

Reviewed on 20080109

SAMOA  
NATIONAL TSUNAMI PLAN

Approved by the National Disaster Council under Part III Section 9 of the  
Disaster and Emergency Management Act 2006 on  
*(Insert Date Update will be approved)*

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## **1. INTRODUCTION**

### **1.1 Plan Purpose**

The purpose of this plan is to detail mitigation, preparedness, response and recovery arrangements for tsunamis that affects Samoa.

### **1.2 Plan Development and Review**

This plan has been produced by the Ministry of Natural Resources, Environment and Meteorology as the National Focal Point for Tsunami Warning Services in Samoa in collaboration with the Disaster Advisory Committee.

This plan is to be reviewed annually and also following each tsunami event that may affect Samoa. Responsibility for the review of this plan rests with the Disaster Advisory Committee.

### **1.3 Plan Context**

This plan is intended to coordinate and work in conjunction with programmes, policies, plans and response arrangements made by:

- Government Ministries and Agencies which have allocated disaster management related roles and responsibilities;
- Community Government representatives in conjunction with the Ministry of Women, Community and Social Development
- Non-Governmental Organizations which have been allocated disaster management related tasks.
- Overseas authorities and organizations which are engaged in rendering assistance to the Government of Samoa in times of a disaster situation.

The contents of this plan have been developed using the no-regrets approach.

#### 1.4 Relationship with the Disaster and Emergency Management Act and the National Disaster Management Plan

The development of this plan is a requirement under Section 6.4.2 of the *Disaster and Emergency Management Act 2006 and the National Disaster Management Plan 2006*

#### 1.5 Definitions

**Local tsunamis** refer to tsunamis from a nearby source for which its destructive effects are confined within 100km of the source.

**“Response agency”** means the agencies referred to in Section 11 of the *Disaster & Emergency Management Act 2006*.

**“Response agency plan”** means the plans referred to in Section 12 of the *Disaster & Emergency Management Act 2006*.

**“Tonga shear fault zone”** refers to the region at which the Pacific plate subducts beneath the Australian Plate

**“Tsunami”** refers to a series of traveling waves of extremely long length generated by earthquakes occurring below or near the ocean floor, volcanic eruptions, meteorites and landslides

**“Distant or Tele-tsunamis”** refers to tsunamis originating from a far away source generally more than 1,000 km away.

**“Warning”** refers to the highest level of tsunami alert that is issued due to confirmation that a destructive tsunami wave or the threat of an imminent tsunami. **“Lapataiga mo se sunami”** e tuuina atu pe a fai ua faamaonia pe ua mautinoa e tupu se sunami

**“Watch”** refers to the second highest level of tsunami alert that is issued based on seismic information without destructive tsunami confirmation. It is issued as a means of alerting the affected populations located within an area where a possible tsunami wave might impact within 1 to 3 hours. **“Nofo sauniuni mo se sunami”** e tuuina atu pe a fai e le'i faamaonia e tupu se sunami; e tuuina atu lenei faamatalaga e logoina ai nofoaga e ono aafia i totonu o le isi 1 ile 3 itula o lumanai.

**“For Information Only or Advisory”** is issued to inform locations near possible affected populations that a tsunami might affect neighboring locations. **“Mo le Silafia”** o se faamatalaga e tuuina atu mo le silafia e ono tulai mai se sunami e afua mai i se mafui'e na tupu i se nofoaga ma e ono aafia ai nisi atunuu tulalata ane ile nofoaga sa tupu ai le mafui'e

**“Cancellation of Warning”** refers to the cancellation of a tsunami warning issued. **“Faaleaogaina o Lapataiga mo se Sunami”** e tuuina atu pe afai ua faaleaogaina se Lapataiga mo se Sunami.

**“Cancellation of Watch”** refers to the cancellation of a tsunami watch.

**“Faaleaogaina o le Nofo Sauniuni”** e tuuina atu pe afai ua faaleaogaina le **“Nofo Sauniuni”** mo se sunami.

## 1.6 Plan Objectives

This National Tsunami Plan aims to achieve the following:

- To ensure all communities and response agencies are prepared and ready to respond to a tsunami event
- To reduce the impact of tsunami hazards in Samoa
- To ensure a safe and quick recovery after a tsunami event

Methods for achieving these objectives include but not limited to:

- Fulfillment of roles and responsibilities outlined in this Plan and the National Disaster Management Plan 2006
- Agreed strategies, activities and programmes at all levels
- Response agency plans and activities
- Community-based programmes supported by response agencies.
- Frequent and constant simulations or exercises

Achievement of these objectives is to be monitored by the Ministry of Natural Resources, Environment and Meteorology in collaboration with the DAC.

Monitoring findings are to be reported to the DAC to facilitate its decisions for improvements to the plan and its requirements.

## 2. TSUNAMI RISK PROFILE

### 2.1 Tsunami Risk in Samoa

Tsunami risk in Samoa is rated as “extreme”. This is because Samoa lies only about 150km northwest of the Tonga shear fault zone, where the Pacific Plate subducts beneath the Australian Plate.

Another possible source for tsunami generation is the active submarine volcano Mt. Vailulu’u, and the new volcano Nafanua that has formed within the Vailulu’u crater, lying approximately 200km east of Tau in the Manu’a Island group. Potential hydro-explosive volcanic activity or volcanic wall-collapses in the coming decades may generate tsunamis propagating west of its current location.

By and large, the main areas at risk of a tsunami are all low-lying coastal areas of the inhabited islands of Samoa; that is areas less than 10 metres above sea level.

## **2.2 Historical Tsunami that affected Samoa**

Anecdotal accounts indicate a total of 60 tsunami events have been recorded between the years 1837 to 1980.

The most significant of these events occurred on June 26<sup>th</sup> 1917. A magnitude 8.3 earthquake on the Richter scale which occurred in the Tonga trench triggered a tsunami which impacted Samoa ten (10) minutes after the earthquake's origin time. The village of Satupaitea (lying on the southeast coast of Savaii) received 3 metre wave run-ups as a result of the tsunami, which completely destroyed all native houses (*fale o'o, fale Samoa*) in the immediate vicinity and caused major damages to subsistence and commercial crops in the area. No loss of lives was recorded however.

An 8.5 earthquake on the Richter scale in the South Chile region generated the 1960 tsunami which is also viewed as one of the largest ever recorded in the Samoan group. This tsunami travelled west crossing the Pacific Ocean, and reaching as far as Japan. Samoa, lying approximately 9,000 km away from its origin point, felt the impact of the tsunami approximately 13 hours after its origin time. It was recorded that 4 metre run-ups inundated some coastal areas.

## **2.3 Tsunami Recurrence and Impacts:**

### **2.3.1 Recurrence:**

Based on probability analysis of historical records a tsunami with a mean run-up of between 7 and 9 metres has a return period of between 50 and 100 years.

### **2.3.2 Impacts**

Tsunami is a serious concern for Samoa's human, socio-economic, natural and built environment given that 70% of Samoa's population and infrastructure are located on low lying coastal areas.

#### 2.3.2.1 Human and Social Impacts:

Due to the strength and speed of tsunami waves and their ability to cause structural damages as well as carrying debris, many people can die or become injured. For locally generated tsunamis, there is little or no time to warn the coastal communities and given that the coastal communities are located a few meters from the shoreline any tsunami can cause mass casualties.

People will also become traumatized due to the loss of life or property as well as the financial implications of reconstruction or rehabilitation. In addition, the horrific experience from a tsunami event will continue to haunt people affected over a long period of time, hence counselling will be needed during the relief and recovery period.

In worst case scenarios, village social structures can also be affected (functionality) as individuals and families will primarily focus on their own recovery from a tsunami event; it may take some time to reorganise social structures within the village communities. Therefore, there will be a need to encourage and strengthen collaboration and collectiveness.

#### 2.3.2.2 Impacts on the Economy and Built Environment

Tsunamis will cause extensive damage to coastal communities including community and public infrastructure, agriculture, fisheries and tourism. The major source of income for Samoa as a nation as well as its individual citizens is from agriculture, fisheries and tourism. The destruction of these sources of income will extremely affect Samoa's economy as well as its infrastructure. It will take a long time for Samoa's economy to recover and it will also impact the standard of living and the livelihood of its people. By and large, the impact of tsunamis on the natural environment will also affect Samoa's economy.

#### 2.3.2.3 Impacts on the Natural Environment



Samoa's natural environment will also be affected by tsunamis. The beauty and the natural features of the beaches will be destroyed and the rate of coastal land erosion will increase. Consequently, coastal communities will lose more land resulting to the increase in coastal reclamations and the rate of coastal erosion.

### 3. Tsunami Risk Reduction Arrangements

Section 5 of the National Disaster Management Plan 2006 sets a general framework for disaster risk reduction. This section lists the measures to reduce Samoa's risks and vulnerabilities to some of the hazards including tsunamis; some of these measures are currently implemented through government and non-government organizations risk reduction programmes.

#### 3.1 Location of development(s)

##### 3.1.1 New development(s)

- It is encouraged for safety to locate new developments further inland and away from the coastal areas; if this option is impossible, then precautionary or mitigation measures should be in place to ensure safety of the people who will occupy, operate and or use this development(s).

##### 3.1.2 Existing development(s)

- Option 1: Relocation

This option could be very expensive for both the government and the individual citizens of Samoa hence it's highly recommended to undertake option 2.

- Option 2: Public Safety Measures

Residents of coastal village communities and users of public infrastructure and services within low lying coastal areas must be made aware of the tsunami safety rules and procedures. Refer to Appendix 2 for details of public safety rules and procedures.

#### 3.2 Tsunami Signs and Symbols

- Tsunami signs or symbols forewarns the residents of coastal village communities and users of public infrastructure and services within the low-lying coastal areas that such areas are likely to be affected by a tsunami. The DMO in collaboration with Samoa Red Cross Society and village mayors

through MWCSO are responsible for the design and installation of these signs in each coastal village community.

### **3.3 Evacuation Routes and Safe Places**

- All villages within low lying coastal areas must identify evacuation routes as well as safe places. These routes and safe places must be clearly marked and made known to all residents of villages and users of public infrastructures and services within these coastal areas. Being aware of these routes and location of safe places will ease the evacuation process and prevent further disasters from being caused. Existing inland roads (auala galue/auala alo) within coastal village communities are recommended for use as evacuation routes. The identification of higher grounds and or strong and safe buildings to shelter evacuees as well as informing residents of safe evacuation routes is the responsibility of the village mayor(s). It is also recommended to consult the Ministry of Works, Transport and Infrastructure for advice regarding safe buildings and routes.

### **3.4 Tsunami Hazard Zones and Mapping**

- In order to determine the coastal areas that might become inundated, inundation (flooded areas) maps must be developed. The development of these maps will be based on tsunami scenarios that will take into account the location, its surrounding environment, total population, critical services and facilities and possible wave heights, amplitudes and speed.
- The demarcation of tsunami hazard zones will provide information about tsunami hazard zones for development planning and serves as a pre-warning to the general public including residents residing within these zones.
- The Ministry of Natural Resources, Environment and Meteorology is responsible for the identification of tsunami hazard zones and mapping this information.

## **4. Preparedness Arrangements**

Section 6 of the National Disaster Management Plan 2006 details preparedness arrangements to be implemented at the national and community level for any disaster. The following sub-sections provide specific preparedness arrangements for tsunami.

#### **4.1 Public awareness**

The information about the nature of tsunamis including safety procedures will be provided to the radio and television stations for airing as soon as the information is received that a tsunami watch or warning is in effect for Samoa. During normal periods, the same information will be broadcasted in the form of a documentary, television and radio spot throughout the nation using radio, television and newspapers twice in every quarter of the year.

Pamphlets that provide tsunami safety procedures will also be made available to the public, government Ministries and Corporations, private sector, non-governmental organizations, international and regional organizations and the media. The pamphlet will provide them with information on what to do when they are alerted of a tsunami through the alert system or any natural indications such as an earthquake or the ocean/sea receding.

The planning and implementation of these awareness programmes is part of the Community Awareness and Education Programme coordinated by the Disaster Management Office in collaboration with the Disaster Advisory Committee.

#### **4.2 Tsunami early warning system**

##### **4.2.1 Observation and monitoring network (Seismic and tide gauge station)**

###### **4.2.1.1 Seismic Station**

Samoa has one seismic station (AFI S095) located at Afiamalu. This station is part of the global seismic network operated and monitored by United States Geological Survey (USGS). The data collected by this station together with data from other stations throughout the globe is automatically analyzed to determine whether a

tsunami has been generated. The maintenance of the station is the responsibility of the Geo-Physics Section of the Meteorology Division.

In the event of a felt earthquake (provided that Pacific Tsunami Warning Centre (PTWC) did not issue any information bulletin), a dial-up modem is used to access and download the data directly from the Afiamalu Station for analysis by the Geo-physics Section to determine the parameters of the earthquake.

#### 4.2.1.2 Tide Gauge

There is only one tide gauge located at Matautu Wharf. This gauge is part of the Climate Change Monitoring Project funded by AusAid. The data from this gauge goes directly to the Australian Bureau of Meteorology who in turn provides near real time data to the Meteorology Division.

#### 4.2.2 Source of Tsunami Warnings/Watch Information

The Pacific Tsunami Warning Center (PTWC) in Hawaii provides tsunami information bulletins that contain the information used by the Meteorology Division to determine whether a watch or warning is issued. Hence the official source of tsunami warnings and or watches in Samoa is the Meteorology Division of the Ministry of Natural Resources and Environment. The Meteorology Division receives the Tsunami Information Bulletins through the Emergency Management Warning Information Network, facsimile and email. The Disaster Management Office of the Division receives the same bulleting through mobile telephone as an SMS text message.

For tsunamis generated within the region as well as Samoa's waters, there is very little time to send any warning. The only warning available for locally generated tsunamis is the act of nature. Once an earthquake is felt and it causes major damage to the surrounding environment or see the ocean recede, people must move to higher grounds or safe places without waiting for an official warning.

#### 4.2.3 How the response agencies, media and the public are alerted

Once the information is received from the PTWC the Weather Officer on Duty will immediately follow the Meteorology Division Tsunami Warning Procedures.

**Meteorology Division Internal Standard Operating Procedures for the Tsunami Early Warning System:**

**Step 1:** Receive Tsunami Information Bulletin from PTWC

**Step 2:** Weather Officer on Duty immediately contact: Digicel and SamoaTel

**Step 3:** Calculate local parameters and prepare local tsunami bulletin

**Step 4:** Issue local tsunami bulletin to TV and radio stations

(Repeat Step 1 – 2 and 4 when more tsunami information bulletins are received)

Upon receiving the call from the Meteorology Division, Digicel and SamoaTel send the text messages to the pre-selected representatives in the villages which includes village mayors, church ministers, school principals, hotel/motels/beach resorts representatives as well as the key personnel of the member agencies of the Disaster Advisory Committee and all the members of the National Disaster Council. The following are the standard operating procedures to be followed by everyone for the different level of alerts.

**National Standard Operating Procedures for the Tsunami Early Warning System**

**Step 1: Tsunami Advisory**

- This tsunami advisory is send to the members of the Disaster Advisory Committee ONLY for their information.

**Step 2: Tsunami Watch**

- Be prepared and stay away from rivers, bridges and the sea
- Inform everyone of where to go and how to get there

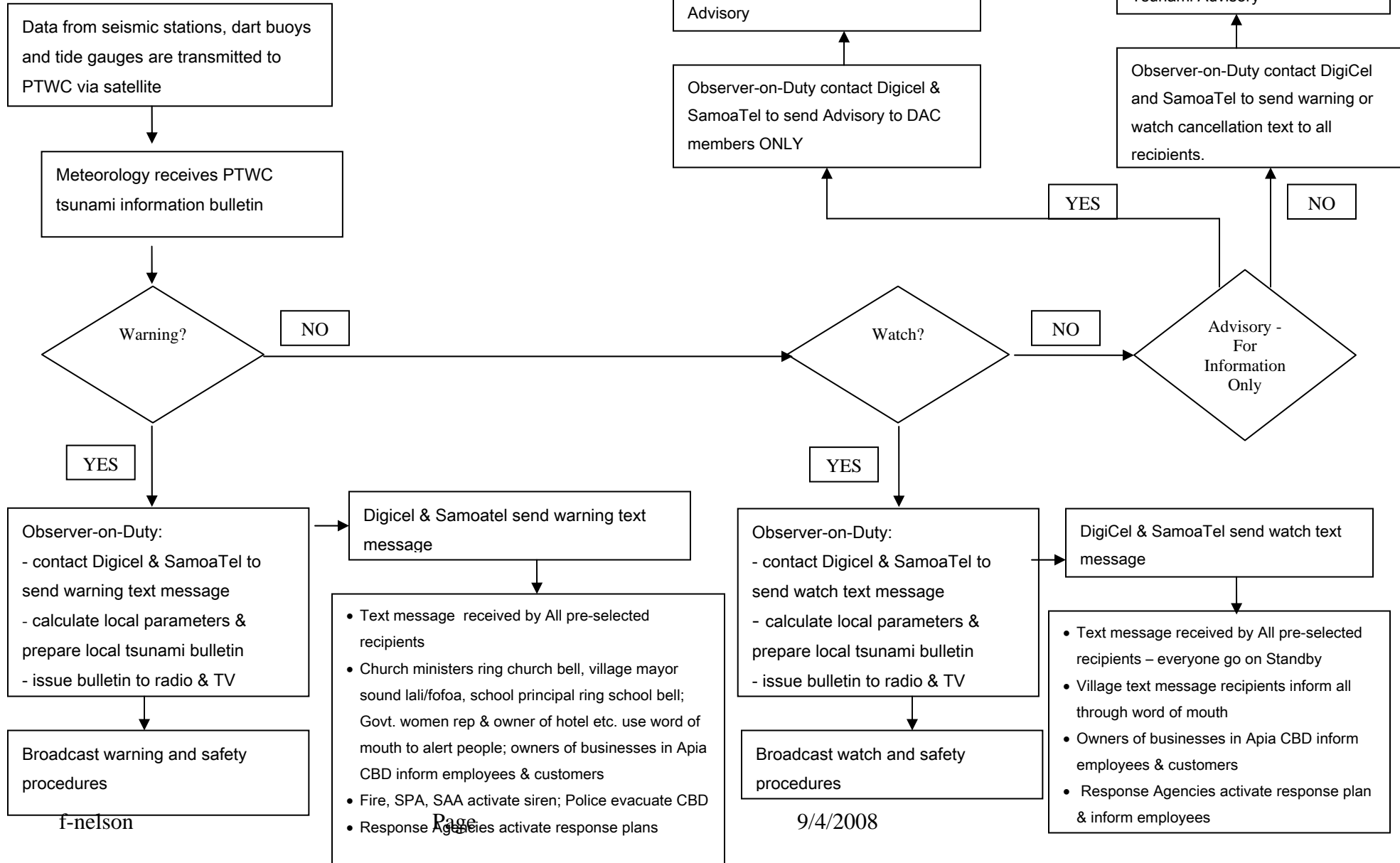
**Step 3: Tsunami Warning**

- Upon hearing the church/school bells in villages and sirens in the urban area, evacuate immediately to designated evacuation sites, use only designated vehicles, run or walk.

#### **Step 4: Tsunami Warning Cancellation**

- Designated people (text message recipients) in the villages and urban areas will inform you that the warning has been cancelled; return home or place of work upon hearing this information. **(Note: for those in the Apia and Salelologa urban areas as well as those within the vicinity of the Faleolo International Airport, the warning cancellation signal is the deactivation of the sirens).**

Figure 1: Flow Chart – SOP - National Tsunami Early Warning System





**Text messages and Levels of the Alert System:**

- **Level 1 (highest level) of Alert System: issue to everyone**
  - a. Warning - “TSUNAMI WARNING IS IN EFFECT” (English) and “SUNAMI: FAAMALOSIA” (Samoan)
- **Level 2 (second highest level) of Alert System: issue to everyone**
  - a. Watch – “TSUNAMI WATCH IS IN EFFECT” (English) and “SUNAMI: NOFO SAUNIUNI” (Samoan)
- **Level 3 of Alert System: issue to members of the Disaster Advisory Committee**
  - a. Advisory – “This Tsunami Advisory is for INFORMATION ONLY” (English) and “SUNAMI: UA NA O SE FAUTUAGA MO LE SILAFIA”
- **Cancellations: issue to everyone**
  - a. Cancellation of Tsunami Warning – “TSUNAMI WARNING IS NOW CANCELLED” (English) and “SUNAMI: FAALEAOGAINA”
  - b. Cancellation of Tsunami Watch – “The Tsunami Watch is now Cancelled” (English) and “SUNAMI: FAALEAOGAINA LE NOFO SAUNIUNI”

### **4.3 Training**

The DMO in collaboration with the DAC will organize and conduct trainings on the following areas:

- Nature of tsunamis
- Safety procedures
- First aid skills

### **4.4 Simulations**

The DMO in collaboration with DAC will organize and conduct tsunami simulations at least once a year. The simulations should aim at testing the following:

- standard operational procedures
- community and emergency response agencies alert system
- communication
- coordination of response agencies

## **5. RESPONSE ARRANGEMENTS**

### **5.1 Responsibilities**

Responsibilities listed in Table 1 are specific to response operations during a tsunami event. Response Agencies are to refer to Table 6 of the NDMP 2006 and their Agency Response Plans for their other responsibilities.

*Table 1: Functions required during a tsunami event.*

Ref	Function	Lead Agency	Role	Support Agency	Role
1.	Receiving tsunami information bulletins	Meteorology Division (Weather/Geophysics)	Receive tsunami information bulletin from PTWC	PTWC	Provide tsunami information bulletins
2.	Calculation of local parameters and verification	Meteorology Division (Geophysics/ Weather)	<ul style="list-style-type: none"> <li>• Calculate local parameters</li> <li>• Determine possible impacts</li> <li>• Verify the information received</li> </ul>	PTWC USGS JMA Aust. BoM,	Provide advice
3.	Issuance of tsunami warning/watch/advisory/cancellation	Meteorology Division (Geo-physics/Weather)	<ul style="list-style-type: none"> <li>▪ Contact Digicel &amp; SamoaTel</li> <li>▪ Prepare and issue local tsunami bulletin to Media (radio/TV)</li> </ul>	SBC, Radio Polynesia, TV3, Laufou, Showers of Blessings, Aigafesilafai	Broadcast the tsunami warning or watch information
4.	Alert Response Agencies and public	SamoaTel & Digicel	<ul style="list-style-type: none"> <li>▪ Send text messages to DAC, NDC &amp; village representatives</li> </ul>	<ul style="list-style-type: none"> <li>▪ Church Minister</li> <li>▪ School representat</li> </ul>	<ul style="list-style-type: none"> <li>- ring church bell fast &amp; continuous</li> <li>- ring school bell fast &amp; continuous</li> </ul>

				<div>ive</div> <ul style="list-style-type: none"> <li>Government Women Representative</li> <li>Hotel/motel /beach resorts</li> <li>Fire &amp; Emergency Services,</li> <li>Samoa Ports Authority</li> <li>Samoa Airport Authority</li> <li>All response agencies</li> </ul>	<ul style="list-style-type: none"> <li>- use word of mouth to alert families &amp; neighbors</li> <li>- use word of mouth to inform staff &amp; tourists</li> <li>- activate siren to run continuously</li> <li>- activate siren continuously</li> <li>- activate siren to run continuously</li> <li>- Carry out response functions in table 6 of the NDMP and RAPs</li> </ul>
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## **5.2 Evacuation and Sheltering**

All residents of coastal villages in Samoa must know how to access inland roads/routes (auala galue/auala alo) within their own villages. As soon as everyone hear the warning signals or a tsunami warning through the radio, television or from someone else, all must immediately evacuate with caution to pre-selected evacuation sites.

It is the responsibility of the village mayor(s) to ensure a shelter/rally point is pre-identified and that residents know the location of and route to this shelter/point. Sui o le Malo, Religious Leaders and Alii ma Faipule must assist the village mayor in these efforts.

All evacuees must not return to their homes unless an "All Clear" notice is given and that preliminary assessment of the village indicates that it is safe to return. If the emergency period exceeds more than eight hours then food and water should be provided to the evacuees. The provision of food and water is the responsibility of the residents.

The coordination of evacuation and sheltering in each village is the responsibility of the village mayor(s), with the assistance of the Sui o le Malo, Religious Leaders and Alii ma Faipule.

The coordination of the evacuation in the Apia urban area in particular the Central Business District is the responsibility of the Ministry of Police and Prison. If a tsunami occurs during daytime when offices and shops are open, the Ministry of Police should ensure that the movement of people from town to inland or higher ground is carried out as safely as possible. It is recommended that the Ministry include the movement of people from Apia urban area in their response plan. It is also recommended that the management of the Central Bank of Samoa Building, FMFMII Building, ACB Building, NPF Building and DBS Building have response plans in place to ensure the safe evacuation of users or occupiers of these buildings.

Everyone who live and work in Apia and Salelologa urban areas must evacuate to evacuation sites tabulated in Table 2 and visually shown in Figure 2 and 3.

*Table 2: Zones, Evacuation routes and Evacuation Sites*

Zones	Areas included	Evacuation Routes	Evacuation Sites
Zone 1: SPG	<ul style="list-style-type: none"> <li>• <b>Boarder mark</b> – from Pesega street lights to Vaitele</li> <li>• <b>Areas included</b> - Pesega, Lepea, Vailoa, Vaitoloa, Vaiusu, Vaigaga and Vaitele</li> </ul>	All roads going inland within this zone	SPG grounds, Tuanaimato
Zone 2: St. Joseph	<ul style="list-style-type: none"> <li>• <b>Boarder mark</b>– from Pesega Street Lights to Vaimoso uta road</li> <li>• <b>Areas included</b> – Vaimoso and part of Fugalei (from round about at Vaimoso to the road in between</li> </ul>	All roads going inland within this zone	St. Josephs College, Alafua

		Tatiana Motel and SMI		
Zone 3: Channel College	<ul style="list-style-type: none"> <li>• <b>Boarder mark:</b> from Vaimoso uta road to 3 corners or roundabout at Taufusi including areas west of townclock</li> <li>• <b>Areas included</b> – part of Fugalei (from SMI), Taufusi, Saleufi, Mulinuu, Sogi, Savalalo up to the townclock and Vaimea</li> </ul>	All roads going inland within this zone		Channel College
Zone 4: Mt. Vaea	<ul style="list-style-type: none"> <li>• <b>Boarder mark:</b> from roundabout at Taufusi and to Lalovaea bridge</li> <li>• <b>Areas included</b> – Matafele,</li> </ul>	All roads going inland within this zone		Government Prayer House and Catholic Church compound, Palisi

		Mulivai, Togafuafua, and part of Lalovaea (i.e. west of the bridge)		
Zone 5: Malifa	<ul style="list-style-type: none"> <li>• <b>Boarder mark:</b> from Mulivai Bridge to Vaisigano Bridge</li> <li>• <b>Areas included</b> – east of Mulivai Bridge, Tamaligi, Vaisigano, Aai o Niue, Maluafou, part of Togafuafua, Tufuiopa and Lalovaea</li> </ul>	All roads going inland within this zone	Apia Primary School and Leififi College, Malifa	
Zone 6: Magiagi	<ul style="list-style-type: none"> <li>• <b>Boarder mark –</b> from Vaisigano Bridge to 4 corners at Matautu</li> <li>• <b>Areas included</b> – Matautu,</li> </ul>	All roads going inland within this zone	Maagiagi burial grounds and National University of Samoa at Toomatagi	



		Vaiala, Vaipuna, Levili, Leone, Vini, Faatoia, Maagao, and Lelata		
Zone 7: Vaivase		<ul style="list-style-type: none"> <li>• <b>Boarder mark</b> – from 4 corners at Matautu to 3 corners at Moata'a</li> <li>• <b>Areas included</b> – Apia Park, Moata'a and Vaivase</li> </ul>	All roads going inland within this zone	Samoa College at Vaivase and National University of Samoa at Toomatagi

## 6. RECOVERY ARRANGEMENTS

After any tsunami event, the recovery provisions of the NDMP and the National Recovery Plan immediately applies.

## **Appendix 1: ACRONYMS**

- DMO            Disaster Management Office
- MWCSD       Ministry of Women, Community and Social Development
- PTWC        Pacific Tsunami Warning Centre
- USGS        US Geological Survey

## **Appendix 2: Tsunami Safety Procedures and Rules**

### **Safety Rules:**

1.     All earthquakes do not cause tsunamis, but many do. When you hear that an earthquake has occurred or feels an earthquake, prepare for emergency evacuation.

2. An earthquake in your area is one of nature's tsunami warning signals. Do not stay in low-lying coastal areas after a strong earthquake has been felt.
3. Tsunamis are sometimes preceded by a noticeable fall in sea level as the ocean recedes. A roar like an oncoming train may sometimes be heard as the tsunami wave rushes toward the shore. These are also nature's tsunami warning signals.
4. A tsunami is not a single wave, but a series of waves. Stay out of danger areas until an "all-clear" is issued by competent authority.
5. A small tsunami at one point on the shore can be extremely large a few kilometers away. Don't let the modest size of one make you lose respect for all.
6. All warnings to the public must be taken very seriously, even if some are for non-destructive events. The tsunami of May, 1960 killed 61 people in Hilo, Hawaii because some thought it was just another false alarm.
7. All tsunamis like hurricanes are potentially dangerous, even though they may not damage every coastline they strike.
8. Never go down to the shore to watch for a tsunami. When you can see the wave you are too close to escape it. Never try to surf a tsunami; most tsunamis are like flash flood full of debris and they do not curl or break like surfing waves.
9. Sooner or later, tsunamis visit every coastline in the Pacific and other oceans. If you live in any coastal area, be prepared and know nature's tsunami warning signs.
10. During a tsunami emergency, the Disaster Management Office, Ministry of Police, and other emergency organizations will try to save your life. Give them your fullest cooperation.

### **Safety Procedures:**

#### **What you should do:**

- If you are in school and you hear there is a tsunami warning, you should follow the advice teachers and other school personnel.
- If you are at home and you hear there is a tsunami warning, make sure your family is aware of it. Your family should evacuate immediately if you are living in

flooding zones or near the coastal areas to higher grounds or top floor of a tall or multi-storey concrete building. Follow the advice given by the authorities to ensure your safety.

- If you are at a beach or near the ocean and you feel the earth shake or seeing a sign of water loss in the sea, move immediately to higher grounds even if you haven't heard a tsunami warning. Stay away from river banks and streams
- Tsunami in a distance location may take sometime before it hits a specific area as it moves towards it. A local tsunami can generate in less than a minute or so and it is vital to move as fast as you can to higher grounds.
- Most of tall buildings and concrete complexes are located in waterfront for better view. The upper floors can provide a safer place for refugee if you are slower to move inland that quick. This procedure is not recommended for small and wooden buildings that sometimes would not withstand the mighty of the tsunami impact.
- If you are in a boat, move to open and deep (depth of 400m is recommended) ocean or rivers. In a local tsunami, make sure to live your boat behind and head for higher grounds. Contact ports authorities to verify the condition before navigation and berthing.

**Threat:** Series of destructive ocean waves can affect all shorelines. May occur with limited or no warning.

**Know the Terms:** If a “**watch**” has been issued, tsunamis are possible; be ready. If a “**warning**” is issued, leave coastal areas immediately. If you live in low lying coastal area, you are at risk.

**Take the precautions:**

- Find out if your home is in the tsunami inundation zone.
- Know the height of your properties above sea level and the distance from the coast.

- Be familiar with tsunami warning signs (a sizable earthquake would trigger a tsunami).
- Tsunamis are NOT surfing waves!!!! Do not attempt to surf or ride a tsunami.
- Know your routes of escape to higher grounds or top floor of a tall or multi-storey concrete building.
- Pick a meeting location that is inland and elevated.
- Have an emergency survival kit ready.
- Have a battery operated radio on hand.

**Action Plan:**

- Listen to radio/TV for the latest emergency information.
- IF you hear an official tsunami warning or detect signs of a tsunami, evacuate at once.
- Watch for a rapid and noticeable rise or fall in coastal waters as a sign of an approaching tsunami.
- Go to higher grounds or move to the top floor of tall or multi-storey concrete building.
- Do not assume that one wave means that the danger is over. The next wave may be larger than the first. Avoid returning unless a warning is good to clear.
- Return to place/home only after authorities advise it is safe to do so.