Towards an Integrated Tsunami Warning System for Port Vila and Luganville, Vanuatu

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Ministry of Climate Change, Meteorology, Geo-hazards, Energy, Environment and Disaster Management
Republic of Vanuatu

Tsunami Early Warning

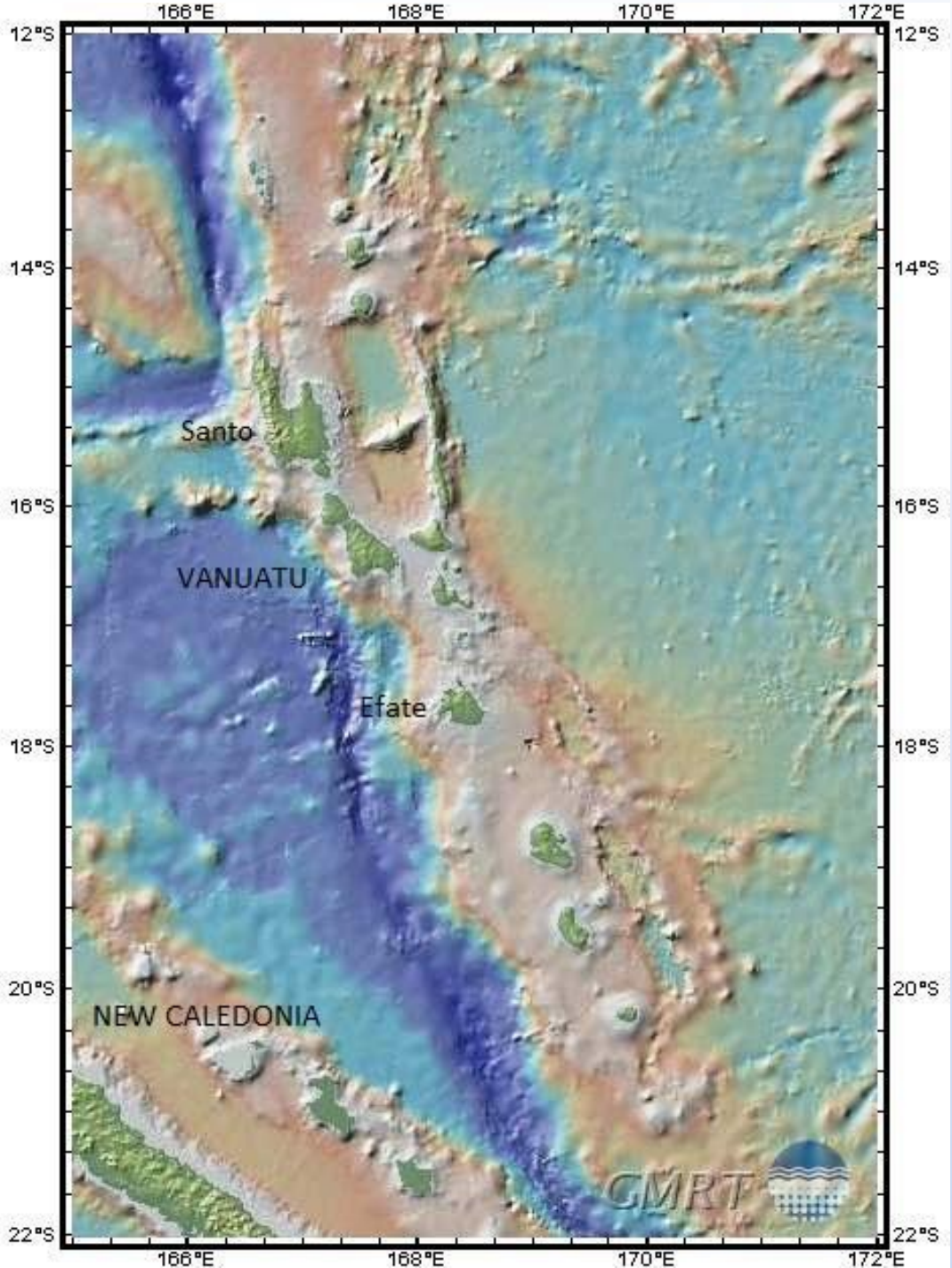
- The Vanuatu Meteorology and Geo-hazards Department (VMGD) issued an Tsunami information, advisory or warning after significant earthquake (local, regional, trans-oceanic) [Based on a Tsunami Directive]
- CISN, USGS, IRIS, PTWC Messages, Tide tool, IOC Sea Level Facility, DARTS
- ORSNET; Seiscomp 3, earthquake detection time 2-4 minutes

Vanuatu Mainstreaming Disaster Risk Reduction (MDRR) Project 2013 – 2016

Project Sites: Port Vila & Greater Port Vila (South Efate) and Luganville & Greater Luganville (South Santo) i.e. pilot sites

Implemented by the Vanuatu Meteorology and Geo-hazards Department
and
National Disaster Management Office

- 3 Components:
  - *Component 1: Risk Mapping to Support Urban Preparedness and Planning (Becca, GNS & NIWA:Tsunami Risk/Hazard Maps for Port Vila and Luganville)*
  - *Component 2: Establish a tsunami warning system for Port Vila and Luganville*
  - *Component 3: Strengthen the National Advisory Board on Climate Change and Disaster Risk Reduction*

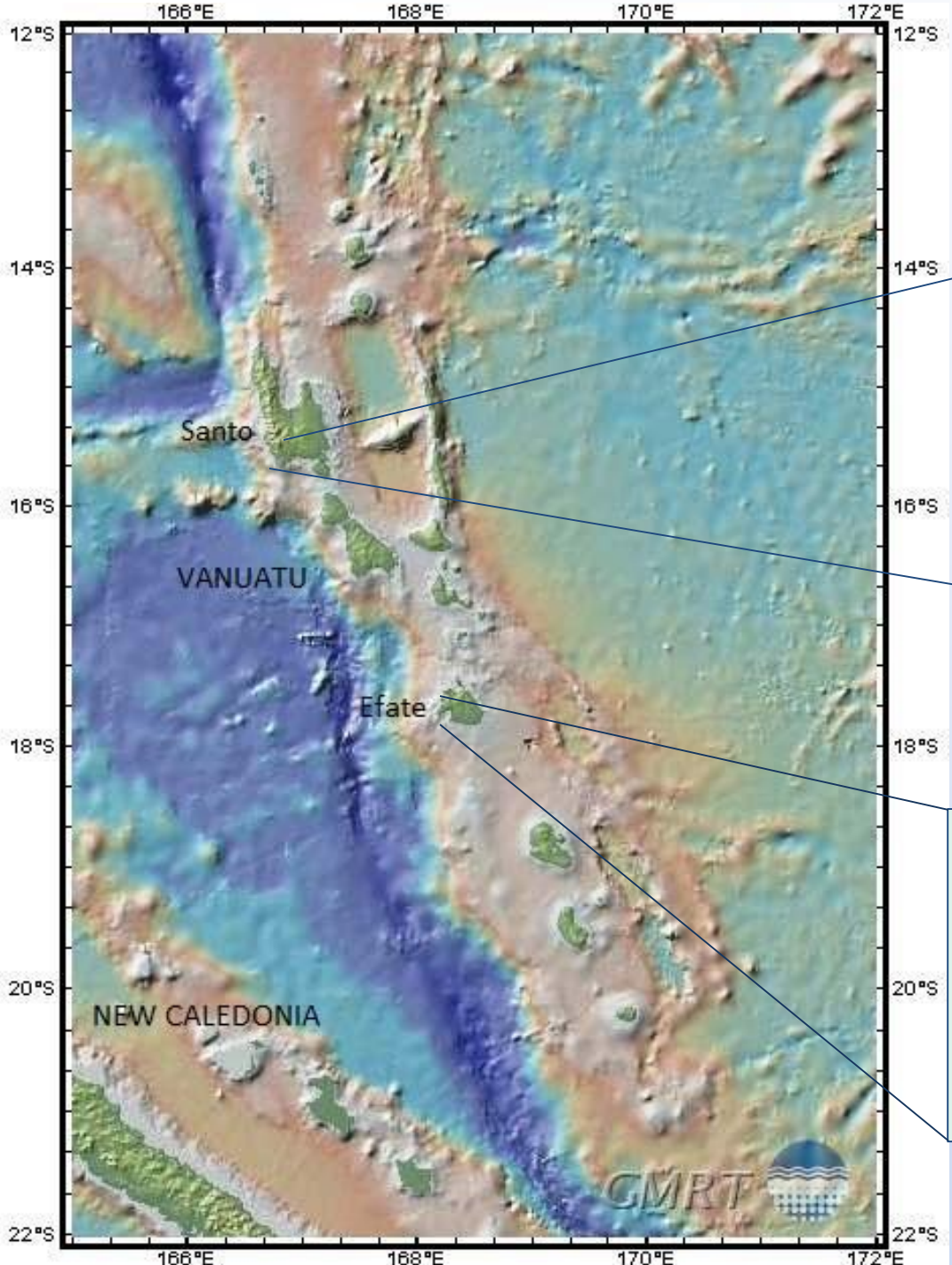


Vanuatu Archipelago

- MDRR project sites
  - *South Santo*
  - *South Efate*

Component 2: Establish a tsunami warning system for Port Vila and Luganville

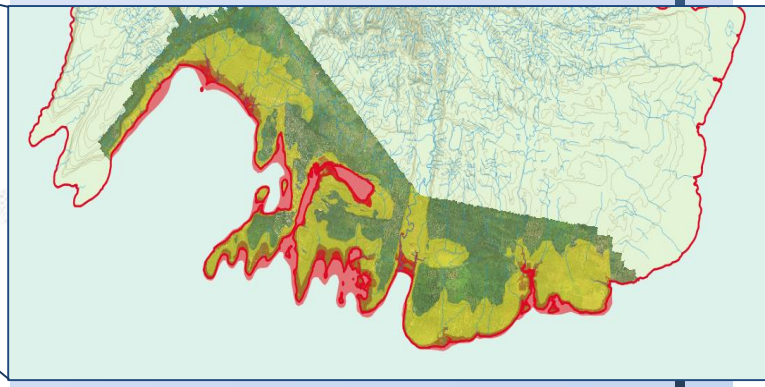
- ❑Tsunami Evacuation Maps
- ❑Tsunami Evacuation Signs
- ❑Tsunami Information Boards
- ❑Tsunami Walk
- ❑Tsunami Sirens
- ❑Tsunami Response Plan
- ❑Tsunami Directive Review
- ❑Tsunami Drill/Simulation
- ❑Tsunami Siren Messaging
- ❑Regulations/Bye Laws



- Tsunami Evacuation Maps
  - 67 Maps

South Santo Tsunami Evacuation Zones

South Efate Tsunami Evacuation Zones



Evacuation Map Sample

Sunami Evakuesen Plan
Tsunami Evacuation Plan
Plan d'évacuation Tsunami
Port Vila

Woning - Warning - Alerte

Long taem blong wan strong o longfala etkwek, muv aot hariap long ol evakuesen zone. No wet long wan samting. Tekem moa long wan minit o tekem taem blong muv, bae hemi no tufala step ia.

In a long or strong earthquake if you are in an evacuation zone, immediately go to a safe location. Longer than a minute OR hard to stand up, it doesn't have to be both.

Au moment de grands tremblements de terre ou de tremblements de terre de plus d'une minute, évacuez les zones immédiatement. N'attendez pas ! Les deux types de tremblement ne peuvent pas se produire en même temps : SOIT celui où il est difficile de se tenir debout SOIT celui de plus d'une minute.

Wokbaot o ron long baesikel long ol rod blong evri evakuesen zone
If you are in an evacuation zone, walk or ride bicycles quickly following routes to a safe location. Don't use cars.
Circulez à pied ou à vélo suivant les voies tracées pour sortir de toutes les zones

I posibol se fes wev i no bigfala wev iet. I save tekem plante haoa bifo bigfala wev i kam.
The first wave may not be the largest. It may take many hours for the largest wave to arrive
La première vague peut ne pas être la plus grande. La vague la plus grande peut prendre plusieurs heures pour arriver.

No mas entarem ol evakuesen zone kasem taem we NDMO i talem se hemi oraet
Stay in safe places until all clear from NDMO
Restez hors des zones d'évacuation jusqu'à ce que le BNGC lève l'alerte

Kamaot long ol zone we oli talemaot long ol ofisol woning
Evacuate from the zones stated in the official warning
Quittez les zones faisant l'objet d'alerte officielle

Ples we i sef
Safe location
Endroit sûr pour évacuation

Evacuesen rod
Evacuation route
Voie d'évacuation

Rod
Road
Voie

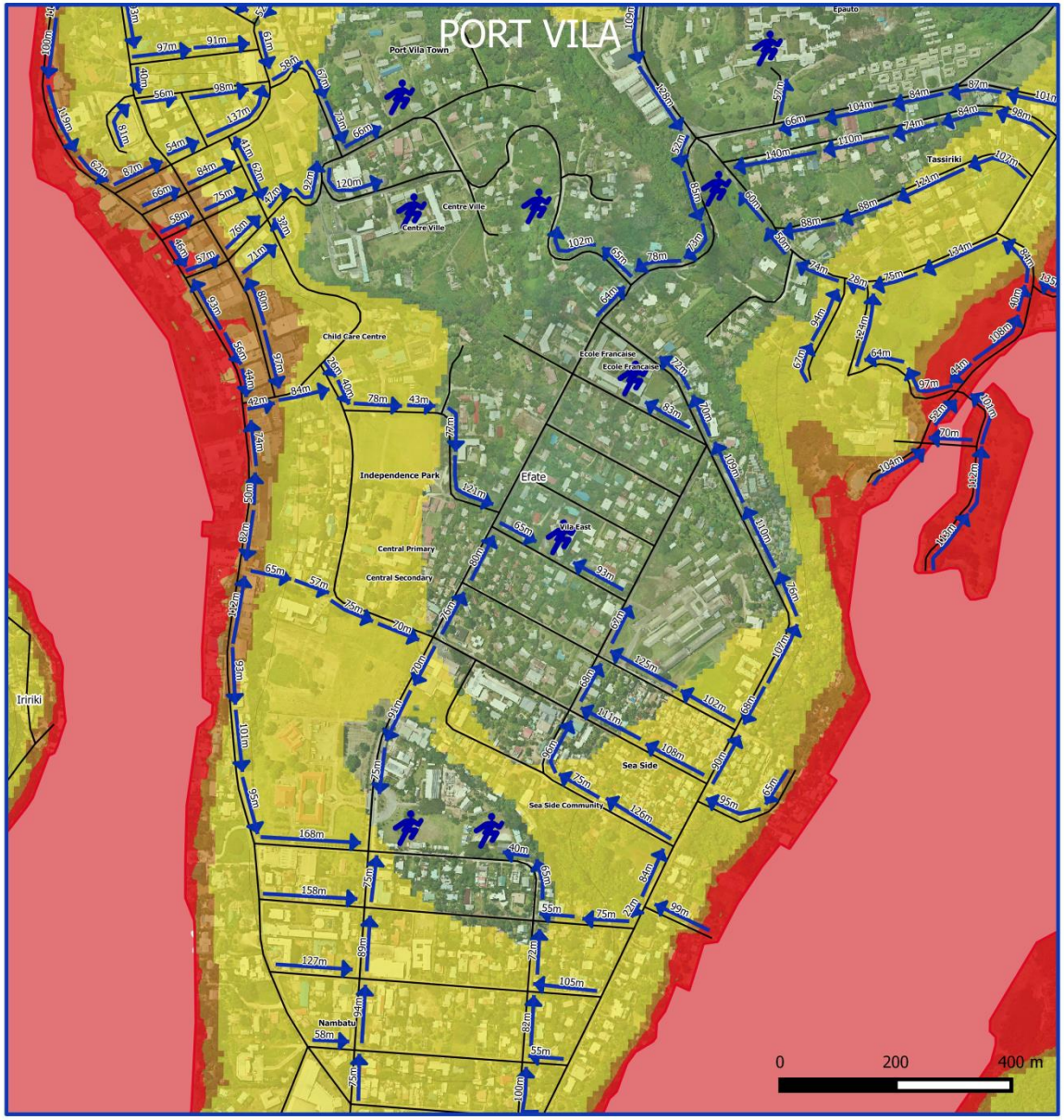
Denja Red Zone
Shore Exclusion Zone Red
Zone d'exclusion près des côtes rouge

Evakuesen Orenj Zone
Muv aot long zone ia wetem Denja Zone taem we i kat ofisol woning
Evacuation Zone Orange
Evacuate along with Red Zone when officially directed
Zone d'évacuation orange
Veuillez évacuer avec la zone rouge sur recommandation officielle

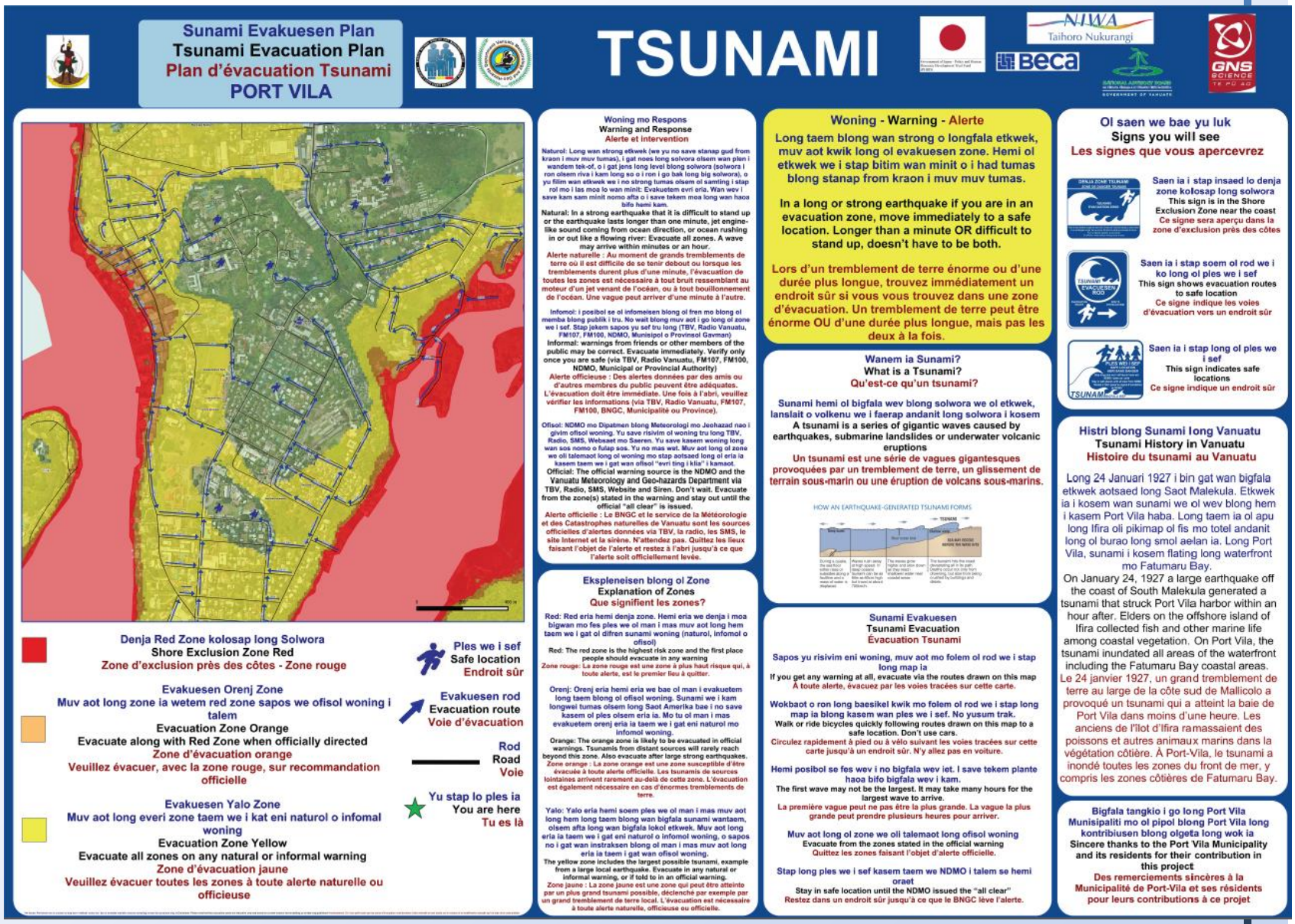
Evakuesen Yalo Zone
Mas muv aot long evri ples long zone ia taem we i gat eni naturol o infomol woning
Evacuation Zone Yellow
Evacuate all zones on any natural or informal warning
Zone d'évacuation jaune
Veuillez évacuer toutes les zones à toute alerte naturelle ou officieuse

Government of Japan - Policy and Human Resource Development Fund (PHRD)
GNS SCIENCE TE PŪ AO
Beca
NIWA Taihoro Nukurangi
NATIONAL ADVISORY BOARD on Climate Change and Disaster Risk Reduction

Tok Saveh: Plis tekem not se ol zones lo map hem i indikativ nomo mo i bes lo available saentific nolej mo modeling lo taem blo producim map ia Disclaimer: Please note that the evacuation zones are indicative only and based on current science and modelling as at date map published Alerte: S'il vous plait noter que les zones d'évacuation sont donnés à titre indicatif et sur la base de la science et de la modélisation actuelle comme à la date carte publiée



❑ Tsunami Information Boards



Port Vila ~26 information boards; Greater Port Vila ~48 information boards; Luganville ~25; Greater Luganville ~27 hence combined total of 126 information boards

Examples of Information Boards

Freshwota Park

Pango Surf Club

Katatara, Ifira Point

Eratap School

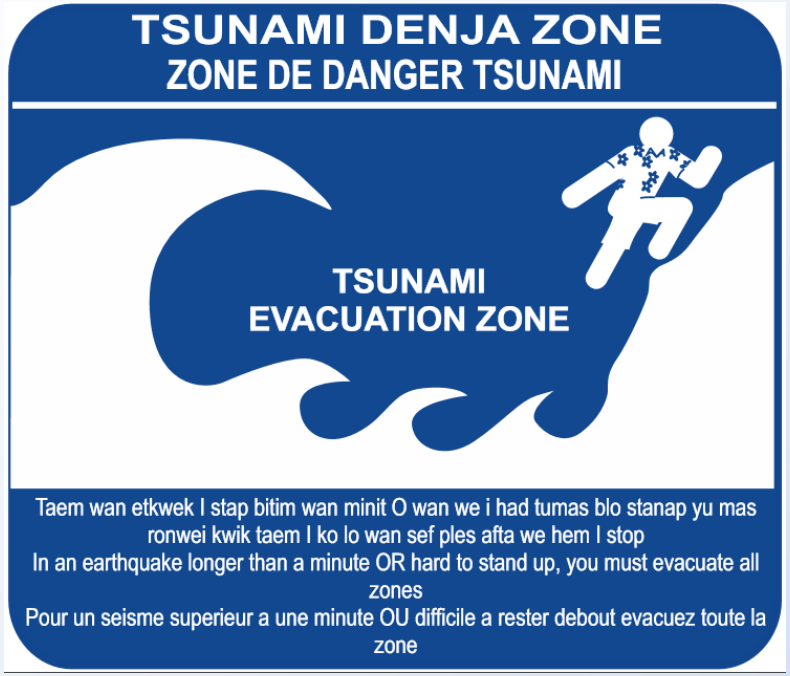
St. Michel, Luganville

❑ Tsunami Evacuation Signs

~300 Signs

DANGER ZONE

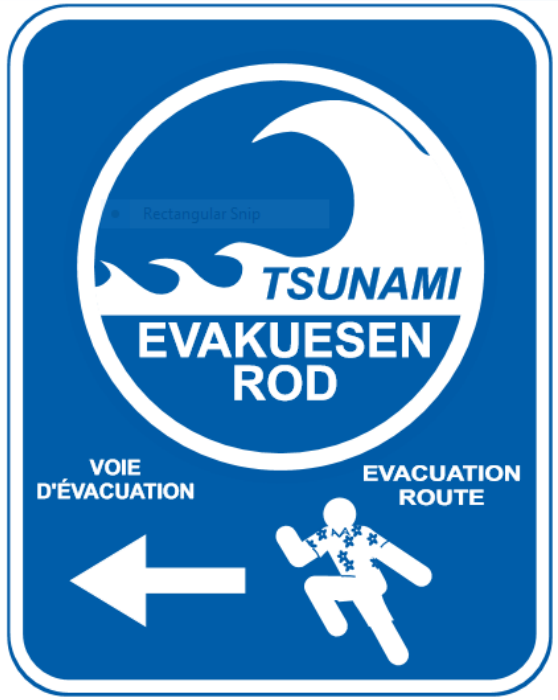
Black sands, South Efate

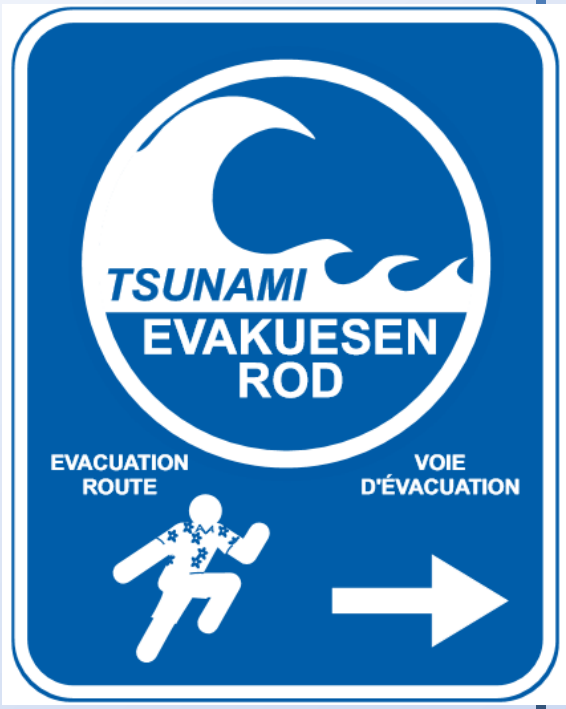


Unity Park, Luganville

❑ Tsunami Evacuation Signs

SAFE ROUTE SIGNS





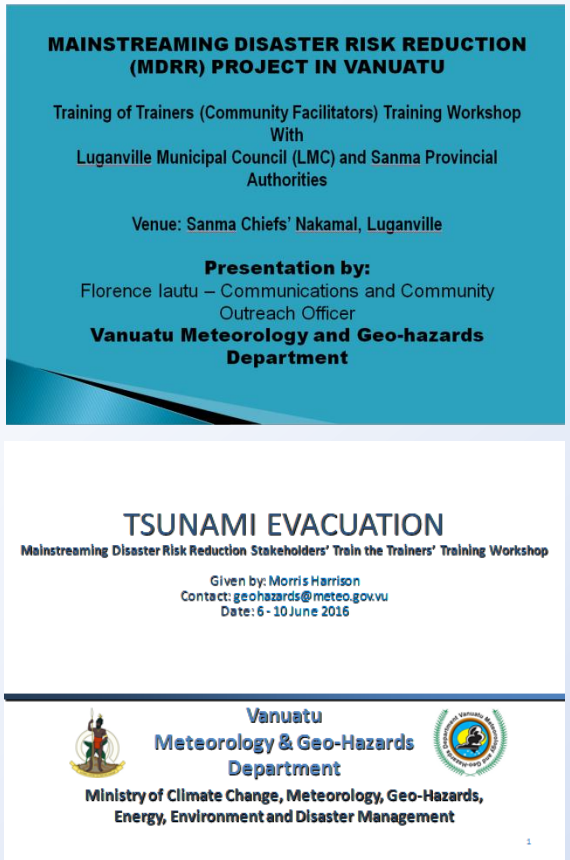
❑ Tsunami Evacuation Signs

SAFE LOCATION

Pekoa airport, Luganville

Tsunami Evacuation Map

- Village/Community consultation process
  - Provincial and Municipality Meetings
  - Facilitator Training
  - Presentation
  - Break-out groups



Example of presentation used during Facilitator Trainings

Example of activity during meeting with provincial and municipality authorities; seen here are Luganville municipality councillors having a go on a draft Luganville evacuation map

Example of presentation used during Community Consultations

- Break-out groups
  - Drawn on proposed evacuation routes using arrows
  - Draw on sign locations for the sign groups
  - Location names that help people read the map
  - Write or correct English, French and Bislama version of evacuation maps, information boards and signs
  - Each group presented their work in front while others listen and asks questions after each presentation (Discussion)
  - After which all used draft materials were collected

Example (left) a break-out group discussing their ward evacuation map,(routes and locations added), and (right) a break-out group explaining a change in the word and language used on the Danger Zone sign during their presentation up front

Standard Operating Procedures

- *Community-Based Tsunami Evacuation Maps and Signs (SOP 11)*
- *Creating Tsunami Evacuation Maps and Information Boards in QGIS (SOP 12)*
- *Guidance from GNS and GIS consultant*

❑ Tsunami Walk

- An educational outreach activity; walking through the main street of Port Vila and Luganville

❑ Tsunami Walk

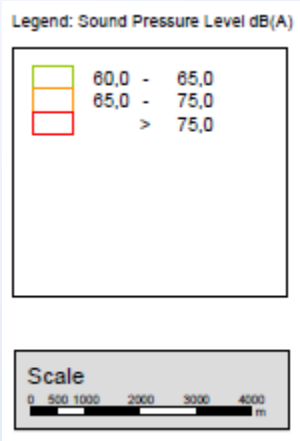
Participants after the “Tsunami Walk” at Unity Park, Luganville

❑ Tsunami Sirens

Port Vila – Greater Port Vila: 9 sirens

❑ Tsunami Sirens

Luganville – Greater Luganville: 10 sirens



Vanuatu Meteorology & Geo-Hazards Department

Protecting Lives and Property

Testing and Commissioning of Tsunami Sirens in Port Vila – Greater Port Vila (South Efate)

Seafront Siren, Port Vila

Mele Siren, Southwest Efate

Vanuatu Meteorology & Geo-Hazards Department

Protecting Lives and Property

Testing and Commissioning of Tsunami Sirens in Port Vila – Greater Port Vila (South Efate)

Mele Siren Cabinet, Southwest Efate

Testing Erakor Siren, South Efate

- Tsunami Response Plan
  - Provincial/Municipality
  - Area Council/Ward
  - Community Disaster and Climate Change Committee

❑Tsunami Directive Review

❑VMGD to review

Current criteria for Tsunami Advisory

Less than 7.0	No action is taken by the NTWC	
7.0 7.1 7.2 7.3	"Tsunami INFORMATION" is issued, if focal depth is **deeper** than 10km.	"Local TSUNAMI ADVISORY" is issued if focal depth **shallower** than 10km.
7.4 more	"Tsunami INFORMATION" is issued, if focal depth is Deeper than 50 km.	"Local TSUNAMI ADVISORY" is issued if focal depth is **shallower** than 50km.

Tsunami Directive Review

Mag	1st Stage
Less than 6.4	Earthquake Information
6.5 - 6.8	Tsunami Information
6.9 and More	Tsunami Advisory

Incorporate the sirens when threat likely for Port Vila and Luganville

Regional & Distant earthquake

PTWC Expected Tsunami Height	Type of Message
More than 3 m	Tsunami Advisory
1 – 3 m	Tsunami Advisory
0.3 – 1 m	Tsunami Information (beach and harbor clear)
No threat	Earthquke Information

- Tide data analysis for tsunami early warning
- Incorporate siren if threat likely for Port Vila and Luganville

- Tsunami Drill/Simulation
  - Testing of Tsunami Response Plans
  - Testing VMGD Tsunami Directive
  - Testing NDMO Tsunami Emergency Plan
  - Testing of Tsunami Sirens
  - Testing of evacuation signs and information boards

- Tsunami Siren Messaging
  - Pre-recorded messages for announcement of “Testing” and “All Clear” situations
  - Especially regular use (e.g. Half year or quarterly) of test announcements increases the awareness of the people and the trust in the tsunami siren system

- Regulations/Bye Laws
  - Protection of tsunami evacuation signs, information board and sirens
  - Smooth evacuation should one is required

Thank you