after an evaluation of water-level data confirms that a destructive tsunami will not impact an area under a warning, advisory, or watch or that a tsunami has diminished to a level where additional damage is not expected.

### 2.2.2 California State Warning Center

The California State Warning Center (CSWC) is responsible for informing, communicating, alerting and notifying local governments, Operational Areas, state officials and the Federal Government of natural or human caused emergencies. The CSWC is equipped with a number of telephone, data and radio systems, including the California Warning System, California Law Enforcement Teletype System (CLETS), NWS Weather Wire, CSWC message switching computer, Emergency Digital Informational Service (EDIS) and Dialogic Automated Notification System, all of which are described below.

- **California Warning System (CALWAS)**

The CSWC maintains the California Warning System (CALWAS) to communicate with Cal OES Regional Offices and County Warning Points during an emergency. CALWAS is part of the National Warning System (NAWAS). Components of CALWAS include the following:

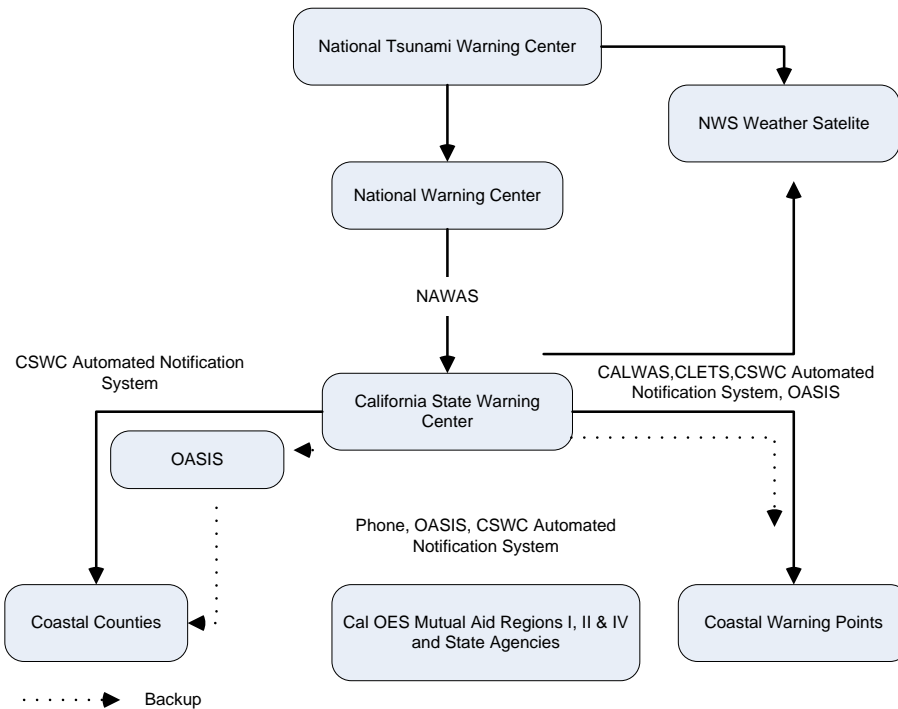
- California Law Enforcement Teletype System (CLETS).
- Operational Area Satellite Information System (OASIS).
- Dialogic Automated Notification System.

- **Emergency Digital Information Service (EDIS)**

Emergency Digital Information Service (EDIS) delivers information about emergencies and disasters to emergency management, the public and news media in California. The statewide EDIS network was upgraded to add sound and image capabilities and to use an advanced satellite data-cast for reliable statewide service.

**\*\* Note: The California Warning Center may provide verbal information via the CALWAS system of a bulletin to be issued for a distant event. The Operational Area will not take any action until a written bulletin is sent from the NTWC or obtained confirmation from their website <http://ntwc.arh.noaa.gov>**

**California State Warning Center Tsunami Notification Flow Chart**



**2.2.3 Orange County Operational Area**

The centralized warning point for the County of Orange and Orange County Operational Area is the Orange County Sheriff’s Department, Emergency Communications Bureau, Control One. The personnel at Control One are responsible for notifying appropriate county agencies, city warning points, and the County emergency management staff. Control One can notify via several different means simultaneously.

Throughout Orange County, Law Enforcement Agencies are the lead and responsible for alerting and warning the public of impending disasters. Other departments including Fire and Marine Safety Departments will assist in warning the public in a tsunami event.

When the Orange County Operational Area receives a warning that should be disseminated to its local jurisdictions, departments, Orange County Sheriff’s Department, Emergency Communications Bureau, Control One will use the following systems:

- Landline – Dispatch to Dispatch System- interconnects dispatch centers so they are able to directly communicate.
- General 800 MHz Radio Broadcast – to law enforcement, fire, lifeguard, public works and emergency medical services.
- CLETS Teletype - to all police departments to forward to emergency services personnel and city management.
- Hospital Emergency Administration Radio (HEAR) and ReddiNet system for hospitals.
- Telephone - to emergency services offices, police and fire departments.

*Control One will contact the following jurisdictions and agencies directly to ensure these agencies have copied the message and to provide conference call information.*

<b>Impact Area</b>	<b>Responsible Jurisdiction</b>	<b>Alert and Warning</b>
Seal Beach	City of Seal Beach	Seal Beach Police Department
Huntington Beach	City of Huntington Beach	Huntington Beach Police Department
Newport Beach	City of Newport Beach	Newport Beach Police Department
Laguna Beach	City of Laguna Beach	Laguna Beach Police Department
Dana Point	City of Dana Point	Orange County Sheriff's Department
San Clemente	City of San Clemente	Orange County Sheriff's Department
County Unincorporated	County of Orange	Orange County Sheriff's Department

#### 2.2.4 Local Jurisdictions

Coastal jurisdictions are responsible for identifying and developing their own internal notification protocols.

### 2.3 Conference Call

For a Distant Event, Control One will notify the County and OA Emergency Manager and brief on the Tsunami Bulletin (Watch, Advisory, Warning) received and request a conference call time. The conference call should take place 45-60 after written notification from the NTWC.

For a Near-Shore, Earthquake Event with a magnitude greater than 6.8, the conference call will take place 1 hour after the initial earthquake due to the possibility of an imminent tsunami occurring within 15 minutes of the earthquake. Local jurisdictions shall just react in cases such as these and have emergency response protocols in place.

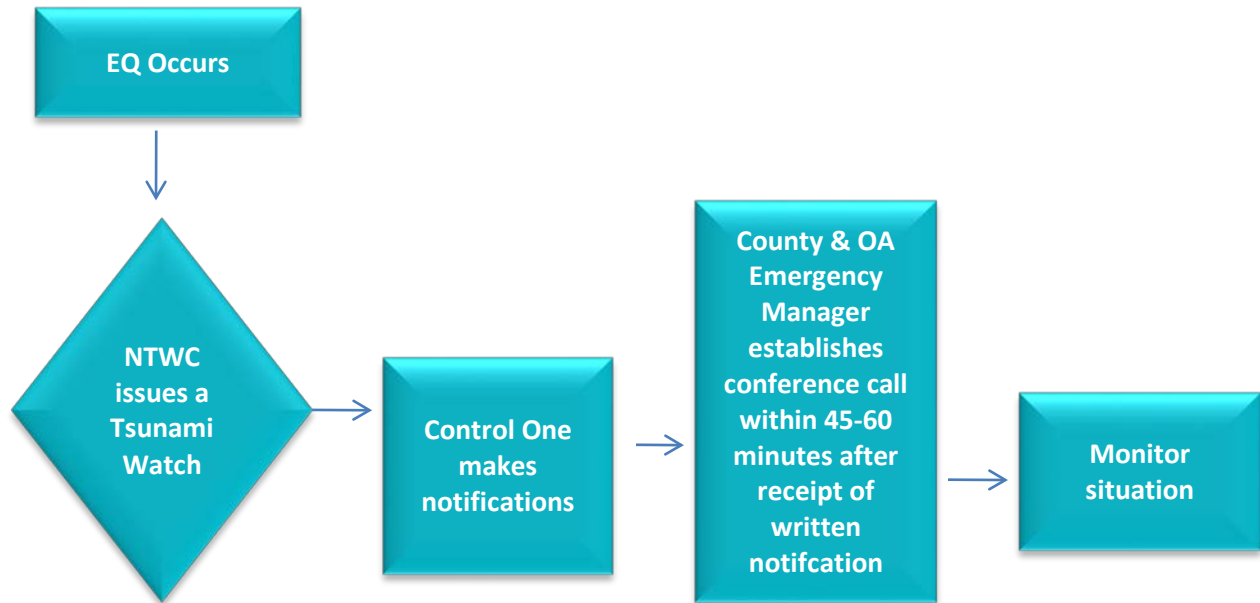
### 2.4 Associated Action and Tasks

The Unified Orange County Operational Area and County of Orange Emergency Operations Plan is the foundation document when speaking to systems and processes; however, during a tsunami event, the Tsunami Working Group has agreed to the following action specific to this type of event.

The following sections outline and present flow charts describing what those actions are and how decisions are arrived at by the Operational Area, and recommended positions for County and OA EOC activation levels.

### 2.4.1 Tsunami Watch

**Tsunami Watch Flow Chart**



#### **Tsunami Watch Actions and Tasks**

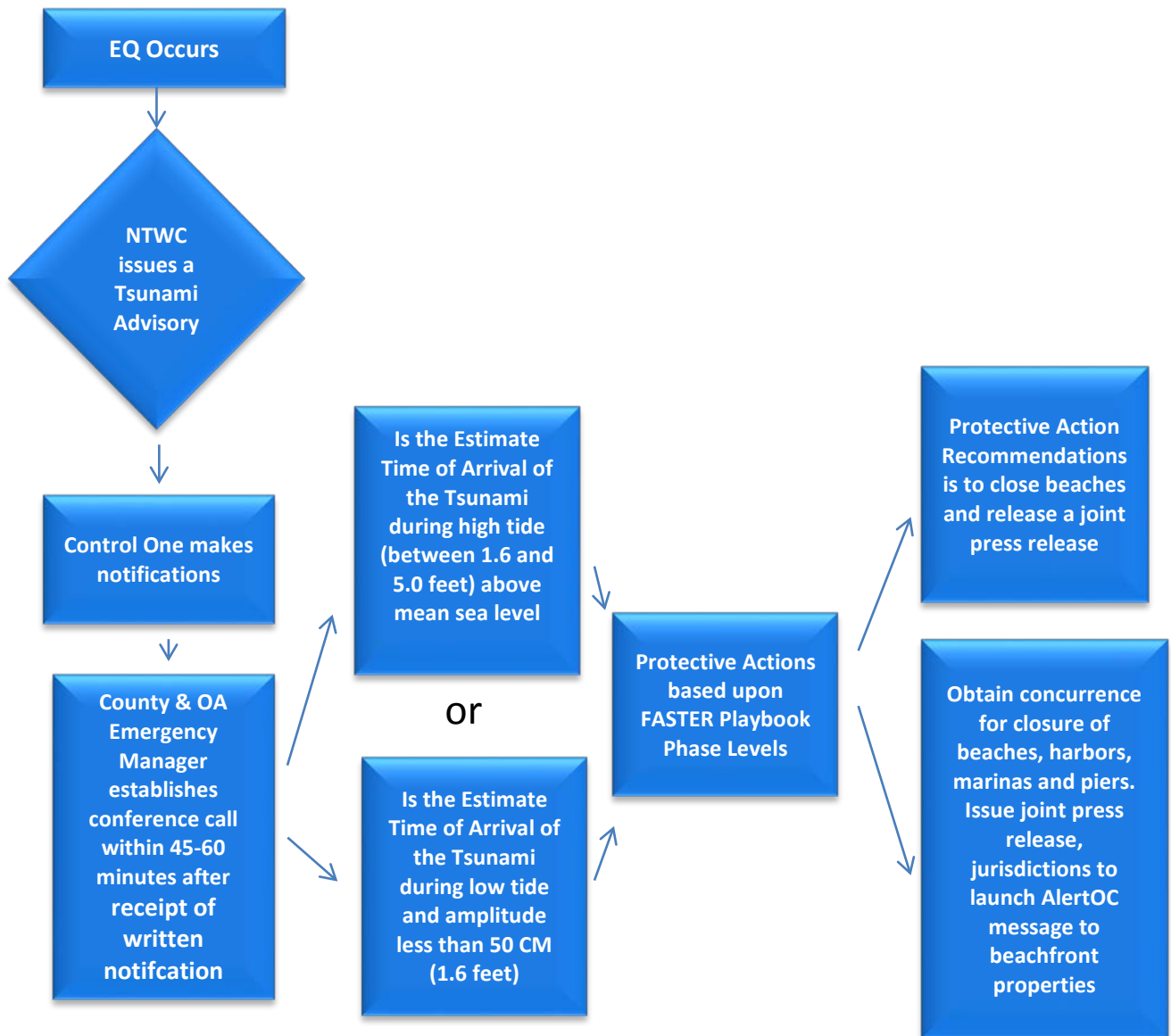
- Control One to notify all coastal jurisdictions and agencies per protocols established for a Tsunami Watch.
- Sheriff's Department Commander to notify jurisdictions and Sheriff's Department personnel per protocols established for a Tsunami Watch.
- Emergency Management Division will establish a conference call with coastal jurisdictions, agencies, Sheriff's Department personnel and NWS to discuss current situation and possible changes.
- No EOC activation.
- Tsunami Watch forwarded to OA.
- Monitor pertinent news and media coverage.
- Maintain a log of all related activities.



2.4.2 Tsunami Advisory

A Tsunami Advisory may involve the movement of people directly in contact with the ocean, as an advisory may cause strong currents and riptides. Protective action may include harbors, beaches and piers. See below.

**Tsunami Advisory Flow Chart**



**Tsunami Advisory Actions and Tasks**

- Control One to notify all jurisdictions and agencies per protocols established for a Tsunami Advisory.
- EOC activated to Level 3 (Low Level).
- Sheriff’s Department Commander to notify jurisdictions and Sheriff’s Department personnel per protocols established for a Tsunami Advisory.

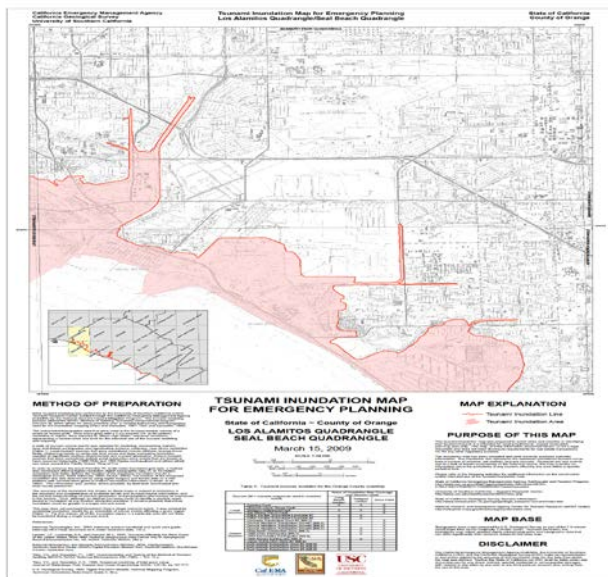
- Emergency Management Division will establish a conference call with coastal jurisdictions, agencies, Sheriff’s Department personnel and NWS to discuss potential beach closures and evacuations.
- Tsunami Advisory forwarded to OA.
- Monitor and notify jurisdictions and agencies if event is upgraded to a Tsunami Warning or cancellation of the Advisory.
- Monitor pertinent news and media coverage.
- Maintain accurate and detailed log of all related activities.

If a Tsunami Advisory is issued, the County and OA EOC will activate to a Level 3 (lowest level) depending on the predicted location of the event and impacts. The following positions may be staffed during a Level 3 (lowest level) activation.

<b>Level 3 - Agency Responsibility Matrix</b>	
Director of Emergency Services/Operational Area Coordinator	OCSO
County and OA EOC Manager	EMD Director or Manager
Public Information Officer	OCSO
Emergency Management Division	Staff

### 2.4.3 Tsunami Warning

Tsunami Warning may involve inland inundation and evacuation of the public. The impact of inundation is dependent on the location where the tsunami initiated, topography, tide, storm surge, and other factors. To assist with decision making and planning, the creation of Tsunami Warning Playbooks by experts at the state level assists with targeted evacuation zones during a warning where smaller tsunami waves are predicted, more on this playbook concept is explained in the next section.



Additionally, the California Office of Emergency Services (Cal OES) has produced maps of the shoreline in Orange County. These maps indicate worst case scenario for the Orange County coastline affected by the threat of a tsunami. An example of these maps is to left, and a complete set of maps is located in Appendix B . Digital copies of these maps are available in PrepareOC or online at:

[http://www.conservation.ca.gov/cgs/geologic\\_hazards/Tsunami/Inundation\\_Maps/Orange](http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Orange)

2.4.4 Tsunami Warning Playbooks (Attachment Q and R)

Scenario-based tsunami playbooks and guidance have been developed for maximum local and distant tsunamis, and for tsunamis coming from the Cascadia Subduction zone toward central and southern California. Scenario playbook information about the expected tsunami amplitude, tsunami travel time, and map of source regions is available from the numerical modeling results for these sources. These are important scenarios for emergency managers to prepare for as there could only be tens of minutes to evacuate or just a few hours to conduct response or evacuation activities before the tsunami arrives. Because of the short time for making response decisions, the following evacuation and response plans are recommended for all of Orange County.

FASTER Formula

- FASTER is an acronym that includes the variables for calculating the most conservative, yet accurate, localized run-up and flood elevation that the tsunami could reach at a particular part of our coastline.
- FASTER is a simple analytical tool that incorporates real-time tsunami **F**orecast **A**mplitudes (wave heights), **S**torm and **T**idal conditions, potential tsunami forecast **E**rrors, and site-specific tsunami **R**un-up potential on land to determine a more exact tsunami flood height along the coast.

The FASTER formula for is as follows:

- FA:** **Forecasted Amplitude** of maximum tsunami wave (in NTWC bulletin)
- + **S:** Storm **surge** or existing ocean conditions for first five hours of tsunami
- + **T:** Maximum **tidal** height for first five hours of tsunami
- + **E:** Forecast **error** potential - 30% (FA x 0.3)
- + **R:** Site-amplified **run-up** potential (FA x 0.1) (add if inundation is expected)
- = **FASTER Tsunami Flood Level Number** (maximum tsunami run-up height)

**FASTER Flood Values and Associated Evacuation Levels**

Evacuation Level	FASTER Tsunami Flood Value (Above Mean Sea Level)
Phase 1 Evacuation	Less than 1.00 meters (3.3 feet)
Phase 2 Evacuation	1.00 – 1.50 meters (3.3 – 5.0 feet)
Phase 3 Evacuation	1.50 – 2.50 meters (5.0 – 8.2 feet)
Maximum Evacuation Level	Over 2.50 meters (over 8.2 feet)

Using this formula, the Playbook shows the appropriate tsunami elevation-based evacuation playbook response plan for the resulting FASTER tsunami flood level number. **Once the FASTER value is calculated for each community, it will be used by the state to recommend a specific playbook phase plan to use.** For example, if the FASTER number is 1.3m, the state will recommend as an option that the community could use the Phase 2 Evacuation Plan.


**What’s the difference between what the National Tsunami Warning Center (NTWC) provides and what FASTER provides?**

- The State Tsunami Experts will still be using the tsunami alert messages and forecast amplitude (wave height) numbers from NTWC as the official public information about the tsunami.
- Tsunami Advisories and Warnings from NTWC cover oceans and continental shorelines in scope. They don't include local details like tides, run-up, and storm influences. Rather they model a number which is just offshore (before coming on land).
- FASTER provides more locally detailed information about the true flood potential on which to base local decisions for tsunami evacuation and response.

**How will Playbook Phase recommendation be made?**

- Within 2-3 hours after the tsunami is generated, shortly after forecast data is relayed by NTWC, the FASTER calculation will be completed and used to select correct Tsunami Evacuation Playbook plan for each community along the California coast.
- The State and NWS will recommend and communicate a MINIMUM Evacuation Playbook Phase Plan for each community.
- The Playbook Phase will be directly shared with communities via redundant communication methods: emails, password-protected websites, etc.
- The State and NWS will provide further real-time support through appropriate conference calls, individual phone calls and other avenues to make sure the communities understand what this recommendation means.
- Ultimately, each community is responsible for determining and implementing tsunami evacuations and response. Each community will determine if and how to share the appropriate evacuation plan with their public.

**Example of Information provided during a real time event**



## TSUNAMI PLAYBOOKS

for Orange County  
generated 03-15-2017 07:32pm PDT

RECOMMENDED MINIMUM TSUNAMI EVACUATION AND MARITIME RESPONSE PLAYBOOK PLANS - The following tables provide recommendations for evacuation and maritime response planning for each California community and harbor, respectively. The recommended Evacuation Phase number in Column Two (e.g. Phase 1, Phase 2, etc.) indicates the MINIMUM area to be evacuated by the community according to your emergency response evacuation plan. The recommended Maritime Response Plan letter in the middle column (e.g. Plan A, Plan B, etc.) indicates the MINIMUM Playbook Response plan which should be used by ports, harbors, and marinas covered by that particular response plan.

NOTE: Tsunami evacuation and response activities are the responsibility of the coastal community. This information is provided in support of the Tsunami Evacuation and Maritime Response Playbook Programs and should only be used if the communities/harbors have Playbooks developed and integrated into the tsunami evacuation and response plans. We do NOT recommend using this information unless you fully understand what it means and have the Playbook plans in place. If you do not have Playbooks in place, use your normal evacuation and response plans for Warning or Advisory level events.

Coastal Location	Recommended Minimum Tsunami Evacuation Playbook	FASTER flood elevation (in feet)	FASTER flood elevation (in meters)
Seal Beach	Phase 3	7.58 ft	2.31 m
HB-Sunset Beach	Phase 3	7.58 ft	2.31 m
HB-Bolsa Chica	Phase 3	7.58 ft	2.31 m
HB-South HB	Phase 3	7.58 ft	2.31 m
Newport Beach	Phase 3	7.80 ft	2.38 m
Laguna Beach	Phase 3	7.80 ft	2.38 m
Dana Point	Phase 3	7.80 ft	2.38 m
San Clemente	Phase 3	7.15 ft	2.18 m
SONGS	Phase 3	7.80 ft	2.38 m

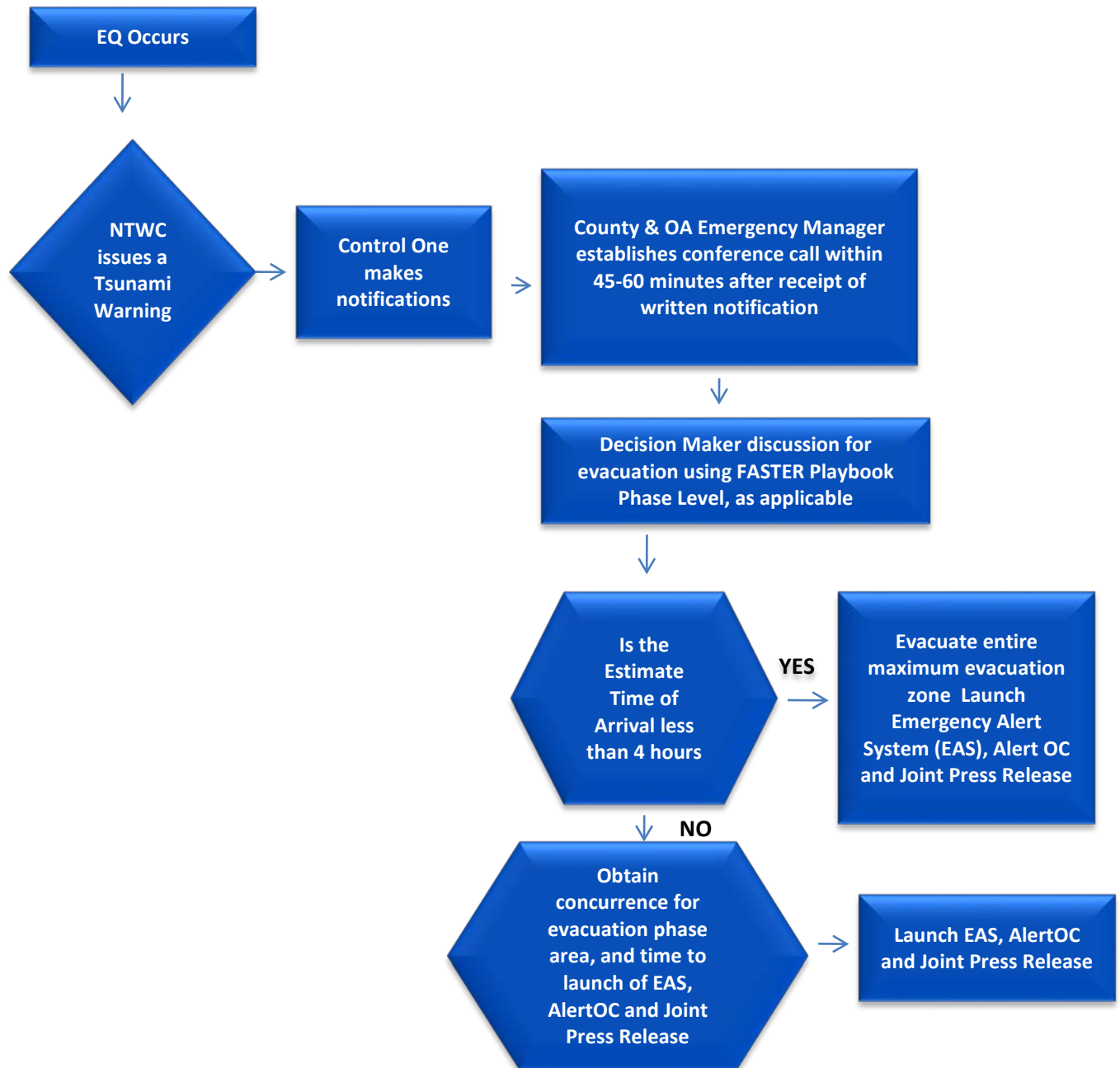
  

Maritime Location	Recommended Minimum Maritime Tsunami Playbook Plan	Amplitude (in feet)	Amplitude (in meters)
Seal Beach/Huntington Harbor	Plan D	3.61 ft	1.10 m
Newport Beach maritime	Plan D	3.31 ft	1.01 m
Dana Point Harbor	Plan D	3.31 ft	1.01 m

NOTE: This information has been reviewed by the State of California and NOAA National Weather Service.

This information will be emailed to emergency managers by CalOES

### Tsunami Warning Flow Chart



#### Tsunami Warning Actions and Tasks

- Control One to notify all jurisdictions and agencies per protocols established for a Tsunami Warning.
- EOC activated to a Level 2 (Moderate Level).
- Control One, when authorized by the Director of Emergency Services, will activate the EAS Message for Tsunami Warning.

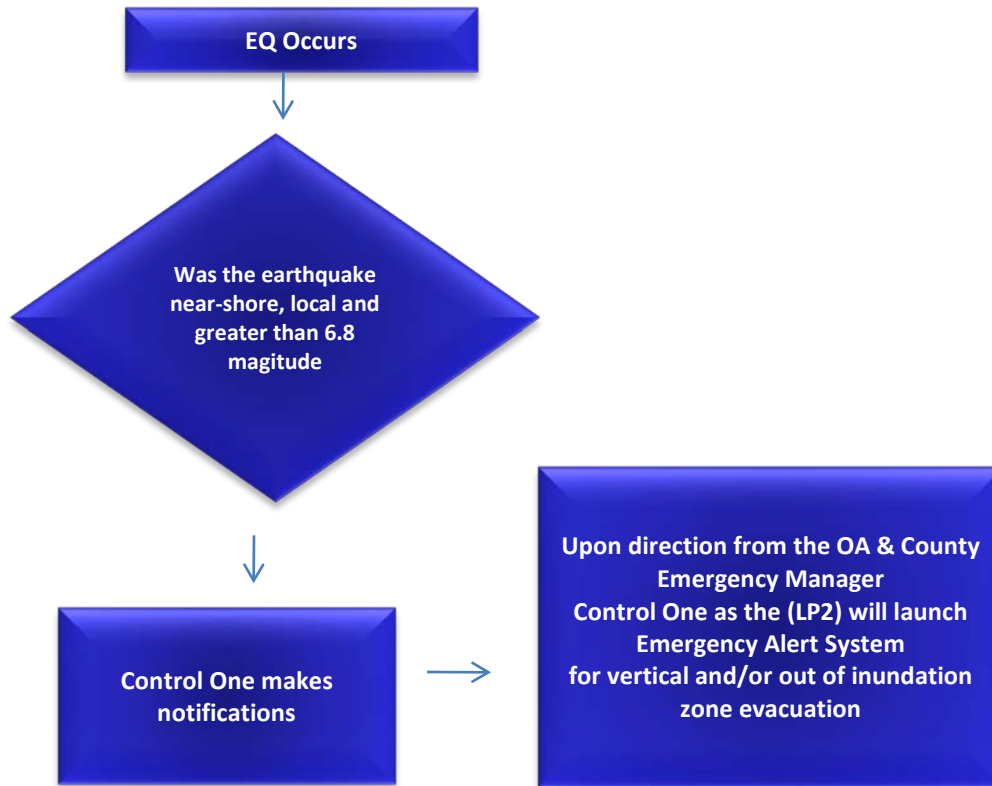
- Sheriff’s Department Commander to notify jurisdictions and Sheriff’s Department personnel per protocols established for a Tsunami Warning.
- Emergency Management Division will establish conference call with coastal jurisdictions, agencies, Sheriff’s Department personnel and NWS to discuss evacuations and maritime evacuations and closures using the FASTER playbook as applicable when ETA is greater than 4 hours. If the ETA of the first wave is less than 4 hours, then the maximum evacuation zone will be applied.
- Issue EAS Message for Tsunami Warning, if not already issued by Control One.
- Tsunami Warning forwarded to OA.
- Monitor pertinent news and media coverage.
- Maintain accurate and detailed log of all related activities.

If a Tsunami Warning is issued, the County and OA EOC will activate to a Level 2 with the following positions staffed:

<b>Level 2 - Agency Responsibility Matrix</b>	
Director of Emergency Services/Operational Area Coordinator	OCSD
County and OA EOC Manager	EMD Director or Manager
Public Information Officer	OCSD
Policy Group	As specified in the Unified County and OA EOP
Public Information Officer (PIO) Support Staff	County PIOs
Public Information Hotline and Rumor Control	County Agencies
Operations Section Chief	OCSD
Law Enforcement & Traffic Control Branch Director	OCSD
Communications/Alert & Warning Unit Leader	OCSD
Health Care Branch Director	HCA
Fire and Rescue Branch Director	OCFA
Public Works and Utilities Branch Director	OCPW
Care and Shelter Branch Director	SSA
American Red Cross Liaison	ARC
Logistics Section Chief	CEO
Resources and Support Unit Leader	CEO
Finance and Administration Section Chief	CEO
Cost Recovery Unit Leader	Auditor-Controller
Planning and Intelligence Section Chief	OCSD
Situation Analysis Unit Leader	OCSD

2.4.5 Tsunami Local Near Shore Earthquake/Immediate Tsunami

**Tsunami Local Near-Shore Earthquake/Immediate Tsunami Flow Chart**



**Local Near-Shore Earthquake/Immediate Tsunami – with insufficient response time or warning – Immediate Actions and Tasks**

- Control One to notify all jurisdictions and agencies per protocols established for a Local Near-Shore Earthquake/Immediate Tsunami.
- Control One, when directed by the County and OA Emergency Manager, will activate the EAS Message for Local Earthquake/Immediate Tsunami.
- Sheriff’s Department Commander to notify jurisdictions and Sheriff’s department personnel per protocols established for a Tsunami Local Earthquake/Immediate Tsunami.
- Activate EOC to Level 2 (Moderate Level).
- Local Tsunami Event notification forwarded to OA.
- Prepare subsequent event updates, for release to the media.
- Monitor pertinent news and media coverage.

If there is a Local Tsunami event, the County and OA EOC will activate to a minimum Level 2 with the following positions staffed:

<b>Level 2 - Agency Responsibility Matrix</b>	
Director of Emergency Services/Operational Area Coordinator	OCSD

County and OA EOC Manager	EMD Director or Manager
Public Information Officer	OCSD
Policy Group	As specified in the Unified County and OA EOP
Public Information Officer (PIO) Support Staff	County PIOs
Public Information Hotline and Rumor Control	County Agencies
Operations Section Chief	OCSD
Law Enforcement & Traffic Control Branch Director	OCSD
Communications/Alert & Warning Unit Leader	OCSD
Health Care Branch Director	HCA
Fire and Rescue Branch Director	OCFA
Public Works and Utilities Branch Director	OCPW
Care and Shelter Branch Director	SSA
American Red Cross Liaison	ARC
Logistics Section Chief	CEO
Resources and Support Unit Leader	CEO
Finance and Administration Section Chief	CEO
Cost Recovery Unit Leader	Auditor-Controller
Planning and Intelligence Section Chief	OCSD
Situation Analysis Unit Leader	OCSD

Tsunami Reference Chart		
Event Type	Definition	Activities/Tasks/Decisions
<b>Tsunami Watch</b>	<b>Distant Tsunami Possible.</b> Issued to alert emergency managers and the public of an event which may later impact the Watch area. May be upgraded to an Advisory or Warning -or canceled -based on updated information and analysis.	<ul style="list-style-type: none"> <li>Control One notifies all jurisdictions and agencies as per established Watch protocols.</li> <li>Emergency Management Division will establish a conference call with coastal jurisdictions, agencies, and NWS to discuss situation and possible changes.</li> <li><b>No formal actions besides monitoring.</b></li> <li>No EOC activation.</li> <li>Tsunami Watch forwarded to OA.</li> </ul>
<b>Tsunami Advisory</b>	<b>Threat of a tsunami which may produce strong currents or waves dangerous to those in or near the water;</b> typically called when forecasted tsunami amplitudes are between 0.3m and 1m (1ft and 3ft) above existing tidal conditions are expected. Coastal communities are advised that beach and harbor areas could expect rapid, moderate tidal changes and strong currents.	<ul style="list-style-type: none"> <li>Control One notifies all jurisdictions and agencies as per Advisory protocols.</li> <li>Emergency Management Division will establish a conference call with coastal jurisdictions, agencies, and NWS to discuss potential beach closures and evacuations.</li> <li><b>Estimate Time of Arrival of the Tsunami during low tide and amplitude less than 50 CM (1.6 feet) - Close beaches and release a joint press release</b> or <b>Estimate Time of Arrival of the Tsunami during high tide (between 1.6 and 5.0 feet) above mean sea level - Close beaches, harbors, marinas and piers. Issue joint press release, jurisdictions to launch AlertOC message to beachfront properties.</b></li> <li>OA EOC activated to Level 3 (Low Level).</li> </ul>



		<ul style="list-style-type: none"> <li>• Tsunami Advisory forwarded to OA.</li> <li>• Monitor and notify jurisdictions and agencies if event is upgraded to a Tsunami Warning or cancellation of the Advisory.</li> </ul>
<b>Tsunami Warning</b>	<b>Distant Tsunami with significant widespread inundation is imminent</b> or expected; typically called when forecasted tsunami amplitudes are equal to or greater than 1m (3ft). Coastal communities are advised to evacuate people from low-lying areas identified as vulnerable to tsunamis.	<ul style="list-style-type: none"> <li>• Control One notifies all jurisdictions and agencies per protocols established for a Tsunami Warning.</li> <li>• Emergency Management Division will establish conference call with coastal jurisdictions, agencies, and NWS to <b>discuss evacuations and maritime closures using FASTER</b> Playbook.</li> <li>• EOC activated to a Level 2 (Moderate Level).</li> <li>• Launch AlertOC and Press releases at time discussed on Conference Call.</li> <li>• Control One, when directed by the County and OA Emergency Manager, will activate the WEA Message for Tsunami Warning.</li> <li>• Tsunami Warning forwarded to OA.</li> </ul>
<b>Local Near-Shore Earthquake</b>	<b>Immediate Tsunami – with insufficient response time or warning.</b> The earthquake near-shore, local and greater than 6.8 magnitude.	<ul style="list-style-type: none"> <li>• Control One to notify all jurisdictions and agencies per protocols established for a Local Near-Shore Earthquake/Immediate Tsunami.</li> <li>• <b>Control One, when directed by the County and OA Emergency Manager, will activate the EAS/WEA Message for Local Earthquake/Immediate Tsunami.</b></li> <li>• Control One will make a Red Channel broadcast.</li> <li>• Activate EOC to Level 2 (Moderate Level).</li> <li>• Conference Call will be conducted 1 hour after initial Earthquake.</li> </ul>

## 2.5 Public Notification and Alerts

Emergency information, warnings and protective action instructions for a tsunami event will be broadcasted to the public by one or more of the following methods:

- Emergency Alert System (EAS)
- Wireless Emergency Alert (WEA)
- Sirens
- Route alerting (vehicle mounted public address systems)
- AlertOC
- Media releases

Methods of warning the public of a tsunami event are described below. All public notifications and alerts issued by the County and OA will be coordinated with the impacted jurisdictions in accordance with the incident’s public information strategy, including people with disabilities and those with access and functional needs considerations. PIOs must always consider language barriers when developing warning messages for the public. All messages should be given in all languages appropriate for the impacted population. PIOs will work with television stations to ensure utilization of closed captioning to warn the hearing impaired. Sign language should be used for all press conferences.

Additional information can be found in the Joint Information System Annex, and Orange County OA Countywide Public Mass Notification System Standard Operating Procedures (AlertOC).

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## Chapter 3 Post-Inundation Response and Recovery Transition

In a major tsunami event in which significant damage occurs, it may be hours or even days before field responders or the public may safely re-enter evacuated areas. In this situation, there will likely be mounting pressure from the community to allow re-entry so that search and rescue, medical, and restoration efforts can begin. Given such pressures, it is critical to life safety and property preservation that extensive re-entry planning be done before allowing either field responders or the public to re-enter evacuated areas.

### 3.1 Re-Entry/Security

#### 3.1.1 Field Responder Re-Entry

The decision on when to allow field responders to re-enter the evacuation area will be made by the DES, in consultation with the Policy Group, Operations Section Chief, state and federal tsunami experts, and the Unified Command or Incident Commanders in the field. The EOC Operations Section is responsible for monitoring of the field responder re-entry process.

Recommended tasks to be performed by field responders on re-entering the evacuation area include the following:

- Initial “windshield surveys” to assess life safety and damage in impacted land areas.
- Stabilizing ongoing hazardous conditions, such as fires, hazardous material spills, and other life-safety issues in impacted areas.
- Search and rescue operations in impacted areas.
- Clearing emergency egress and other critical transportation routes of debris.
- Providing input on the scheduling and process for lifting the evacuation order and allowing public re-entry into non-impacted areas and impacted areas.

### 3.2 Traffic Control and Perimeter Security

Local jurisdictions are responsible for providing traffic and perimeter control to prevent the public from re-entering the tsunami evacuation area until it is safe to do so. Local law enforcement either being the city Police Department or the Orange County Sheriff’s Department is the lead agency in providing traffic control and perimeter security. Supporting agencies include Public Works, which provides barricades, signs, and other resources to assist with route closure. As time, resources, and personnel safety permit, the Police Department, and other first responders will be deployed to traffic checkpoints outside but near the evacuation area to direct traffic out of, and to prevent traffic from returning to, the evacuation area. The Police Department will set up traffic control points at strategic locations to restrict traffic and access to evacuated areas, and to prevent “sightseers” from entering evacuation areas. Traffic control points will consist of barricades, roadblocks, and – as resources permit – a system of officer patrols of the evacuated area perimeter to secure the area. Blockades also need to be set up on sidewalk areas around the evacuation area perimeter to curtail pedestrian traffic into evacuated areas.

NOTE: Establishing and staffing traffic control points and providing security around the perimeter of the evacuation area will require a large number of law enforcement personnel for successive operational periods. Accordingly, the EOC should quickly assess the need for, and take action to:

- Request law enforcement mutual aid from inland communities.
- Request that the state provide first responders, such as California Highway Patrol or California National Guard personnel, who may augment personnel in providing perimeter control.

### 3.3 Issuing Public Evacuation “All Clear” Notice

Local government officials are responsible for determining when to issue an all-clear notice. An evacuation all-clear notice indicates that the tsunami threat has passed and that it is safe for the public to re-enter evacuated areas. The NTWC does not issue all-clear notices because local shoreline and bathymetric features can cause wide variations in tsunami wave action from location to location. In addition, other local dangers, such as the presence of debris, fires, and hazardous material spills, may make impacted areas unsafe long after the threat of inundating tsunami waves has passed.

The decision as to when to issue an all-clear notice allowing the public to re-enter the evacuation area will be by the decision makers of the Tsunami Working Group on a Tsunami Conference call.

Jurisdictional decision makers should consider the following guidelines to make that decision:

- If no tsunami was generated:
  - The NTWC’s cancellation of a Warning, Advisory, or Watch indicates that City officials may issue an all-clear notice allowing public re-entry into evacuated areas.
- If a tsunami was generated:
  - Local officials can assume the threat to land-based areas from destructive tsunami waves has passed when no waves, or only insignificant waves, occur for a *minimum of two hours after the latest wave arrival time* issued by the NTWC, unless the NTWC extends the Warning or Advisory.
  - Beaches and maritime areas (e.g., ports, marinas, and harbors) should remain closed for a minimum of 12 hours or up to a full tidal cycle after the NTWC cancels a Tsunami Warning or Advisory due to strong, unpredictable currents along shoreline areas. These currents may last for days.
  - When tsunami inundation or damage has occurred, or the extent of inundation or damage is unknown, field responders must first re-enter the evacuation area to perform an initial safety and damage assessment to determine whether and when the public may re-enter

A phased re-entry may be needed if there are locations within the evacuation area that remain unsafe for the public.

The NTWC may cancel or downgrade Tsunami Warnings and Advisories when conditions drop below dangerous thresholds for a sustained time period. For example, the NTWC will downgrade a Warning when conditions fall below 1 meter (3.28 feet) for a sustained period, or below 0.3 meters (1 foot) for an Advisory. The NTWC makes these determinations based on observations of local tide gauge data.

### 3.4 Safety and Damage Assessments

When a tsunami incident results in damage, or it is unclear whether damage has occurred, a safety assessment must be conducted before the public can be allowed to re-enter. The EOC Operations and Planning and Intelligence Section is responsible for coordinating post-disaster safety assessments of public and private property as described in the Unified County of Orange and Orange County Operational Area Emergency Operations Plan and Recovery Annex.

### 3.5 Response and Recovery Operations Continued

Jurisdictions should use their Emergency Operations Plan and supporting annexes to respond to a tsunami event where inundation has occurred. For the County of Orange and Operational Area Emergency Operations Plan the following Annexes will be used during a tsunami event with inundation:

- Evacuation Annex
- Joint Information System Annex
- Mass Care and Shelter Annex
- Recovery Annex

Other Annexes may be used as required by the event.

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## Chapter 4 Plan Development and Maintenance

### 4.1 Plan Maintenance

This Annex has been developed and reviewed by the Orange County Emergency Management Organization (OCEMO), Emergency Management Council Sub-Committee (EMC Sub-Committee) and Tsunami Planning Working Group and presented for final approval to the Orange County Operational Area Executive Board and Emergency Management Council. Ongoing maintenance will be by periodic review at the minimum of every two years, with revisions tasked to the Orange County Sheriff's Department, Emergency Management Division.

The ongoing administration of this annex will be the responsibility of the Orange County Emergency Management Organization (OCEMO) and the Orange County Sheriff's Department, Emergency Management Division. Each jurisdiction is responsible for:

- identification of tsunami impact areas
- developing a jurisdiction specific response plan
- training of jurisdiction EOCs and response personnel
- conducting and/or participating in tsunami exercises

### 4.2 Training and Exercises

Each jurisdiction within Orange County is responsible for its own planning, training and exercises, as well as involvement in Operational Area planning, training and exercises as required by Standardized Emergency Management System (SEMS) / National Incident Management System (NIMS) as described in the Unified County of Orange and Orange County Operational Area Emergency Operations Plan.

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## Chapter 5 References

The following references specifically related to this annex are listed below:

### 5.1 Federal

- National Tsunami Hazard Mitigation Program, 2018
- National Science and Technology Council's Subcommittee on Disaster Reduction – Tsunami
- NOAA's Tsunami Program
- NOAA's National Weather Service TsunamiReady
- FEMA P646A - Vertical Evacuation from Tsunamis: A guide for Community Officials, 2009
- U.S. Geological Survey, Science Application for Risk Reduction (SAFRR) – Tsunami Scenario, 2013
- U.S. Geological Survey, Community Exposure to Tsunami Hazards in California, 2013

### 5.2 State

- California State Emergency Operations Plan, 2017
- California State Hazard Mitigation Plan, 2013
- State of California Seismic Safety Commission, The Tsunami Threat to California, 2005
- Tsunami Emergency Response Playbooks and FASTER Tsunami Height Calculation, 2018

### 5.3 County

- Unified County of Orange and Orange County Operational Area Emergency Operations Plan, 2016
- County of Orange Hazard Mitigation Plan, 2015
- Orange County Operational Area Evacuation Annex, 2015
- Orange County Operational Area Joint Information System Annex, 2014
- Orange County Operational Area Mass Care and Shelter Annex, 2016

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## Appendix A: Tsunami Terminology

**Amplitude:** The rise above or drop below the ambient water level as read on a tide gauge.

**Bathymetry:** The measurement of the depths of oceans, seas, etc.

**Bore:** Traveling wave with an abrupt vertical front or wall of water. Under certain conditions, the leading edge of a tsunami wave may form a bore as it approaches and runs onshore. A bore may also be formed when a tsunami wave enters a river channel, and may travel upstream penetrating to a greater distance inland than the general inundation.

**ETA:** Estimated Time of Arrival. Computed arrival time of the first tsunami wave at coastal communities after a specific earthquake has occurred.

**FASTER:** A simple analytical tool that incorporates real-time tsunami **F**orecast **A**mplitudes (wave heights), **S**torm and **T**idal conditions, potential tsunami forecast **E**rrors, and site-specific tsunami **R**un-up potential on land to determine a more exact tsunami flood height along the coast.

**Harbor Resonance:** The continued reflection and interference of waves from the edge of a harbor or narrow bay. This interference can cause amplification of the wave heights and extend the duration of wave activity from a tsunami.

**Horizontal Inundation Distance:** The distance that a tsunami wave penetrates onto the shore. Measured horizontally from the mean sea level position of the water's edge, it is usually measured as the maximum distance for a particular segment of the coast.

**Inundation:** The depth, relative to a stated reference level, to which a particular location is covered by water.

**Inundation area:** An area that is flooded with water.

**Inundation Line (limit):** The inland limit of wetting, measured horizontally from the edge of the coast, defined by mean sea level.

**Leading-Depression Wave:** Initial tsunami wave is a trough, causing a draw-down of water level.

**Leading-Positive Wave:** Initial tsunami wave is a crest, causing a rise in water level. Also called a leading-elevation wave.

**Marigram:** Tide gauge recording showing wave height as a function of time.

**Marigraph:** The instrument which records wave height.

**MLLW:** (Mean Lower Low Water) The average low tide water elevation often used as a reference to measure run-up.

**Ms:** (Surface Wave Magnitude) Magnitude of an earthquake as measured from the amplitude of seismic surface waves. Often referred to as the "Richter" magnitude.

**Mw:** (Moment Magnitude) Magnitude based on the size and characteristics of the fault rupture, and determined from long-period seismic waves. It is a better measure of earthquake size than surface wave magnitude, especially for very large earthquakes.

**Paleotsunami:** A tsunami occurring prior to the historical record or for which there are no written observations.

**Period:** The length of time between two successive peaks or troughs. Will vary due to complex interference of waves. Tsunami periods generally range from 5 to 60 minutes.

**Run-up:** Maximum height of the water onshore observed above a reference sea level. Usually measured at the horizontal inundation limit.

**Salinas:** a salt lake or salt marsh.

**Seiche:** An oscillating wave (also referred to as a seismic sea wave) in a partially or fully enclosed body of water. May be initiated by long period seismic waves, wind and water waves, or a tsunami.

**Strike-Slip Earthquake:** An earthquake caused by horizontal slip along a fault.

**Thrust Earthquake:** Earthquake caused by slip along a gently sloping fault where the rock above the fault is pushed upward relative to the rock below. The most common type of earthquake source generating tsunamis.

**Tidal Wave:** Common term for tsunami used in older literature, historical descriptions, and popular accounts. Tides, caused by the gravitational attractions of the sun and moon, may increase or decrease the impact of a tsunami, but have nothing to do with their generation or propagation. However, most tsunamis (initially) give the appearance of a fast-rising or fast-ebbing tide as they approach shore, and only rarely appear as a near-vertical wall of water.

**Travel Time:** Time (usually measured in hours and tenths of hours) that it took the tsunami to travel from the source to a particular location.

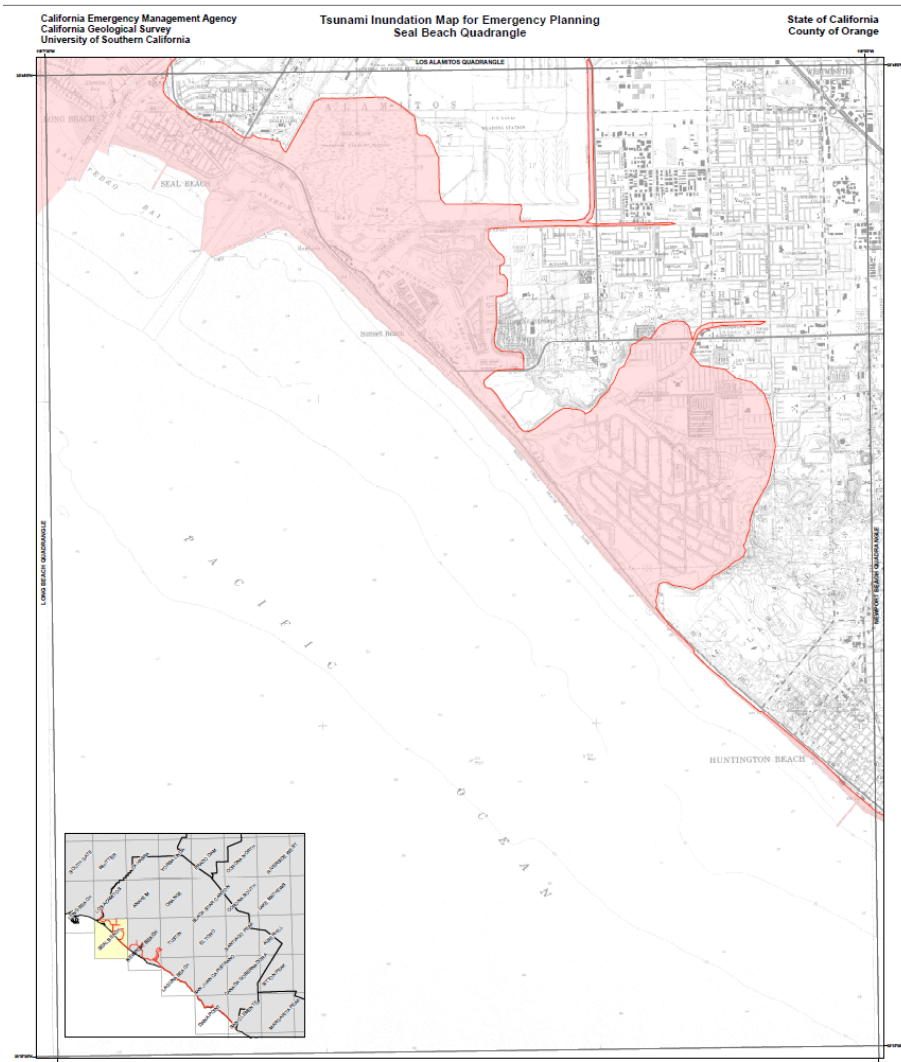
**Tsunami:** A Japanese term derived from the characters "tsu" meaning harbor and "nami" meaning wave. Now generally accepted by the international scientific community to describe a series of traveling waves in water produced by the displacement of the sea floor associated with submarine earthquakes, volcanic eruptions, or landslides.

**Tsunami Earthquake:** A tsunamigenic earthquake which produces a much larger tsunami than expected for its magnitude.

**Tsunami Magnitude:** A number that characterizes the strength of a tsunami based on the tsunami wave amplitudes. Several different tsunami magnitude determination methods have been proposed.



Seal Beach and portion of Huntington Beach Tsunami Inundation Map



**METHOD OF PREPARATION**

Initial tsunami modeling was performed by the University of Southern California (USC) Tsunami Research Center funded through the California Emergency Management Agency (CEMA) by the National Tsunami Hazard Mitigation Program. The tsunami modeling process utilized the MOST method of modeling. Tsunami propagation modeling (MOST) results were used to determine inundation depth at a specific location and Emergency Use for the inundation mapping (Tow and Gornitz, 1987; Tow and Gornitz, 1996).

The bathymetric data that were used in the tsunami model consist of a series of nautical charts. Bathymetric data with a maximum 10-m contour resolution or higher, were extracted to "Mean High Water" sea level conditions. Wherever a contour was used for the modeled use of the tsunami modeling and mapping.

A series of ground source events were selected for modeling, including nearshore and distant earthquakes and hypothetical extreme offshore, nearshore tsunamis (Table 1). Land source events that were considered include offshore nearshore faults, resulting faults on offshore fault zones and large submarine tsunamis resulting of significant weather disturbance and generation. Distant tsunamis include the 1960 Chile and 1964 Alaska earthquakes that are known to have occurred historically (1960 Chile and 1964 Alaska earthquakes and others which are listed around the Pacific Ocean "Ring of Fire").

In order to enhance the result from the 10- to 30-minute inundation grid data, a method was developed utilizing high-resolution digital topographic data 0- to 10-meters resolution that define the location of the maximum inundation (Table 1). Geological Survey, 1993; Howard, 2000; NOAA, 2000). The location of the maximum inundation was determined by using digital elevation and terrain data for a grid pattern. An elevation grid was created using information from the USGS, 1993. This information was verified, where possible, by field work coordinated with local survey personnel.

The accuracy of the inundation shown on these maps is subject to limitations in the accuracy and completeness of elevation data and tsunami inundation, and the current understanding of tsunami generation and propagation phenomena as expressed in the model. This, although an effort has been made to identify a suitable area based on inundation of any location along the coastline. It remains possible that actual inundation could be greater in major tsunami event.

This map does not represent inundation from a single tsunami event. It was created by combining inundation results for an ensemble of source events affecting a given region (Table 1). For this reason, all of the inundation region in a particular area will not only occur during a single tsunami event.

**References**  
 Intermap Technologies, Inc., 2003. Intermap product methods and quick start guide Intermap NEXTmap document on Swatow resolution date, 11/2/03.  
 Lander, J.F., Lindberg, P.A., and Koush, M.J., 1993. Tsunami Affecting the West Coast of the United States (1900-20). Marine Geology, 102A, 1-19.  
 Tow, V.W., and Gornitz, C.E., 1988. Numerical modeling of deep water tsunami. Journal of Waterways, Port, Coastal and Ocean Engineering, ASCE, 114 (6), pp 184-191.  
 U.S. Geological Survey, 1993. Digital Elevation Model. National Mapping Program, Technical Instructions, Data Users Guide 4, 4/93.

**TSUNAMI INUNDATION MAP FOR EMERGENCY PLANNING**

State of California ~ County of Orange

**SEAL BEACH QUADRANGLE**

March 15, 2009

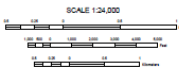


Table 1. Tsunami sources modeled for the Orange County coastline.

Source (M = moment magnitude used in modeled waves)	Area of inundation (km <sup>2</sup> covered)		
	Coastal Beach Region	Interior Region	Delta Point
Chile 1960	15	15	0
Alaska 1964	15	15	0
San Marino 1992	15	15	0
San Marino 1992 #2	15	15	0
San Marino 1992 #3	15	15	0
Chile 1960	15	15	0
Alaska 1964	15	15	0
San Marino 1992	15	15	0
San Marino 1992 #2	15	15	0
San Marino 1992 #3	15	15	0
Chile 1960	15	15	0
Alaska 1964	15	15	0
San Marino 1992	15	15	0
San Marino 1992 #2	15	15	0
San Marino 1992 #3	15	15	0

**MAP EXPLANATION**

- Tsunami Inundation Line
- Tsunami Inundation Area

**PURPOSE OF THIS MAP**

This tsunami inundation map was prepared to assist other entities in identifying their locations that are impacted by local tsunamis, coastal wave surge, coastal wave surge, and other related phenomena. This map is a general overview and does not meet disclosure requirements for real estate transactions or for any other regulatory purpose.

The inundation map has been compiled with best currently available scientific information. The inundation represents the maximum modeled tsunami surge from a number of sources, not realistic tsunami sources. Tsunamis are rare events. This map is not intended to be used as a basis for any regulatory or other action. Please refer to the following websites for additional information on the construction and/or intended use of the tsunami inundation map:  
 State of California Emergency Management Agency, Tsunami Information: <http://www.cemag.ca.gov/EMAP/Information/TS/Content/USC%201993%20TSUAMI%20INUNDATION>  
 University of Southern California - Tsunami Research Center: <http://www.usc.edu/tsunami/2005/index.php>  
 State of California Geological Survey, Tsunami Information: <http://www.construction.ca.gov/geomag/TS/Information/TS/Information.htm>  
 National Oceanic and Atmospheric Administration (NOAA) Center for Tsunami Research (MOST model): <http://www.noaa.gov/most/index.cfm>

**MAP BASE**

Topographic base maps prepared by U.S. Geological Survey as part of the 7.5-minute Quadrangle Map Series (originally 1:24,000 scale). Tsunami inundation boundaries may reflect updated digital topographic and bathymetric data that can differ significantly from contours shown on the base map.

**DISCLAIMER**

The California Emergency Management Agency (CEMA), the University of Southern California (USC), and the California Geological Survey (CGS) make no representation or warranty regarding the accuracy of the inundation map. The data from which the map was derived, neither the State of California nor USC, shall be liable under any circumstances for any direct, indirect, incidental or consequential damage with respect to any claim by any user in any third party on account of or arising from the use of this map.

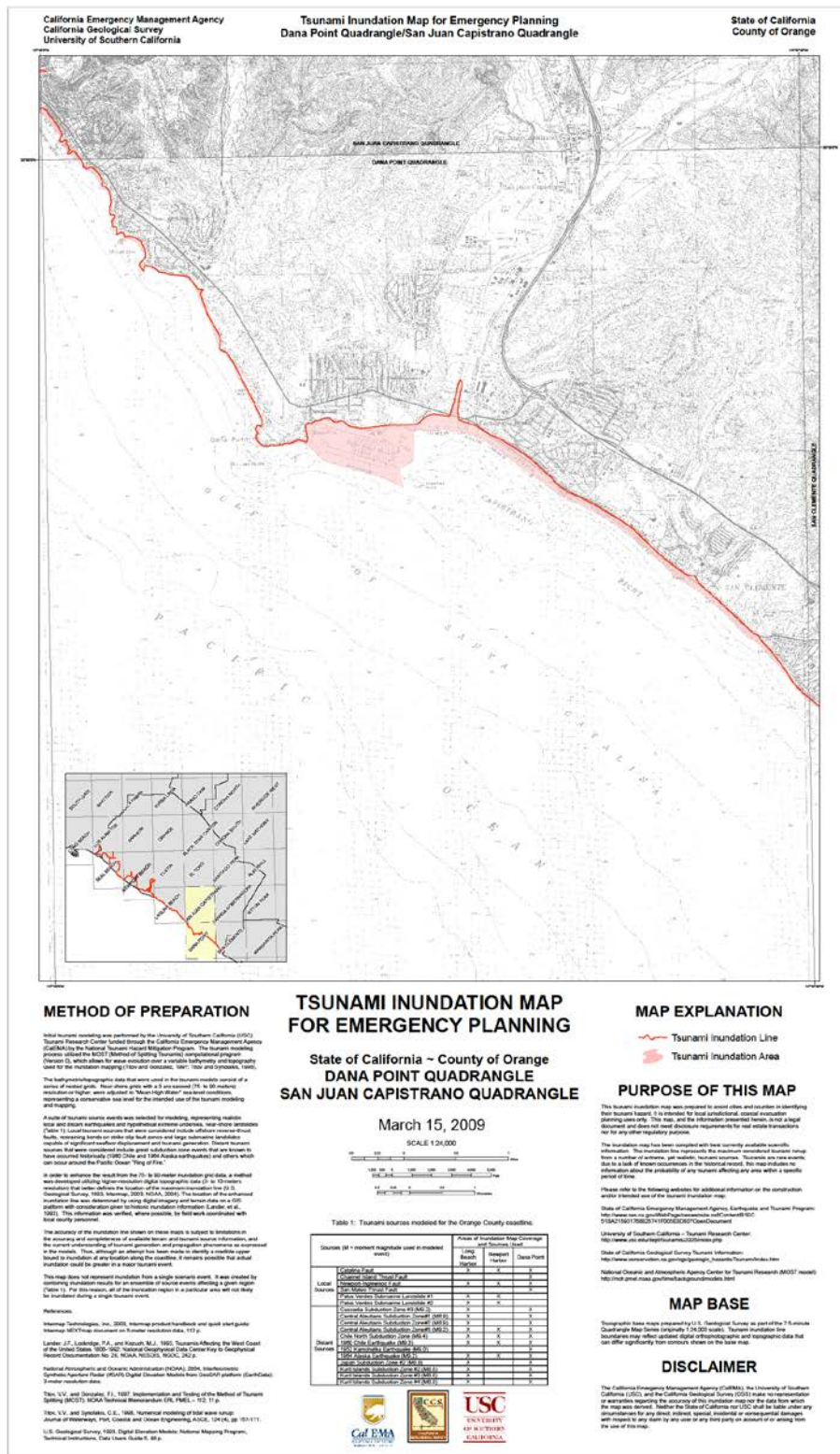




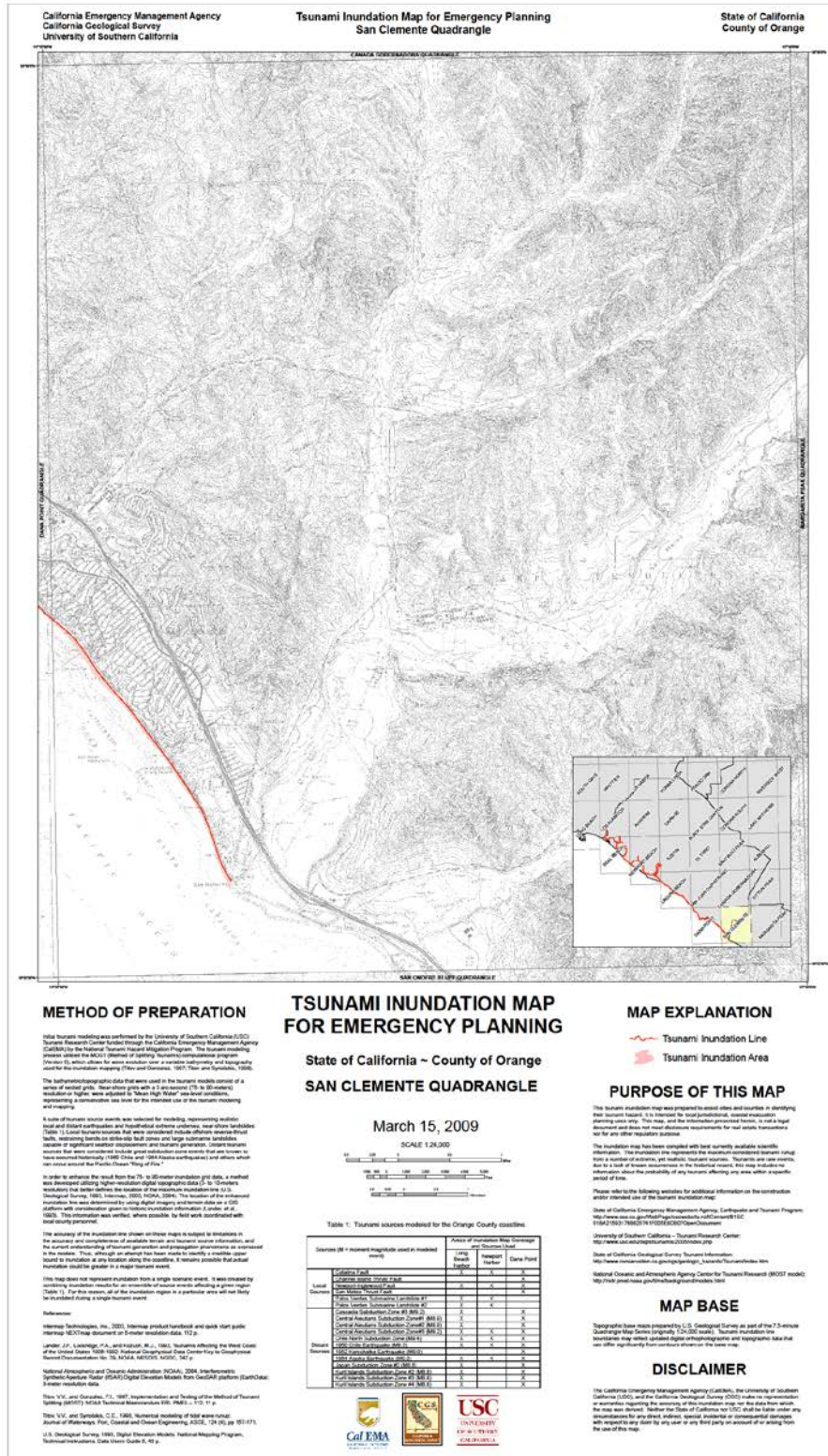




Dana Point Tsunami Inundation Map



San Clemente Tsunami Inundation Map



## Chapter 6 Attachments

### Attachment A - Control One Tsunami Watch Notification List

When notified of Tsunami **Watch**, Control One will immediately broadcast the information received from the California State Warning Center as outlined below.

TYPE	CHANNEL(S)	CODE	ASSIGNED TO
County and OA Emergency Manager	Refer to Emergency Management Division Contact Listing		
Sheriff's Department Commander	Phone / Face-to-Face		
Roll Call on DSP-DSP To ensure these agencies copied the message (see Control One Checklist)	Station 10, Station 18, Station 41, Station 42, Station 43, Station 45, Station 92 (West Comm), Station 54, Orange County Fire, Metro Net		
General Radio Broadcast	OAccess-Admin/ RED / DSP-DSP / OA-1 / OA-2 / WEROC / MED-9 / SILVER-1-OCTA / SILVER-1 COM/ SILVER-1 IWM / SILVER-1 OCA / SILVER-1 OCE / SILVER-1-PFR / SILVER-1-PRK / SILVER-2-PFR / SILVER-5 FAC / SILVER-6 TRP / SILVER-7-PDSD / SILVER-1&2-EMS	Use Incident Button -or- 20946 (Quick Call)	
General Radio Broadcast (Lifeguard Departments & other agencies)	AQUA-1-HTB / AQUA-1-LAB AQUA-1-NPB / AQUA-1-SCL AQUA-1-SLB / AQUA-1-OC	Use #3 Alert Tone and press and hold for at least 5 seconds	
Teletype	CLETS	ZALL / SNNB	
Hospitals	Voice: HEAR – A Text: ReddiNet	Heargram page button -or- 1444 (Reddinet)	
WEROC	<b>Primary- Kelly Hubbard</b> Work cell-714-715-0283 Work-714-593-5010  <b>Alternate-Karl Seckel</b> Work cell-714-423-3361 Work-714-593-5024		
Emergency Alert System	<b>Upon direction of the County and OA EOC</b> Notify LP-1 (Control One will only broadcast the message using the EAS Encoder if the LP-1 is unable to do so)		

Remember, time is of the essence! Information MUST be released in a TIMELY manner in order to be effective.

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### Attachment B - Control One Tsunami Advisory Notification List

When notified of Tsunami Advisory, Control One will immediately broadcast the Tsunami Advisory Broadcast script (see attached) as outlined below.

TYPE	CHANNEL(S)	CODE	ASSIGNED TO
County and OA Emergency Manager	Refer to Emergency Management Division Contact Listing		
Sheriff's Department Commander	Phone / Face-to-Face		
Roll Call on DSP-DSP To ensure these agencies copied the message (see Control One Checklist)	Station 10, Station 18, Station 41, Station 42, Station 43, Station 45, Station 92 (West Comm), Station 54, Orange County Fire, Metro Net		
General Radio Broadcast	OCAccess-Admin/ RED / DSP-DSP / OA-1 / OA-2 / WEROC / MED-9 / SILVER-1-OCTA / SILVER-1 COM/ SILVER-1 IWM / SILVER-1 OCA / SILVER-1 OCE / SILVER-1-PFR / SILVER-1-PRK / SILVER-2-PFR / SILVER-5 FAC / SILVER-6 TRP / SILVER-7-PDSD / SILVER-1&2-EMS	Use Incident Button -or- 20946 (Quick Call)	
General Radio Broadcast (Lifeguard Departments & other agencies)	AQUA-1-HTB / AQUA-1-LAB AQUA-1-NPB / AQUA-1-SCL AQUA-1-SLB / AQUA-1-OC	Use #3 Alert Tone and press and hold for at least 5 seconds	
Teletype	CLETS	ZALL / SNNB	
Hospitals	Voice: HEAR – A Text: ReddiNet	Heargram page button -or- 1444 (Reddinet)	
WEROC	<b>Primary- Kelly Hubbard</b> Work cell-714-715-0283 Work-714-593-5010  <b>Alternate-Karl Seckel</b> Work cell-714-423-3361 Work-714-593-5024		
Emergency Alert System	<b>Upon direction of the County and OA EOC</b> Notify LP-1 (Control One will only broadcast the message using the EAS Encoder if the LP-1 is unable to do so)		

Remember, time is of the essence! Information MUST be released in a TIMELY manner in order to be effective.

## Attachment C - Control One Red Channel Tsunami Advisory Broadcast

### **Tsunami Advisory:**

Attention all units and stations.

Special attention to the coastal cities of Seal Beach, Huntington Beach, Newport Beach, Laguna Beach, Dana Point, San Clemente and unincorporated areas Emerald Bay and County Beaches. The National Tsunami Warning Center has issued a Tsunami Advisory that includes Orange County coastal areas resulting from an earthquake occurring near (insert location). A Tsunami Advisory indicates a Tsunami capable of producing strong currents or waves dangerous to persons in or very near the water is expected, with an estimated time of arrival of (insert time). Protective actions may include the closure of beaches, harbors and piers. Contact your immediate supervisor for further instructions.

Repeating, the National Tsunami Warning Center has issued a Tsunami Advisory that includes Orange County coastal areas resulting from earthquake occurring near (insert location). A Tsunami Advisory indicates a Tsunami capable of producing strong currents or waves may occur. Protective actions may include the closure of beaches, harbors and piers. Contact your immediate supervisor for further instructions.

Control One

## Attachment D - Tsunami Advisory Press Release

ORANGE COUNTY OPERATIONAL AREA  
EMERGENCY OPERATIONS CENTER  
FOR IMMEDIATE RELEASE  
PRESS RELEASE #  
DATE:  
TIME:

Tsunami Advisory

*A Tsunami Advisory has been issued by the National Tsunami Warning Center for all of Orange County Coastal areas.*

The first waves are expected to arrive in Orange County at approximately (insert time here). Although no significant coastal flooding is expected, some areas could experience dangerous currents and tidal surges due to this tsunami along beaches and in harbors and marinas.

The impact of this tsunami will be stronger than normal currents and possible higher than normal tidal surges along the beaches. Stay out of the water.

There will be strong outgoing tidal currents at the same time the tsunami arrives. The combined effect could produce very strong currents in harbors and bays.

A Tsunami event is a series of waves that can last for several hours. The first wave is usually not the strongest.

Local Coastal Officials are monitoring the situation and directing all persons in the coastal areas to:

- Stay off the beaches and out of the harbors and marinas starting at (insert time here).
- Local officials will determine when areas are safe to open.
- Contact your local jurisdiction for more specific information.

Do not call 9-1-1 unless you have a life threatening emergency.

Release authorized by: \_\_\_\_\_ Title: \_\_\_\_\_

Email or Faxed time: \_\_\_\_\_

Sent by: \_\_\_\_\_

## Attachment E - Tsunami Advisory AlertOC Message (County issued)

AlertOC Message for Tsunami Advisory  
*(If issued by the County of Orange)*  
*(with 5 hours or less)*

This is an important AlertOC message from the City of \_\_\_\_\_  
A Tsunami Advisory has been issued by the National Tsunami Warning Center for all of Orange County Coastal areas.

The first waves are expected to arrive in Orange County at approximately (insert time here)(insert time here). Although no significant coastal flooding is expected, some areas could experience dangerous currents and tidal surges due to this tsunami along beaches and in harbors and marinas.

The impact of this tsunami will be stronger than normal currents and possible higher than normal tidal surges along the beaches. Stay out of the water.

There will be a strong outgoing tidal current at the same time the tsunami arrives. The combined effect could produce very strong currents in harbors and bays.

A Tsunami event is a series of waves that can last for several hours. The first wave is usually not the strongest.

Local Coastal Officials are monitoring the situation and directing all persons in the coastal areas to:

- Stay off the beaches and out of the harbors and marinas starting at (insert time here)(insert time here).
- Local officials will determine when areas are safe to open.
- Contact your local jurisdiction for more specific information.

Do not call 9-1-1 unless you have a life threatening emergency. Please contact your local jurisdiction or the Orange County Public Information Hotline at 714-628-7085.



### Attachment F - Control One Tsunami Warning Notification List

When notified of Tsunami **Warning**, Control One will immediately broadcast the Tsunami Warning Broadcast script (see attached) as outlined below.

TYPE	CHANNEL(S)	CODE	ASSIGNED TO
County and OA Emergency Manager	Refer to Emergency Management Division Contact Listing		
Sheriff's Department Commander	Phone / Face-to-Face		
Roll Call on DSP-DSP To ensure these agencies copied the message (see Control One Checklist)	Station 10, Station 18, Station 41, Station 42, Station 43, Station 45, Station 92 (West Comm), Station 54, Orange County Fire, Metro Net		
General Radio Broadcast	OCAccess-Admin/ RED / DSP-DSP / OA-1 / OA-2 / WEROC / MED-9 / SILVER-1-OCTA / SILVER-1 COM/ SILVER-1 IWM / SILVER-1 OCA / SILVER-1 OCE / SILVER-1-PFR / SILVER-1-PRK / SILVER-2-PFR / SILVER-5 FAC / SILVER-6 TRP / SILVER-7-PDSD / SILVER-1&2-EMS	Use Incident Button -or- 20946 (Quick Call)	
General Radio Broadcast (Lifeguard Departments & other agencies)	AQUA-1-HTB / AQUA-1-LAB AQUA-1-NPB / AQUA-1-SCL AQUA-1-SLB / AQUA-1-OC	Use #3 Alert Tone and press and hold for at least 5 seconds	
Teletype	CLETS	ZALL / SNNB	
Hospitals	Voice: HEAR – A Text: ReddiNet	Heargram page button -or- 1444 (Reddinet)	
WEROC	<b>Primary- Kelly Hubbard</b> Work cell-714-715-0283 Work-714-593-5010  <b>Alternate-Karl Seckel</b> Work cell-714-423-3361 Work-714-593-5024		
Emergency Alert System	<b>Upon direction of the County and OA EOC</b> Notify LP-1 (Control One will only broadcast the message using the EAS Encoder if the LP-1 is unable to do so)		

Remember, time is of the essence! Information MUST be released in a TIMELY manner in order to be effective.

## Attachment G - Control One Red Channel Tsunami Warning Broadcast

### **Tsunami Warning:**

Attention all units and stations.

Special attention to the coastal cities of Seal Beach, Huntington Beach, Newport Beach, Laguna Beach, Dana Point, San Clemente and unincorporated areas of Emerald Bay and County Beaches.

The National Tsunami Warning Center has issued a Tsunami Warning that includes Orange County coastal areas resulting from an earthquake occurring near \_\_\_\_\_(location). A Tsunami Warning indicates that a tsunami has been detected with an estimated time of arrival of \_\_\_\_\_. Public warning and evacuation protocols should be initiated upon direction from your law enforcement watch commander.

Repeating, the National Tsunami Warning Center has issued a Tsunami Warning that includes Orange County coastal areas resulting from an earthquake occurring near \_\_\_\_\_(location). A Tsunami Warning indicates that a tsunami has been detected with an estimated time of arrival of \_\_\_\_\_. Public warning and evacuation protocols should be initiated, upon direction from your law enforcement watch commander.

Control One

## Attachment H - Tsunami Warning EAS Message

### EAS Message for Tsunami Warning (with 5 hours or less )

The National Tsunami Warning Center has issued a Tsunami Warning at \_\_\_\_\_ AM/PM that includes Orange County coastal areas. A tsunami is expected to arrive in Orange County at approximately \_\_\_\_\_ AM/PM, Date \_\_\_\_\_.

Orange County and coastal city officials are ordering all persons in Orange County low-lying coastal areas to take immediate action by following the local tsunami evacuation routes.

Additional specific information and instructions from your local officials will be broadcast on KWVE 107.9 FM and other local radio and television stations. Check your city or county website for more information.

Do not call 9-1-1 unless you have a life threatening emergency. Stay away from beach areas. Follow the direction of law enforcement and public safety officials while evacuating.

---

*\* Each jurisdiction should develop a Supplemental Press Release including the following:*

Specific instructions on evacuation routes  
Safe zone points  
Transportation Assembly Points, if warranted.  
Shelters

You may also want to include the following:

Take only essentials with you such as pets, medicines, baby supplies, money and important papers.

Secure any boats to their docks  
Lock doors and windows  
Check on any neighbors who may need assistance

If you have no means of transportation, ask for help from a neighbor or friend.

## Attachment I - Tsunami Warning AlertOC Message (County issued)

AlertOC Message for Tsunami Warning  
(If issued by the County of Orange)  
(with 5 hours or less)

The National Tsunami Warning Center has issued a Tsunami Warning at \_\_\_\_\_ AM/PM that includes Orange County coastal areas. A tsunami is expected to arrive in Orange County at approximately \_\_\_\_\_ AM/PM, Date \_\_\_\_\_.

Orange County and coastal city officials are ordering all persons in Orange County low-lying coastal areas to take immediate action by following the local tsunami evacuation routes.

Additional specific information and instructions from your local officials will be broadcast on KWVE 107.9 FM and other local radio and television stations. Check your city or county website for more information.

Do not call 9-1-1 unless you have a life threatening emergency. Stay away from beach areas. Follow the direction of law enforcement and public safety officials while evacuating.

---

*\* Each jurisdiction should develop a Supplemental Press Release including the following:*

Specific instructions on evacuation routes  
Safe zone points  
Transportation Assembly Points, if warranted.  
Shelters

You may also want to include the following:

Take only essentials with you such as pets, medicines, baby supplies, money and important papers.

Secure any boats to their docks  
Lock doors and windows  
Check on any neighbors who may need assistance

If you have no means of transportation, ask for help from a neighbor or friend.

## Attachment J - Control One Local Near-Shore Earthquake/Immediate Tsunami Notification List

When notified by National Tsunami Warning Center/CALWAS or by the OA/County EOC Manager of a **Local Near-Shore Earthquake**, Control One will immediately broadcast the attached script (see attached) as outlined below.

TYPE	CHANNEL(S)	CODE	ASSIGNED TO
County and OA Emergency Manager	Refer to Emergency Management Division Contact Listing		
Sheriff's Department Commander	Phone / Face-to-Face		
Roll Call on DSP-DSP To ensure these agencies copied the message (see Control One Checklist)	Station 10, Station 18, Station 41, Station 42, Station 43, Station 45, Station 92 (West Comm), Station 54, Orange County Fire, Metro Net		
General Radio Broadcast	OAccess-Admin/ RED / DSP-DSP / OA-1 / OA-2 / WEROC / MED-9 / SILVER-1-OCTA / SILVER-1 COM/ SILVER-1 IWM / SILVER-1 OCA / SILVER-1 OCE / SILVER-1-PFR / SILVER-1-PRK / SILVER-2-PFR / SILVER-5 FAC / SILVER-6 TRP / SILVER-7-PDSD / SILVER-1&2-EMS	Use Incident Button -or- 20946 (Quick Call)	
General Radio Broadcast (Lifeguard Departments & other agencies)	AQUA-1-HTB / AQUA-1-LAB AQUA-1-NPB / AQUA-1-SCL AQUA-1-SLB / AQUA-1-OC	Use #3 Alert Tone and press and hold for at least 5 seconds	
Teletype	CLETS	ZALL / SNNB	
Hospitals	Voice: HEAR – A Text: ReddiNet	Heargram page button -or- 1444 (Reddinet)	
WEROC	<b>Primary- Kelly Hubbard</b> Work cell-714-715-0283 Work-714-593-5010  <b>Alternate-Karl Seckel</b> Work cell-714-423-3361 Work-714-593-5024		
Emergency Alert System	<b>Upon direction of the County and OA EOC</b> Notify LP-1 (Control One will only broadcast the message using the EAS Encoder if the LP-1 is unable to do so)		

Remember, time is of the essence! Information MUST be released in a TIMELY manner in order to be effective.

## Attachment K - Control One Red Channel Local Near-Shore Earthquake Immediate Tsunami Broadcast

### **Local Near-Shore Earthquake/Immediate Tsunami:**

Attention all units and stations.

Special attention to the coastal cities of Seal Beach, Huntington Beach, Newport Beach, Laguna Beach, Dana Point, San Clemente and unincorporated areas of Emerald Bay and county beaches.

A large near-shore earthquake has occurred and a Tsunami could arrive within 15 minutes. All persons in low lying coastal areas should evacuate immediately to higher ground – 50 to 100 feet above sea level, if you cannot evacuate move to the highest point possible, this includes emergency personnel.

Repeating, a large near-shore earthquake has occurred and a Tsunami could arrive within 15 minutes. All persons in low lying coastal areas should evacuate immediately to higher ground – 50 to 100 feet above sea level, if you cannot evacuate move to the highest point possible, this includes emergency personnel. Control One

## Attachment L - Local Near-Shore Earthquake/Immediate Tsunami EAS Message (Control One to issue as the LP-2)

A large near-shore earthquake occurred at \_\_\_\_\_ AM/PM, Date \_\_\_\_\_. An earthquake of this size may cause a Tsunami that could arrive within 15 minutes of its occurrence.

Orange County and coastal city officials are ordering all persons in Orange County low-lying coastal areas to take immediate action. Evacuate to higher ground (50 to 100 feet above sea level) or move to the highest point possible.

Stay away from beach areas. Please stay tuned to KWVE 107.9 FM or other local radio or television stations for more information.

## Attachment M - Local Near-Shore Earthquake/Immediate Tsunami AlertOC Message (County issued)

### AlertOC Message Local Near-Shore Earthquake/Immediate – Tsunami *(If issued by the County of Orange)*

A large near-shore earthquake occurred at \_\_\_\_\_ AM/PM, Date \_\_\_\_\_. An earthquake of this size may cause a Tsunami that could arrive within 15 minutes of its occurrence.

Orange County and coastal city officials are ordering all persons in Orange County low-lying coastal areas to take immediate action. Evacuate to higher ground (50 to 100 feet above sea level) or move to the highest point possible.

Stay away from beach areas. Please stay tuned to KWVE 107.9 FM or other local radio or television stations for more information.



## Attachment N - Tsunami Evacuations Supplemental Press Release

ORANGE COUNTY OPERATIONAL AREA  
EMERGENCY OPERATIONS CENTER  
FOR IMMEDIATE RELEASE  
PRESS RELEASE #  
DATE:  
TIME:

### Evacuations Tsunami Warning (non-local)

Mandatory evacuations have been ordered due to a ***Tsunami Warning issued by the National Tsunami Warning Center.***

Orange County and coastal city officials are ordering all persons in the following low-lying coastal areas to take immediate action by following the local tsunami evacuation routes.

**Seal Beach** – public safety officials request all persons south of Pacific Coast Highway, Old Town and Bridgeport travel inland past Bolsa Ave. All persons in Surfside proceed to Seal Beach Blvd and travel inland past Bolsa Ave.

**Sunset Beach** – public safety officials request all persons in Sunset Beach to travel inland past Bolsa Avenue.

**Huntington Beach** – public safety officials request all persons East of Beach Blvd and South of Indianapolis to evacuate north towards Westminster using Newland, Magnolia, Bushard or Brookhurst Streets. All persons West of Golden West and South of Edinger evacuate North using Springdale, Edwards and Golden West Streets.

**Newport Beach** – public safety officials request all beaches and beachfront persons to evacuate inland and uphill. All persons should travel north by using Jamboree Rd., MacArthur Blvd., Marguerite Ave., Newport Coast Rd., Superior Ave., Newport Blvd., Dover Dr., and Riverside Ave. More information is available online at [www.newportbeachca.gov](http://www.newportbeachca.gov).

**Laguna Beach** – public safety officials request all persons on all beaches and coves in Laguna Beach, Aliso Beach and in the downtown areas of Main Beach and the 200 blocks of all streets South of Aster Street to Legion Street, to travel inland and uphill.

**Emerald Bay** – public safety officials request all persons in Emerald Bay travel inland and uphill.

**Dana Point** – public safety officials request all persons along Beach Road to evacuate up Palisades Drive. Persons in the low areas of Dana Point Harbor should leave the area by using Golden Lantern, Del Obispo or Cove Road. At the Strands, Salt Creek, Doheny and Capistrano Beaches should evacuate these areas. More information is available online at [www.danapoint.org/tsunami](http://www.danapoint.org/tsunami) , or by calling 949-248-3500.

**San Clemente** – public safety officials request all persons in the beach areas to travel inland and uphill. All persons at Poche Beach, Colony Cove, North Beach and Baca La Canyon/Riviera should follow their posted Tsunami Evacuation Route signs. More information is available online at [www.san-clemente.org](http://www.san-clemente.org)

**Harbors and Marinas** –

Take only essentials with you such as pets, medicines, baby supplies, money and important papers.  
Secure any boats to their docks  
Lock doors and windows  
Check on any neighbors who may need assistance

If you have no means of transportation ask for help from a neighbor or friend. Stay away from the beach areas. Follow the direction of law enforcement and public safety officials while evacuating.

Do not call 9-1-1 unless you have a life threatening emergency.

The Public Information Hotline phone number is (714) 628-7085.

Release authorized by: \_\_\_\_\_ Title: \_\_\_\_\_

Email or Faxed time: \_\_\_\_\_

Sent by: \_\_\_\_\_

## Attachment O - OCSD Department Commander Notification List

Tsunami Advisory, Watch or Warning Conference Call Notification Checklist for  
OC Sheriff's Department Commander

Control One notifies the Department Commander of a Tsunami Watch, Advisory, Warning or Local  
Near-Shore Earthquake/Immediate and provides a hardcopy of the notification

Department Commander will contact the following personnel, in the order listed, to relay the  
Tsunami notification and conference call instructions

Conference Call Bridge Access Information:

Phone number: 1-877-336-1828

Participant Code: 5180323

For the Dana Point and San Clemente Contact the Primary Listed, if unable to reach the primary  
contact the 1st Alternate listed, if unable to reach the 1st Alternate contact the 2nd Alternate listed.

Position/Name	Work #	Cell #	Home #
City of Dana Point			
Primary-Dir. of Disaster Preparedness: Mike Rose	(949) 248-3535	(949) 636-3914	(714) 628-9727
Primary Alternate-Vacant			
1st Alternate-City Lieutenant	(949) 248-3550	Use Sheriff's Internal Contact Listings	
2nd Alternate-City Manager: Mark Denny	(949) 248-3513		
City of San Clemente			
Primary-Emergency Planning Officer: Stephen Foster	(949)361-6109		n/a
1st Alternate-City Lieutenant	(949) 361-8230	Use Sheriff's Internal Contact Listings	
2nd Alternate-City Manager: James Makshanoff	(949)361-8321	(949)272-6115	n/a
Orange County Sheriff's Department-Unincorporated Contact all listed below			
Harbor Patrol Lieutenant:	(949) 673-1025	Use Sheriff's Internal Contact Listings	
North Patrol Lieutenant:	(714) 647-4094	Use Sheriff's Internal Contact Listings	
North Operations Captain	(714) 647-4559	Use Sheriff's Internal Contact Listings	
Orange County Sheriff's Department contact all listed below			
Assistant Sheriff: Robert Peterson	(714) 647-1833	Use Sheriff's Internal Contact Listings	
Commander Bill Baker	(714) 647-1802	Use Sheriff's Internal Contact Listings	
Public Information Manager	(714) 647-7042	Use Sheriff's Internal Contact Listings	

Department Commander ensures Radio Dispatchers contact the following to verify they copied  
Control One's broadcast:

- Harbor Patrol Dispatch Center - Station 54
- Dana Point Sergeant - Sam 34
- San Clemente Sergeant - Sam 70
- North Patrol Sergeant - Sam 10

The tsunami warning system in the United States is a function of the National Weather Service (NWS). The National Tsunami Warning Center (NTWC) is responsible for warning California

Notification Types with definitions starting with the lowest level to the highest level of warning:

**Tsunami Information Statement** - A tsunami information statement is issued when an earthquake or tsunami has occurred of interest to the message recipients. In most cases, information statements are issued to indicate there is no threat of a destructive basin-wide tsunami and to prevent unnecessary evacuations. Information statements for distant events requiring evaluation may be upgraded to a warning, advisory, or watch based on updated information and analysis.

**Tsunami Watch** - A tsunami watch is issued when a tsunami may later impact the watch area. The watch may be upgraded to a warning or advisory or canceled based on updated information and analysis. Emergency management officials and the public should prepare to take action.

**Tsunami Advisory** - 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 may be updated, adjusted geographically, upgraded to a warning, or cancelled based on updated information and analysis.

**Tsunami Warning** - A tsunami warning is issued when a tsunami with the potential to generate widespread inundation is imminent, expected, or occurring. Warnings alert the public that dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after initial arrival. Warnings alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas, and the repositioning of ships to deep waters when there is time to safely do so. Warnings may be updated, adjusted geographically, downgraded, or canceled based on updated information and analysis.

## Attachment P - Tsunami Conference Call Agenda for Watch, Advisory and Warning Notifications

### PURPOSE

This guide is designed to facilitate communication among jurisdictions for a tsunami incident. This guide may be used under any of the following conditions:

- To establish communications among jurisdictions.
- To facilitate protective action decision-making.

### INITIATING A TSUNAMI CONFERENCE CALL

The following jurisdictions/agencies should participate on tsunami call as indicated below:

#### Jurisdiction/Agency

San Clemente  
Dana Point  
Laguna Beach  
Newport Beach  
Huntington Beach  
Seal Beach  
OC Community Resources/OC Parks  
OCSO Department Commander  
OCSO Harbor Patrol  
Orange County Fire Authority  
Orange County Transportation Authority  
Metro-Net  
State Beaches  
National Weather Service  
Water Emergency Response of Orange County (WEROC)

### CONFERENCE CALL LINES AND BACK-UP SYSTEMS

#### Primary conference call line:

Conference Call Phone Number: 877-336-1828

Access Code: 5180323 (this is the code provided to those calling in)

Host Code: 3486

- The conference may consist of up to 100 members.
- All conferees will dial the **phone number and access code only. Only OCSO Emergency Management Division will utilize the host code 3486. This should not be disseminated to other agencies.**
- As conferees enter or leave the call, a confirmation tone will be received by all conferees to confirm that there has been a change in the number of participants.
- When the conference call is completed, conferees simply hang up.

**In the event the primary conference call line fails, the OCSO Emergency Management Division has the capabilities to provide back-up modes of communications including:**

**Secondary back up conference call line:**

Conference Call Phone Number: 877-336-1829

Access Code: 3753246(this is the code provided to those calling in)

Host Code: 4361

- The conference may consist of up to 100 members.
- All Conferees will dial the **phone number and access code only. Only OCSD EM will utilize the host code 4361. This should not be disseminated to other agencies.**
- As conferees enter or leave the call, a confirmation tone will be received by all conferees to confirm that there has been a change in the number of participants.
- When the conference call is completed, conferees simply hang up.

**Orange County, "MEET ME" Conference Call Line:**

Allows agencies to host conference calls by using the Orange County Telecommunications Network (OCTNET) system.

Conference Call phone number: 714-834-7400

Agency ID: 22

Passcode: 164422#

The conference may consist of up to 30 members.

- All Conferees will dial the **phone number, Agency ID and Pass Code** to activate the conference bridge.
- The first person to call will hear a ringing only, until the next party connects. As conferees are added a confirmation tone will sound to all parties but the new arrival. This allows any conferee to check the "roll call" and ensure that only desired parties are involved in the conference call and maintain an orderly list of participants.
- As conferees leave the bridge, a confirmation tone will be received by all conferees to confirm that there has been a change in the number of participants.
- When the conference call is completed, conferees simply hang up.

Other:

Type of notification from NTWC:

- Tsunami Watch
- Tsunami Advisory
- Tsunami Warning

---

Date:

Time:

---

Event Name:

---

County and OA EOC Facilitator:

The Orange County Tsunami Conference Call is to begin 45-60 minutes after notification from Control One.

Conference Call Number:

Conference Call Phone Number: 877-336-1828

Access Code: 5180323 (this is the code provided to those calling in)

Host Code: 3486

**LEGEND:**

CF= Call Facilitator

**CF= SAY IT**

*CF = indicates actions or items to complete*

---

*CF Ensure the following County and OA EOC Section Chiefs are in attendance, if position is activated:*

- Operations Section Chief
- Planning and Intelligence Section Chief
- Logistics Section Chief
- Finance and Administration Section Chief

**Critical Information required for the Conference Call:**

*CF should have the information below ready prior to initiating the conference call*

Copy of the message(s) sent from the NATIONAL TSUNAMI WARNING CENTER (NTWC)		
Location and event that generated the tsunami <i>CF can obtain this information from the NTWC Bulletin</i>		
Estimated time of wave arrival <i>CF can obtain this information from the NTWC Bulletin</i>		
Projected amplitude CF can obtain this information from the NTWC Bulletin		
Tide levels and marine conditions predicted during event (quick information website is: <a href="http://wavecast.net/tideall.shtml">http://wavecast.net/tideall.shtml</a> )	Low Tide Time:	Low Tide Level:
	High Tide Time:	High Tide Level:
	Marine Conditions:	
FASTER Playbook Recommended Evacuation Phases (If available) to access playbook recommendations go to the following website: <a href="https://cgstsunamidb.basecampHQ.com/login">https://cgstsunamidb.basecampHQ.com/login</a>		
For login and password go to EOC Contacts, Tsunami Basecamp Web Portal		
Time of Sunrise (damage assessments)		
Copy of any Press Releases or AlertOC messages associated with an Advisory or Warning in case		

they need to be read to the group and/or amendments made (see attachments to Tsunami Annex)	
Tsunami Quick Reference Chart (next page)	

**FASTER Reference Table for Individual Jurisdictional Playbooks**

Evacuation Playbook Reference Pages	Recommended Community Action	Associated FASTER Tsunami Flood Level Number (in METERS above Mean Sea Level)	Associated FASTER Tsunami Flood Level Number (in FEET above Mean Sea Level)	Anticipated Associated NOAA Tsunami Alert Level	Tsunami height compared to other tidal reference points (see TIDAL REFERENCE FIGURE)	
					Tsunami flood level above high tide line - MHHW (flow depth above low-lying dry land)	Tsunami flood level above low tide conditions (Mean Low Low Water - MLLW)
Pages 8-9	Phase 1 Evacuation	less than 1.00m	less than 3.3ft	Advisory	none (less than 0 ft)	0 ft to 6ft
Pages 10-11	Phase 2 Evacuation	1.00m to 1.50m	3.3ft to 5.0ft	Advisory or Warning	0 ft to 1.7ft	6ft to 7.7ft
Pages 12-13	Phase 3 Evacuation	1.50m to 2.50m	5.0ft to 8.2ft	Warning	1.7ft to 5.0ft	7.7ft to 11.0ft
Pages 14-15	Maximum Evacuation Phase	more than 2.50m	more than 8.2ft	Warning	more than 5.0ft	more than 11.0ft

**Tsunami Reference Chart**

Event Type	Definition	Activities/Tasks/Decisions
<b>Tsunami Watch</b>	<b>Distant Tsunami Possible.</b> Issued to alert emergency managers and the public of an event which may later impact the Watch area. May be upgraded to an Advisory or Warning -or canceled -based on updated information and analysis.	<ul style="list-style-type: none"> <li>Control One notifies all jurisdictions and agencies as per established Watch protocols.</li> <li>Emergency Management Division will establish a conference call with coastal jurisdictions, agencies, and NWS to discuss situation and possible changes.</li> <li><b>No formal actions besides monitoring.</b></li> <li>No EOC activation.</li> <li>Tsunami Watch forwarded to OA.</li> </ul>
<b>Tsunami Advisory</b>	<b>Threat of a tsunami which may produce strong currents or waves dangerous to those in or near the water;</b> typically called when forecasted tsunami amplitudes are between 0.3m and 1m (1ft and 3ft) above existing tidal conditions are expected. Coastal communities are advised that beach and harbor areas could expect rapid, moderate tidal changes and strong currents.	<ul style="list-style-type: none"> <li>Control One notifies all jurisdictions and agencies as per Advisory protocols.</li> <li>Emergency Management Division will establish a conference call with coastal jurisdictions, agencies, and NWS to discuss potential beach closures and evacuations.</li> <li><b>Estimate Time of Arrival of the Tsunami during low tide and amplitude less than 50 CM (1.6 feet) - Close beaches and release a joint press release</b> or</li> </ul>



		<p><b>Estimate Time of Arrival of the Tsunami during high tide (between 1.6 and 5.0 feet) above mean sea level - Close beaches, harbors, marinas and piers. Issue joint press release, jurisdictions to launch AlertOC message to beachfront properties.</b></p> <ul style="list-style-type: none"> <li>• OA EOC activated to Level 3 (Low Level).</li> <li>• Tsunami Advisory forwarded to OA.</li> <li>• Monitor and notify jurisdictions and agencies if event is upgraded to a Tsunami Warning or cancellation of the Advisory.</li> </ul>
<p><b>Tsunami Warning</b></p>	<p><b>Distant Tsunami with significant widespread inundation is imminent</b> or expected; typically called when forecasted tsunami amplitudes are equal to or greater than 1m (3ft). Coastal communities are advised to evacuate people from low-lying areas identified as vulnerable to tsunamis.</p>	<ul style="list-style-type: none"> <li>• Control One notifies all jurisdictions and agencies per protocols established for a Tsunami Warning.</li> <li>• Emergency Management Division will establish conference call with coastal jurisdictions, agencies, and NWS to <b>discuss evacuations and maritime closures using FASTER</b> Playbook.</li> <li>• EOC activated to a Level 2 (Moderate Level).</li> <li>• Launch AlertOC and Press releases at time discussed on Conference Call.</li> <li>• Control One, when directed by the County and OA Emergency Manager, will activate the WEA Message for Tsunami Warning.</li> <li>• Tsunami Warning forwarded to OA.</li> </ul>
<p><b>Local Near-Shore Earthquake</b></p>	<p><b>Immediate Tsunami – with insufficient response time or warning.</b> The earthquake near-shore, local and greater than 6.8 magnitude.</p>	<ul style="list-style-type: none"> <li>• Control One to notify all jurisdictions and agencies per protocols established for a Local Near-Shore Earthquake/Immediate Tsunami.</li> <li>• <b>Control One, when directed by the County and OA Emergency Manager, will activate the EAS/WEA Message for Local Earthquake/Immediate Tsunami.</b></li> <li>• Control One will make a Red Channel broadcast.</li> <li>• Activate EOC to Level 2 (Moderate Level).</li> <li>• Conference Call will be conducted 1 hour after initial Earthquake.</li> </ul>

CF This is \_\_\_\_\_ (name of facilitator) from the Operational Area Emergency Operations Center and I will be facilitating the tsunami conference call.

Reminder - please mute your phones during this call in order to keep background noise to a minimum. Please do not place this call on hold – some phone systems have music and it is a disruption.

The National Tsunami Warning Center has issued a Tsunami *CF circle one* (Watch--Advisory--Warning) for Orange County due to \_\_\_\_\_  
*CF provide location and event description causing the tsunami.*

This conference call has been initiated to establish communications and discuss if any protective actions need to be implemented. Each agency with public safety authority for their jurisdiction is expected to have a Decision Maker on the Conference Call for this event.

I will conduct a roll call; jurisdictions will be called from south to north, then additional agencies.

**When prompted, please respond if your Decision Maker is present, and provide the Decision Maker's name and phone number.**

CF *The following jurisdictions are required participants who have decision making authority for this event:*

Jurisdiction or Agency Name	"Is your Agency Decision Maker on line?"		"Decision Maker Name and Contact Number"
	YES	NO	
San Clemente	YES	NO	
Dana Point	YES	NO	
Laguna Beach	YES	NO	
Newport Beach	YES	NO	
Huntington Beach	YES	NO	
Seal Beach	YES	NO	
OC Community Resources/Parks	YES	NO	
OCSD Harbor Patrol	YES	NO	
OCSD Department Commander	YES	NO	
State Beaches	YES	NO	

CF **I will now call other assisting agencies who are on this call. Please provide the name of the primary point of contact.**

CF *will conduct roll call of the agencies listed below. If any agency is not listed, indicate in the others column.*

Other Participants:	"Please list your conference call participant's name"	
OC Fire Authority		
Metro-Net		
National Weather Service (NWS)		
Others:		

--	--	--

**CF National Weather Service will you please provide an update on the current situation, and provide weather, tide and marine conditions.**

*CF, If the National Weather Service is unable to be on the conference call, the CF will provide the current situation update, weather, tide predictions and marine conditions to the group.*

**NOAA/NWS Status Report:**

Current event status

Weather, tide and marine conditions forecast:

**CF National Weather Service can you advise if a Wireless Emergency Alert has been or will be released at this time. *This only occurs during a Tsunami Warning***

No

Yes *CF capture the time to/has be launched and , message contents*

**CF When I call your jurisdiction or agency, please provide the following information:**

- If your EOC is activated or will be activating
- Current status update
- Special events scheduled
- Road closures or construction
- Beach or harbor/marina status
- Any other pertinent information which may impact decision making

**Current Status Report From: (EOC, Special Events scheduled, Road impediments, beach status, etc.)**

County and OA EOC	
San Clemente	
Dana Point	

Laguna Beach	
Newport Beach	
Huntington Beach	
Seal Beach	
OCSD Harbor Patrol	
OCSD Department Commander	
OC Community Resources/Parks	
State Beaches	
OC Fire Authority	
Others	

*CF \*\* Stop and go to the Tsunami Threat Event Level Specific Script either Watch, Advisory or Warning\*\**

**Event Level: Tsunami Watch**

**CF** A tsunami watch is issued to alert emergency management officials and the public of an event which may later impact the watch area. The watch area may be upgraded to a warning or advisory - or cancelled - based on updated information and analysis. Therefore, emergency management officials and the public should prepare to take action. Watches are normally issued based on seismic information without confirmation that a destructive tsunami is underway.

**CF** For a Tsunami Watch in Orange County the following are the protective action recommendations.

There are:

- No Protective Actions under a watch
- No AlertOC
- No Evacuations Orders
- Jurisdictions will continue to Monitor Situation

**CF** Is there any discussion, comments or questions before we continue?

*CF shall capture additional comments here, if any:*

**CF** When I call your jurisdiction, state your concurrence with the protective action recommendations. Please state yes or no to the following:

*Conference Call Facilitator (CF) Note: There is no legal bounds to make all jurisdictions and/or agency's concur. We are asking for concurrence in order to make coordination easier. If a jurisdiction and/or agency does not concur, try to work out what the issue is, to address concerns and actions. If concurrence cannot be reached, document what transpired in detail.*

*CF will call each jurisdiction then read the header of each column and indicate yes or no.*

**Tsunami Watch Concurrence Table**

No AlertOC		No Evacuation Orders		Continue to Monitor Situation		Social Media Postings (Website, Twitter, Facebook, etc.)			
Concurrence		Concurrence		Concurrence					
YES	NO	YES	NO	YES	NO			YES	NO
San Clemente									
Dana Point									

Laguna Beach								
Newport Beach								
Huntington Beach								
Seal Beach								
OCSA Harbor Patrol								
OCSA DC for Unincorp. Areas								
State Beaches								
OC Community Resources/Parks								

**CF Is there any jurisdiction with any needs or requests at this time.**

*CF will capture any needs or requests from jurisdictions, including mutual aid, OA EOC support, etc.*

County and OA EOC	
San Clemente	
Dana Point	
Laguna Beach	
Newport Beach	
Huntington Beach	
Seal Beach	

OCSD Harbor Patrol	
OCSD Department Commander	
OC Community Resources/Parks	
State Beaches	
OC Fire Authority	
Others	

*CF Prior to ending the conference call, facilitator should provide a summary of the final decision on protective actions to be taken or not taken.*

**CF** Our next conference call will be held at \_\_\_\_\_ time on \_\_\_\_\_ date.

**CF** This concludes this conference call. Thank you.

*CF Immediately send out next scheduled conference call date and time information via email and AlertOC.*

## Event Level: Tsunami Advisory

**CF** A tsunami advisory is issued due to the threat of a potential tsunami which may produce strong currents or waves dangerous to those in or near the water. Coastal regions historically prone to damage due to strong currents induced by tsunamis are at the greatest risk. The threat may continue for several hours after the arrival of the initial wave, but significant widespread 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.

**CF** For a Tsunami Advisory in Orange County the protective action recommendations are as follows:

- Close Beaches
- Close Harbors and Piers
  - *CF If Estimate Time of Arrival of the Tsunami is during high tide (greater than 6 feet) \*\* Make determination prior to conference call*
- Launch AlertOC
- Issue joint Press Release

**CF** Is there any comments or questions before we continue?  
*CF shall capture additional comments here, if any:*

**CF** When I call your jurisdiction, state your concurrence with the protective action recommendations. Please state yes or no to the following:

*Conference Call Facilitator (CF) Note: There is no legal bounds to make all jurisdictions and/or agency's concur. We are asking for concurrence in order to make coordination easier. If a jurisdiction and/or agency does not concur, try to work out what the issue is, to address concerns and actions. If concurrence cannot be reached, document what transpired in detail.*

*CF will call each jurisdiction then read the header of each column and indicate yes or no.*

**Tsunami Advisory Concurrence Table**

Close Beaches		Close or Not Closing Piers and Harbors		Launch AlertOC		Issue joint press release		Social Media Postings (Website, Twitter, Facebook, etc.)	
Concurrence		Concurrence		Concurrence		Concurrence			
YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
San Clemente									



Dana Point									
Laguna Beach									
Newport Beach									
Huntington Beach									
Seal Beach									
OCSD Harbor Patrol									
OCSD DC For Unincorp. Areas									
State Beaches									
OC Community Resources/Parks									

*CF will recap if a concurrence has been received. If there is not a concurrence, discussion to come to a resolution will take place until a concurrence or reasonable solution is agreed upon.*

**CF All groups have concurred to the \_\_\_\_\_ CF recap above. Does anyone have any changes or modifications to the press release or AlertOC message?**

*CF will make any changes provided from jurisdictions and supply to the PIO for revisions. Documents amended will have to be sent to the tsunami jurisdictions responsible for notifications.*

**CF Is there any jurisdiction with any needs or requests at this time.**

*CF will capture any needs or requests from jurisdictions, including mutual aid, OA EOC support, etc.*

County and OA EOC	
San Clemente	
Dana Point	

Laguna Beach	
Newport Beach	
Huntington Beach	
Seal Beach	
OCSD Harbor Patrol	
OCSD Department Commander	
OC Community Resources/Parks	
State Beaches	
OC Fire Authority	

Others	
--------	--

**As a reminder please provide your Social Media postings the the County and OA EOC.**

*CF Prior to ending the conference call, facilitator should provide a summary of the final decision on protective actions to be taken or not taken.*

*CF if the Tsunami event occurred during night time hours, a conference call should be scheduled after sunrise to collect tsunami impact observations and damage data.*

**CF Our next conference call will be held at \_\_\_\_\_time on \_\_\_\_\_date.**

**CF This concludes this conference call. Thank you.**

*CF Immediately send out next scheduled conference call date and time information via email and AlertOC.*

*CF should indicated time call ended here: \_\_\_\_\_*

## **Event Level: Tsunami Warning**

**CF** A tsunami warning is issued when a potential tsunami with significant widespread inundation is imminent or expected. Warnings alert the public that widespread, dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after arrival of the initial wave. Warnings also alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas, and the repositioning of ships to deep waters when there is time to safely do so. Warnings may be updated, adjusted geographically, downgraded, or canceled. To provide the earliest possible alert, initial warnings are normally based only on seismic information.

### Recommend Protective Actions for a Tsunami Warning:

**CF** For a Tsunami Warning in Orange County the protective action recommendations are as follows:

#### **Protective Actions to be taken at this time including:**

- Evacuation of pre-identified tsunami inundation zones based on current full inundation maps or FASTER
- Activate EAS
- Issue a joint press release
- Issue AlertOC

**CF** Is there any discussion, comments or questions before we continue?

*CF shall capture additional comments here, if any:*

**CF** When I call your jurisdiction, state your concurrence with the protective action recommendations. Please state yes or no to the following:

*Conference Call Facilitator (CF) Note: There is no legal bounds to make all jurisdictions and/or agency's concur. We are asking for concurrence in order to make coordination easier. If a jurisdiction and/or agency does not concur, try to work out what the issue is, to address concerns and actions. If concurrence cannot be reached, document what transpired in detail.*

*CF will call each jurisdiction then read the header of each column and indicate yes or no.*

### **Tsunami Warning Concurrence Table**

	Evacuations		Are you using Playbook Phases?		Activate EAS		Launch AlertOC		Issue joint press release	
	Concurrence				Concurrence		Concurrence		Concurrence	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
San Clemente										
Dana Point										
Laguna Beach										
Newport Beach										
Huntington Beach										
Seal Beach										
OCSD Harbor Patrol										
OCSD DC For Unincorp. Areas										
State Beaches										
OC Community Resources/Parks										

**CF All groups have concurred to the \_\_\_\_\_ recap above. Does anyone have any changes or modifications to the press release or AlertOC message.**

*CF Will make any changes provided from jurisdictions and supply to the PIO for revisions. Documents amended will have to be sent to the tsunami jurisdictions responsible for notifications.*

*CF If AlertOC is concurred upon:*

**CF The group has determined AlertOC will be issued at \_\_\_\_\_ time on \_\_\_\_\_ date, any further discussion on this matter.**

**CF Is there any jurisdiction with any needs or requests at this time.**

*CF will capture any needs or requests from jurisdictions, including mutual aid, OA EOC support, etc.*

<b>County and OA EOC</b>	
<b>San Clemente</b>	
<b>Dana Point</b>	
<b>Laguna Beach</b>	
<b>Newport Beach</b>	
<b>Huntington Beach</b>	
<b>Seal Beach</b>	
<b>OCSD Harbor Patrol</b>	
<b>OCSD Department Commander</b>	
<b>OC Community Resources/Parks</b>	
<b>State Beaches</b>	
<b>OC Fire Authority</b>	

<b>Others</b>	

**As a reminder please provide your Social Media postings the the County and OA EOC.**

*CF Prior to ending the conference call, facilitator should provide a summary of the final decision on protective actions to be taken or not taken.*

*CF if the Tsunami event occurred during night time hours, a conference call should be scheduled after sunrise to collect tsunami impact observations and damage data.*

**CF Our next conference call will be held at \_\_\_\_\_time on \_\_\_\_\_date.**

**CF This concludes this conference call. Thank you.**

*CF Immediately send out next scheduled conference call date and time information via email and AlertOC.*

*CF should indicated time call ended here: \_\_\_\_\_*

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Attachment Q – Orange County Tsunami Evacuation Playbooks  
Updated – 01/14/2018

**California Tsunami Evacuation Playbook  
for Orange County  
City of Seal Beach  
City of Huntington Beach  
City of Newport Beach  
City of Laguna Beach  
City of Dana Point  
City of San Clemente**

**DURING AN EMERGENCY, USE THE “QUICK REFERENCE” SHEET ON  
THE BACK PAGE (PAGE 38).**

**(For the expanded playbook analysis, use directions on Page 4 )**



California Tsunami Evacuation Playbook No. 2018-OC-01  
Modified

California Geological Survey  
California Governor's Office of Emergency Services  
National Oceanic and Atmospheric Administration

Funded by the National Tsunami Hazard Mitigation Program



**THE NATIONAL TSUNAMI  
HAZARD MITIGATION  
PROGRAM (U.S.)**

**DISCLAIMER:** The State of California and its partners make no representation or warranties regarding the accuracy of this document and the maps within nor the data from which the maps were derived. Neither the State of California nor its partners shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any claim by any user or any third party on account of or arising from the use of this document and its maps. In addition, the community is not responsible for the contents of this document.

**Table of Contents – Orange County Combined Tsunami Response Plan Playbooks**

Page 2: Purpose and use of tsunami playbooks, and tsunami alert bulletins  
Page 3: Tsunami alert bulletins and FASTER reference information  
Page 4: Expanded real-time response reference page  
Page 5: Tsunami evacuation/response “decision tree”  
Page 6: Tsunami elevation-based evacuation playbook information  
Page 7: Tsunami scenario-based evacuation playbook information  
Pages 8-35: Tsunami elevation-based evacuation playbook plans and maps pages  
Page 36-37: Notable historical tsunamis and state tsunami program modeling results  
Page 38: APPENDIX – QUICK REFERENCE PAGE for real-time response activities

**DURING AN EMERGENCY, USE THE “QUICK REFERENCE” ON PAGE 18 FOR  
GATHERING INFORMATION FOR RESPONSE ACTIVITIES.**

**PURPOSE: NOTE:** Emergency managers should become familiar with this Playbook plan prior to use. The ultimate decision and responsibility for tsunami evacuation/response activities is up to community-level officials. A significant issue for emergency managers is that existing tsunami evacuation plans call for evacuation of the predetermined tsunami evacuation zone (typically at a 30- to 50-foot elevation) during a “Warning” level event; the alternative is to not call an evacuation at all. A solution to provide more detailed information has been the development of tsunami evacuation “Playbooks” to plan for tsunami scenarios of various sizes and source locations. NOAA-issued Tsunami Alert Bulletins received in advance of a distant event will contain a tsunami alert level, forecasted tsunami amplitude (or wave height) and arrival time for a number of locations along the coastline. Elevation-based “playbook” evacuation lines/zones can be useful for partial tsunami evacuations when information about forecasted tsunami amplitudes and arrival times is available to coastal communities and there is sufficient time to implement a partial evacuation. Provision for multiple elevation-based evacuation lines and response plans for those lines enables planning for different evacuation scenarios based on the forecast tsunami amplitude, potentially alleviating the need for an “all or nothing” decision with regard to evacuation.

**USE:** This playbook is designed to help the emergency managers with tsunami evacuation and response activities. First, it requires that the emergency manager become familiar with the information herein, especially the “Tsunami Response Decision Tree” (Page 5), the overall Playbook approach, and FASTER calculation (Page 3). When a distant-source tsunami is occurring, fill out the information on Page 4 regarding the earthquake (magnitude, location) and tsunami (alert level, forecasted amplitude and arrival time). Keep in mind that this information can change during the first hour or two after the earthquake occurs.

Use this information to determine which branch of the decision tree applies to the event. Refer to information on Pages 6 and 7 regarding the “Elevation-Based Evacuation Playbook,” the “Scenario-Based Evacuation Playbook,” and the FASTER calculation value. If there is sufficient time, FASTER will be calculated and provided to each community by the state, county or regional NOAA Weather Forecast Office. If there is sufficient time, the state or NOAA will also provide a recommendation on which tsunami “playbook” phase plan for each community to use. Each scenario-based Playbook will be accompanied by a digital file identifying the full evacuation zone for a community. This file should be referenced and used during an event. Communities may wish to use these maps to establish “reverse 911” calling areas.

**Tsunami Alert Bulletins:** During the typical tsunami alert, the Warning Center provides information about the tsunami in "bulletins" to the state and local jurisdictions. There are four levels of "alert" that can be sent by the NTWC (from least to greatest significance):

**Tsunami Information Statement** - Issued to inform and update emergency managers and the public that an earthquake has occurred, or that a tsunami Watch, Advisory or Warning has been issued elsewhere in the ocean.

**Tsunami Watch** - Issued to alert emergency managers and the public of an event which may later impact the Watch area. May be upgraded to an Advisory or Warning - or canceled - based on updated information and analysis.

**Tsunami Advisory** - Issued due to the threat of a tsunami which may produce strong currents or waves dangerous to those in or near the water; typically called when forecasted tsunami amplitudes are between 0.3m and 1m (1ft and 3ft) above existing tidal conditions are expected. Coastal communities are advised that beach and harbor areas could expect rapid, moderate tidal changes and strong currents.

**Tsunami Warning** - Issued when a tsunami with significant widespread inundation is imminent or expected; typically called when forecasted tsunami amplitudes are equal to or greater than 1m (3ft). Coastal communities are advised to evacuate people from low-lying areas identified as vulnerable to tsunamis.

**FASTER Analytical Tool:** To determine the full impact of the tsunami, other variables such as tidal and storm conditions must be considered. An analytical method has been created which incorporates important variables that will impact the ultimate tsunami flood level. The FASTER calculation will be made by the regional NOAA NWS Weather Forecast Office for each community during a tsunami event; it is used to help determine which "phase" evacuation/response playbook plan should be used. NOAA and/or the state will recommend which particular phase evacuation plan should be used by each community, and transmit that information to the communities prior to the tsunami's arrival. Communities themselves can also use the FASTER value to match which phase playbook plan to use. The simplified components of the calculation are shown to the right.

Working example: Formula for determining  
playbook evacuation line to use (FA-S-T-E-R):

FA: Forecasted Amplitude (Wave Height) from  
Warning Center

+

S: Storm surge or existing ocean conditions

+

T: Maximum tidal height (first 5 hours of tsunami)

+

E: Forecast error potential (30%; analysis of 2010-11 events)

+

R: Site amplified run-up potential (from existing modeling,  
unique to each location; applied if inundation expected)

= **Maximum tsunami run-up height**

= **Playbook elevation line**

## Expanded and Enhanced Reference Information for Determining Real-Time Tsunami Response Activities

**NOTE:** Tsunami response activities are the responsibility of the coastal community. It is important to review all sections of this Playbook prior to using it during a tsunami emergency. When a tsunami alert is issued by the National Tsunami Warning Center, fill out the Expanded Reference page below under Step 1 and follow steps on the right side of the page to determine response activities. If there is sufficient time, to help reduce confusion the state/NOAA will provide information on recommended "Phase" evacuation and response plans to use based on the FASTER tsunami flood level value calculated for each community.

**Step 1:** Obtain information about earthquake and tsunami from National Tsunami Warning Center in Alaska, regional NOAA-Weather Forecast Office, and/or county emergency manager. The explanation of the FASTER calculation is provided on Page 3. FASTER value will be calculated and provided to the emergency manager; it is used to determine which Playbook scenario to use.

Earthquake location \_\_\_\_\_  
Earthquake magnitude \_\_\_\_\_  
Tsunami Alert level (circle one)      WATCH      ADVISORY      WARNING  
Forecasted tsunami amplitude/wave height \_\_\_\_\_  
Forecasted tsunami arrival time \_\_\_\_\_  
Calculate/obtain FASTER tsunami run-up value in first 5 hours: \_\_\_\_\_  
Calculate/obtain FASTER tsunami run-up value at highest tide \_\_\_\_\_  
Other general information regarding tidal, storm, and other ambient conditions: \_\_\_\_\_

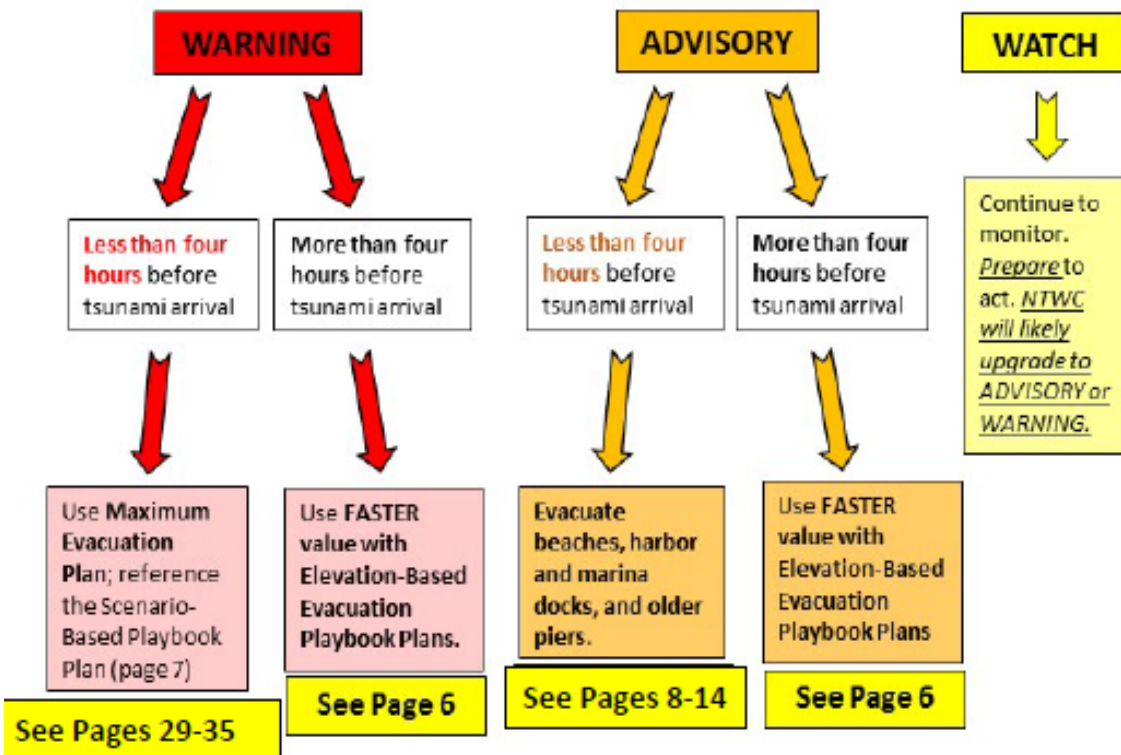
**Step 2:** Compare the information from Step 1 to the [Tsunami Response Decision Tree](#) on the right. Select the decision tree branch that best fits the forecast tsunami information.

**Step 3:** Go to Page 6 or 7 "Playbook" reference pages and utilize the appropriate Playbook or strategy for evacuation and response. Refer to the table on Page 6 to see which pages to related to a particular tsunami "phase" evacuation and response. The particular "phase" plan will be provided as a recommendation by the state/NOAA when a tsunami Advisory or Warning is issued.

A set of digital evacuation maps and response instructions will accompany each of the Elevation-based Evacuation Playbook plans. These files can be used to develop "reverse 911" calling areas prior to the event.

# Tsunami Response Decision Tree

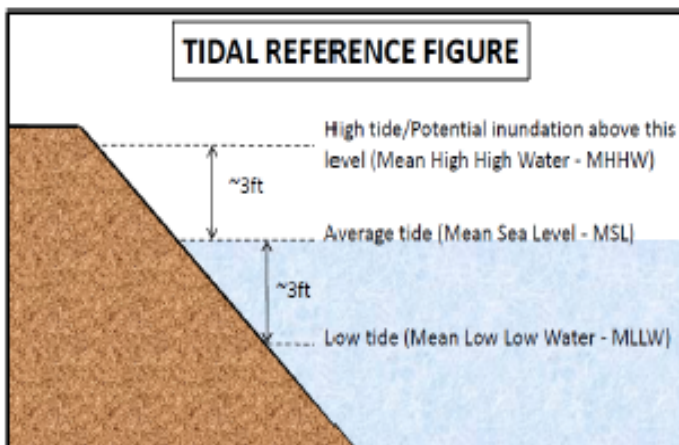
Users should reference information from Step 1 on page 4 regarding the potential tsunami event, including source location, magnitude, FASTER tsunami height number, arrival time, and Alert Level as listed. The following decision tree is guidance for community evacuation planning. Ultimately, each community is responsible for determining and carrying out the appropriate tsunami response activities.



## Elevation-Based Evacuation Playbook

**NOTE: The ultimate decision and responsibility for tsunami evacuation/ response activities is the community emergency manager. The table below shows the appropriate tsunami elevation-based evacuation playbook response plan for the resulting FASTER tsunami flood level number. Once the FASTER value is calculated for each community, it will be used by the state and NOAA to recommend a specific playbook phase plan to use. For example, if the FASTER number is 1.3m, the state/NOAA will recommend as an option that the community could use the Phase 2 Evacuation Plan provided on pages 15-21.**

Orange County Evacuation Playbook Reference Pages	Recommended Community Action	Associated FASTER Tsunami Flood Level Number (in METERS above Mean Sea Level)	Associated FASTER Tsunami Flood Level Number (In FEET above Mean Sea Level)	Anticipated Associated NOAA Tsunami Alert Level	Tsunami height compared to other tidal reference points (see TIDAL REFERENCE FIGURE)	
					Tsunami flood level above high tide line-MHHW (flow depth above low-lying dry land)	Tsunami flood level above low tide conditions (Mean Low Low Water – MLLW)
Pages 8-14	Phase 1 Evacuation	Less than 1.00m	Less than 3.3ft	Advisory	None (less than 0ft)	0ft to 6ft
Pages 15-21	Phase 1 Evacuation	1.00m to 1.50m	3.3ft to 5.0ft	Advisory or Warning	0ft to 1.7ft	6ft to 7.7ft
Pages 22-28	Phase 3 Evacuation	1.50m to 2.50m	5.0ft to 8.2ft	Warning	1.7ft to 5.0ft	7.7ft to 11.0ft
Pages 29-35	Maximum Evacuation Phase	More than 2.50m	More than 8.2ft	Warning	More than 5.0ft	More than 11.0ft



**NOTE FOR TABLE ABOVE:** Use only locally enhanced FASTER numbers coming from the state or your regional NWS office to implement actions on this page. The NTWC forecast amplitude/wave height should not be referenced here as it does not include tides, storms, or other factors contributing to flood potential.

## Scenario-Based Evacuation Playbook

**NOTE: The ultimate decision and responsibility for tsunami evacuation/ response activities is the community emergency manager.** Scenario-based tsunami playbooks and guidance have been developed for maximum local and distant tsunamis, and for tsunamis coming from the Cascadia Subduction Zone toward central and southern California. Scenario playbook information about the expected tsunami amplitude, tsunami travel time, and map of source regions is available from the numerical modeling results for these sources (Page 37). These are important scenarios for emergency managers to prepare for as there could only be tens of minutes to evacuate or just a few hours to conduct response or evacuation activities before the tsunami arrives. Because of the short time for making response decisions, the following evacuation and response plans are recommended for all of Orange County:

Scenarios with short tsunami arrival times	Shortest tsunami travel time to Orange County after earthquake	Suggested Scenerio Playbook Response Plan
Local coastal earthquake >M6.5	10-15 minutes	Maximum Phase Evacuation
Cascadia subuduction zone >M8.5	2 hours	Phase 2 Elevation Playbook
Alaska or Aleutians subduction zone >M8.5	6 hours	Maximum Phase Evacuation

## Phase 1 Evacuation Plan

### Background Information:

Alert level = Advisory

FASTER tsunami value = less than 1.0m (3.3 ft)

### Specific Instructions:

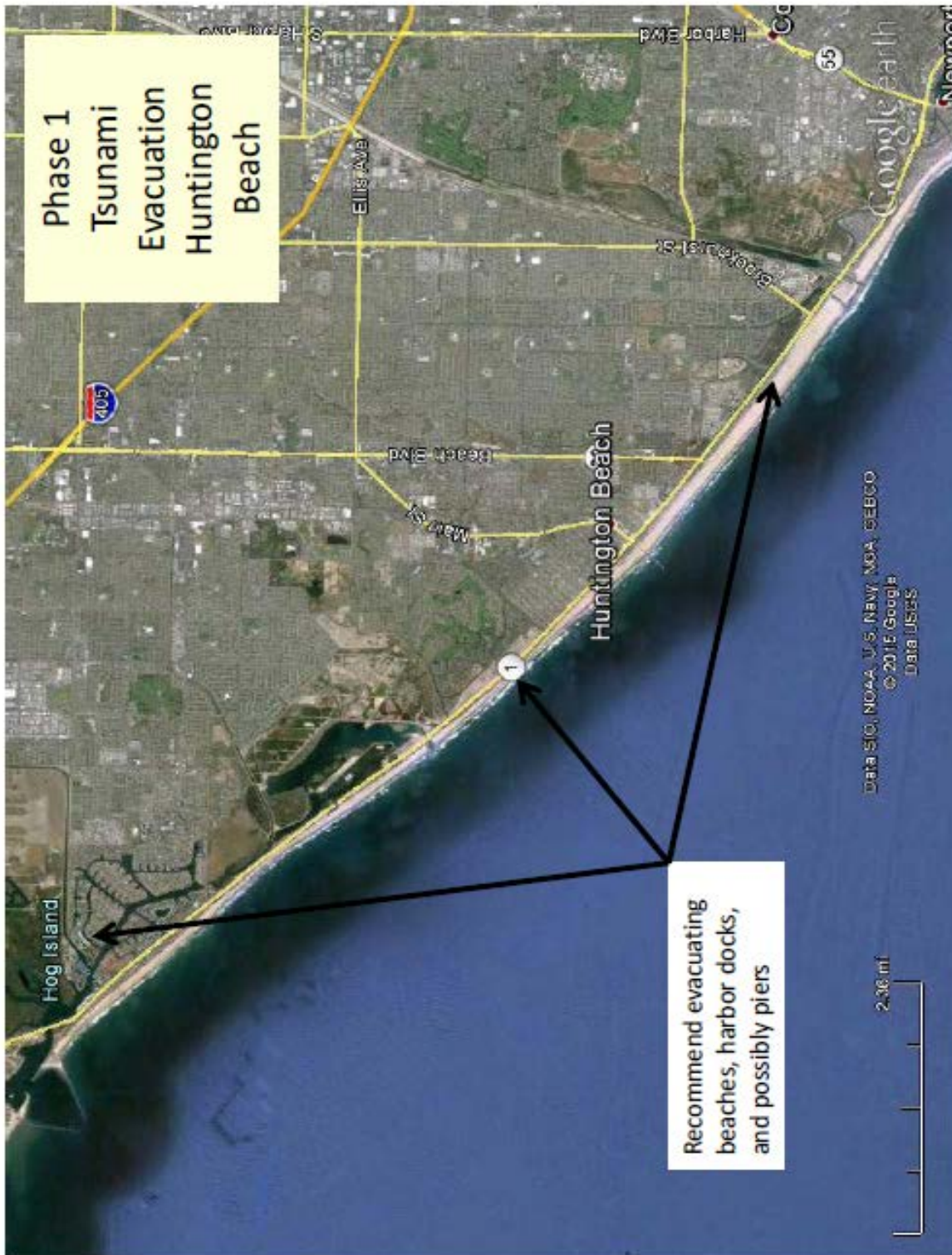
- Follow general guidance for Advisory-level tsunamis (Page 3)
- Evacuate beaches, harbor docks and boats, and possibly piers (depending on the stability and age of the pier). Strong currents and potential scour may be expected in harbors.
- A digital file showing evacuation maps and response instructions is available for use.
- Specific evacuation and response instructions..... (completed with the community input)



City of Seal Beach Phase 1 - Advisory



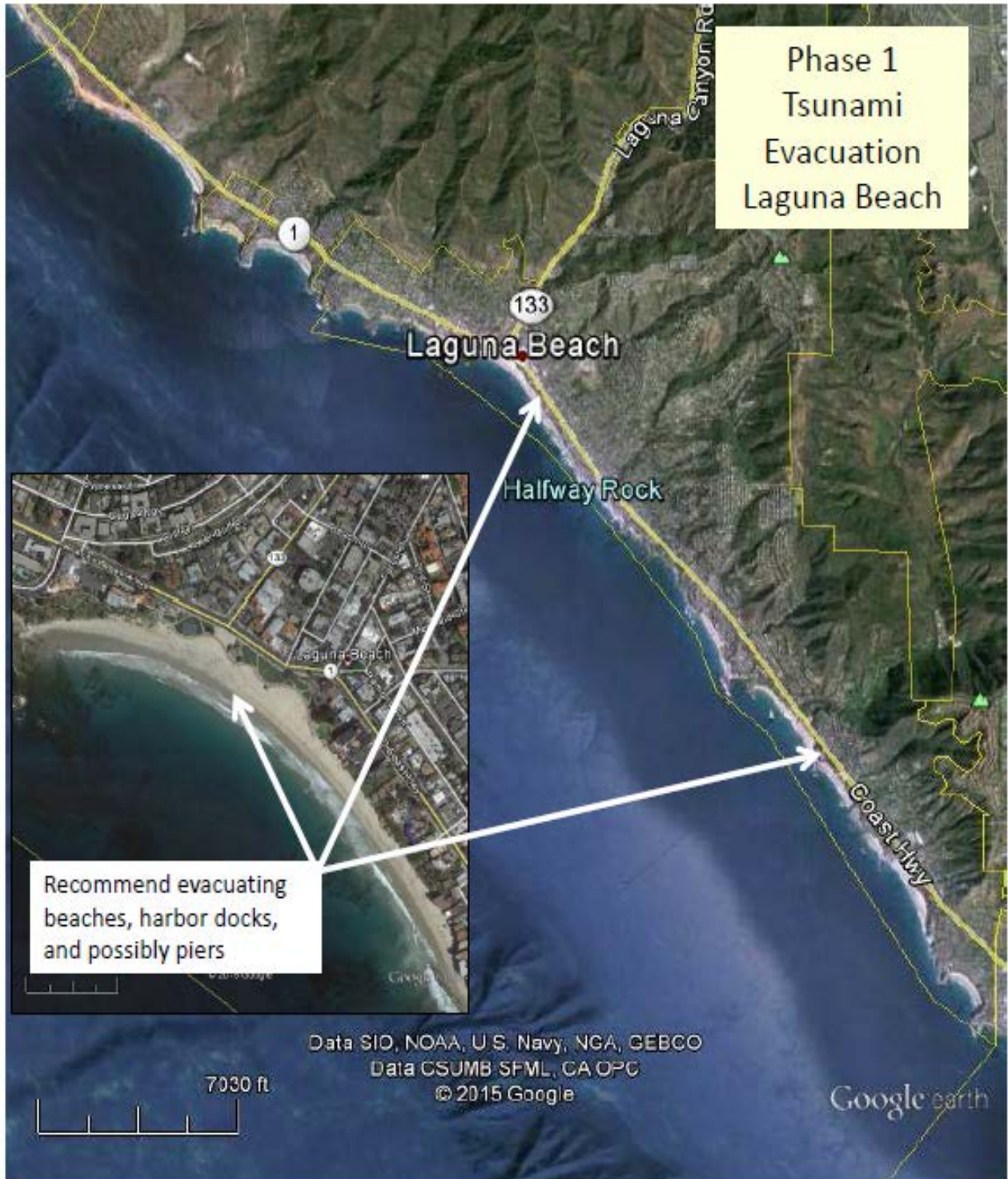
City of Huntington Beach Phase 1 - Advisory



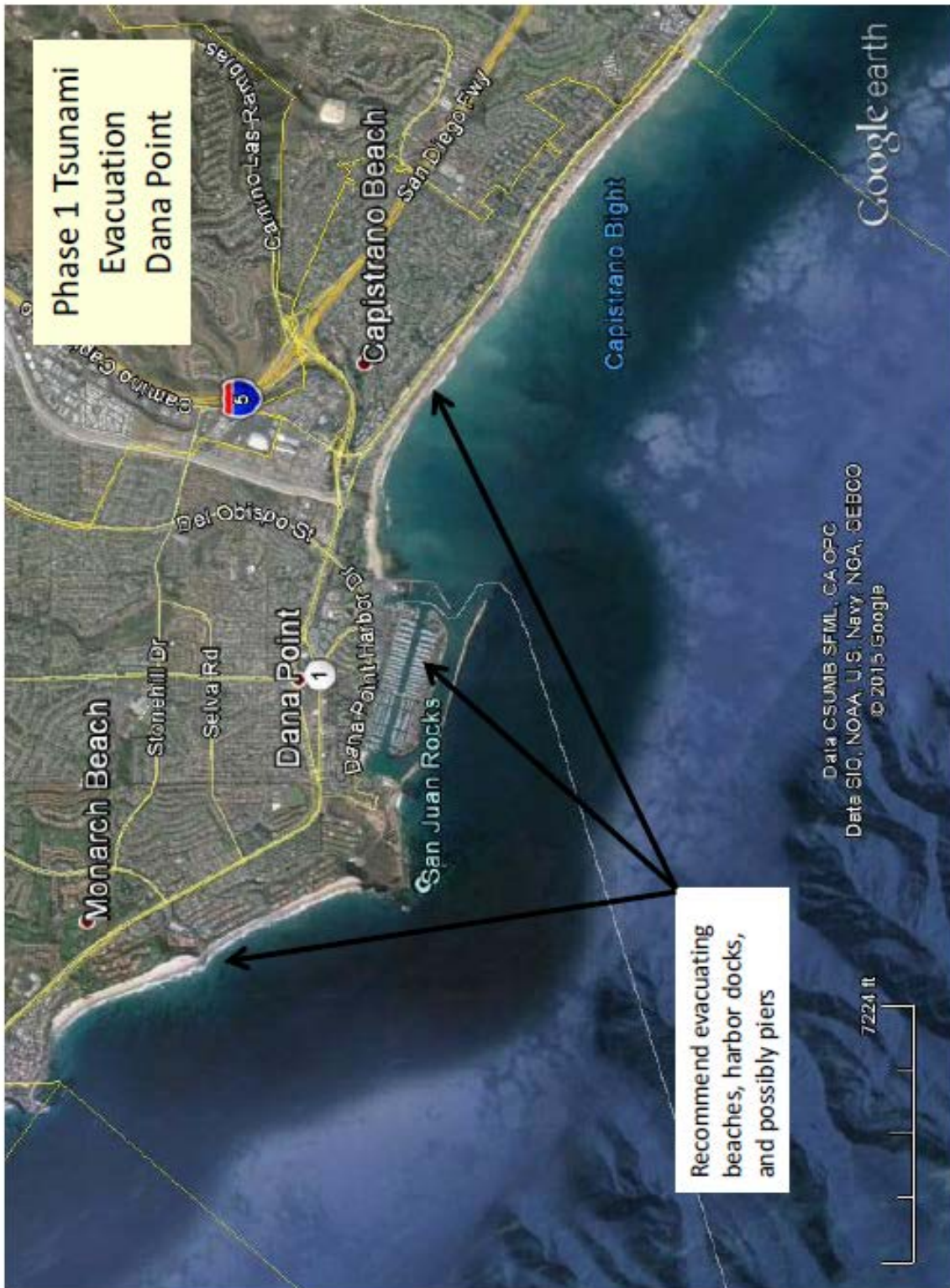
City of Newport Beach Phase 1 – Advisory



City of Laguna Beach Phase 1 – Advisory



City of Dana Point Phase 1 - Advisory



City of San Clemente Phase 1 – Advisory



## Phase 2 Evacuation Plan

### Background Information:

Alert level = Warning

FASTER tsunami value = between 1.0m (3.3 ft) and 1.5m (5.0ft)

### Specific Instructions:

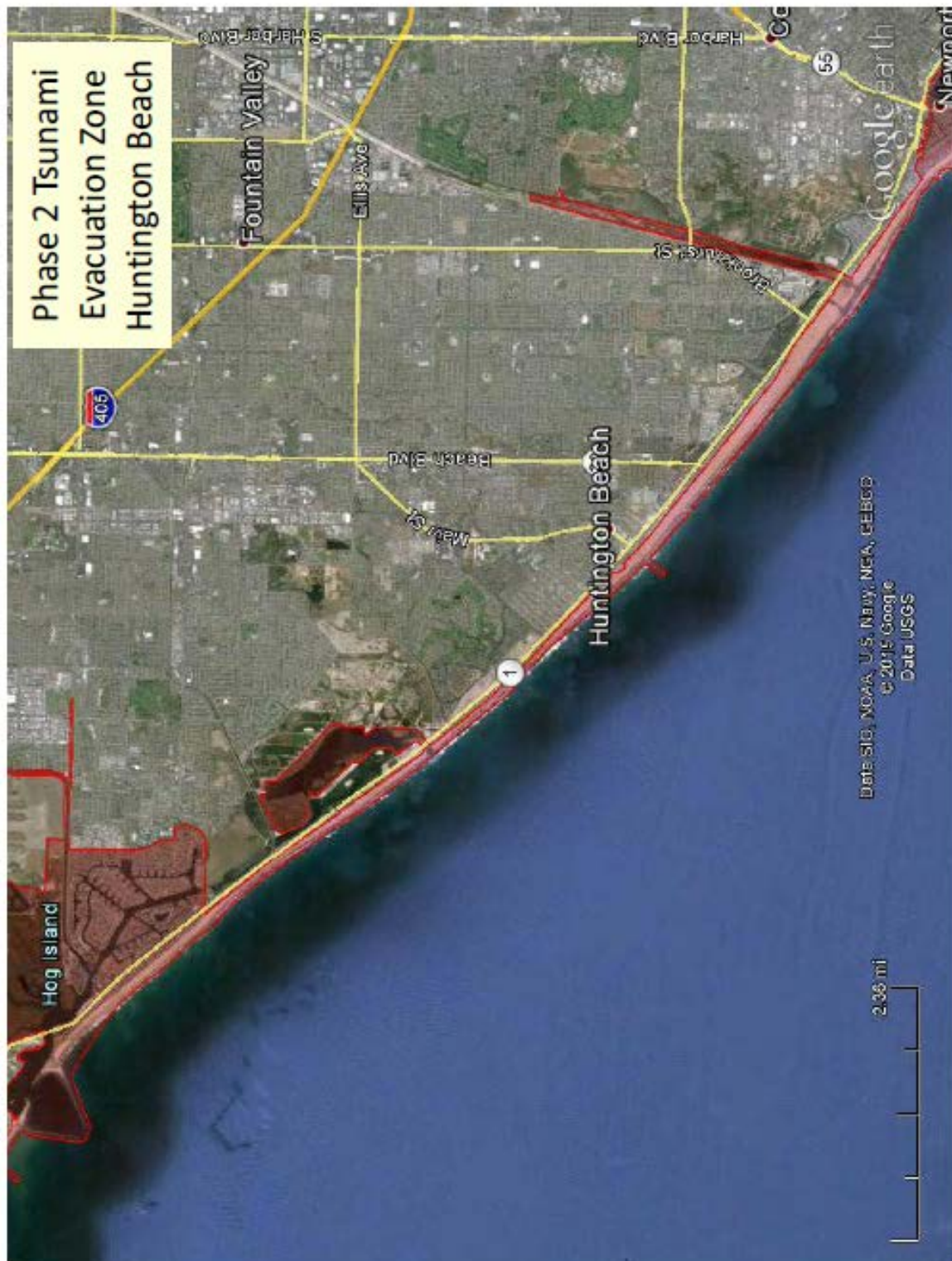
- Follow general guidance for Warning-level tsunamis (Page 3)
- Evacuate areas outlined by the red line, including beaches, piers, and harbor docks and boats. Strong currents and potential scour may be expected in harbors.
- A digital file showing evacuation maps and response instructions is available for use.
- Specific evacuation and response instructions..... (completed with the community input)

City of Seal Beach Phase 2 – Warning





City of Huntington Beach Phase 2 – Warning



City of Newport Beach Phase 2 – Warning



City of Laguna Beach Phase 2 – Warning



City of Dana Point Phase 2 – Warning



City of San Clemente Phase 2 – Warning



## Phase 3 Evacuation Plan

### Background Information:

Alert level = Warning

FASTER tsunami value = between 1.5m (5.0ft) and 2.5m (8.2ft)

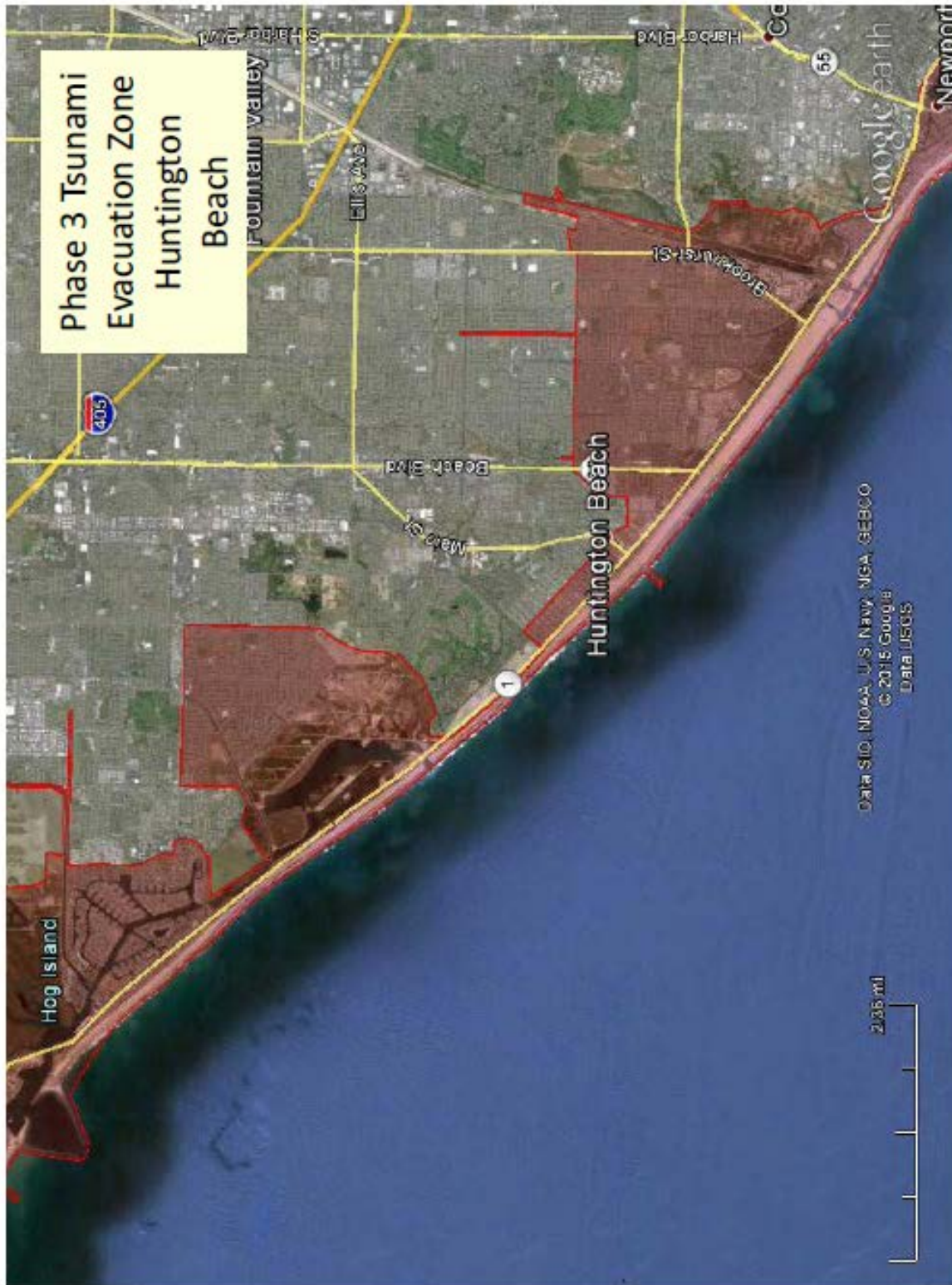
### Specific Instructions:

- Follow general guidance for Warning-level tsunamis (Page 3)
- Evacuate areas outlined by the red line, including beaches, piers, and harbor docks and boats. Strong currents and potential scour may be expected in harbors.
- A digital file showing evacuation maps and response instructions is available for use.
- Specific evacuation and response instructions..... (completed with the community input)

City of Seal Beach Phase 3 – Warning



City of Huntington Beach Phase 3 – Warning





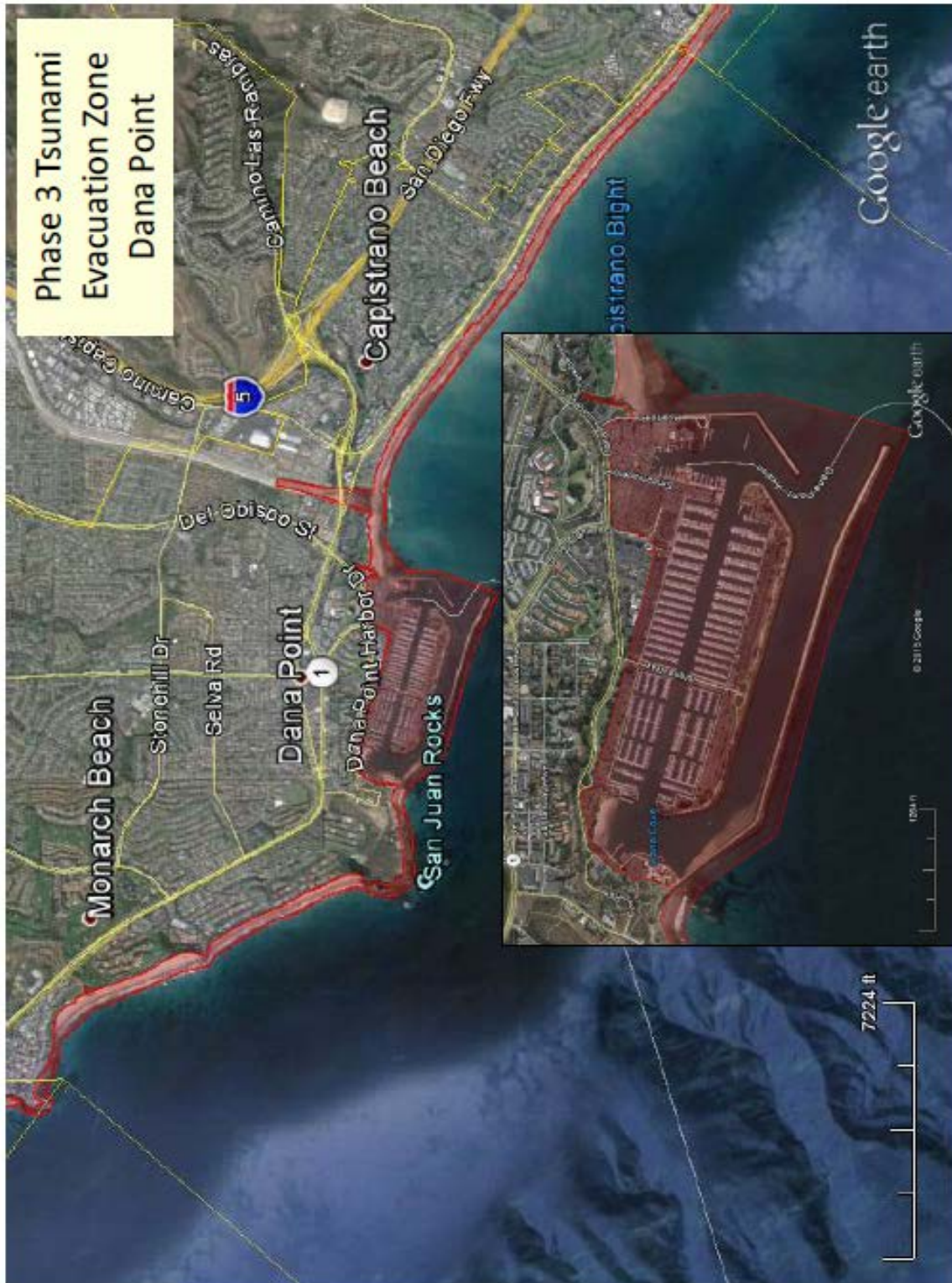
City of Newport Beach Phase 3 – Warning



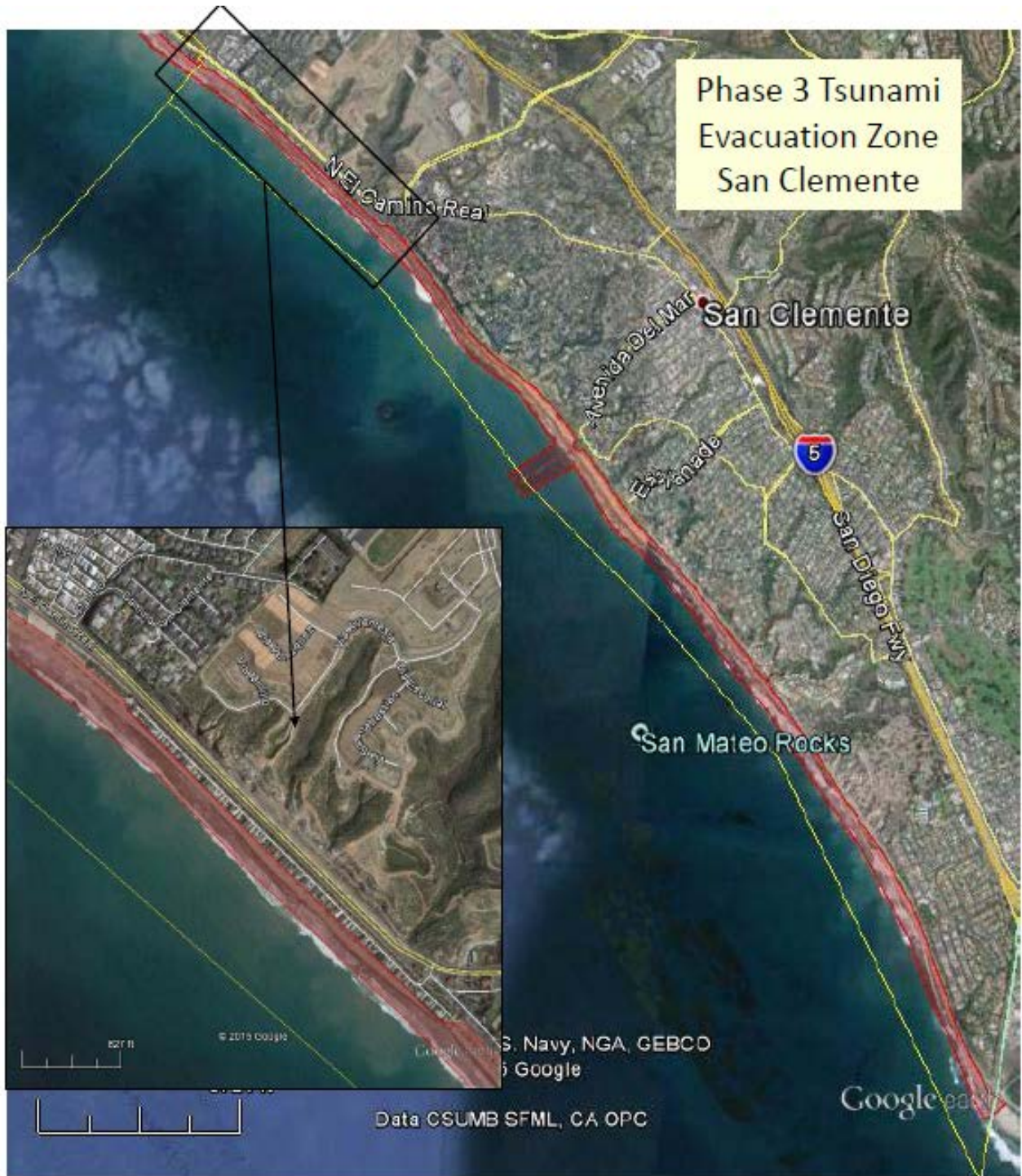
City of Laguna Beach Phase 3 - Warning



City of Dana Point Phase 3 – Warning



City of San Clemente Phase 3 – Warning



# Maximum Phase Evacuation

## Background Information:

Alert level = Warning

FASTER tsunami value = greater than 2.5m (8.2ft)

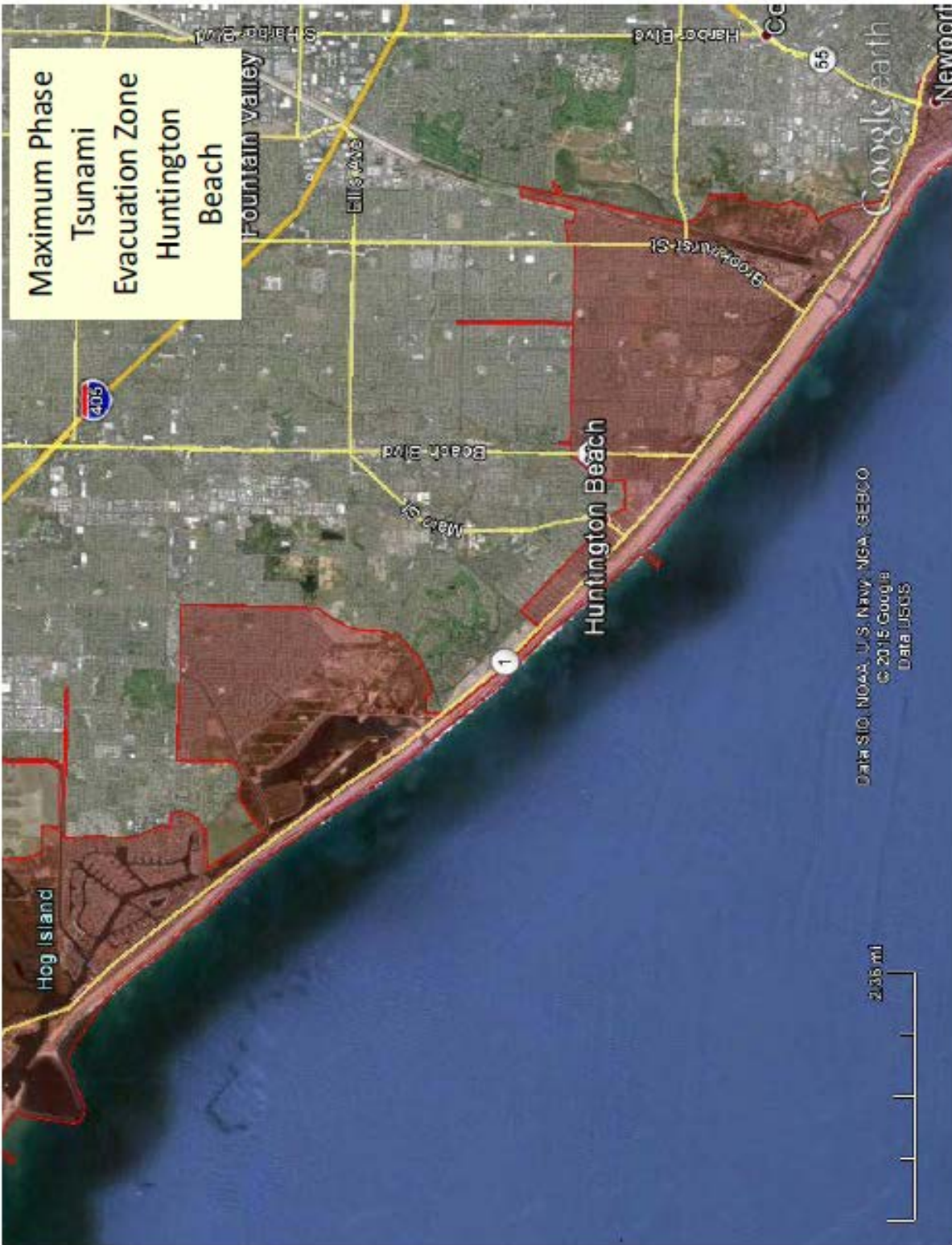
## Specific Instructions:

- Follow general guidance for Warning-level tsunamis (Page 3)
- Evacuate areas outlined by the red line (the maximum tsunami evacuation zone), including beaches, piers, and harbor docks and boats. Strong currents and potential scour may be expected in harbors.
- A digital file showing evacuation maps and response instructions is available for use.
- Specific evacuation and response instructions..... (completed with the community input)

City of Seal Beach Maximum Evacuation



City of Huntington Beach Maximum Evacuation Phase



City of Newport Beach Maximum Evacuation Phase

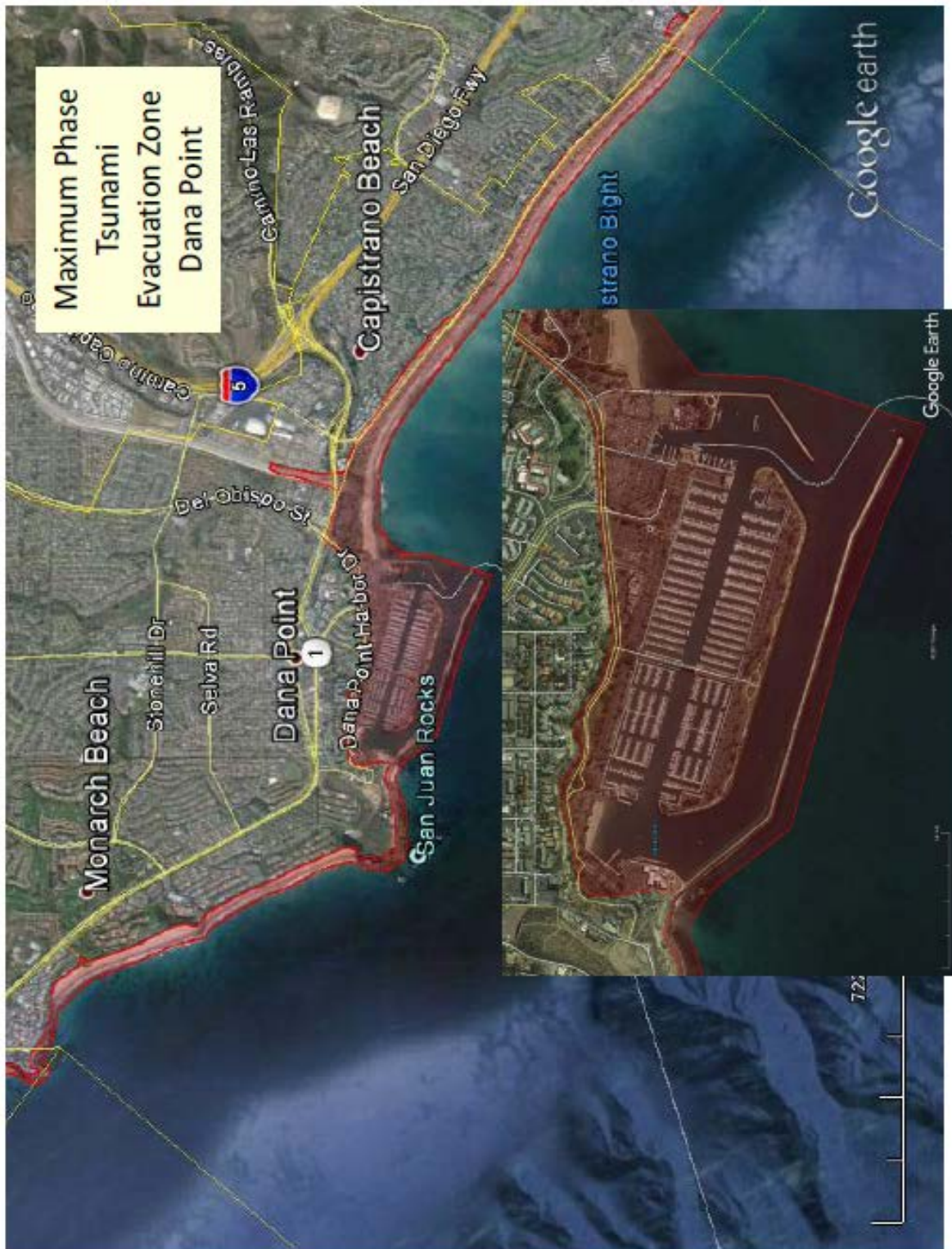




City of Laguna Beach Maximum Evacuation Phase



City of Dana Point Maximum Evacuation Phase



City of San Clemente Maximum Evacuation Phase



**Notable Historical Tsunamis:** The following table provides very basic information about historical tsunami events; not all tsunamis are represented, especially minor or small tsunamis. Note that the largest, most damaging tsunamis in Orange County history have come from large earthquakes in the Alaska-Aleutian Islands and Chile regions as distant tsunami sources and potential offshore faults or submarine landslide as local sources. Although the potential for local tsunamis exists, they are much less frequent than distant source tsunamis.

### Notable Historical Tsunamis in Orange County

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

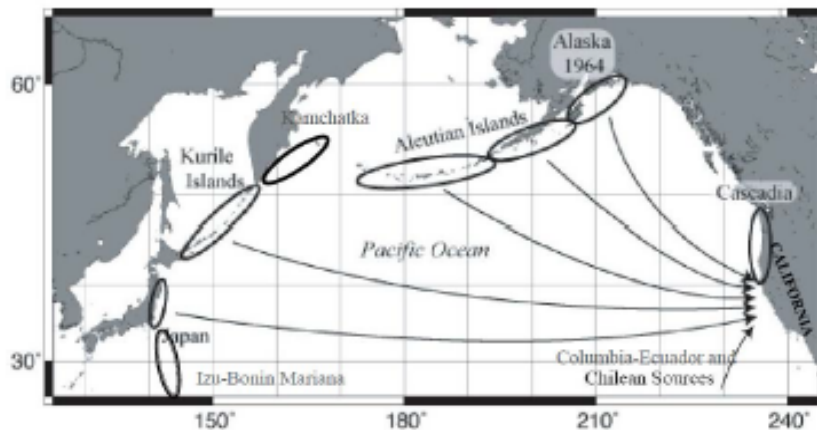
OBS = observed tsunami activity

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
7/10/1855	multiple local earthquakes	Dana Point	OBS	"...considerable commotion in the water, attended by a strong rushing sound..."
4/1/1946	M8.8 - Aleutian Islands	Newport Beach	1 ft	"...furious eddy between Balboa and Little Island..."
3/9/1957	M8.6 - Aleutian Islands	Newport Beach	1 ft	NR
5/22/1960	M9.5 - Chile	Alamitos Bay	2 ft	NR
		Dana Point	3 ft	cabin cruiser sank
3/28/1964	M9.2 - Alaska	Alamitos Bay	1 ft	NR
		Newport Beach	1 ft	NR
2/27/2010	M8.8 - Chile	Huntington Beach	2 ft	NR
		Newport Beach	2 ft	NR
		Dana Point	2 ft	Bait barge severed
3/11/2011	M9.0 - Japan	Huntington Beach	2 ft	Boat pulled off mooring
		Newport Beach	1 ft	NR
		Dana Point	2 ft	Pylon damaged when hit by boat

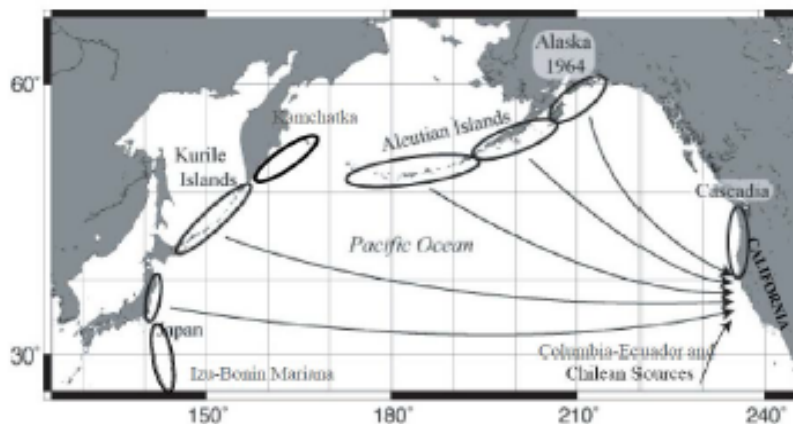


**Modeled Tsunami Scenarios:** Because very large tsunamis are infrequent and the likelihood that the largest potential tsunamis have not yet occurred in Orange County, the state tsunami program developed a suite of maximum credible tsunami scenarios as part of their tsunami inundation mapping project for local evacuation planning. The general tsunami wave height for key locations from these scenarios are provided below. As identified in the historical tsunami table, the largest tsunamis could occur from large earthquakes in the Alaska-Aleutian Islands or Chile regions, or from a large offshore fault or submarine landslide.

### Tsunami Source Scenario Model Results for Orange County

Near shore tsunami heights (flow depths) for both local and distant source scenarios, in FEET above Mean Sea Level. NOTE: The projections do not include any adjustments for ambient conditions, such as storm surge and tidal fluctuations, and model error (it is very important to note this difference, as those numbers can increase the projected water height during an event).

	TSUNAMI SOURCES	Approximate Travel Time	Seal Beach	Seal B. Naval Harbor	Sunset Beach	Hunt Beach	Newport Beach	Crystal Cove	Laguna Beach	Aliso Beach	Dana Point	San Clemente
Local Sources	M7 Newport-Inglewood Fault	10-15min	2	3	3	2	2	2				
	M7.1 San Mateo Thrust Fault	10-15min								7	13	16
	M7.1 Oceanside Thrust Fault	15-20min								6	4	
	Palos Verdes Landslide 1	15-20min	5	5	10	10	3	3				
	Palos Verdes Landslide 2	15-20min	5	5	13	11	3	3	3			
	M7.7 Catalina Fault	20-30min	8	8	7	11	13	11	10	7	7	7
Distant Sources	M9 Cascadia-full rupture	2hr	4	4	3	3				3	3	3
	M9.2 Alaska 1964 EQ	6hr	10	6	6	6	3	4	4	4	6	5
	M8.9 Central Aleutians I	6hr	5	5	4	4				3	4	4
	M8.9 Central Aleutians II	6hr	3	3	3	3				3	3	3
	M9.2 Central Aleutians III	6hr	14	10	9	9	6	6	6	7	8	6
	M9 Kamchatka 1952 EQ	9hr								3		3
	M8.8 Kuril Islands II	10hr	2	3	2	2				2	3	2
	M8.8 Kuril Islands III	10hr	2	3	2	2				2	3	2
	M8.8 Kuril Islands IV	10hr	3	3	2	2				2	3	2
	M8.8 Japan II	11hr	3	3	3	2				2	3	2
	M9.5 Chile 1960 EQ	13hr	10	5	5	5	3	3	3	3	4	4
	M9.4 Chile North	13hr	10	6	7	8	4	4	4	4	4	4
	Maximum Runup - Local Source			9	9	14	12	14	12	11	8	15
Maximum Runup - Distant Source			15	11	10	10	7	7	7	8	10	8



**APPENDIX**  
**Quick Reference Page for Determining Real-Time Tsunami Response Activities**

**Step 1:** Obtain basic information about the earthquake and tsunami from National Tsunami Warning Center in Alaska, regional National Weather Service office, and/or county emergency manager. **NOTE: Tsunami Alert Level may change in first 2 to 3 hours after the earthquake; WATCH may be upgraded to ADVISORY or WARNING.**

Earthquake location \_\_\_\_\_

Earthquake magnitude \_\_\_\_\_

Tsunami Alert level (circle one)      WATCH      ADVISORY      WARNING

Closest forecasted tsunami amplitude/wave height \_\_\_\_\_

Forecasted tsunami arrival time \_\_\_\_\_

Recommended community playbook evacuation zone phase plan \_\_\_\_\_

Calculated FASTER tsunami flood level number (if needed) \_\_\_\_\_

**Step 2:** Tsunami evacuation and response will depend on the amount of time before the tsunami arrival. Four (4) hours is considered the threshold time needed for evacuation. As a quick reference, we offer the following guidance:

- 1) **If less than four hours** before tsunami arrival, we recommend the following:
  - ADVISORY – evacuate beaches, harbor docks, and piers
  - WARNING – evacuate entire maximum evacuation zone
- 2) **If greater than four hours** before tsunami arrival, and your community has fully developed its tsunami playbooks plans, communities can utilize the tsunami elevation-based evacuation playbook “phase” plan recommended by the state and/or NOAA given sufficient time for them to provide this information. Use the table on the right to identify the page numbers for the appropriate phase plan.

Orange County Evacuation Playbook Reference Pages	Recommended Community Action
Pages 8-14	Phase 1 Evacuation
Pages 15-21	Phase 1 Evacuation
Pages 22-28	Phase 3 Evacuation
Pages 29-35	Maximum Evacuation Phase

## Attachment R - Orange County Maritime Tsunami Playbooks

Updated 01/11/18

### California Maritime Tsunami Response Playbook And Mitigation Guidance for Orange County

# Seal Beach/Huntington Harbor Newport Beach Harbor Dana Point Harbor

**DURING AN EMERGENCY, REFER TO THE "QUICK REFERENCE" SHEET ON  
THE BACK PAGE (PAGE 45).**

(For the expanded Playbook response format, refer to page 7)



California Maritime Tsunami Response Playbook No. 2018-OC-01  
Modified

California Geological Survey  
California Governor's Office of Emergency Services  
University of Southern California  
Humboldt State University  
National Oceanic and Atmospheric Administration



Funded by the Federal Emergency Management Agency  
and the National Tsunami Hazard Mitigation Program



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### **Table of Contents – Tsunami Response Plan Playbooks**

Page 2: Purpose and Use of Maritime Response Tsunami Playbook and Mitigation Guidance  
Page 3: Mitigation Planning  
Page 4-5: Tsunami Hazards, Tsunami Alert Levels, and General Response Recommendations  
Page 6: Forecast Amplitude and FASTER Reference Information; Current-Damage Relationship  
Page 7: Expanded Response Reference Page  
Pages 8-37: Maritime Tsunami Response Playbook Scenario Plans and Maps  
Page 38-39: Notable historical tsunamis and state tsunami program modeling results  
Page 40-44: Offshore and On-shore Evacuation Plans  
Page 45: **APPENDIX – QUICK REFERENCE PAGE For Real-Time Maritime Response Activities**

### **DURING AN EMERGENCY, USE THE “QUICK REFERENCE” ON PAGE 22 FOR GATHERING INFORMATION FOR RESPONSE ACTIVITIES.**

**PURPOSE:** This Maritime Tsunami Response Playbook Guidance document will help members of the maritime community prepare, plan, and respond to strong currents and damage from future tsunamis. It has been developed with assistance from the maritime communities by the California Tsunami Program and principle funding from FEMA. **It is essential that harbor staff become familiar with this Playbook guidance document before use.** The information within the Playbook can also help the harbor develop and implement tsunami mitigation strategies through their Local Hazard Mitigation Plan, and receive potential mitigation funding if needed.

**USE:** This Playbook is primarily designed to help the maritime communities with tsunami response activities by providing detailed information about potential tsunami scenarios which can be used during an event.

Once this Playbook guidance document is received, **maritime communities should review the document and develop response plans for each of the scenarios in the Playbook.** The California Tsunami Program will work with the maritime communities to assist in developing these plans if requested. **Maritime communities should exercise the Playbook approach** on a regular basis to ensure it is understood by all emergency responders so that the plan works during an emergency.

When a tsunami is occurring, follow the steps outlined in either the Quick Reference guideline on the last page (Page 45) if the user is not as familiar with the Playbooks, or the Expanded Reference guideline on Page 7 if the user wants more detailed information. The harbormaster or emergency manager should **fill out information about the source earthquake and tsunami;** this information can be obtained from multiple sources, including the tsunami alert message from the National Tsunami Warning Center (NTWC) in Alaska, the city or county emergency manager, and/or the National Weather Service, Local Weather Forecast Office. Keep in mind that this information can change during the first hour or two after the earthquake occurs. **If there is sufficient time, the State of California and NWS will provide a recommendation on which Playbook Plan should be referenced for a “minimum” response.** Harbors can also compare the tsunami forecast amplitude (wave height) to the maximum tsunami amplitude on the scenario table on Page 7 or 45. Choose the Playbook Plan (Pages 8-37) which best matches the forecast information. Follow the instructions on the page for that scenario. Each scenario Playbook may be accompanied by a digital file indicating the response and evacuation plans; this can be shared during an emergency with emergency responders in the field.



**MITIGATION PLANNING**

In addition to using these Playbooks for tsunami response, the California Tsunami Program, FEMA, and its partners encourage maritime communities to utilize this information to help mitigate damages and loss of life from future tsunamis. These products and plans should be used by maritime communities to pre-identify real-time response mitigation measures, determine where infrastructure enhancements should be initiated, and provide a mechanism for pre-disaster hazard mitigation funding through additions to their Local Hazard Mitigation Plans (see the list of potential mitigation measures below). Although these products, plans, and related mitigation efforts will not eliminate all casualties and damages from future tsunamis, they will provide a basis for greatly reducing future tsunami impacts on life-safety, infrastructure, and recovery in California maritime communities. Therefore, we recommend the following steps/actions:

1. Review the maps within this Playbook guidance document to identify where strong currents could potentially damage docks, structures, and/or infrastructure, especially where aging or run-down facilities exist.
2. Review the Mitigation Measures below for both real-time response actions, or “soft” mitigation, or permanent measures, or “hard” mitigation.
3. Incorporate these measures/actions into the community Local Hazard Mitigation Plan, and work with the community, the state tsunami program, and/or FEMA to develop a strategy to request funding to implement these improvements.

**Mitigation Measures for Reducing Impacts in Maritime Communities**

<u>Real-time response (“soft”) mitigation measures</u>	<u>Permanent (“hard”) mitigation measures</u>
Reposition ships within harbor	Increase size and stability of dock piles
Move boats and ships out of harbors	Fortify and armor breakwaters
Remove small boats/assets from water	Improve flotation portions of docks
Shut down infrastructure before tsunami arrives	Increase flexibility of interconnected docks
Evacuate public/vehicles from water-front areas	Improve movement along dock/pile connections
Restrict boats from moving during tsunami	Increase height of piles to prevent overtopping
Prevent boats from entering harbor during event	Deepen/Dredge channels near high hazard zones
Secure boat/ship moorings	Move docks/assets away from high hazard zones
Personal flotation devices/vests for harbor staff	Widen size of harbor entrance to prevent jetting
Remove hazardous materials away from water	Reduce exposure of petroleum/chemical facilities
Remove buoyant assets away from water	Strengthen boat/ship moorings
Stage emergency equipment outside affected area	Construct flood gates
Activate Mutual Aid System as necessary	Prevent uplift of wharfs by stabilizing platform
Activate of Incident Command at evacuation sites	Install debris deflection booms to protect docks
Alert key first responders at local level	Ensure harbor structures are tsunami resistant
Restrict traffic entering harbor; aid traffic evacuating	Construct breakwaters further away from harbor
Identify/Assign rescue, survey, and salvage personnel	Install Tsunami Warning Signs
Identify boat owners/live-aboards; establish phone tree, or other notification process	Identify equipment/assets (patrol/tug/fire boats, cranes, etc.) to assist response activities

There are a number of **TSUNAMI HAZARDS** that could directly affect boats/boaters:

- Sudden water-level fluctuations where docks and boats:
  - Hit bottom (grounded) as water level drops
  - Could overtop piles as water level rises
- Strong and unpredictable currents, especially where there are narrow entrances, narrow openings, and other narrow parts of harbor
- Tsunami bores and amplified waves resulting in swamping of boats and damage to docks
- Eddies/whirlpools causing boats to lose control
- Drag on deep draught boats causing damaging forces to the docks they are moored to
- Collision with other boats, docks, and debris in the water
- Dangerous tsunami conditions can last tens of hours after first wave arrival, causing problems for inexperienced and unprepared boaters who take their boats offshore

**Tsunami Alert Bulletins:** During tsunami alerts, the National Tsunami Warning Center provides information about the tsunami in “bulletins” to the state and local jurisdictions. There are four levels of “alert” that can be sent by the NTWC (from least to greatest significance; <http://ntwc.arh.noaa.gov/>):

**Tsunami Information Statement** - Issued to inform and update emergency managers and the public that an earthquake has occurred, or that a tsunami Watch, Advisory or Warning has been issued elsewhere in the ocean.

**Tsunami Watch** - Issued to alert emergency managers and the public of an event which may later impact the Watch area coastline. May be upgraded to an Advisory or Warning - or canceled - based on updated information and analysis.

**Tsunami Advisory** - Issued due to the threat of a tsunami which may produce strong currents or waves dangerous to those in or near the water; typically called when forecasted tsunami amplitudes are between 0.3m and 1m (1ft and 3ft) above existing tidal conditions are expected. Coastal communities are advised that beach and harbor areas could expect rapid, moderate tidal changes and strong currents.

**Tsunami Warning** - Issued when a tsunami with significant widespread inundation is imminent or expected; typically called when forecasted tsunami amplitudes are equal to or greater than 1m (3ft). Coastal communities are advised to evacuate people from low-lying areas identified as vulnerable to tsunamis.

### **ACTIONABLE TSUNAMI ALERT LEVELS**

Tsunami **Advisories** and **Warnings** are the two actionable Alert levels for maritime communities.

Actions taken will depend on the Alert level and the forecasted tsunami wave height or amplitude for a particular harbor. For both Advisory and Warning level events, it is important that clear and consistent directions are provided to the entire boating community and waterfront or pier businesses.

If there is not sufficient time to use the Playbooks, consider the following general actions for your maritime communities for either Advisory or Warning level events:

### **GENERAL "WARNING" LEVEL RECOMMENDATIONS**

All activities below should be completed no later than 30 minutes before forecasted tsunami arrival.

- Advise facility maintenance to shut off fuel to fuel docks, and all electrical and water services to all docks.
- Secure and strengthen all mooring lines throughout harbor, specifically areas near the entrance or narrow constrictions.
- Evacuate the public and harbor personnel from all structures and vessels in the water, as well as all land-ward areas identified in the mapped tsunami evacuation area (last page).
- Do not allow public to re-enter tsunami evacuation area until an official "all clear" message is provided by local emergency managers.
- Follow instructions for an Advisory if Warning is downgraded to Advisory level.

### **GENERAL "ADVISORY" LEVEL RECOMMENDATIONS**

All activities below should be completed no later than 30 minutes before forecasted tsunami arrival.

- Advise facility maintenance to shut off fuel to fuel docks, and all electrical and water services to all docks.
- Secure and strengthen all mooring lines throughout harbor, specifically areas near the entrance or narrow constrictions.
- Evacuate the public from all structures and vessels in the water.
- Coordinate with local law enforcement to limit access of public along waterfront areas.
- While the tsunami is active, all personnel working on or near the water should wear personal flotation devices.
- Do not allow public to re-enter structures and vessels in the water until and official "all clear" message is provided by local emergency managers.

**DIFFERENCE BETWEEN FORECAST TSUNAMI AMPLITUDE/WAVE HEIGHT AND FASTER TSUNAMI FLOOD HEIGHT**

**Forecast Tsunami Amplitude/Wave Height:** Within the first couple hours after an earthquake and the generation of a tsunami, the National Tsunami Warning Center will provide an estimate, or forecast, of the potential amplitude/wave height of the tsunami for over 50 locations along the California coast. This amplitude is the height of the tsunami above existing ocean conditions and helps determine the official Tsunami Alert level for each region. **For the purposes of the Playbook, the forecast tsunami amplitude is used on the page 7 or 45 "Response Reference" to determine which Maritime Playbook Response Plan is appropriate to use.**

**FASTER Analytical Tool:** To determine the full impact of tsunami inundation, other variables such as tidal and storm conditions must be considered. An analytical method has been created which incorporates important variables that will impact the ultimate tsunami flood level. The simplified components of the calculation are shown to the right. **The FASTER calculation, which will be provided by the local jurisdiction or the regional NOAA NWS Weather Forecast Office to the harbor during a tsunami event, is used on Page 7 to determine if piles will be overtopped and inundation of dry land will occur.**

**Working example: Formula for determining playbook evacuation line to use ( F-A-S-T-E-R ):**

**FA:** Forecasted Amplitude (Wave Height) from Warning Center  
+

**S:** Storm surge or existing ocean conditions  
+

**T:** Maximum tidal height (first 5 hours of tsunami)  
+

**E:** Forecast error potential (30%; analysis of 2010-11 events)  
+

**R:** Site amplified run-up potential (from existing modeling, unique to each location; applied if inundation expected)

---

**= Maximum tsunami run-up height**  
**= Playbook elevation line**

**RELATIONSHIP BETWEEN TSUNAMI CURRENT SPEED AND HARBOR DAMAGE:**

Analysis of recent tsunami damage indicates a relationship between current speed and harbor damage. The Damage Index (from Lynett and others, 2013) to the right has been used to determine the following relationship (see color codes here for blue, yellow, and red areas and on current threshold maps):

**CURRENTS = DAMAGE**

- 0-3 knots = No Damage
- 3-6 knots = Minor/Moderate Damage
- 6-9 knots = Moderate/Major Damage
- >9 knots = Major/Complete Damage

Damage Index:	Damage Type:
0	no damage
1	small buoys moved
2	1-2 docks/small boats damaged, large buoys moved
3	Moderate dock/boat damage, mid-sized vessels off moorings
4	Major dock/boat damage, large vessels off moorings
5	Complete destruction

## Expanded Reference Information for Determining Real-Time Maritime Response Activities

**NOTE:** It is important to review all sections of this Playbook prior to using it during a tsunami emergency. When a tsunami alert is issued by the National Tsunami Warning Center, fill out the Expanded Reference page below under Step 1. The State/NOAA will recommend a MINIMUM Playbook Response Plan for each maritime communities, and a FASTER number to determine the potential for piles to be overtopped during the tsunami.

**Step 1:** Obtain information about earthquake and tsunami from National Tsunami Warning Center in Alaska, regional NOAA-Weather Forecast Office, and/or county and state emergency managers. (e.g. [www.tsunami.gov](http://www.tsunami.gov))

Earthquake location \_\_\_\_\_  
 Earthquake magnitude \_\_\_\_\_  
 Tsunami Alert level (circle one)      WATCH      ADVISORY      WARNING  
 Forecasted tsunami amplitude/wave height \_\_\_\_\_ (this will be compared with Peak Amplitude in Step 2)  
 Forecasted tsunami arrival time \_\_\_\_\_  
 Calculate/obtain FASTER tsunami run-up value in first 5 hours: \_\_\_\_\_  
 Calculate/obtain FASTER tsunami run-up value at highest tide \_\_\_\_\_  
 Height of shortest pilings above Mean Sea Level: \_\_\_\_\_  
 Elevation of lowest land above Mean Sea Level: \_\_\_\_\_  
 Compare FASTER value to pile heights and lowest land to determine if they will be overtopped.

**Step 2:** Compare and match forecasted tsunami amplitude/wave height in Step 1 to "Peak Amplitude" in the table below (red box). Refer to associated Playbook page to determine actions for securing vessels and/or repositioning ships away from areas of expected damage to safe areas within the harbor or offshore (Pg. 40-41). If there is sufficient time, the State of California and NWS will also provide a recommendation on which Playbook Plan should be referenced for a "minimum" response.

Reference Pages for Details in Maritime Playbook	Scenario Playbook Plan Letter	Historical Events and Modeled Scenarios	Earthquake Magnitude and Source Location	Peak Amplitude near harbor (in meters, above existing conditions near harbor entrance)	Likely Tsunami Alert Level	Tidal condition (during first 5 hours)	Peak Velocity in Harbor from Modeling (in knots)	Damage Summary
	(No action)	2009	8.0 Samoa	< 0.2	Advisory	High		No damage or activity
Page 8-13	A	2011	9.0 Japan	0.4	Advisory	Low	3	No damage reported
Page 14-19	B	2010	8.8 Chile	0.5	Advisory	Low	3	No damage reported
Page 20-25	C	Modeled Scenario	9.0 Cascadia	0.6	Advisory	High	3	
Page 26-31	D	Modeled Scenario	9.4 North Chile	1.0	Warning	High	6	
Page 32-37	E	Modeled Scenario	9.2 Aleutians	1.7	Warning	High	9	

# Seal Beach/Huntington Harbor Playbook Plan A (based on 2011 M9 Japan Event )

## Background Information:

Alert level = Advisory

Peak Amplitude = 0.6 meters

Peak Velocity = 5 knots

Projected duration of strong currents (see location map below):

3-6 knots = 15 hrs; 6-9 knots = 0 hrs; >9 knots = 0 hrs

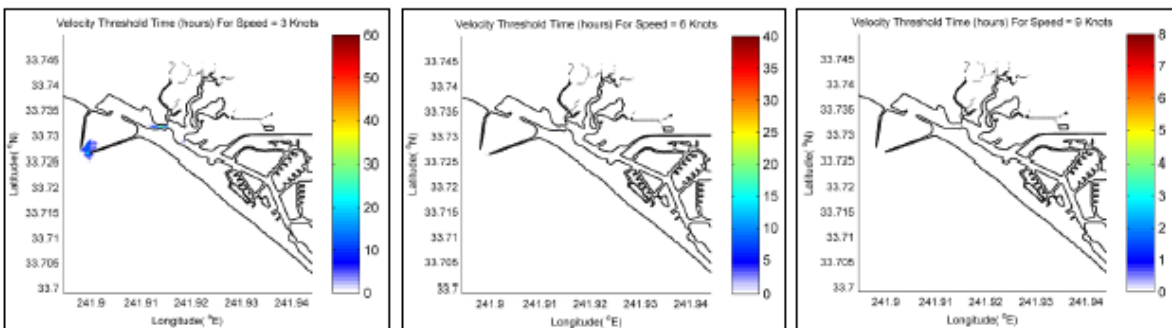
## Specific Instructions:

- Follow general guidance for Advisory-level tsunamis (Page 5)
- Strong currents and potential scour are expected in areas identified in blue and/or with eddy activity on the map to the right. Consider relocating vessels 100 meters (300 feet) from these areas.
- Specific areas where vessels should be relocated and docks secured:
  - Vessels can be moved to non-blue areas of the harbor because these areas will not likely have damaging currents.
  - .... (completed with maritime community input)

## Safe areas for repositioning vessels within Seal Beach/Huntington Harbor:

..... (completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





# Newport Beach Harbor Playbook Plan A (based on 2011 M9 Japan Event )

Background Information:

Alert level = Advisory

Peak Amplitude = 0.4 meters

Peak Velocity = 3 knots

Projected duration of strong currents (see location map below):

3-6 knots = 5 hrs; 6-9 knots = 0 hrs; >9 knots = 0 hrs

Specific Instructions:

- Follow general guidance for Advisory-level tsunamis (Page 5)
- As there appear to be no strong currents in the harbor, it is recommended that vessels remain docked and not be moved within or removed from the harbor
- ..... (completed with maritime community input)

Safe areas for repositioning vessels within Newport Beach Harbor:

..... (completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)







# Dana Point Harbor Playbook Plan A (based on 2011 M9 Japan Event )

Background Information:

Alert level = Advisory

Peak Amplitude = 0.6 meters

Peak Velocity = 5 knots

Projected duration of strong currents (see location map below):

3-6 knots = 10 hrs; 6-9 knots = 0 hrs; >9 knots = 0 hrs

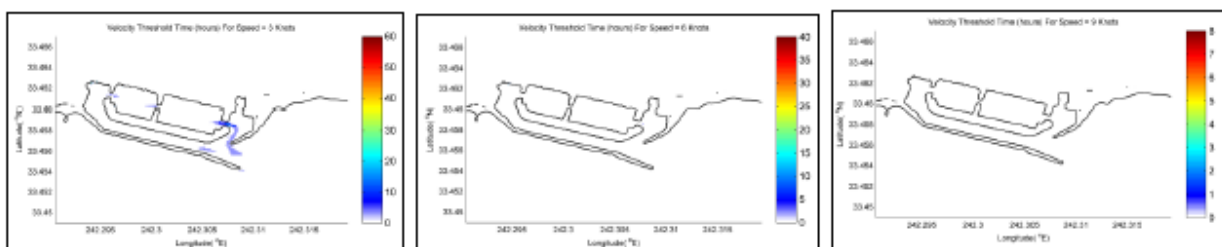
Specific Instructions:

- Follow general guidance for Advisory-level tsunamis (Page 5)
- Strong currents and potential scour are expected in areas identified in blue and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated and docks secured:
  - Vessels can be moved to non-blue areas of the harbor.
  - ..... (completed with maritime community input)

Safe areas for repositioning vessels within Dana Point Harbor:

..... (completed with maritime community input)

**Time thresholds for currents >3 knots.....>6 knots.....>9 knots**  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





# Seal Beach/Huntington Harbor Playbook Plan B (based on M9 Cascadia Scenario)

## Background Information:

Alert level = Advisory

Peak Amplitude = 0.7 meters

Peak Velocity = 5 knots

Projected duration of strong currents (see location map below):

3-6 knots = 20 hrs; 6-9 knots = 0 hrs; >9 knots = 0 hrs

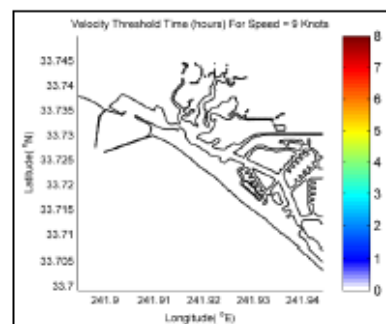
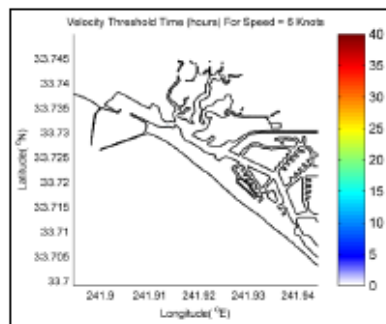
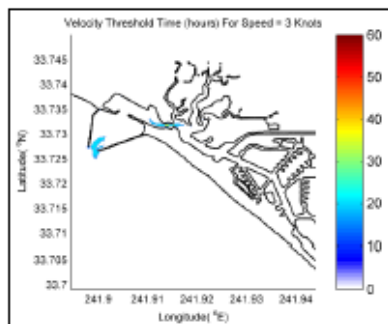
## Specific Instructions:

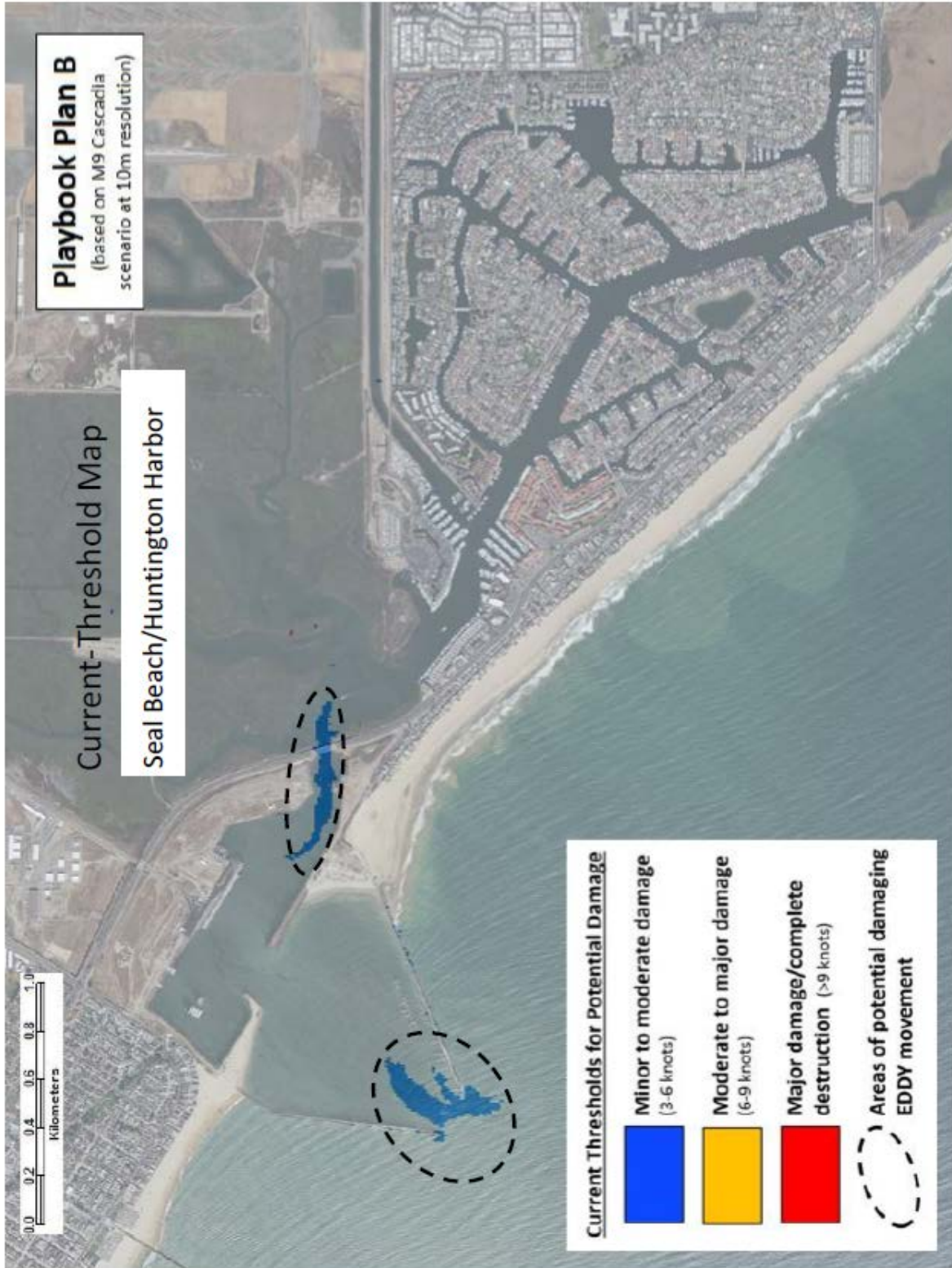
- Follow general guidance for Advisory-level tsunamis (Page 5)
- Strong currents and potential scour are expected in areas identified in blue and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated and docks secured:
  - Vessels can be moved to non-blue areas of the harbor because these areas will not likely have damaging currents.
  - .... (completed with maritime community input)

## Safe areas for repositioning vessels within Seal Beach/Huntington Harbor :

..... (completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





# Newport Beach Harbor Playbook Plan B (based on 2010 M8.8 Chile Event)

Background Information:

Alert level = Advisory

Peak Amplitude = 0.5 meters

Peak Velocity = 3 knots

Projected duration of strong currents (see location map below):

3-6 knots = 7 hrs; 6-9 knots = 0 hrs; >9 knots = 0 hrs

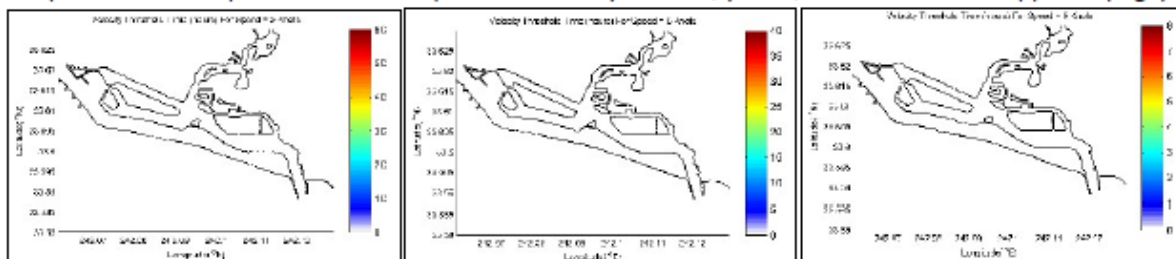
Specific Instructions:

- Follow general guidance for Advisory-level tsunamis (Page 5)
- As there appear to be no strong currents in the harbor, it is recommended that vessels remain docked and not be moved within or removed from the harbor.
  - .... (completed with maritime community input)

Safe areas for repositioning vessels within Newport Beach Harbor :

..... (completed with maritime community input)

**Time thresholds for currents >3 knots.....>6 knots.....>9 knots**  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





# Dana Point Harbor Playbook Plan B (based on M9 Cascadia Scenario)

## Background Information:

Alert level = Advisory

Peak Amplitude = 0.7 meters

Peak Velocity = 6 knots

Projected duration of strong currents (see location map below):

3-6 knots = 15 hrs; 6-9 knots = 0 hrs; >9 knots = 0 hrs

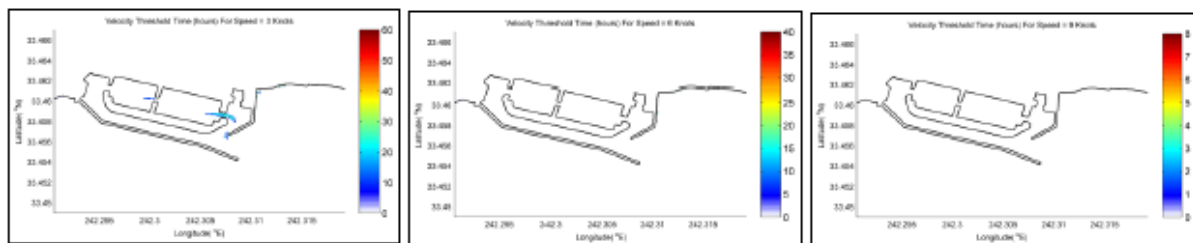
## Specific Instructions:

- Follow general guidance for Advisory-level tsunamis (Page 5)
- Strong currents and potential scour are expected in areas identified in blue and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated and docks secured:
  - Vessels can be moved to non-blue areas of the harbor.
  - .... (completed with maritime community input)

## Safe areas for repositioning vessels within Dana Point Harbor :

..... (completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)







# Seal Beach/Huntington Harbor Playbook Plan C (based on 2010 M8.8 Chile Event)

### Background Information:

Alert level = Advisory

Peak Amplitude = 0.9 meters

Peak Velocity = 6 knots

Projected duration of strong currents (see location map below):

3-6 knots = 20 hrs; 6-9 knots = 5 hrs; >9 knots = 0 hrs

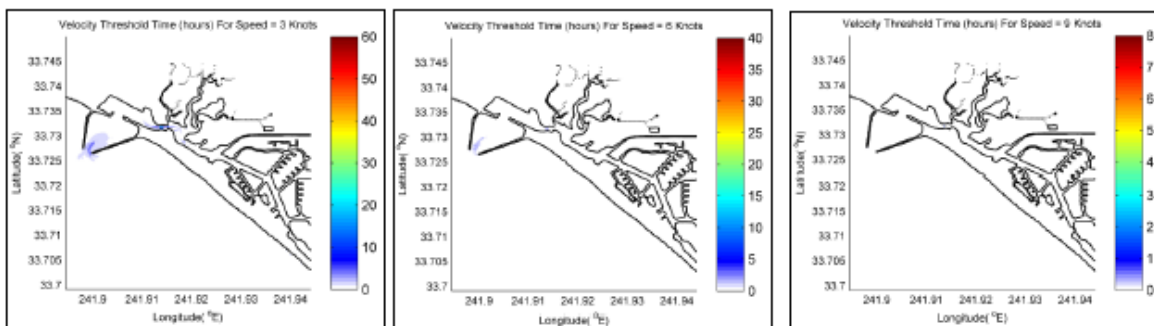
### Specific Instructions:

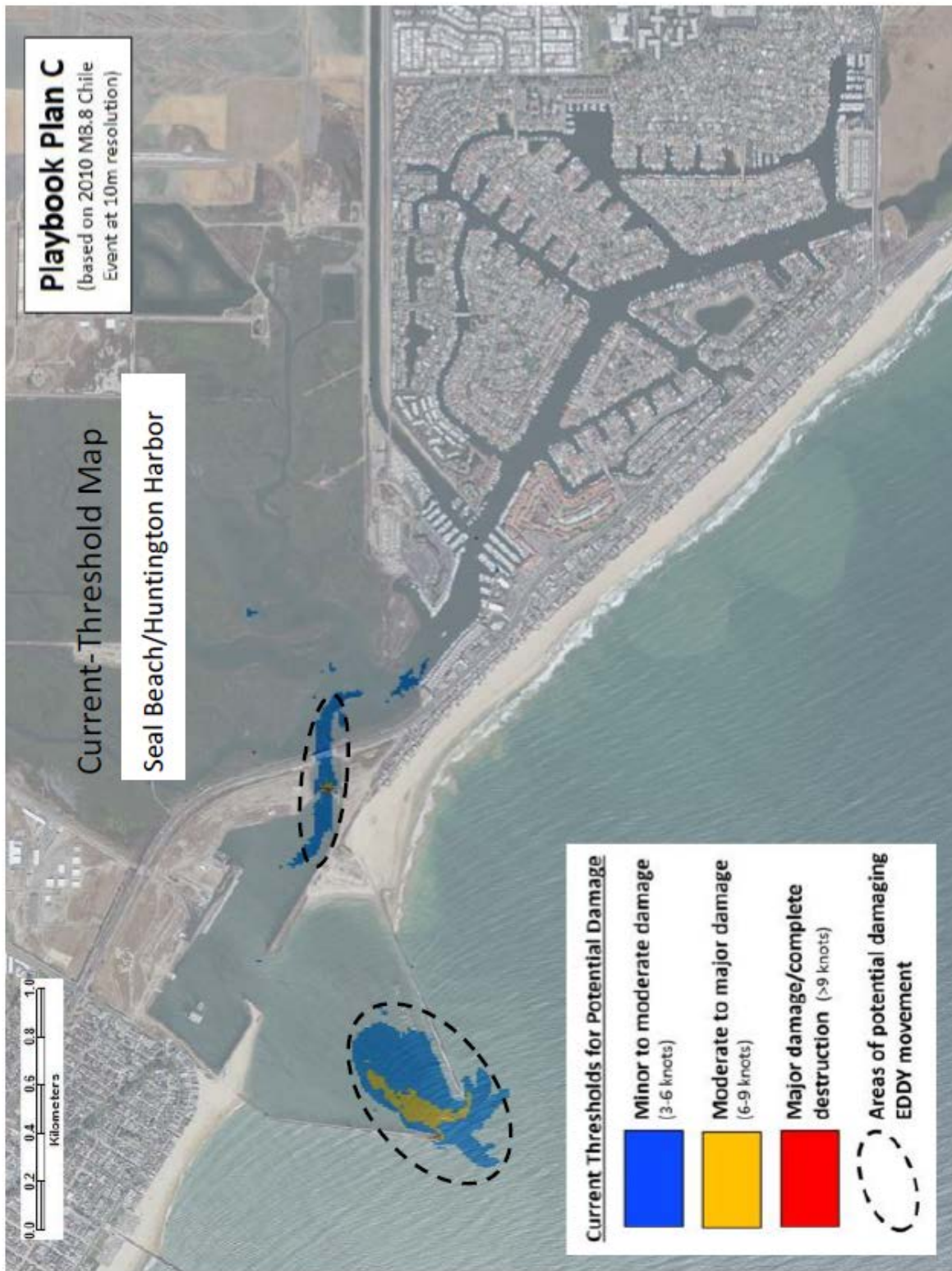
- Follow general guidance for Advisory-level tsunamis (Page 5)
- Strong currents and potential scour are expected in areas identified in blue and gold and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated from and docks secured:
  - Vessels can be moved to non-blue/yellow areas of the harbor because these areas will not likely have damaging currents.
  - ..... (completed with maritime community input)

Safe areas for repositioning vessels within Seal Beach/Huntington Harbor :

.....(completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





# Newport Beach Harbor Playbook Plan C (based on M9 Cascadia Scenario)

## Background Information:

Alert level = Advisory

Peak Amplitude = 0.6 meters

Peak Velocity = 3 knots

Projected duration of strong currents (see location map below):

3-6 knots = 10 hrs; 6-9 knots = 0 hrs; >9 knots = 0 hrs

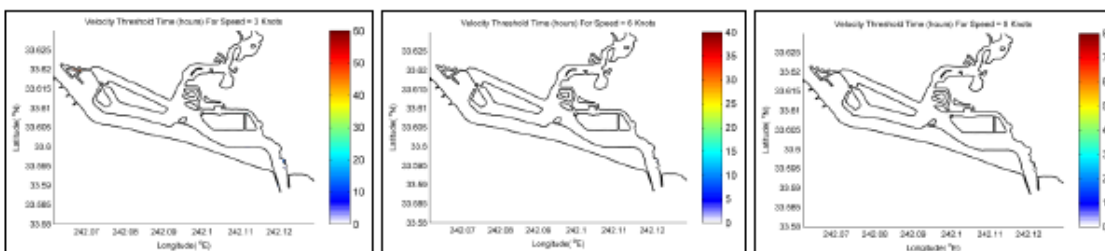
## Specific Instructions:

- Follow general guidance for Advisory-level tsunamis (Page 5)
- As there appear to be no strong currents in the harbor, it is recommended that vessels remain docked and not be moved within or removed from the harbor.
- Vessels should stay away from the mouth of the harbor during tsunami activity.
  - ..... (completed with maritime community input)

## Safe areas for repositioning vessels within Newport Beach Harbor :

.....(completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





# Dana Point Harbor Playbook Plan C (based on 2010 M8.8 Chile Event)

## Background Information:

Alert level = Advisory

Peak Amplitude = 0.8 meters

Peak Velocity = 7 knots

Projected duration of strong currents (see location map below):

3-6 knots = 20 hrs; 6-9 knots = 5 hrs; >9 knots = 0 hrs

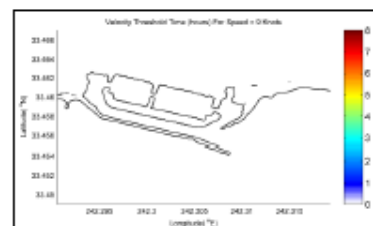
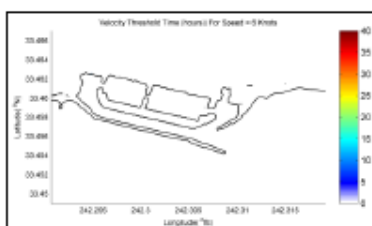
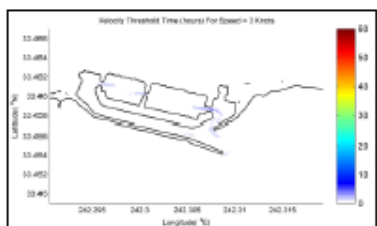
## Specific Instructions:

- Follow general guidance for Advisory-level tsunamis (Page 5)
- Strong currents and potential scour are expected in areas identified in blue and gold and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated from and docks secured:
  - Vessels can be moved to non-blue areas of the harbor.
  - ..... (completed with maritime community input)

## Safe areas for repositioning vessels within Dana Point Harbor :

.....(completed with maritime community input)

**Time thresholds for currents >3 knots.....>6 knots.....>9 knots**  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





# Seal Beach/Huntington Harbor Playbook Plan D

(based on M9.4 Northern Chile Scenario)

Background Information:

Alert level = Warning

Peak Amplitude = 1.4 meters

Peak Velocity = 10+ knots

Projected duration of strong currents (see location maps below):

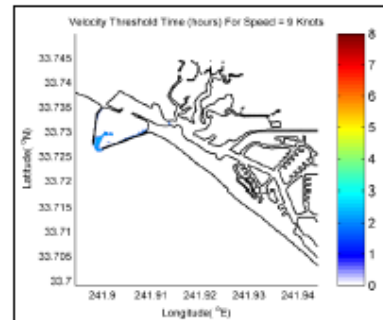
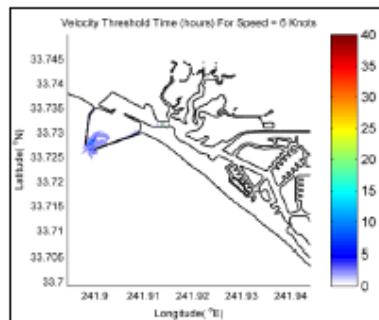
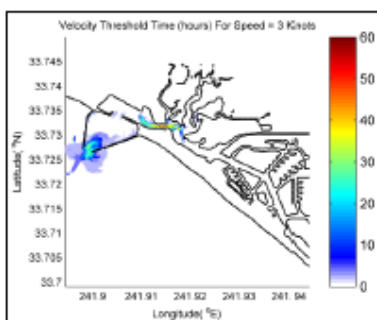
3-6 knots = 40 hrs; 6-9 knots = 10 hrs; >9 knots = 3 hrs

Specific Instructions:

- Follow general guidance for Warning-level tsunamis (Page 5)
- **Inundation of dry land may occur in this scenario**
- Strong currents and potential scour are expected in areas identified in blue – yellow-red and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated from and docks secured:  
(completed with maritime community input)

Safe areas for repositioning vessels within Seal Beach/Huntington Harbor :  
(completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)







# Newport Beach Harbor Playbook Plan D (based on M9.4 Northern Chile Scenario)

Background Information:

Alert level = Warning

Peak Amplitude = 1.0 meters

Peak Velocity = 6 knots

Projected duration of strong currents (see location maps below):

3-6 knots = 20 hrs; 6-9 knots = 5 hrs; >9 knots = 0 hrs

Specific Instructions:

- Follow general guidance for Warning-level tsunamis (Page 5)
- **Inundation of dry land may occur in this scenario**
- Strong currents and potential scour are expected in areas identified in blue – yellow-red and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated from and docks secured:  
(completed with maritime community input)

Safe areas for repositioning vessels within Newport Beach Harbor :

(completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





# Dana Point Harbor Playbook Plan D (based on M9.4 Northern Chile Scenario)

Background Information:

Alert level = Warning

Peak Amplitude = 1.0 meters

Peak Velocity = 8 knots

Projected duration of strong currents (see location maps below):

3-6 knots = 30 hrs; 6-9 knots = 10 hrs; >9 knots = 0 hrs

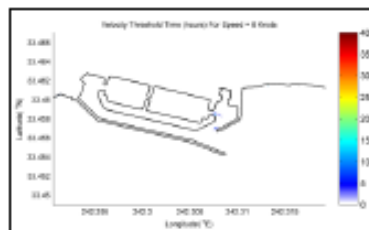
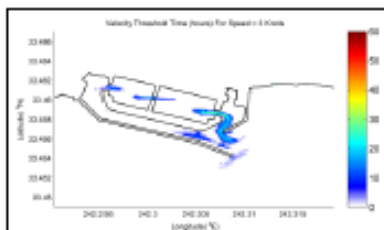
Specific Instructions:

- Follow general guidance for Warning-level tsunamis (Page 5)
- **Inundation of dry land may occur in this scenario**
- Strong currents and potential scour are expected in areas identified in blue – yellow-red and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated from and docks secured:  
(completed with maritime community input)

Safe areas for repositioning vessels within Dana Point Harbor :

(completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





# Seal Beach/Huntington Harbor Playbook Plan E (based on M9.2 Eastern Aleutian-Alaska Scenario)

Background Information:

Alert level = Warning

Peak Amplitude = 2.5 meters

Peak Velocity = 15+ knots

Projected duration of strong currents (see location maps below):

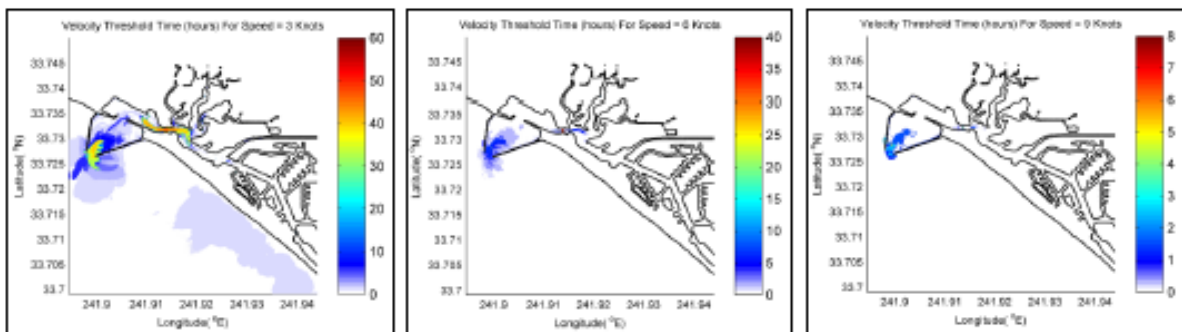
3-6 knots = 50 hrs; 6-9 knots = 20 hrs; >9 knots = 5 hrs

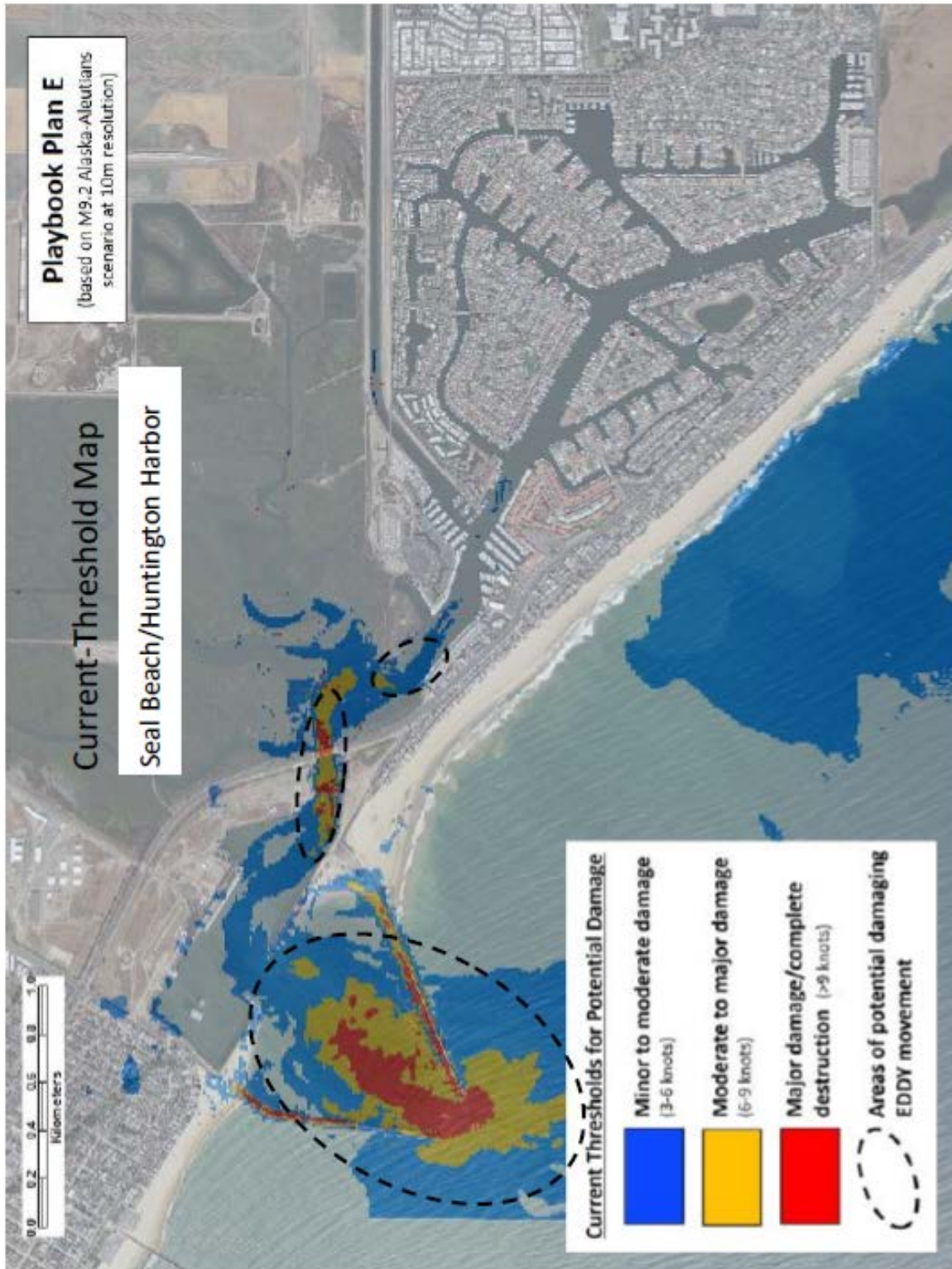
Specific Instructions:

- Follow general guidance for Warning-level tsunamis (Page 5)
- **Inundation of dry land will likely occur in this scenario**
- Strong currents and potential scour are expected in areas identified in blue – yellow-red and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated from and docks secured:  
None (completed with maritime community input)

Safe areas for repositioning vessels within Seal Beach/Huntington Harbor : None  
(wide-spread inundation likely to occur)  
(completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





# Newport Beach Harbor Playbook Plan E

(based on M9.2 Eastern Aleutian-Alaska Scenario)

Background Information:

Alert level = Warning

Peak Amplitude = 1.7 meters

Peak Velocity = 9 knots

Projected duration of strong currents (see location maps below):

3-6 knots = 25 hrs; 6-9 knots = 10 hrs; >9 knots = 3 hrs

Specific Instructions:

- Follow general guidance for Warning-level tsunamis (Page 5)
- **Inundation of dry land will likely occur in this scenario**
- Strong currents and potential scour are expected in areas identified in blue – yellow-red and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated from and docks secured:  
None (completed with maritime community input)

Safe areas for repositioning vessels within Newport Beach Harbor: None (wide-spread inundation likely to occur)

(completed with maritime community input)

Time thresholds for currents >3 knots.....>6 knots.....>9 knots  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)







# Dana Point Harbor Playbook Plan E

(based on M9.2 Eastern Aleutian-Alaska Scenario)

Background Information:

Alert level = Warning

Peak Amplitude = 2.5 meters

Peak Velocity = 12+ knots

Projected duration of strong currents (see location maps below):

3-6 knots = 40 hrs; 6-9 knots = 15 hrs; >9 knots = 5 hrs

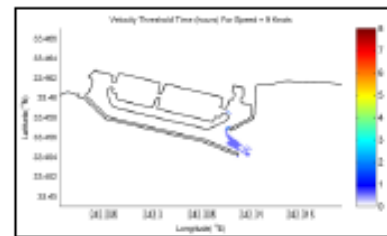
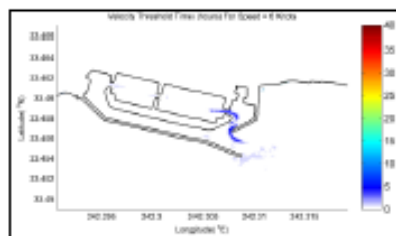
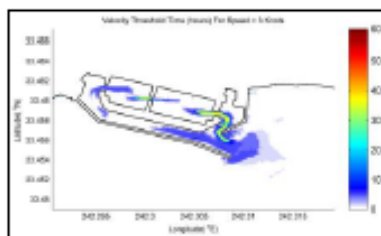
Specific Instructions:

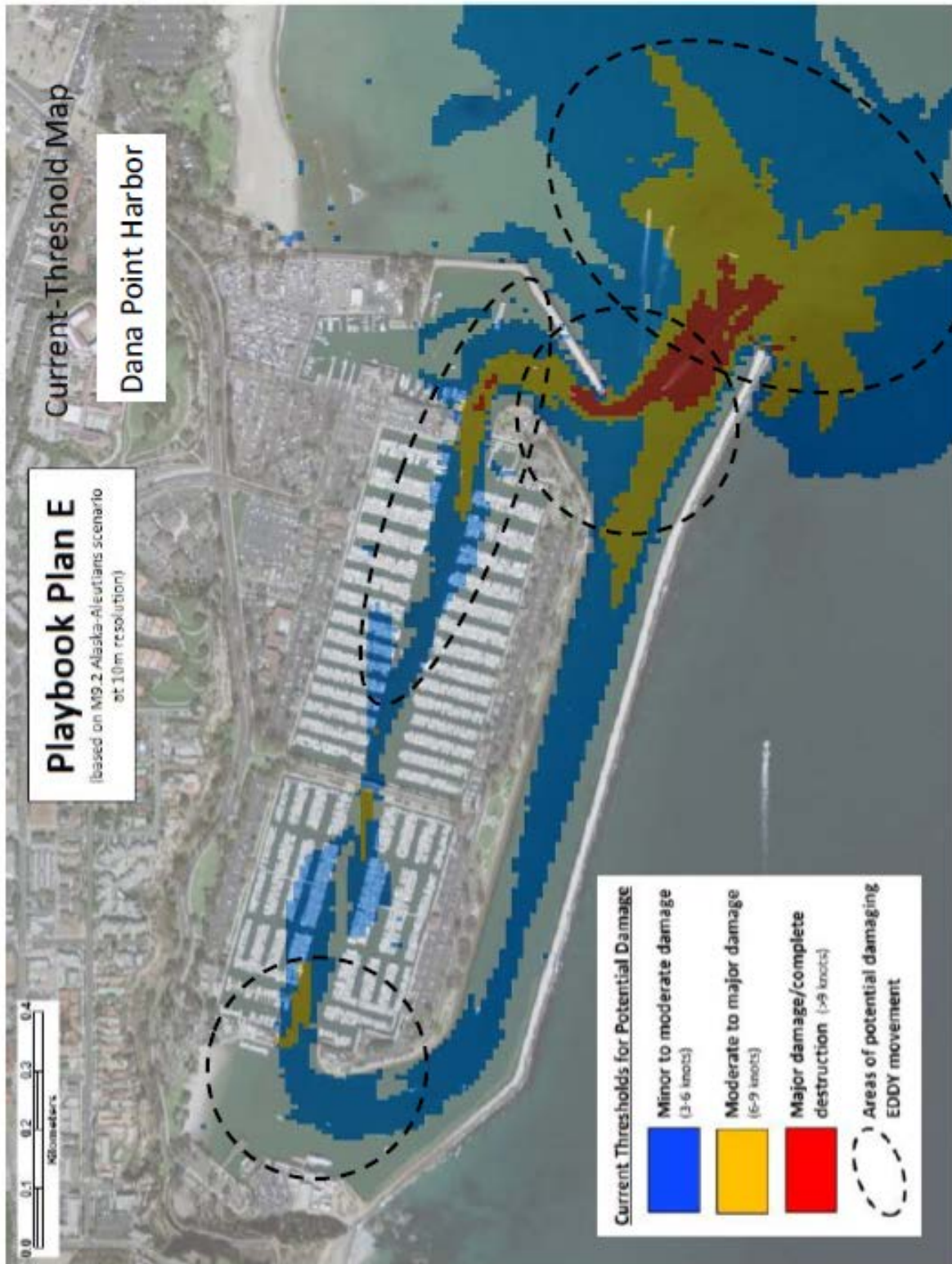
- Follow general guidance for Warning-level tsunamis (Page 5)
- **Inundation of dry land will likely occur in this scenario**
- Strong currents and potential scour are expected in areas identified in blue – yellow-red and/or with eddy activity on the map to the right. Consider relocating vessels located within 100 meters (300 feet) of these areas.
- Specific areas where vessels should be relocated from and docks secured:  
**None (completed with maritime community input)**

Safe areas for repositioning vessels within Dana Point Harbor: None (wide-spread inundation likely to occur)

**(completed with maritime community input)**

**Time thresholds for currents >3 knots.....>6 knots.....>9 knots**  
(Colors below represent HOURS of potential activity for blue, yellow, and red zones on opposite page)





**Notable Historical Tsunamis:** The following table provides very basic information about historical tsunami events; not all tsunamis are represented, especially minor or small tsunamis. Note that the largest, most damaging tsunamis in Orange County history have come from large earthquakes in the Alaska-Aleutian Islands and Chile regions as distant tsunami sources and a potential submarine landslide as a local source. Although the potential for local tsunamis exists, they are much less frequent than distant source tsunamis.

### Notable Historical Tsunamis in Orange County

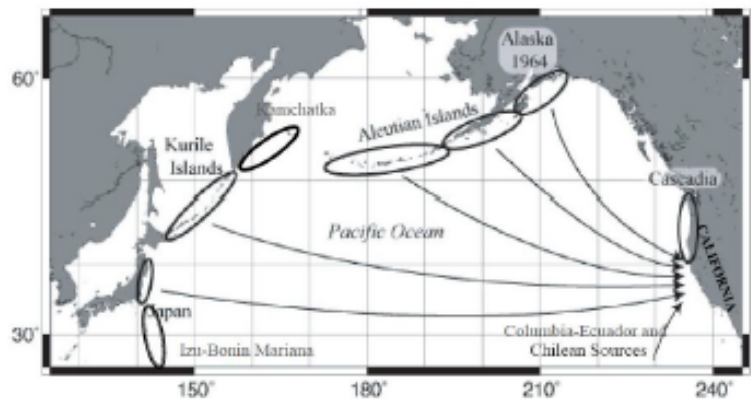
Run-up amplitude, in feet, above normal tide conditions

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
7/10/1855	multiple local earthquakes	Dana Point	OBS	*...considerable commotion in the water, attended by a strong rushing sound..."
4/1/1946	M8.8 - Aleutian Islands	Newport Beach	1 ft	*...furious eddy between Balboa and Little Island..."
3/9/1957	M8.6 - Aleutian Islands	Newport Beach	1 ft	NR
5/22/1960	M9.5 - Chile	Alamitos Bay	2 ft	NR
		Dana Point	3 ft	cabin cruiser sunk
3/28/1964	M9.2 - Alaska	Alamitos Bay	1 ft	NR
		Newport Beach	1 ft	NR
2/27/2010	M8.8 - Chile	Huntington Beach	2 ft	NR
		Newport Beach	2 ft	NR
		Dana Point	2 ft	Bait barge severed
3/11/2011	M9.0 - Japan	Huntington Beach	2 ft	Boat pulled off mooring
		Newport Beach	1 ft	NR
		Dana Point	2 ft	Pylon damaged when hit by boat

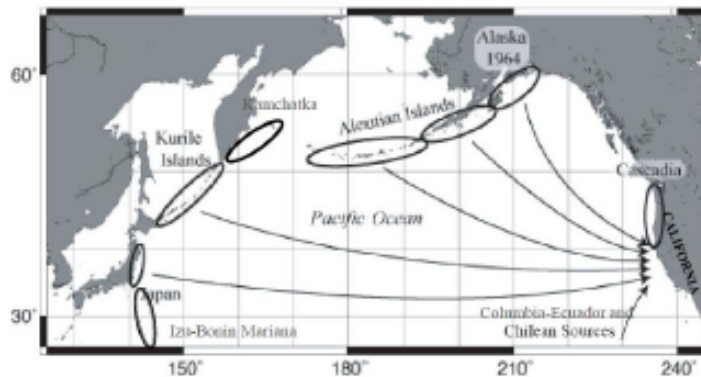


**Modeled Tsunami Scenarios:** Because very large tsunamis are infrequent and the likelihood that the largest potential tsunamis have not yet occurred in Orange County, the state tsunami program developed a suite of maximum credible tsunami scenarios as part of their tsunami inundation mapping project for local evacuation planning. The general tsunami wave height for key locations from these scenarios are provided below. As identified in the historical tsunami table, the largest tsunamis could occur from large earthquakes in the Alaska-Aleutian Islands or Chile regions, or from a large submarine landslide offshore.

### Tsunami Source Scenario Model Results for Orange County

Near shore tsunami heights (flow depths) for both local and distant source scenarios, in FEET above Mean Sea Level. NOTE: The projections do not include any adjustments for ambient conditions, such as storm surge and tidal fluctuations, and model error (it is very important to note this difference, as those numbers can increase the projected water height during an event).

	TSUNAMI SOURCES	Approximate Travel Time	Seal Beach	Seal B. Naval Harbor	Sunset Beach	Hunt Beach	Newport Beach	Crystal Cove	Laguna Beach	Aliso Beach	Dana Point	San Clemente
Local Sources	M7 Newport-Inglewood Fault	10-15min	2	3	3	2	2	2				
	M7.1 San Mateo Thrust Fault	10-15min								7	13	16
	M7.1 Oceanside Thrust Fault	15-20min								6	4	
	Palos Verdes Landslide 1	15-20min	5	5	10	10	3	3				
	Palos Verdes Landslide 2	15-20min	5	5	13	11	3	3	3	3		
Distant Sources	M7.7 Catalina Fault	20-30min	8	8	7	11	13	11	10	7	7	7
	M9 Cascadia-full rupture	2hr	4	4	4	3	3			3	3	3
	M9.2 Alaska 1964 EQ	6hr	10	6	6	6	3	4	4	4	6	5
	M8.9 Central Aleutians I	6hr	5	5	4	4				3	4	4
	M8.9 Central Aleutians II	6hr	3	3	3	3				3	3	3
	M9.2 Central Aleutians III	6hr	14	10	9	9	6	6	6	7	8	6
	M9 Kamchatka 1952 EQ	9hr								3		3
	M8.8 Kuril Islands II	10hr	2	3	2	2				2	3	2
	M8.8 Kuril Islands III	10hr	2	3	2	2				2	3	2
	M8.8 Kuril Islands IV	10hr	3	3	2	2				2	3	2
	M8.8 Japan II	11hr	3	3	3	2				2	3	2
	M9.5 Chile 1960 EQ	13hr	10	5	5	5	3	3	3	3	4	4
	M9.4 Chile North	13hr	10	6	7	8	4	4	4	4	4	4
<b>Maximum Runup - Local Source</b>			<b>9</b>	<b>9</b>	<b>14</b>	<b>12</b>	<b>14</b>	<b>12</b>	<b>11</b>	<b>8</b>	<b>15</b>	<b>17</b>
<b>Maximum Runup - Distant Source</b>			<b>15</b>	<b>11</b>	<b>10</b>	<b>10</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>8</b>	<b>10</b>	<b>8</b>

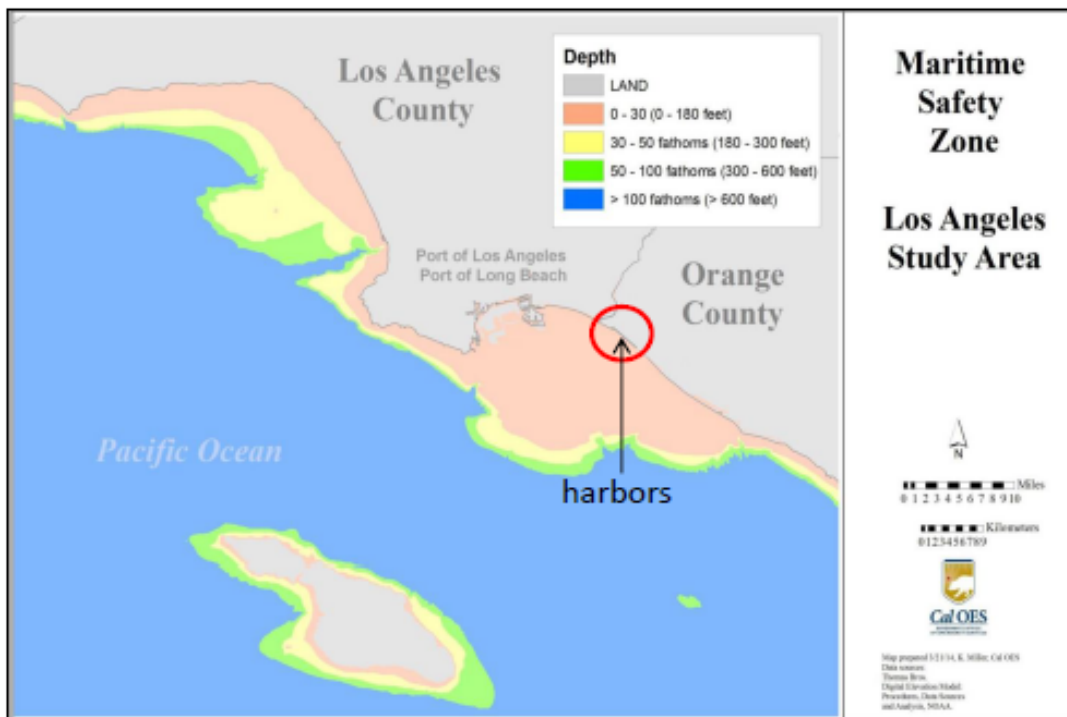


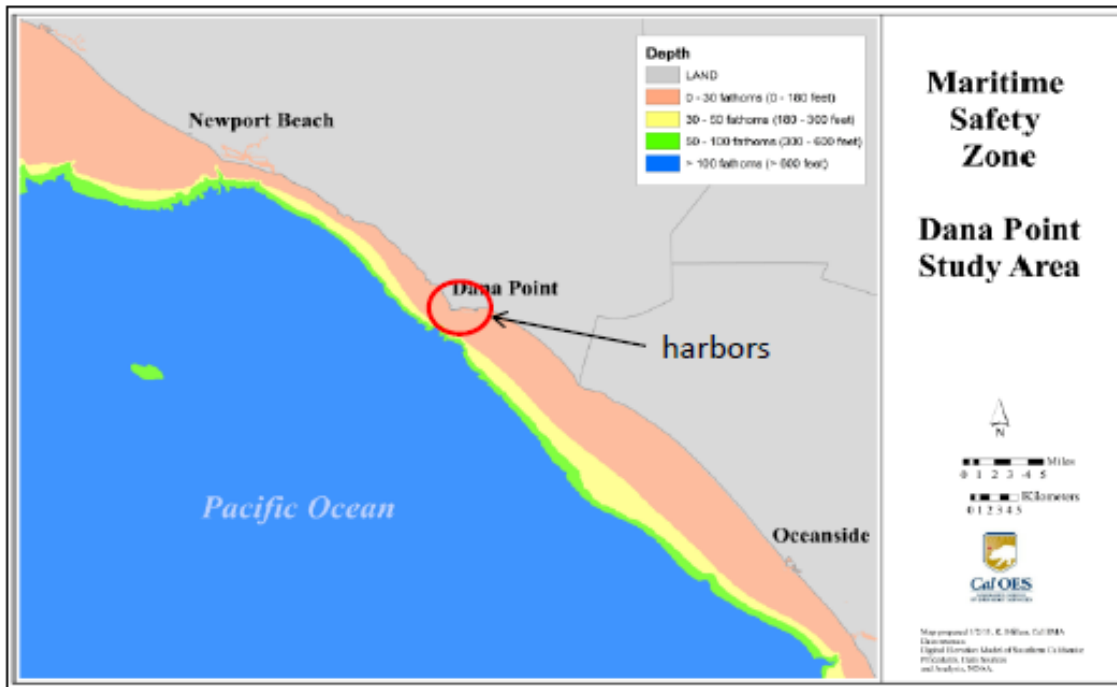
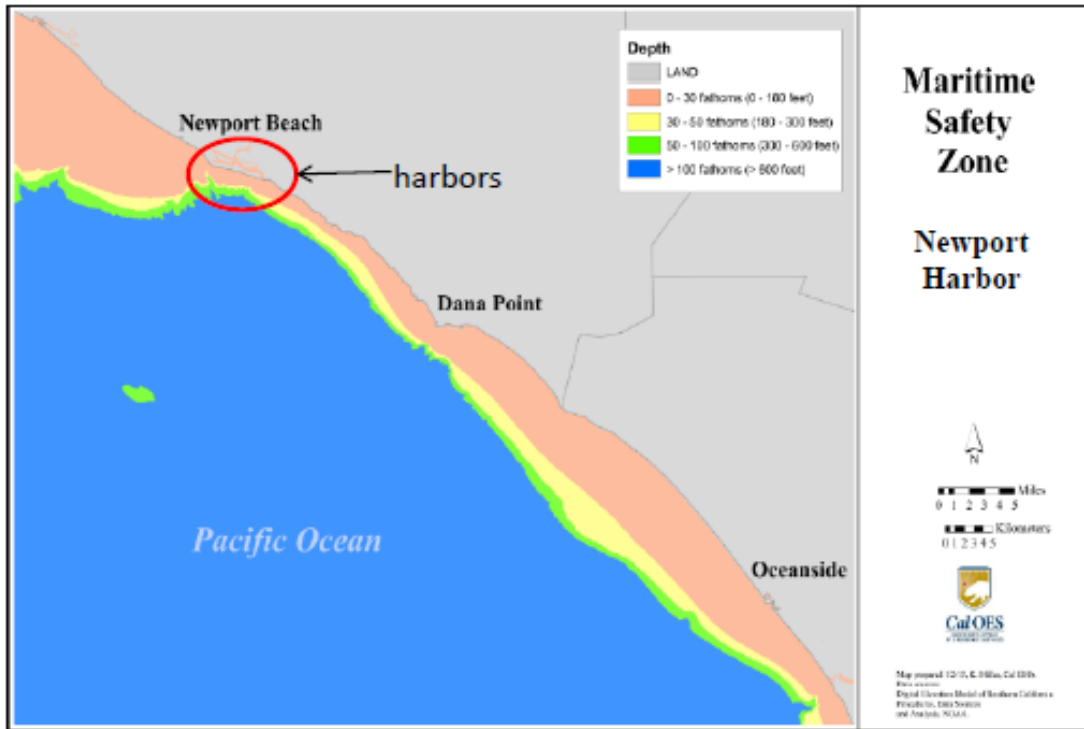
### PLAN FOR OFFSHORE EVACUATION OF BOATS

**NOTE: The safety of the boating public should outweigh the benefit of saving boats and harbor property during a tsunami.**

- For most harbors in California, it is safer to keep boats docked during a tsunami because most tsunamis are relatively small.
- On the rare occasion when a large, damaging tsunami and associated strong currents are expected and there are no safe areas within the harbor, the boat owner may be considering taking their boat offshore.
- There are a number of factors that should be considered prior to recommending boats evacuate offshore prior to the arrival of the tsunamis, including:
  - (1) the **SIZE** of the tsunami;
  - (2) is there sufficient **TIME** to get to the **30 fathom depth (180 feet)**, which has been evaluated as safe depth for boats during distant source tsunamis (map below);
  - (3) the **PREPAREDNESS** of the boat and its captain to stay at sea over 24 hours;
  - (4) the **WEATHER** at sea could be as dangerous as the tsunami itself; and,
  - (5) if significant damage occurs within the harbor, boaters should have enough fuel and supplies to travel to a non-damaged harbor.

**Note for trailer boat owners:** Expect congested boat ramps and remember that you have to get your boat to the trailer, out of the water, and out of the tsunami zone before the tsunami arrives.





### **TSUNAMI EVACUATION ZONE MAP FOR SEAL BEACH/HUNTINGTON HARBOR**

This tsunami evacuation map was prepared to assist cities and counties in identifying their tsunami hazard and safe areas to evacuate to. It is intended for local jurisdictional, coastal evacuation planning uses. The red area represents the maximum considered tsunami inundation from a number of extreme, yet realistic, tsunami sources. In other words, people within the red-colored zones could get wet; people uphill or inland from these areas should be safe during any tsunami. **This map, or the local tsunami evacuation map/plan, should be used for evacuation from a Warning-level tsunami event unless otherwise directed by local emergency management officials.**

For digital copies of tsunami inundation maps for other portions of California, visit <http://www.tsunami.ca.gov>





**TSUNAMI EVACUATION ZONE MAP FOR NEWPORT BEACH HARBOR**

This tsunami evacuation map was prepared to assist cities and counties in identifying their tsunami hazard and save areas to evacuate to. It is intended for local jurisdictional, coastal evacuation planning uses. The red area represents the maximum considered tsunami inundation from a number of extreme, yet realistic, tsunami sources. In other words, people within the red-colored zones could get wet; people uphill or inland from these areas should be safe during any tsunami. **This map, or the local tsunami evacuation map/plan, should be used for evacuation from a Warning-level tsunami event unless otherwise directed by local emergency management officials.**

For digital copies of tsunami inundation maps for other portions of California, visit <http://www.tsunami.ca.gov>



### TSUNAMI EVACUATION ZONE MAP FOR DANA POINT HARBOR

This tsunami evacuation map was prepared to assist cities and counties in identifying their tsunami hazard and save areas to evacuate to. It is intended for local jurisdictional, coastal evacuation planning uses. The red area represents the maximum considered tsunami inundation from a number of extreme, yet realistic, tsunami sources. In other words, people within the red-colored zones could get wet; people uphill or inland from these areas should be safe during any tsunami. This map, or the local tsunami evacuation map/plan, should be used for evacuation from a Warning-level tsunami event unless otherwise directed by local emergency management officials.

For digital copies of tsunami inundation maps for other portions of California, visit <http://www.tsunami.ca.gov>



**APPENDIX**  
**Quick Reference Page for Determining Real-Time Maritime  
Tsunami Response Activities**

**Step 1:** Obtain basic information about the earthquake and tsunami from National Tsunami Warning Center in Alaska, regional National Weather Service office, and/or county emergency manager. **NOTE: Tsunami Alert Level may change in first couple hours after the earthquake; WATCH may be upgraded to ADVISORY or WARNING.**

Earthquake location \_\_\_\_\_

Earthquake magnitude \_\_\_\_\_

Tsunami Alert level (circle one)      WATCH      ADVISORY      WARNING

Closest forecasted tsunami amplitude/wave height \_\_\_\_\_

Forecasted tsunami arrival time \_\_\_\_\_

**Step 2:** Tsunami evacuation and response will depend on the amount of time before the tsunami arrival. Four (4) hours is considered the threshold time needed for evacuation. As a quick reference, we offer the following guidance:

1) If less than four hours before tsunami arrival, we recommend the following:

- ADVISORY – evacuate beaches, harbor docks, and piers
- WARNING – evacuate entire maximum on-land evacuation zone, or follow guidance provided by local emergency manager

2) If greater than four hours before tsunami arrival, and your harbor has fully developed its tsunami response Playbook plans, the harbor can utilize the FORECAST AMPLITUDE from Step 1 on the table on the right to identify the appropriate response plan to use. If there is sufficient time, the State of California and NWS will also provide a recommendation on which Playbook Plan should be referenced for a “minimum” response.

Reference Pages for Details in Maritime Playbook	Scenario Playbook Plan Letter	Peak Amplitude near harbor (in meters, above existing conditions near harbor entrance)
	(No action)	< 0.2
Page 8-13	A	0.4
Page 14-19	B	0.5
Page 20-25	C	0.6
Page 26-31	D	1.0
Page 32-37	E	1.7

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## Chapter 7 Position Checklists Tsunami Specific

### Control One

Name:

Date:

Start Time:

End Time:

**Tsunami Information Statement** - A tsunami information statement is issued when an earthquake or tsunami has occurred of interest to the message recipients. In most cases, information statements are issued to indicate there is no threat of a destructive basin-wide tsunami and to prevent unnecessary evacuations. Information statements for distant events requiring evaluation may be upgraded to a warning, advisory, or watch based on updated information and analysis.

- Control One will notify the County and OA Emergency Manager via email, the Tsunami Information Statement received.
- Control One will brief the Department Commander on the Tsunami Information Statement received.
- Forward Tsunami Information Statement received through CLETS system.
- Monitor situation and acknowledge CalWAS as needed, passing on updated information to the County/OA Emergency Manager.

## Control One

Name:

Date:

Start Time:

End Time:

**Tsunami Watch** - A tsunami watch is issued when a tsunami may later impact the watch area. The watch may be upgraded to a warning or advisory or canceled based on updated information and analysis. Emergency management officials and the public should prepare to take action.

*(Use Attachment A-Control One-Tsunami Watch Notification List)*

- Control One will notify the County and OA Emergency Manager and brief on the Tsunami Watch Received and request a conference call time.
- Control One will brief the Department Commander and provide time of the conference call.
  - Remind Department Commander there is a notification checklist in the call out rolodex.
- Control One Supervisor will conduct roll call on DSP – DSP to the following agencies: (Stations: 10, 18, 41, 42, 43, 45, 54, OC Parks, OCFA and Metro Net)
  - Provide the Tsunami Watch information received from the National Alaska Tsunami Warning Center- *for DSP to DSP* along with the conference call information and remind them to notify their Emergency Manager of the event and conference call.

**Conference Call Time:** \_\_\_\_\_

**Conference Call Phone Number: 1-877-336-1828**

**Participant Code: 5180323**

- Perform General Broadcast(s) in accordance to attached matrix using the Tsunami Watch information received from the National Tsunami Warning Center.
- Send Tsunami Watch information received from the National Alaska Tsunami Warning Center out by teletype using ZALL/SNNB.
- Monitor situation and acknowledge CalWAS as needed, passing on updated information to the County/OA Emergency Manager.

## Control One

Name:

Date:

Start Time:

End Time:

**Tsunami Advisory** - 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 may be updated, adjusted geographically, upgraded to a warning, or cancelled based on updated information and analysis.

*(Use Attachment C-Control One-Tsunami Notification Advisory Notification List)*

- Control One will notify the County and OA Emergency Manager and brief on the Tsunami Advisory received and request a conference call time.
- Control One will brief the Department Commander and provide time of the conference call.
  - Remind Department Commander there is a notification checklist in the call out rolodex.
- Control One Supervisor will conduct roll call on DSP – DSP to the following agencies: (Stations: 10, 18, 41, 42, 43, 45, 54, OC Parks, OCFA and Metro Net)
  - Provide the Tsunami Advisory information received from the National Tsunami Warning Center - *use the Tsunami Red Channel Broadcast for Advisory script*, along with the conference call information and remind them to notify their Emergency Manager of the event and conference call.

**Conference Call Time:** \_\_\_\_\_

**Conference Call Phone Number: 1-877-336-1828**

**Participant Code: 5180323**

- Perform General Broadcast(s) in accordance to attached matrix using the Tsunami Advisory information received from the National Tsunami Warning Center. *Use the Tsunami Red Channel Broadcast for Advisory script.*
- Send Tsunami Advisory information received from the National Tsunami Warning Center out by teletype using ZALL/SNNB.
- Monitor situation and acknowledge CalWAS as needed, passing on updated information to the County/OA Emergency Manager.

## Control One

Name:

Date:

Start Time:

End Time:

**Tsunami Warning** - A tsunami warning is issued when a tsunami with the potential to generate widespread inundation is imminent, expected, or occurring. Warnings alert the public that dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after initial arrival. Warnings alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas, and the repositioning of ships to deep waters when there is time to safely do so. Warnings may be updated, adjusted geographically, downgraded, or canceled based on updated information and analysis.

*(Use Attachment G-Control One Tsunami Warning Notification List)*

- Control One will notify the County and OA Emergency Manager and brief on the Tsunami Warning Received and request a conference call time.
- Control One Supervisor will conduct roll call on DSP – DSP to the following agencies: (Stations: 10, 18, 41, 42, 43, 45, 54, OC Parks, OCFA and Metro Net) to ensure they have received the message.
  - Provide the Tsunami Warning information received from the National Tsunami Warning Center *use the Tsunami Red Channel Broadcast for Warning script*, along with the conference call information and remind them to notify their Emergency Manager of the event and conference call.

**Conference Call Time:** \_\_\_\_\_

**Conference Call Phone Number: 1-877-336-1828**

**Participant Code: 5180323**

- Control One will brief the Department Commander and provide time of the conference call.
  - Remind Department Commander there is a notification checklist in the call out rolodex.
- Perform General Broadcast(s) in accordance to attached matrix using the Tsunami Warning information received from the National Tsunami Warning Center. *Use the Tsunami Red Channel Broadcast for Warning script.*
- Send Tsunami Warning information received from the National Tsunami Warning Center out by teletype using ZALL/SNNB.
- Activate the EAS, if directed by the OA EOC, using the *EAS Message for Tsunami Warning script*.
- Monitor situation and acknowledge CalWAS as needed, passing on updated information to the County and OA Emergency Manager.



## Control One

Name:

Date:

Start Time:

End Time:

**Local Near-Shore Earthquake/Immediate Tsunami** - If a large earthquake or undersea landslide occurs at or near the California coast, the first waves may reach coastal communities within minutes. There may be little or no time for authorities to issue a warning. **Appropriate action is to immediately move inland or to higher ground.**

*(Use the Control One Local Near-Shore Earthquake/Immediate Tsunami Notification List*

- Control One will notify the County and OA Emergency Manager and brief on the Local Near-Shore Earthquake/ Immediate Tsunami received and request a conference call time. *Conference call will occur 1 hour after initial earthquake*
- Upon approval from the OA and County Emergency Manager activate the EAS, using the Tsunami EAS Local Near-Shore Earthquake/Immediate Tsunami script-utilize the *EAS Message – Local Near-Shore Earthquake/Immediate Tsunami*
- Perform General Broadcast(s) in accordance to attached matrix using the Local Earthquake/Tsunami information received from the National Tsunami Warning Center. *Use the Tsunami Red Channel Broadcast for Local Near-Shore Earthquake/Immediate Tsunami*
- Control One Supervisor will conduct roll call on DSP – DSP to the following agencies:  
(Stations: 10, 18, 41, 42, 43, 45, 54, OC Parks, OCFA and Metro Net)
  - Provide the Local Earthquake/Tsunami information received from the National Tsunami Warning Center-use *the Tsunami Red Channel Broadcast for Local Near-Shore Earthquake/Immediate Tsunami* along with the following conference call information and remind them to notify their Emergency Manager of the event and conference call.

**Conference Call Time:** \_\_\_\_\_

**Conference Call Phone Number: 1-877-336-1828**

**Participant Code: 5180323**

- Control One will brief the Department Commander and provide time of the conference call.
  - Remind Department Commander there is a notification checklist in the call out rolodex.
- Send Local Near-Shore Earthquake/Immediate Tsunami information received from the National Tsunami Warning Center out by teletype using ZALL/SNNB.
- Monitor situation and acknowledge CalWAS and National Tsunami Warning Center as needed, passing on updated information to the County and OA Emergency Manager.

## County and OA EOC Manager

Name:

Date:

Start Time:

End Time:

**Tsunami Information Statement** - A tsunami information statement is issued when an earthquake or tsunami has occurred of interest to the message recipients. In most cases, information statements are issued to indicate there is no threat of a destructive basin-wide tsunami and to prevent unnecessary evacuations. Information statements for distant events requiring evaluation may be upgraded to a warning, advisory, or watch based on updated information and analysis.

Upon the receipt of a Tsunami Information Statement from Control One, the County and OA Emergency Manager will perform the following:

- Continue to a monitor situation.

## County and OA EOC Manager

Name:

Date:

Start Time:

End Time:

**Tsunami Watch** - A tsunami watch is issued when a tsunami may later impact the watch area. The watch may be upgraded to a warning or advisory or canceled based on updated information and analysis. Emergency management officials and the public should prepare to take action.

Upon the receipt of a Tsunami Watch from Control One, the County and OA Emergency Manager will perform the following:

- Confirm written notification was received from NWTC and not just a verbal from California State Warning Center.
- Provide Control One will Conference Call time (conference call should occur within 45-60 minutes of this notification).
- Send E-mail to the Tsunami Notification Group located in the EOC Contacts.
- Launch AlertOC message to the Tsunami OA Notification Group to include NTWC notification and conference call time.
- Gather information pertaining to:
  - ETA of wave arrival
  - projected amplitude
  - tide levels (quick information website is <http://wavecast.net/tideall.shtml> )
- Facilitate conference call (*utilize the Conference Call Agenda for Tsunami*) and recommendations in accordance with the Tsunami Watch Flow Chart.
- Establish Conference Call occurrence schedule.
  - Ensure subsequent Conference Call date and time information is sent out to the Tsunami Notification Group, via:
    - Email
    - AlertOC
- Continue to monitor status.

## County and OA EOC Manager

Name:

Date:

Start Time:

End Time:

**Tsunami Advisory** - 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 may be updated, adjusted geographically, upgraded to a warning, or cancelled based on updated information and analysis.

Upon the receipt of a Tsunami Advisory from Control One, the County and OA EOC Manager will perform the following:

- Confirm written notification was received from NWTC and not just a verbal from California State Warning Center.
- Provide Control One with Conference Call time (conference call should occur within 45-60 minutes of this notification).
- Send E-mail to the Tsunami Notification Group located in the EOC Contacts.
- Launch AlertOC message to the Tsunami OA Notification Group to include NTWC notification and conference call time.
- Gather information pertaining to
  - ETA of wave arrival
  - projected amplitude
  - tide levels (quick information website is <http://wavecast.net/tideall.shtml> )
  - FASTER Playbook recommendation from the State, to access the reports go to:
    - Tsunami Basecamp Web Portal <https://cgstsunamidb.basecampHQ.com/login>
    - EOC Contacts, Tsunami Basecamp Web Portal, for user login and password information.
- Facilitate Conference call (*use the Conference Call Agenda for Tsunami*) and recommendations in accordance with the Tsunami Advisory Flow Chart.
- Establish Conference Call occurrence schedule.
- Ensure Public Information Officer distributes the Joint Jurisdictional Press Release. (*see Press Release for Tsunami Advisory*)
- Continue to monitor situation.

## County and OA EOC Manager

Name:

Date:

Start Time:

End Time:

**Tsunami Warning** - A tsunami warning is issued when a tsunami with the potential to generate widespread inundation is imminent, expected, or occurring. Warnings alert the public that dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after initial arrival. Warnings alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas, and the repositioning of ships to deep waters when there is time to safely do so. Warnings may be updated, adjusted geographically, downgraded, or canceled based on updated information and analysis.

Upon the receipt of a Tsunami Warning from Control One, the County and OA Emergency Manager will perform the following:

- Confirm written notification was received from NWTC and not just a verbal from California State Warning Center.
- Provide Control One with Conference Call time (conference call should occur within 45-60 minutes of this notification).
- Send E-mail to the Tsunami Notification Group located in the EOC Contacts-include NTWC notification and conference call time.
- Launch AlertOC message to the Tsunami OA Notification Group to include NTWC notification and conference call time.
- Gather information pertaining to:
  - ETA of wave arrival
  - projected amplitude
  - tide levels (quick information website is <http://wavecast.net/tideall.shtml> )
  - FASTER Playbook recommendation from the State, to access the reports go to:
    - Tsunami Basecamp Web Portal <https://cgstsunamidb.basecampHQ.com/login>
    - EOC Contacts, Tsunami Basecamp Web Portal, for user login and password information.
- Facilitate Conference call and recommendations in accordance with the Tsunami Warning Flow Chart. Upon concurrence initiate the following actions
  - Request EAS activation through Control One
  - Supplemental Press Release for evacuations
  - AlertOC for County coastal unincorporated
- Establish Conference Call occurrence schedule.
- Continue to monitor situation and information from NTWC and NWS.

## County and OA EOC Manager

Name:

Date:

Start Time:

End Time:

**Local Near-Shore Earthquake/Immediate Tsunami** - if a large earthquake or undersea landslide occurs at or near the California coast, the first waves may reach coastal communities within minutes. There may be little or no time for authorities to issue a warning. **Appropriate action is to immediately move inland or to higher ground.**

Upon the receipt of a Local Near-Shore Earthquake/Immediate Tsunami from Control One, the County and OA Emergency Manager will perform the following:

- Authorize Control One to initiate the EAS as the LP2 for Local Near-Shore Earthquake/Immediate Tsunami. *Utilize the EAS Message – Local Near-Shore Earthquake/Immediate Tsunami.*
- Provide Control One with Conference Call time *Conference Call will be conducted 1 hour after initial Earthquake.*
- Send E-mail to the Tsunami Notification Group located in the EOC Contacts.
- Launch AlertOC message to the Tsunami OA Notification Group.
- Gather information pertaining to
  - earthquake location and magnitude
  - projected amplitude
  - tide levels (quick information website is <http://wavecast.net/tideall.shtml> )
  - FASTER Playbook recommendation from the State, to access the reports go to:
    - Tsunami Basecamp Web Portal <https://cgstsunamidb.basecampHQ.com/login>
    - EOC Contacts, Tsunami Basecamp Web Portal, for user login and password information.
- Facilitate Conference call and the Tsunami Immediate Flow Chart.
- Establish Conference Call occurrence schedule.
- Continue to monitor situation and information from NTWC and NWS.

## EOC Liaison Officer

Name:

Date:

Start Time:

End Time:

- In coordination with the EOC Manager, ensure event notifications are forwarded to Orange County coastal jurisdictions, utilizing:
  - Tsunami Notification Group email distribution list (located in EOC Contacts)
  - AlertOC, Tsunami OA Notification Group
  - Other notification tools, as necessary
- In coordination with the EOC Manager, assist in gathering information pertaining to:
  - ETA of wave arrival
  - projected amplitude
  - tide levels (quick information website is <http://wavecast.net/tideall.shtml> )
- Ensure Tsunami Advisory or Tsunami Warning received from the National Tsunami Warning Center is forwarded to the Operational Area.
- Establish and maintain communications with Los Angeles and San Diego Operational Areas.
- Maintain constant contact with Orange County coastal jurisdictions.
- After each Conference Call, email the Tsunami Notification Group with the next scheduled conference call date and time.
- Continue to monitor the National Tsunami Warning Center website <http://ntwc.arh.noaa.gov/> for tsunami event updates.

## OCSD Department Commander

Name:

Date:

Start Time:

End Time:

**Tsunami Information Statement** - A tsunami information statement is issued when an earthquake or tsunami has occurred of interest to the message recipients. In most cases, information statements are issued to indicate there is no threat of a destructive basin-wide tsunami and to prevent unnecessary evacuations. Information statements for distant events requiring evaluation may be upgraded to a warning, advisory, or watch based on updated information and analysis.

Upon the receipt of a Tsunami Information Statement from Control One, the OCSD Department Commander will perform the following:

- Keep in contact with Control One Supervisor to monitor any changing events.



## OCSD Department Commander

Name:

Date:

Start Time:

End Time:

**Tsunami Watch** - A tsunami watch is issued when a tsunami may later impact the watch area. The watch may be upgraded to a warning or advisory or canceled based on updated information and analysis. Emergency management officials and the public should prepare to take action.

Upon the receipt of a Tsunami Watch from Control One, the OCSD Department Commander will perform the following:

- Using the notification sheet in the Department Commander callout rolodex (attached to the wall) contact the agencies listed in the order on the sheet. *utilize the Department Commander Tsunami Notification Checklist*
  - Provide the Tsunami Watch information received from the National Tsunami Warning Center along with the conference call information.

**Conference Call Time:** \_\_\_\_\_

**Conference Call Phone Number: 1-877-336-1828**

**Participant Code: 5180323**

- Have the Yellow 1 and Yellow 4 dispatchers broadcast the Tsunami Watch information received from the National Tsunami Warning Center and have the Dana Point Patrol Sgt. (sam34) and North County Patrol Sgt (sam10) called by phone.
- Determine the actions to be performed by OCSD patrol units.
- Participate in the Tsunami Conference Call.
- Keep in contact with Control One Supervisor to monitor any changing events.
- Keep in contact with the County and OA EOC Manager and provide updates to the activities of the Department.

## OCSD Department Commander

Name:

Date:

Start Time:

End Time:

**Tsunami Advisory** - 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 may be updated, adjusted geographically, upgraded to a warning, or cancelled based on updated information and analysis.

Upon the receipt of a Tsunami Advisory from Control One, the OCSD Department Commander will perform the following:

- Using the notification sheet in the Department Commander callout rolodex contact the agencies listed in the order on the sheet (*utilizing the Department Commander Tsunami Notification Checklist*).

- Provide the Tsunami Advisory information received from the National Tsunami Warning Center along with the conference call information.

**Conference Call Time:** \_\_\_\_\_

**Conference Call Phone Number:** 1-877-336-1828

**Participant Code:** 5180323

- Have the Yellow 1 and Yellow 4 dispatchers broadcast the Tsunami Advisory information received from the National Tsunami Warning Center and contact the following by phone to verify they copied Control One's broadcast:
  - Dana Point Patrol Sgt. (sam34)
  - North County Patrol Sgt. (sam10)
  - San Clemente Sgt. (sam70)
  - Harbor Patrol Dispatch Center (Station 54)
- Determine the actions to be performed by OCSD patrol units.
- Participate in the Tsunami Conference Call.
- Keep in contact with Control One Supervisor to monitor any changing events.
- Keep in contact with the County and OA EOC Manager and provide updates to the activities of the Department.
- After initial wave arrival time, keep in contact with Harbor Patrol, and patrol sergeants, ask if any change in amplitude was observed.

## OCSD Department Commander

Name:

Date:

Start Time:

End Time:

**Tsunami Warning** - A tsunami warning is issued when a tsunami with the potential to generate widespread inundation is imminent, expected, or occurring. Warnings alert the public that dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after initial arrival. Warnings alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas, and the repositioning of ships to deep waters when there is time to safely do so. Warnings may be updated, adjusted geographically, downgraded, or canceled based on updated information and analysis.

Upon the receipt of a Tsunami Warning from Control One, the OCSD Department Commander will perform the following:

- Using the notification sheet in the Department Commander callout rolodex contact the agencies listed in the order on the sheet. (*utilizing the Department Commander Tsunami Notification Checklist*)
  - Provide the Tsunami Warning information received from the National Tsunami Warning Center along with the conference call information.

**Conference Call Time:** \_\_\_\_\_

**Conference Call Phone Number: 1-877-336-1828**

**Participant Code: 5180323**

- Have the Yellow 1 and Yellow 4 dispatchers broadcast the Tsunami Advisory information received from the National Tsunami Warning Center and contact the following by phone to verify they copied Control One's broadcast:
  - Dana Point Patrol Sgt. (sam34)
  - North County Patrol Sgt. (sam10)
  - San Clemente Sgt. (sam70)
  - Harbor Patrol Dispatch Center (Station 54)
- Determine the actions to be performed by OCSD patrol units.
- Participate in the Tsunami Conference Call.
- Keep in contact with Control One Supervisor to monitor any changing events.
- Keep in contact with the County and OA Emergency Manager and provide updates to the activities of the Department.

## OCSD Department Commander

Name:

Date:

Start Time:

End Time:

**Local Near-Shore Earthquake/Immediate Tsunami** - Upon the receipt of a Local Near-Shore Earthquake/Immediate Tsunami from Control One, the OCSD Department Commander will perform the following:

- Using the notification sheet in the Department Commander callout rolodex (attached to the wall) contact the agencies listed in the order on the sheet. *Utilize Attachment P-Department Commander Tsunami Notification Checklist.*
- Provide the Local Near-Shore Earthquake/ Immediate Tsunami information received from the National Tsunami Warning Center along with the conference call information.

**Conference Call Time:** \_\_\_\_\_

**Conference Call Phone Number: 1-877-336-1828**

**Participant Code: 5180323**

- Have the Yellow 1 and Yellow 4 dispatchers broadcast the Tsunami information received from the National Tsunami Warning Center and have the Dana Point Patrol Sgt. (sam34) and North County Patrol Sgt (sam10) call by phone.
- Participate in the Tsunami Conference Call.
- Keep in contact with Control One Supervisor to monitor any changing events.
- Keep in contact with the County/OA EOC Manager and provide updates to the activities of the Department.