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I. Purpose

The City of Oakland (City) Tsunami Annex to the Emergency Operations Plan (EOP) provides a framework for the coordination of City resources to ensure the safety of life and property following a tsunami incident. This Annex was developed to ensure the protection of lives and property through the coordinated execution of response and recovery activities.

II. Situation and Assumptions

A tsunami is a series of waves generated by sudden displacements in the sea floor, landslides, or volcanic activity. The word tsunami is a Japanese word, represented by two characters: “tsu” meaning “harbor”, and “nami” meaning “wave”.

Tsunamis can be generated several different ways, the most common of which is through seismic activity. A large earthquake (moment magnitude [M] > 7.5) that is centered offshore is capable of producing a tsunami. More specifically, a thrust-type earthquake (vertical displacement) is more likely to produce a tsunami than an earthquake from a lateral strike-slip fault, such as the San Andreas. Because of this, subduction zones, where dense oceanic crust burrows underneath less-dense continental crust, are more likely to produce a large tsunami. The Pacific coast of North America is a prime example of a subduction zone.

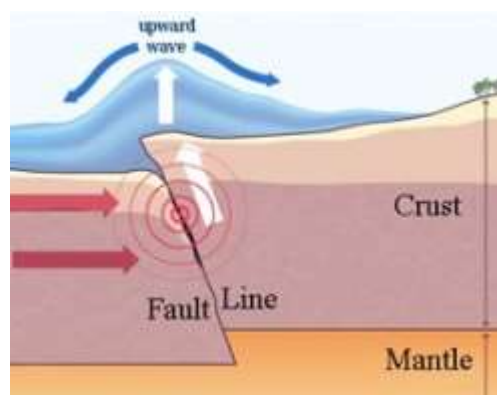


Figure 1: Tsunami Wave Generated by Seismic Activity

Another aspect of tsunamis that needs to be noted is that a tsunami generally consists of a *series* of waves, not a single wave. The number of waves can vary, but data have shown that there are usually between two and ten waves. Further, the first wave is typically not the largest one. The time interval between waves can range from 5 to 60 minutes, although usually falling between 10 and 30 minutes. The speed at which the tsunami travels is dependent on the depth of the water; on average Pacific Ocean tsunamis travel at about 480 miles per hour. However, due to the depth of the ocean, the height may only be a few feet. Therefore, vessels in the open ocean may not even notice a passing tsunami. In deep water, the wavelength can be as much as 50 to 150 miles. As a tsunami reaches shallower water nearer to the coast, it has less area in which it can be dispersed. The tsunami is then compressed into a dense area causing the wave heights to increase dramatically close to the shore.

The U.S. Tsunami Warning Centers issue tsunami messages to notify emergency managers, the public, and other partners about the potential for a tsunami following a possible tsunami-generating event. Alerts to the West Coast are issued by the National Tsunami Warning Center (NTWC), formerly the Alaska/West Coast Tsunami Warning Center. Domestic tsunami messages include four levels of tsunami alerts: warning, advisory, watch, and information statement.¹ Each has a distinct meaning relating to local emergency response. Recommended protective actions vary within areas under warnings and advisories.

¹ National Oceanic and Atmospheric Administration/National Weather Service: U.S. Tsunami Warning System. 2017.

- **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.
- **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 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 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.

A. Situation

Table 1 shows the hazard analysis for tsunami threat, as profiled in Section 2 of the EOP.

Table 1: Tsunami Threat Analysis

Frequency	Warning Lead Times	Consequences	Population/Area at Risk
Low (Less than every 25 years)	Hours/none	High (Moderate to high citywide impact. May require county, state, or federal assistance.)	Medium

Since 1850, approximately 80 tsunamis have been recorded or observed in the 12-county Bay Area region as established by the Bay Area Urban Areas Security Initiative (UASI). The majority of these tsunamis originated in Alaska and were caused by an earthquake, earthquake and landslide, or volcano and earthquake; the remainder had a source location of Northern California, Japan, or Chile.² Most were either eyewitness events or measured using a tide gauge, and the overwhelming majority of tsunamis observed or recorded resulted in little to no damage.

The 1906 earthquake generated a 4-inch wave run-up, recorded at the Presidio gauge station shortly after the 1906 earthquake. The earthquake caused the down-dropping of the seafloor north of Lake Merced

² National Center for Environmental Information/World Data Service: Global Historic Tsunami Database. 2017.

between overlapping segments of the San Andreas Fault and, as such, the earthquake inertia generated a tsunami. In the more recent years, it is probable that wave impact occurred in and around the Bay Area during 1946, 1960, and 1964. In 1946, an earthquake in the Aleutian Islands generated a tsunami on the coast of San Francisco. In 1960, coastal areas of Alameda County and Pacifica experienced high water resulting from an M 9.5 earthquake off the coast of Chile. A 1964 Alaskan earthquake caused twelve deaths and 17 million dollars in damage in Crescent City, but damage to the Bay Area was not observed. Following the M 8.1 2009 Samoa earthquake, the National Weather Service (NWS) issued a tsunami advisory for the Bay Area. A 2010 tsunami originating M 8.8 Chile earthquake caused several million dollars in damage to ports and harbors in the state, including Santa Cruz County. The tsunami that resulted from the 2011 M 9.1 Tohoku earthquake caused extensive damage to piers and harbors on the California coast. The Governor proclaimed a State of Emergency for six counties, including San Mateo and Santa Cruz counties; Santa Cruz County subsequently received a Presidential Declaration of Major Disaster.

Figure 2 estimate areas of Oakland which could experience inundation following a tsunami, showing the Bay Bridge landing, Jack London District, the Port of Oakland's seaport, the entirety of the Oakland International Airport, and the San Leandro Bay shoreline, including the Oakland Coliseum complex and the City of Oakland Corporation yard, as potential sites for flooding during a tsunami.

B. Assumptions

Refer to **Section 1.4.2** of the Oakland EOP for overarching emergency management assumptions. In addition, the following assumptions have been used to develop this annex:

- First responders may be among those affected by the incident and therefore may be unable to immediately report for duty.
- This Annex assumes a tsunami in the City of Oakland follows a seismic event such as an earthquake or a landside significant enough to generate this phenomenon.
- Local tsunamis may occur with little or no warning, and the time to warn the public, evacuate sensitive/critical facilities, establish temporary shelters, and secure coastal areas will vary.
- Flooding may occur in areas in close proximity to the San Francisco Bay following a tsunami, and public utilities and private infrastructure (such as power, water, sewer, natural gas networks, and phone lines) may be damaged and unusable immediately following a tsunami.
- The City of Oakland will respond initially to a tsunami. However, if damage is severe, it may take hours or days for emergency response personnel to reach all affected areas.
- Both response and recovery operations may be impacted by impassible roads or bridges, damaged buildings, and downed trees and utility poles.
- Residents near San Francisco Bay shorelines may be without food, water, shelter, heat, sanitary facilities, and transportation for extended periods of time following a tsunami.
- Oakland communities that are not directly impacted by a tsunami may become overwhelmed by an influx of displaced residents who require alternate housing or shelter because of damage caused by the tsunami.
- A tsunami can result in cascading impacts and produce persistent chemical, biological, or radiological contamination that severely challenge the ability and capacity of governments and communities to achieve a timely recovery.
- City facilities in the tsunami inundation zone shown in **Figure 2** include two schools and two fire stations, which may become inoperable.

III. Concept of Operations

In accordance with the City of Oakland EOP, the Emergency Operations Center (EOC) will likely be fully activated (level I).³ The Emergency Management Services Division (EMSD) of the Oakland Fire Department (OFD) will have the lead on coordination of departments and agencies to respond immediately following a tsunami.

Mission tasks and operational priorities will be determined in conjunction with information received from the Governor’s Office of Emergency Services (Cal OES), the National Oceanic and Atmospheric Administration (NOAA), and other reputable sources describing the potential and likely impact of the tsunami to the City.

Requested equipment, materials, supplies, and personnel will be obtained through City resources, mutual aid agreements, resource requests made to and through the Operational Area, or purchasing through official City channels.

Most procedures required for response to and recovery from a tsunami are already covered in Emergency Support Function (ESF) Annexes to the EOP, in particular, ESF #6 – Mass Care and Shelter, ESF #8 – Public Health and Medical, ESF #9 – Search and Rescue, and ESF #11 – Food, Agriculture, and Animal Services.

During a tsunami the following functions will be critical:

Functions	Incident Conditions
<p>Evacuation (ESF #1 – Transportation, ESF #5 – Management, ESF #16 - Evacuation)</p>	<ul style="list-style-type: none"> The time between alert and notification of a potential tsunami threat can vary significantly. Quick decision-making regarding evacuation orders followed by rapid release of information to the public using all methods and channels possible is important.
<p>Damage/Safety Assessments and Debris Removal (ESF #3 – Public Works and Engineering)</p>	<ul style="list-style-type: none"> Resources and personnel to support damage and safety assessments and debris removal are limited. Generally, damage assessment takes place in two phases: <ol style="list-style-type: none"> Initial assessment/windshield survey to determine general impact and damage to vital facilities and resources and provide a brief overview of impact on citizens and businesses Subsequent, in-depth assessments to determine the full extent of damage and the financial implications for disaster declarations and disaster assistance Removal of debris from public roads/highways is the responsibility of the department that is responsible for a particular road or highway’s maintenance. In a tsunami incident, the amount of debris generated is significant and will require more resources than the City can provide. When damage assessments and/or debris removal are required in

³ As described in Section 3.4 in the EOP.

Functions	Incident Conditions
	<p>the impacted areas, the limited availability of properly equipped resources underscores the need for the prompt county and state response.</p>
<p>Mass Care, Housing, and Human Services (ESF #6 – Mass Care and Shelter and ESF #11 – Food, Agriculture and Animal Services)</p>	<ul style="list-style-type: none"> The ability to support the provision of temporary shelter, food, emergency first aid, and other essential life support to people and animals in the impacted area may be complicated by the significance of the incident. A tsunami levels everything in its path, which limits the resources left to provide a response. Transportation routes are destroyed or covered with debris, housing and shelters may be destroyed or unusable, and the death toll may be so significant that human services will not be able to provide a basic level of service. A tsunami may also affect the ability to quickly transport resources into the area. The care and sheltering of animals during and after a tsunami is a concern for the City of Oakland. Plans for providing basic animal services such as food, shelter, and medical care to animals affected by the incident are described in City of Oakland’s Animal Care Annex. Service animals are exempt from restrictions regarding facility and transportation access. Service animals are defined as dogs that are individually trained to do work or perform tasks for people with disabilities.⁴
<p>Public Health and Medical Support (ESF #8 – Public Health and Medical)</p>	<ul style="list-style-type: none"> There is a need for public health and medical support (including behavioral health services) after a tsunami. Medical support is required at healthcare facilities, evacuation points, evacuee assembly points and shelters, and other locations that support field operations. In addition, behavioral health services will be critical to provide to survivors, response workers, and others. Due to the very limited public health and medical resources in the City of Oakland, a prompt local and state response is required. Alameda County is the primary provider of health and medical services for the City of Oakland and will likely also have limited resources.
<p>Search and Rescue (ESF #9 – Search and Rescue)</p>	<ul style="list-style-type: none"> Resources and personnel to perform operational activities (for example, locating, extricating, and providing on-site medical treatment to survivors) are limited. A tsunami may cause significant structural damage to buildings, bridges, overpasses, and other critical infrastructure. Search and rescue efforts will be needed to rescue survivors.

⁴ The Americans with Disabilities Act (https://www.ada.gov/service_animals_2010.htm)

Functions	Incident Conditions
<p>Public Safety and Security (ESF #13 – Law Enforcement)</p>	<ul style="list-style-type: none"> City resources may be required to provide evacuation coordination and incident perimeter security/checkpoints for communities that were evacuated or areas that have hazardous material releases. Law enforcement and emergency management officials who normally respond to incidents may be among those affected and therefore may be unable to perform their duties.
<p>Public Information (ESF #15 – Public Information)</p>	<ul style="list-style-type: none"> A tsunami may threaten a wide geographical area. More than one city, county, or region may be affected and the need to provide consistent public information will exist. Additionally, if the City of Oakland evacuates residents to other counties, information about the incident, potential return dates, and other critical information will have to be provided in a timely and consistent manner.

IV. Operational Roles and Responsibilities

The following section describes roles and responsibilities *specific* to tsunami activities. Primary agencies identified to lead each ESF are responsible for coordinating and/or delegating the activities of the ESF. Additional roles and responsibilities to support associated emergency response efforts are described in the specific ESFs. Refer to the specific ESF for more information. Additional ESFs may be activated to support the response as necessary.

ESF #1 – TRANSPORTATION
<p>Primary Agency: Oakland Department of Transportation</p>
<p>Preparedness (Pre-event)</p>
<ul style="list-style-type: none"> <input type="checkbox"/> Identify mass transit capabilities in the potential inundation areas. <input type="checkbox"/> Identify evacuation routes with OFD and OPD.

ESF #1 – TRANSPORTATION

Response

- Coordinate with law enforcement, fire, and the Operational Area to conduct aerial overflight and warning as needed.
- Determine which routes are available for emergency use.
- Maintain and repair damaged traffic control devices.
- Establish a transportation plan for:
 - Movement of personnel, supplies, and equipment to the EOC and field units
 - Movement of individuals to medical facilities
 - Movement of survivors and victims from the incident area
 - Placement of barricades outside of the affected areas
 - Detour routes around the impacted area
- Coordinate with ESF #13 – Law Enforcement to establish traffic control points.
- Coordinate with ESF #6 – Mass Care and Shelter, ESF #8 – Public Health and Medical, and the Emergency Functional Needs Coordinator (E-FNC) on the movement of populations with disabilities and others with access and functional needs from the incident area in accordance with the City of Oakland Functional Needs Annex.

Recovery

- Assess and document damage to transportation infrastructure. Provide the documentation to the EOC Planning and Intelligence Section.
- Identify and repair transportation infrastructure.
- Complete administrative, financial, and other forms for cost reimbursement and to meet legal requirements.
- Participate in the After Action Report.

ESF #3 – PUBLIC WORKS AND ENGINEERING

Primary Department: Oakland Department of Public Works

Preparedness (Pre-event)

- Coordinate with utility providers to render safe critical infrastructure (for example, if necessary, shut off power and gas lines to potential high-risk areas).

Response

- Obtain and help the Oakland Police Department (OPD) set up signs and barricades (such as traffic cones, pedestrian barriers, caution tape, etc.).
- Coordinate with ESF #12 – Utilities regarding utility issues.
- Develop alternate work sites and evacuate personnel from potentially dangerous areas.
- Document damage assessments and estimates from field personnel.

Recovery

- Assess and record damage to public infrastructure and provide this information to the EOC Planning and Intelligence Section.
- Conduct street cleaning to help mitigate potential health impacts.
- Identify and repair damaged infrastructure.
- Complete administrative, financial, and other forms for cost reimbursement and to meet legal requirements.
- Participate in the After Action Report.

ESF #5 – MANAGEMENT

Primary Agencies: Emergency Management Services Division & City Administrator’s Office

Preparedness (Pre-event)

- Bring together relevant stakeholders to develop detailed standard operating procedures for how to respond to tsunamis.
- Develop and post tsunami evacuation route signs in the tsunami inundation area.
- Identify and post tsunami evacuation assembly sites.

Response

- Receive and assess tsunami threat.
- Coordinate with the Policy Group and EOC Operations Section to develop tsunami response actions.
- Contact and coordinate with local, Operational Area, regional, state, and federal emergency management agencies.
- Contact and advise neighboring jurisdictions.
- Activate outdoor warning sirens and other public notification systems, such as the Emergency Alert System (EAS).
- Provide information to the City Administrator and the City Council to support the proclamation of a local emergency, if necessary.
- Coordinate monitoring and surveillance, including aerial surveillance.
- Participate in situation conference calls with Operational Area, regional, state, and federal agencies (such as the NWS, the NTWS, and the U.S. Coast Guard).
- Coordinate with ESF #15 – Public Information to develop public information messages.
- Keep up-to-date situation status information on conditions posted in the EOC.
- Coordinate the issuance of the “All Clear” as necessary.
- Represent the City in post-warning conference calls.
- Provide coordination for disaster recovery activities and agencies.

Recovery

- Coordinate the documentation of damage assessments with reporting agencies and develop a combined report.

ESF #5 – MANAGEMENT

- Provide coordination for recovery activities.
- Ensure all response and EOC personnel complete all required administrative and financial forms for reimbursement and to meet legal requirements.
- Facilitate post-incident analysis and conduct the After Action Report.
- Revise EOP and/or any annexes or procedures as necessary and informed by the incident.

ESF #6 – MASS CARE AND SHELTER

Primary Department: Oakland Parks, Recreation, and Youth Development Department

Preparedness (Pre-event)

- Identify shelter locations and resources that can be used outside of the inundation zone.

Response

- Coordinate the opening and staffing of shelters within the City.
- Coordinate with the E-FNC and the shelter functional needs coordinator (S-FNC) to ensure that the needs of populations with disabilities and others with access and functional needs are being met.
- Continue to assess the need for shelters and provide ongoing analysis to the EOC.

Recovery

- Close shelter locations when shelter needs are resolved.
- Provide information on disaster assistance (such as housing and disaster grants).
- Complete administrative, financial, and other forms for cost reimbursement and to meet legal requirements.
- Participate in the After Action Report.

ESF #8 – PUBLIC HEALTH AND MEDICAL

(Refer to ESF #8 – Public Health and Medical for detailed responsibilities as well as the Alameda County Health and Medical Agency plans for detailed information)

Primary Agencies: Human Services Department & Oakland Fire Department

Preparedness (Pre-event)

- Discuss how to modify EMS tactics and protocols to fit a tsunami incident.
- During the warning period, top off fuel tanks and order additional supplies.
- During the warning period, assign and bring on additional staff.
- Pre-deploy and stage resources as appropriate.

ESF #8 – PUBLIC HEALTH AND MEDICAL
(Refer to ESF #8 – Public Health and Medical for detailed responsibilities as well as the Alameda County Health and Medical Agency plans for detailed information)
Response
<ul style="list-style-type: none"> <input type="checkbox"/> Establish and maintain operational awareness of Oakland public health and medical services through direct communications links with operational units (Incident Command in the field, hospitals, nursing homes, health care facilities, etc.) in the field and/or their appropriate coordinating entities. <input type="checkbox"/> Provide primary coordination with Alameda County Health Care Services Agency. <input type="checkbox"/> Coordinate with Alameda County Health Care Services Agency for the implementation of the Operational Area Disaster Medical Health Plan and surge capacity plans, including assessments of immediate medical needs, as well as the following activities: <ul style="list-style-type: none"> <input type="checkbox"/> Provide on-scene triage, treatment, and stabilization in coordination with field units <input type="checkbox"/> Activate field treatment sites <input type="checkbox"/> Track patients transported through EMS <input type="checkbox"/> Assign patients to available hospital service in accordance with established protocols <input type="checkbox"/> Support surge implementation throughout the medical system <input type="checkbox"/> Request the National Disaster Medical System (NDMS) support if needed <input type="checkbox"/> Request the Medical Health Mutual Aid System activation through the Oakland EOC if needed <input type="checkbox"/> Request OPD escort for all ESF #8 – Public Health and Medical personnel performing response actions. <input type="checkbox"/> Provide guidance and advice on potential health impacts (for example, notify the public that individuals should not contact the street, sidewalk, and other impacted structures with their bare hands or feet for two days after it has dried and exposed to sunlight).
Recovery
<ul style="list-style-type: none"> <input type="checkbox"/> Complete administrative, financial, and other forms for cost reimbursement and to meet legal requirements. <input type="checkbox"/> Participate in the After Action Report.

ESF #9 – SEARCH AND RESCUE
Primary Department: Oakland Fire Department
Preparedness (Pre-event)
<ul style="list-style-type: none"> <input type="checkbox"/> Move and stage resources out of the tsunami inundation area until the all clear is sounded.
Response
<ul style="list-style-type: none"> <input type="checkbox"/> Advise Incident Command on structural and debris issues that may impede search and rescue. <input type="checkbox"/> Coordinate response activities associated with search and rescue including locating, extricating, and providing medical treatment on site to survivors and victims trapped in collapsed structures.

ESF #9 – SEARCH AND RESCUE

- Request additional search and rescue resource through the Operational Area EOC if necessary.

Recovery

- Release excess personnel and equipment according to demobilization plan.
- Complete administrative, financial, and other forms for cost reimbursement and to meet legal requirements.
- Participate in the After Action Report.

ESF #11 – FOOD, AGRICULTURE, AND ANIMAL SERVICES

Primary Agencies: Human Services Department & Oakland Animal Services Department

Preparedness (Pre-event)

- Identify vendors that will be able to provide food and animal supplies during disasters for shelters and affected residents.
- Coordinate with owners and operators of agricultural facilities within tsunami inundation area to develop plans and procedures for the evacuation of livestock.

Response

- Coordinate the delivery of food and water to shelters for people and pets.
- Coordinate the safe disposal of animal remains.
- Coordinate with ESF #10 – Hazardous Materials and ESF #8 – Public Health and Medical regarding the safety of agricultural food supplies.

Recovery

- Complete administrative, financial, and other forms for cost reimbursement and to meet legal requirements.
- Participate in the After Action Report.

ESF #13 – LAW ENFORCEMENT

Primary Department: Oakland Police Department

Preparedness (Pre-event)

- Move and stage resources out of the tsunami inundation area until the all clear is sounded.

Response

- Coordinate with ESF #16 – Evacuation on the evacuation of risk areas.
- Establish traffic and perimeter control and on-scene security.
- Notify and deploy special officers and units.

ESF #13 – LAW ENFORCEMENT

- Notify Regional Law Enforcement Mutual Aid Coordinator (Alameda County Sheriff) of impending and/or actual need for law enforcement mutual aid.
- Support hospital security as necessary.
- Establish Unified Command with other affected jurisdictions as appropriate.
- In coordination with ESF #3 – Public Works and Engineering assess damage to department resources and facilities.

Recovery

- Release excess personnel and equipment according to demobilization plan.
- Complete administrative, financial, and other forms for cost reimbursement and to meet legal requirements.
- Participate in the After Action Report.

ESF #15 – PUBLIC INFORMATION

Primary Agency: City Administrator's Office

Preparedness (Pre-event)

- Develop messages and standard operating procedures for tsunami.
- Provide information to 2-1-1 and other public information sources as described in established procedures.
- During the warning period, develop and release messages to the public on how to avoid the incident and how the City is responding.

Response

- Activate the Emergency Public Information Team (EPIT).
- Prepare instructions for the media on actions taken by the City of Oakland to respond to the incident.
- Work with EOC Sections and Units to develop verified fact sheets regarding the scope of the event.
- Release information to the public on potential health issues (for example, impacted structures such as sidewalks, buildings, landscaped areas, and streets should be washed down with City water and allowed to dry out while exposed to UV light for 2 days prior to contact and during this time individuals should be instructed not to touch with their bare hands or feet).
- Monitor broadcast media and use information to develop follow-up news releases and rumor control.

ESF #15 – PUBLIC INFORMATION**Recovery**

- Coordinate with ESF # 3 – Public Works and Engineering to obtain a hotline for the public to call to request street cleaning and schedule for debris pick up.
- Notify the public of their responsibility to clean private property such as walkways in front of their buildings as well as landscaped areas.
- Complete administrative, financial, and other forms for cost reimbursement and to meet legal requirements.
- Participate in the After Action Report.

ESF #16 – EVACUATION

Primary Agencies: Oakland Police Department & Oakland Fire Department

Preparedness (Pre-event)

- Move and stage resources out of the tsunami inundation area until the all clear is sounded.

Response

- Coordinate with ESF #13 – Law Enforcement and ESF #1 – Transportation on the evacuation of risk areas.
- Coordinate with ESF #1 – Transportation and ESF #3 – Public Works and Engineering to assess the condition of roadways and infrastructure for evacuation purposes.
- Coordinate traffic and perimeter control and on-scene security with ESF #13 – Law Enforcement.
- Notify and deploy special officers and units.
- Notify Regional Law Enforcement Mutual Aid Coordinator (Alameda County Sheriff) of impending and/or actual need for law enforcement mutual aid.

Recovery

- Release excess personnel and equipment according to demobilization plan.
- Complete administrative, financial, and other forms for cost reimbursement and to meet legal requirements.
- Participate in the After Action Report.

V. Additional Information

A. Tsunami Alert and Notification

All tsunami watches and warnings originate from the NTWC, operated by NOAA, headquartered in Palmer, AK. The NTWC notifies the California State Warning Center (CSWC) in Sacramento, which in turn notifies all coastal county Public Safety Answering Points (PSAPs). The NTWC also notifies the NWS and Federal organizations such as the U.S. Coast Guard.

The NWS activates the Emergency Alert System (EAS), which is the method TV and radio media use to warn the public. These warnings come across TV screens as a ticker with the watch or warning text scrolling along. The local NWS station also tones the watch or warning message out to NOAA weather radios.

The CSWC warns the coastal counties via the Dialogic system and the California Law Enforcement Teletype System (CLETS), which includes a follow-up phone call to verify receipt of the message.

The CWSC also activates the Emergency Digital Information System (EDIS), an enhancement of the EAS. Once the initial watch or warning is issued to the NWS and the CSWC, the other methods of notification are all done concurrently. It is the responsibility of the City of Oakland 9-1-1 to notify local agencies, including all law and fire agencies, the City Administrator, EMSD/the Emergency Manager, and other relevant organizations in accordance with its dispatch protocols. These agencies/departments may very well already receive the watch or warning via CLETS, EDIS, EAS, or weather radio.

It is imperative that EMSD be in contact with Communications Team to ensure that the correct message is being delivered to the public to limit confusion and unnecessary panic. It must be noted that due to the quick turnaround of EAS, it is possible that the general public, through the media, may receive the watch or warning message at the same time as, or perhaps even before, emergency managers and first responders.

Figure 4 outlines the alert and notification watch/warning protocol. When the tsunami watch or warning is cancelled, either due to the event being over or the verification of no tsunami present, a cancellation/all-clear message will be sent out. In this case, the same notification protocol will be used. Whether the message is a watch or warning will dictate initial response.

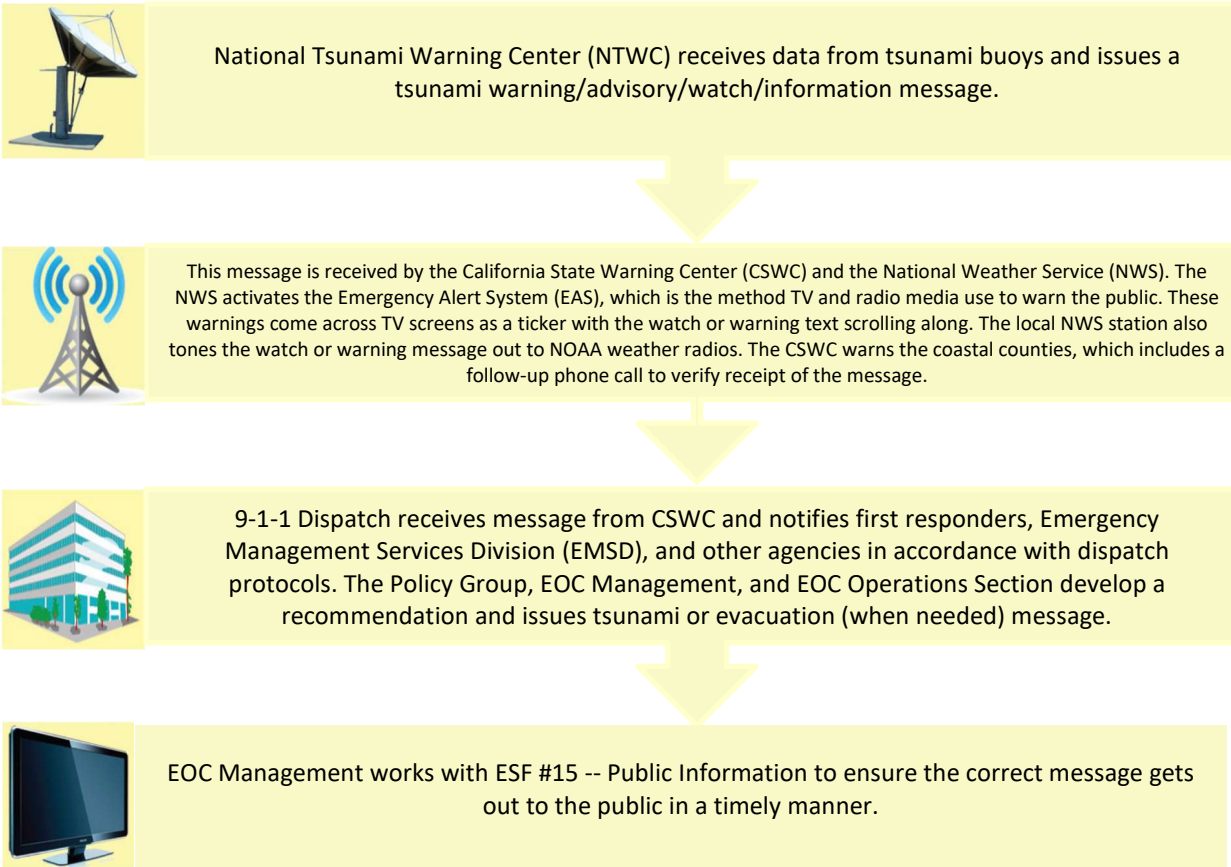


Figure 4: Tsunami Alert and Notification Process

B. Sample Tsunami Statement Issued by the National Tsunami Warning Center

Sample Tsunami Information Statement as Issued by the NTWC for a Local Event:

Scenario: Tsunami Seismic Information Statement issued in response to a non-tsunamigenic earthquake off the Kona coast of the Big Island.

ZCZC
SEHW70 PHEB 011033
EQIHWX

TSUNAMI SEISMIC INFORMATION STATEMENT NUMBER 1
NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI
1233 AM HST SUN FEB 01 2009

TO - CIVIL DEFENSE IN THE STATE OF HAWAII

SUBJECT - LOCAL TSUNAMI INFORMATION

THIS STATEMENT IS FOR INFORMATION ONLY. NO ACTION REQUIRED.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1230 AM HST 01 FEB 2009
COORDINATES - 19.3 NORTH 156.0 WEST
LOCATION - OFF THE KONA COAST OF THE BIG ISLAND
MAGNITUDE - 5.5

EVALUATION

NO TSUNAMI IS EXPECTED. REPEAT. NO TSUNAMI IS EXPECTED.
HOWEVER... SOME AREAS MAY HAVE EXPERIENCED STRONG SHAKING.

THIS WILL BE THE ONLY STATEMENT ISSUED FOR THIS EVENT UNLESS
ADDITIONAL DATA ARE RECEIVED.

Sample Tsunami Warning as Issued from the NTWC for a Distant Event:

Scenario: Initial issuance of a Tsunami Warning to the entire State of Hawaii following a large earthquake off the coast of Chile. This is an upgrade to a previous Tsunami Watch that had been issued to the State of Hawaii for this event.

ZCZC
WEHW40 PHEB 012150
TSUHWX

BULLETIN
TSUNAMI MESSAGE NUMBER 5
NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI
645 AM HST SUN FEB 01 2009

TO - CIVIL DEFENSE IN THE STATE OF HAWAII

SUBJECT - TSUNAMI WARNING

A TSUNAMI WARNING IS ISSUED FOR THE STATE OF HAWAII EFFECTIVE AT 0645 AM HST.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1230 AM HST 01 FEB 2009
COORDINATES - 37.1 SOUTH 74.2 WEST
LOCATION - OFF COAST OF CENTRAL CHILE
MAGNITUDE - 8.9 MOMENT
MAGNITUDE - 8.4 RICHTER (MS)

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GUAGE LOCATION	LAT	LON	TIME	AMPL	PER
SAN ANTONIO CL	33.6S	71.6W	1130Z	2.37M / 7.7FT	16MIN
VALPARAISO CL	33.0S	71.6W	1141Z	1.29M / 4.2FT	14MIN
JUAN FERNANDEZ	33.6S	78.8W	1150Z	0.88M / 2.9FT	18MIN
COQUIMBO CL	29.9S	71.4W	1210Z	0.51M / 1.7FT	15MIN
CALDERA CL	27.1S	70.8W	1215Z	0.20M / 0.6FT	14MIN
SAN FELIX CL	26.3S	80.1W	1226Z	0.14M / 0.4FT	18MIN
ANTOFAGASTA CL	23.6S	70.4W	1244Z	0.09M / 0.3FT	17MIN
IQUIQUE CL	20.2S	70.2W	1258Z	0.09M / 0.3FT	19MIN

LAT - LATITUDE (N-NORTH, S-SOUTH)
LON - LONGITUDE (E-EAST, W-WEST)
TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME)
AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS (M) AND FEET (FT) .
PER - PERIOD OF TIME IN MINUTES (MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

A TSUNAMI HAS BEEN GENERATED THAT COULD CAUSE DAMAGE ALONG

COASTLINES OF ALL ISLANDS IN THE STATE OF HAWAII. URGENT ACTION SHOULD BE TAKEN TO PROTECT LIVES AND PROPERTY.

A TSUNAMI IS A SERIES OF LONG OCEAN WAVES. EACH INDIVIDUAL WAVE CREST CAN LAST 5 TO 15 MINUTES OR MORE AND EXTENSIVELY FLOOD COASTAL AREAS. THE DANGER CAN CONTINUE FOR MANY HOURS AFTER THE INITIAL WAVE AS SUBSEQUENT WAVES ARRIVE. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVES EFFICIENTLY WRAP AROUND ISLANDS. ALL SHORES ARE AT RISK NO MATTER WHICH DIRECTION THEY FACE. THE TROUGH OF A TSUNAMI WAVE MAY TEMPORARILY EXPOSE THE SEAFLOOR BUT THE AREA WILL QUICKLY FLOOD AGAIN. EXTREMELY STRONG AND UNUSUAL NEARSHORE CURRENTS CAN ACCOMPANY A TSUNAMI. DEBRIS PICKED UP AND CARRIED BY A TSUNAMI AMPLIFIES ITS DESTRUCTIVE POWER. SIMULTANEOUS HIGH TIDES OR HIGH SURF CAN SIGNIFICANTLY INCREASE THE TSUNAMI HAZARD.

THE ESTIMATED ARRIVAL TIME IN HAWAII OF THE FIRST TSUNAMI WAVE IS

0250 PM HST SUN 01 FEB 2009

MESSAGES WILL BE ISSUED HOURLY OR SOONER AS CONDITIONS WARRANT.

VI. Policies

The following agreements, procedures, plans, and guidelines apply to the execution of this Annex:

- The City will assist in coordination with impacted departments without regard to race, color, national origin, religion, nationality, sex, age, disability, limited English proficiency, economic status, or sexual orientation.
- This appendix will not supersede the existing City of Oakland codes, regulations, and compliance standards for emergency response.

VII. References

The following agreements, procedure, plans, and guidelines apply to the execution of the Tsunami Annex, in addition to references listed in the EOP and ESFs associated with this Annex:

- City of Oakland Emergency Operations Plan
- City of Oakland Functional Needs Annex
- City of Oakland Animal Care Annex
- 2021 – 2026 City of Oakland Local Hazard Mitigation Plan
- Article 15 of the California Emergency Services Act (Chapter 7, Division 1, Title 2 of the Government Code)
- California Department of Transportation Tsunami Signage Program (<http://www.dot.ca.gov/trafficops/tcd/tsunami.html>)