TSUNAMI READY FOR CRITICAL INFRASTRUCTURES

Suci Dewi Anugrah

Chair of WG 3: Tsunami Ready Implementation

INTRODUCTION

HISTORICAL IMPACTS

EARTHQUAKE AND TSUNAMI – BIAK 1996

Biak Seaport, Papua

Strategic Area, Korem North Biak

EARTHQUAKE AND TSUNAMI – FLORES 1992

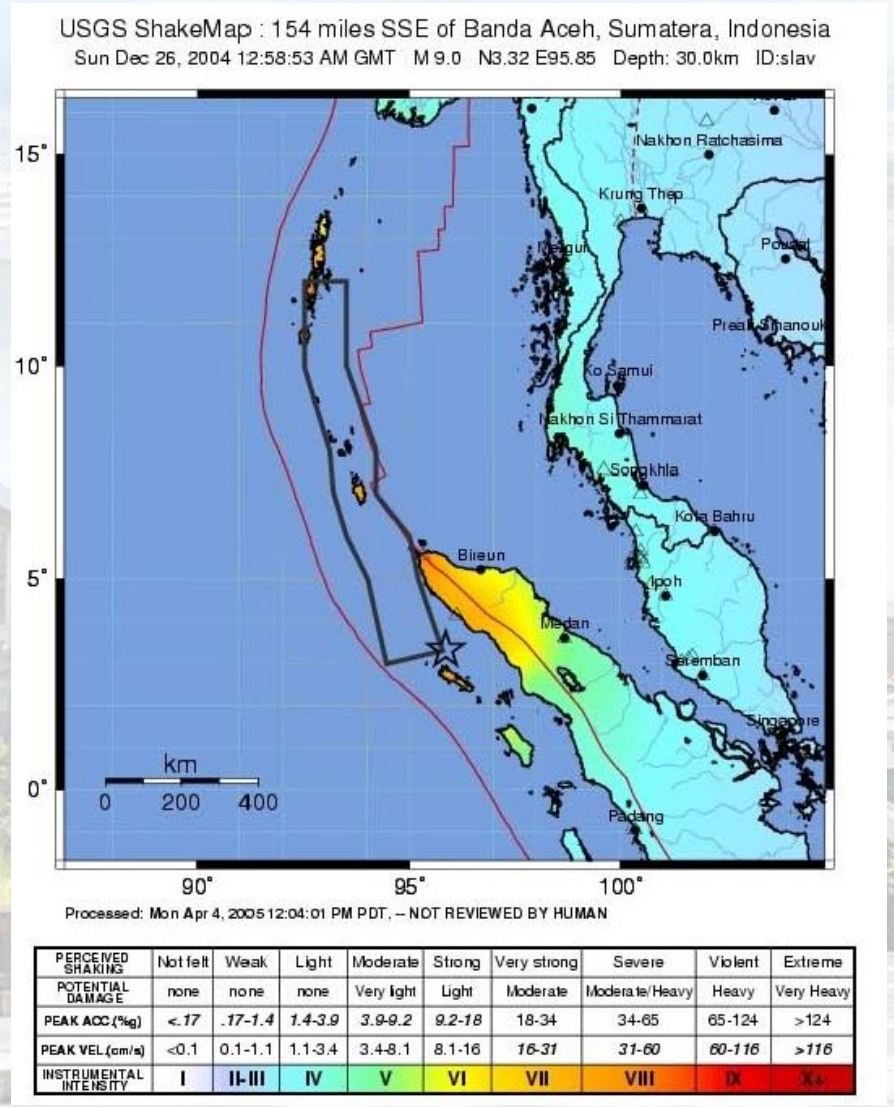
L. Say Seaport, Maumere

L. Say Seaport, Maumere

EARTHQUAKE AND TSUNAMI – ACEH 2004

Damages to critical infrastructures, include:

- 19 Docks / Ports;
- 10 Airports;
- 120 Main Bridges;
- 1500 Bridges;
- 3000 km of Highways



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

EARTHQUAKE AND TSUNAMI – PALU 2018

Wani Seaport, Donggala

INTRODUCTION

UNESCO/IOC TSUNAMI READY RECOGNITION PROGRAMME (TRRP)

BMKG

IMPLEMENTATION

12 TSUNAMI READY INDICATORS

BACK GROUND

- Critical Infrastructure is part of the community
- Critical Infrastructure (ex: Port) is one of the critical facilities for public with a very busy and rapid activities for 24 hours in 7 days operation
- Critical infrastructure has a strategic function in ensuring the availability of logistics transportation in during the emergency period of disaster
- Critical Infrastructure
- The ability to continue business activities of the critical infrastructure will accelerate the rehabilitation process after disaster.

Critical Infrastructure is part of the Tsunami Ready Village

PILOTING TSUNAMI READY FOR CRITICAL

TSUNAM READY INDICATORS FOR CRITICAL INFRASTRUCTURE

- **Same Foundation,** The approach **adopts the 12 UNESCO-IOC Tsunami Ready indicators,** adjusts them based on **the type and function of each critical infrastructure** (e.g., airport, port, industrial zone).
- **Breakdown** Each indicator is **interpreted in context**:
  - **Assessment,**
  - **Preparedness,**
  - **Response**
- **Objectives:**

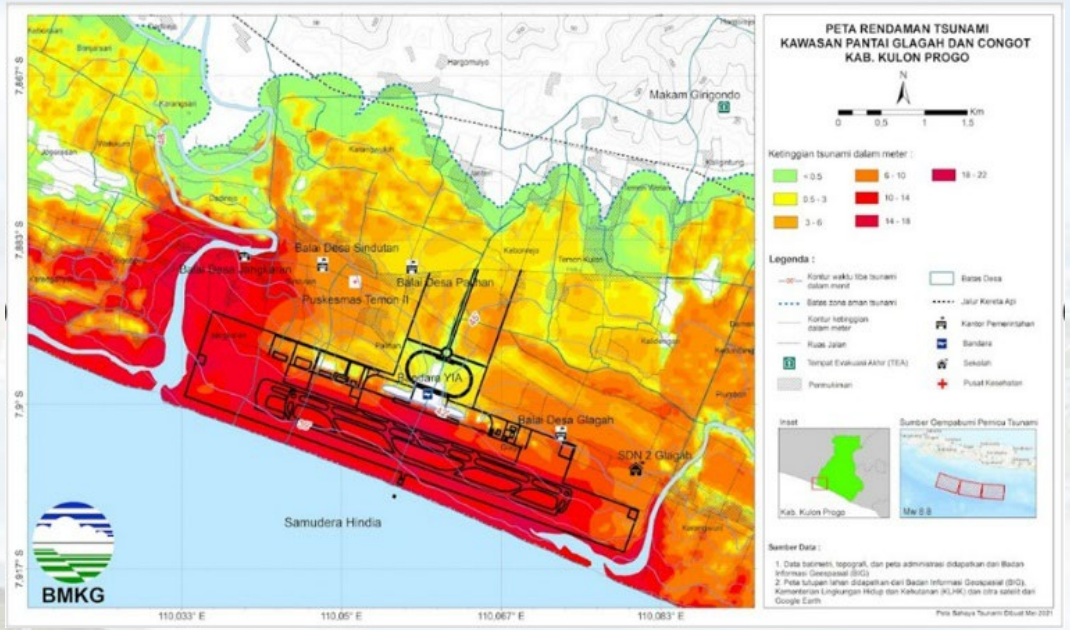
- **Ensuring Human Safety** Strengthen **tsunami preparedness** to protect the safety of **workers, service users, and visitors** at critical infrastructure sites such as airports, ports, hotels, and industrial zones.
- **Anticipating Cascading Hazards** Minimize **secondary disaster risks** that could arise after a tsunami, such as **industrial accidents, chemical spills, and logistics failures**—especially in complex zones like industrial estates.
- **Accelerating Business Continuity** Support **rapid recovery** of operations and public services through well-designed **emergency response plans and tested evacuation systems**, reducing downtime after disaster strikes.
- **Maximizing the Role of Critical Infrastructure to Strengthen Community Preparedness**

	UNESCO IOC TSUNAMI READY INDICATORS
I	**ASSESSMENT (ASSESS)**
1	ASSESS-1. Tsunami hazard zones are mapped and designated.
2	ASSESS-2. The number of people at risk in the tsunami hazard zone is estimated.
3	ASSESS-3. Economic, infrastructural, political, and social resources are identified.
II	**PREPAREDNESS (PREP)**
4	PREP-1. Easily understood tsunami evacuation maps are approved.
5	PREP-2. Tsunami information including signage is publicly displayed.
6	PREP-2. Outreach and public awareness and education resources are available and distributed.
7	PREP-3. Outreach or educational activities are held at least three times a year.
8	PREP-4: A community tsunami exercise is conducted at least every two years.
III	**RESPONSE (RESP)**
9	RESP-1. A community tsunami emergency response plan (TERP) is approved.
10	RESP-2. The capacity to manage emergency response operations during a tsunami is in place.
11	RESP-3. Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place.
12	RESP-4. Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place.

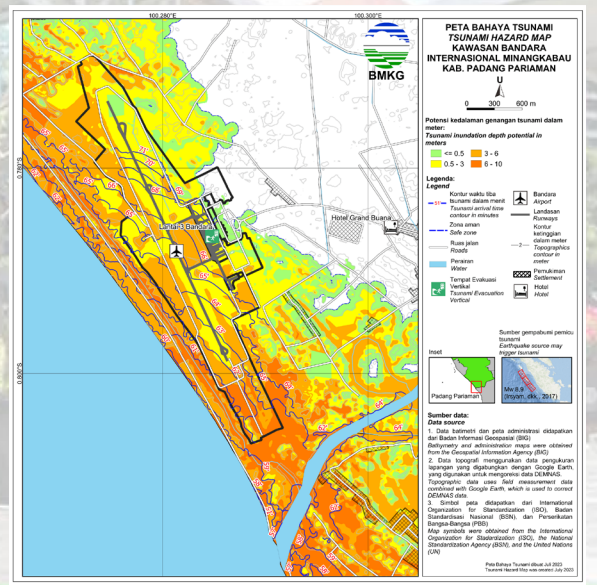
ASSESS-1: Tsunami Hazard Map for the Critical Infrastructure

Critical Infrastructure have to develop tsunami hazard map

- Tsunami hazard zones depict the areas that are prone to tsunami inundation.
- Hazard maps must clearly show which key areas within the infrastructure are exposed to tsunami risk—and the extent of potential impact.
  - Airports: Runway, Terminal buildings, Parking areas
  - Seaports: Docks and berths,Passenger or cargo terminals, Logistics and parking zones
  - Industrial Facilities: Administrative offices, Warehouses and production units, Utility/service zones
- Purpose These maps serve as a foundation for planning evacuation routes, risk communication, and emergency protocols tailored to each location.
- If an airport, port, or hotel doesn't have a tsunami hazard map, they can ask experts to create one.



Tsunami Hazard Map for YIA



Tsunami Hazard Map for Minangkabau

ASSESS-2: Number of people at risk in the tsunami hazard zone is estimated

1. Number of Airport/Port/Hotel Managers Working Day Night:
   a) Airport, port, and hotel staff
   b) Airline and ship personnel
2. Estimated Number of Airport Users (Morning, Afternoc Evening, Night, Weekday, Weekend, Holiday):
   a) Estimated users/tenants of airports/ports/hotels (restaurant owners, café owners, shop owners, trave agents)
   b) Estimated number of passengers
   c) Estimated number of guests

Staff Eksisting

Area kerja	Jumlah Personil (Pegawai Tetap)	Jumlah Personil (Pegawai Kontrak)
Airport Operation Airside	27	49
Airport Rescue & Fire Fighting	35	62
Cargo Service	7	
Airport Operation Landside & Terminal	26	49
Airport Security	247	900
Airport Equipment	56	52
Airport Facilities	11	14
Airport Commercial & Development	28	38

Airpot Personel Data - Ngurah Rai Airport
Source: PT AP II Ngurah Rai

This estimated number of people will form the basis for evacuation plans, specifically for:
- **Evacuation capacity**
- **Evacuation grouping**

ASSESS-3: Economic, infrastructural, political, and social resources are identified

Infrastructure

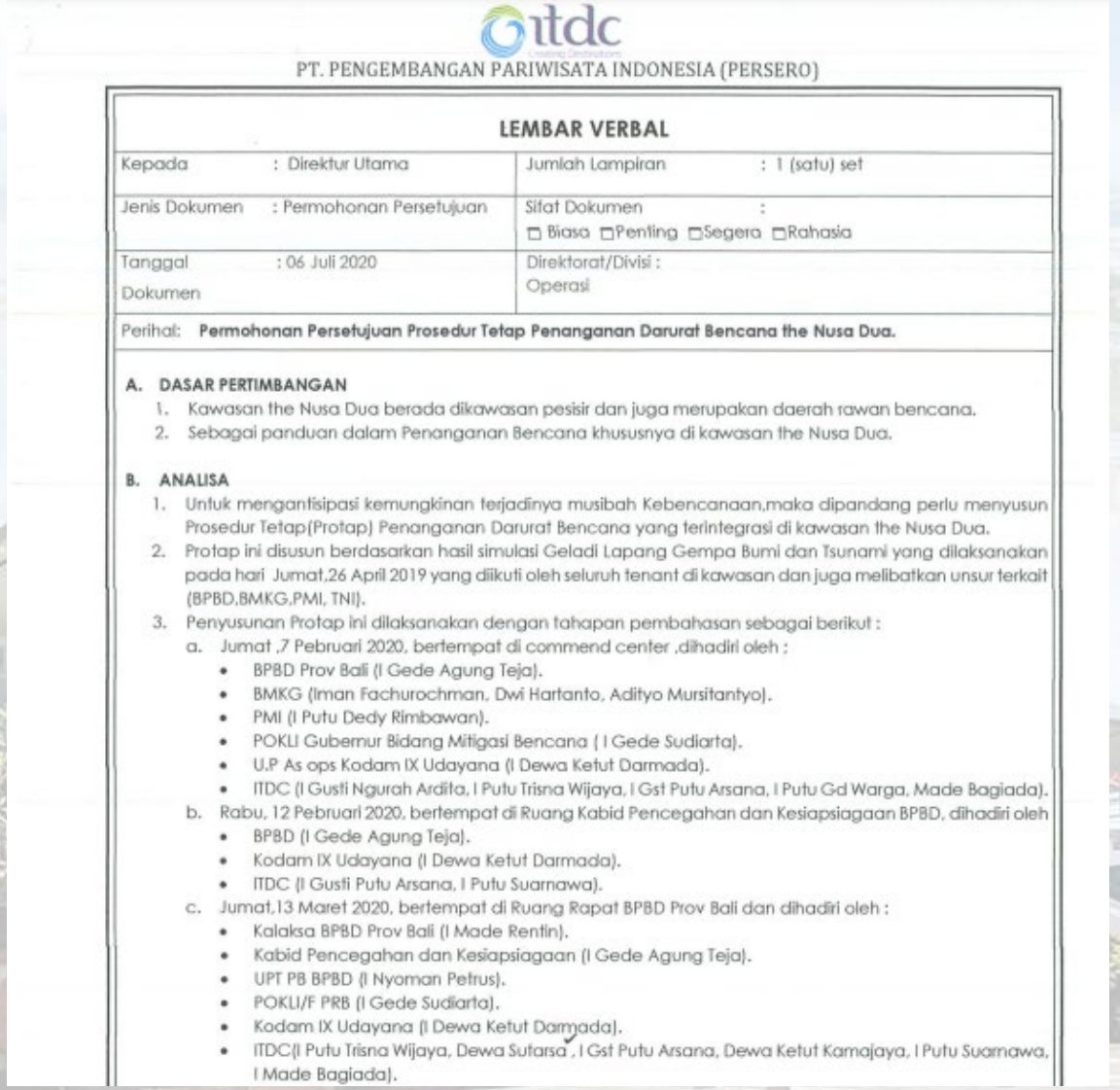
- Earthquake-resistant assessment of airport/port/hotel buildings;
- Number of evacuation routes;
- Number of evacuation shelters (and their capacity);
- Early Warning equipment

Human Resources

- Quick Response Team

Policies

- Earthquake and Tsunami Response;
- SOPs (Standard Operating Procedures);
- Emergency Plan
- MOU (Memorandum of Understanding) related to mitigation efforts



PT. PENGEMBANGAN PARIWISATA INDONESIA (PERSERO)

LEMBAR VERBAL

Kepada : Direktur Utama	Jumlah Lampiran : 1 (satu) set
Jenis Dokumen : Permohonan Persetujuan	Sifat Dokumen : ☐ Biasa ☐Penting ☐Segera ☐Rahasia
Tanggal Dokumen : 06 Juli 2020	Direktorat/Divisi : Operasi

Perihal: **Permohonan Persetujuan Prosedur Tetap Penanganan Darurat Bencana the Nusa Dua.**

A. DASAR PERTIMBANGAN

1. Kawasan the Nusa Dua berada dikawasan pesisir dan juga merupakan daerah rawan bencana.
2. Sebagai panduan dalam Penanganan Bencana khususnya di kawasan the Nusa Dua.

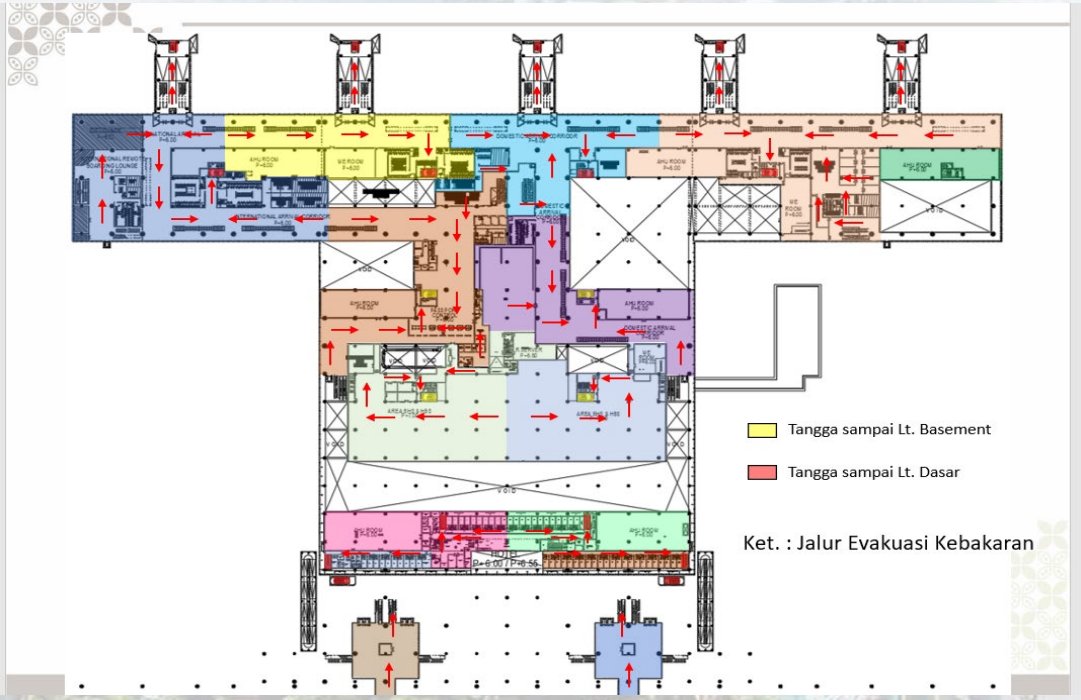
B. ANALISA

1. Untuk mengantisipasi kemungkinan terjadinya musibah Kebencanaan,maka dipandang perlu menyusun Prosedur Tetap(Protap) Penanganan Darurat Bencana yang terintegrasi di kawasan the Nusa Dua.
2. Protap ini disusun berdasarkan hasil simulasi Geladi Lapang Gempa Bumi dan Tsunami yang dilaksanakan pada hari Jumat,26 April 2019 yang diikuti oleh seluruh tenant di kawasan dan juga melibatkan unsur terkait (BPBD,BMKG,PMI, TNI).
3. Penyusunan Protap ini dilaksanakan dengan tahapan pembahasan sebagai berikut :
   a. Jumat ,7 Pebruari 2020, bertempat di commend center ,dihadiri oleh :
      - BPBD Prov Bali (I Gede Agung Teja).
      - BMKG (Iman Fachurochman, Dwi Hartanto, Adityo Mursitantyo).
      - PMI (I Putu Dedy Rimbawan).
      - POKLI Gubernur Bidang Mitigasi Bencana (I Gede Sudiarta).
      - U.P As ops Kodam IX Udayana (I Dewa Ketut Darmada).
      - ITDC (I Gusti Ngurah Ardita, I Putu Trisna Wijaya, I Gst Putu Arsana, I Putu Gd Warga, Made Bagiada).
   b. Rabu, 12 Pebruari 2020, bertempat di Ruang Kabid Pencegahan dan Kesiapsiagaan BPBD, dihadiri oleh
      - BPBD (I Gede Agung Teja).
      - Kodam IX Udayana (I Dewa Ketut Darmada).
      - ITDC (I Gusti Putu Arsana, I Putu Suarnawa).
   c. Jumat,13 Maret 2020, bertempat di Ruang Rapat BPBD Prov Bali dan dihadiri oleh :
      - Kalaksa BPBD Prov Bali (I Made Rentin).
      - Kabid Pencegahan dan Kesiapsiagaan (I Gede Agung Teja).
      - UPT PB BPBD (I Nyoman Petrus).
      - POKLI/F PRB (I Gede Sudiarta).
      - Kodam IX Udayana (I Dewa Ketut Darmada).
      - ITDC(I Putu Trisna Wijaya, Dewa Sutarsa , I Gst Putu Arsana, Dewa Ketut Kamajaya, I Putu Suarnawa, I Made Bagiada).

Disaster Resource Inventory (One-Page Verbal Summary)

PREP-1: Easily understood tsunami evacuation maps are developed

- A tsunami evacuation map needs to illustrate tsunami evacuation routes and designated assembly areas;
- These maps should be placed in easily visible locations within every building and waiting area (prominent place)
- The maps should be created using appropriate print materials and/or digital media;
  - Use intuitive design, **Interactive formats**:
- Tsunami evacuation maps must be understood by everyone—staff, visitors, service users, and all stakeholders within critical infrastructure.
- Ensure the evacuation map includes a **"You are here"** indicator.



PREP-2: Tsunami information including signage is publicly displayed

Earthquake/tsunami information boards can include:

- Evacuation signs
- Assembly point signs
- Information boards containing earthquake and tsunami response education
- Earthquake and tsunami evacuation maps

These information boards must be:

- Easy to understand and bilingual (Indonesian and English)
- Installed in easily visible locations within every building and waiting area

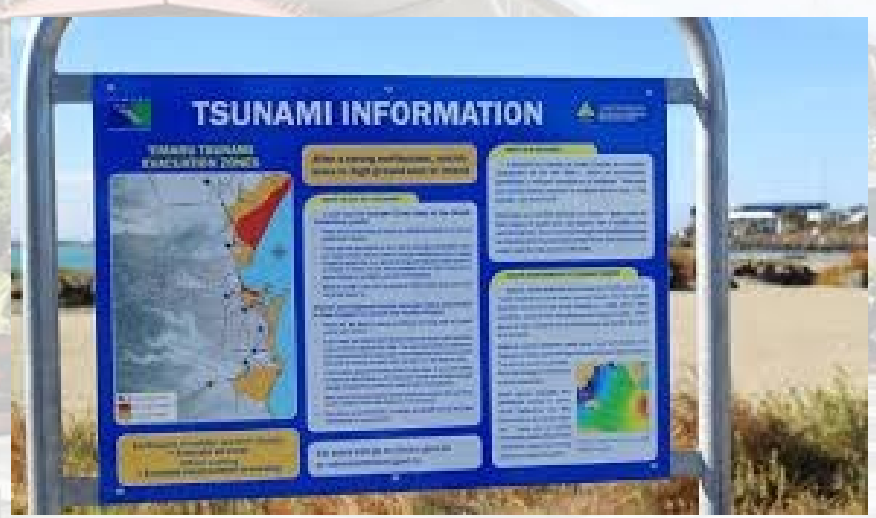
The media for these information boards can be:

- Boards
- Posters
- Digital Signage

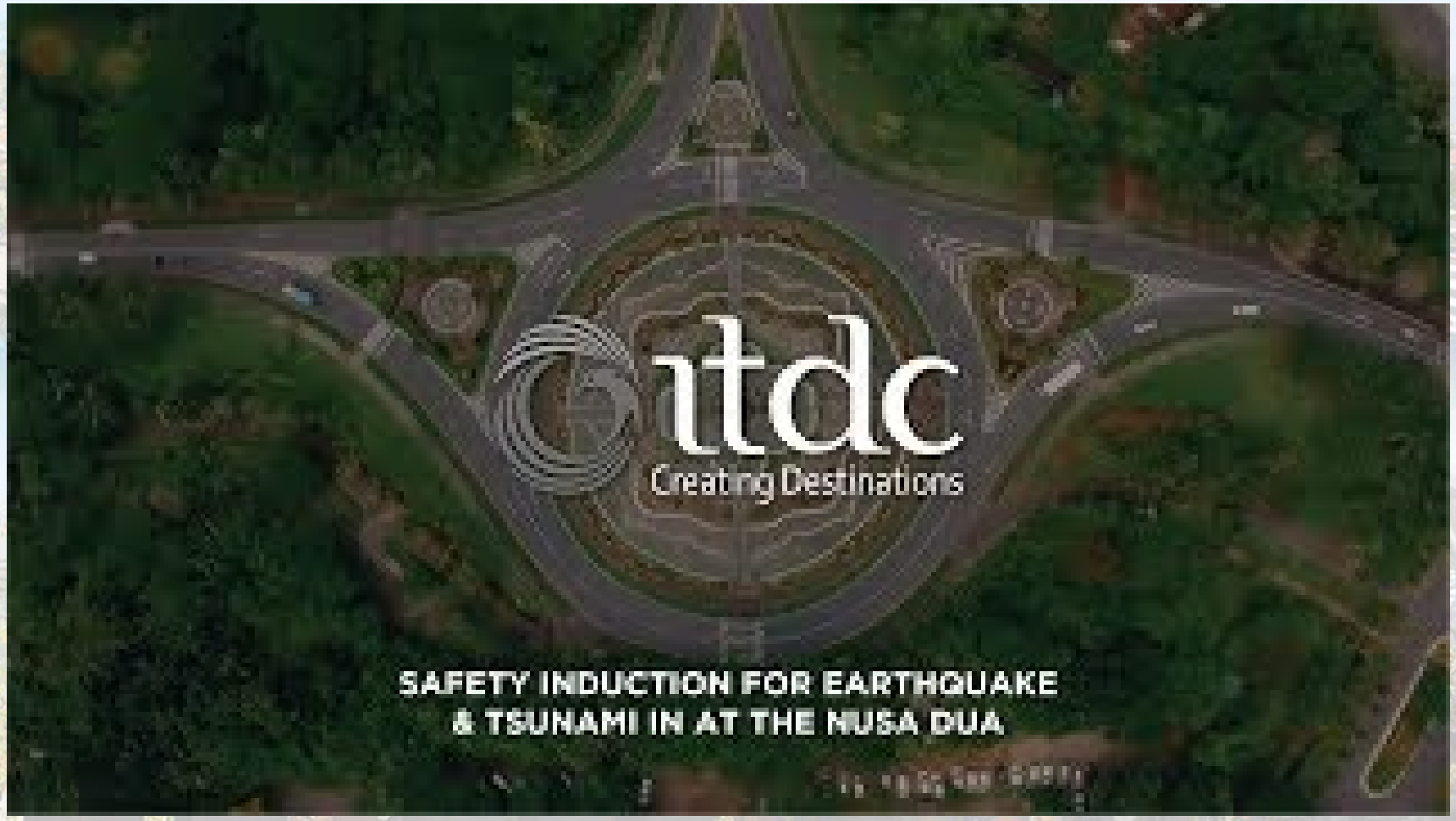
•**Tsunami information signs** should be placed in several crowded areas within **airport, port, and hotel premises, such as:**

- **Airport arrival/departure terminals.**
- Port passenger/vehicle loading areas.
- Hotel waiting areas, halls, and cafeterias.

Papan Tsunami di Gapura Pintu Masuk ITDC



PREP-3: Outreach and public awareness and education resources are available and distributed



Dissemination of Socialization Material on In-Room TV Opening Screens (ITDC)

PREP-4: Outreach or educational activities are held at least 3 times a year

Educational activities should be conducted at least **3 times a year**. The material presented should cover:

- Safe actions during earthquakes and tsunamis
- Evacuation routes
- Understanding earthquake information and tsunami early warnings

These activities can include **workshops, K3 (Occupational Health and Safety) training, and campaigns during exhibitions.**

Airports, ports, and hotels need to have regular training for disasters and other force majeure events.

PREP-5: A community Tsunami Exercise is conducted at least every two years

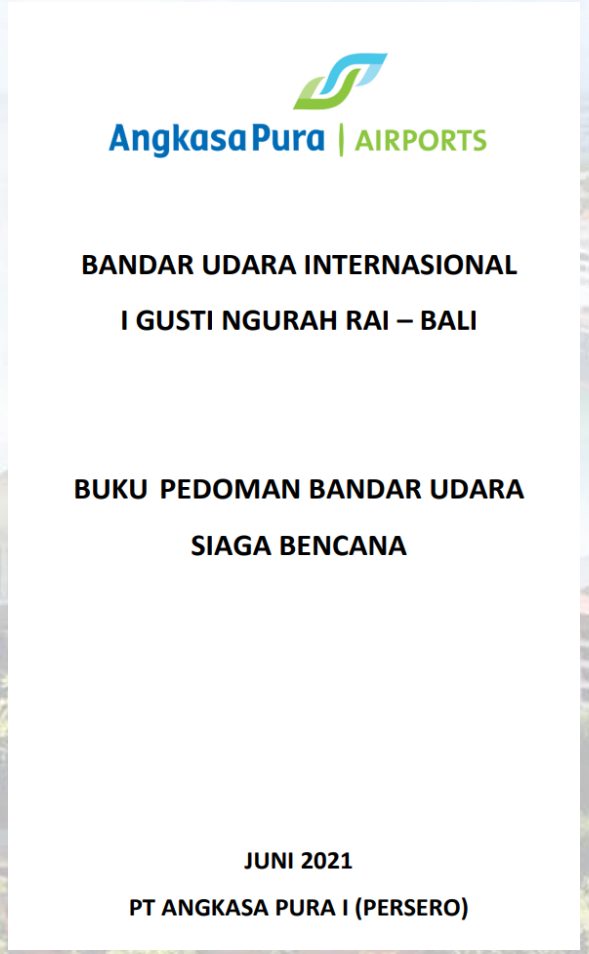
- Drills can focus specifically on **earthquake/tsunami hazards**, or can be incorporate with other simulation in **Joint Safety & Security Drills (**Counter-Terrorism Response Simulation), Enhancing coordination among disaster response teams, security personnel, and infrastructure managers.
- These exercises can take various forms, such as **tabletop exercises, drills, communication tests**, and more.
- Drills should be conducted routinely, at least **once a year**.
- Participation should include **all staff**, and it's even better if **users/guests** can also be involved.

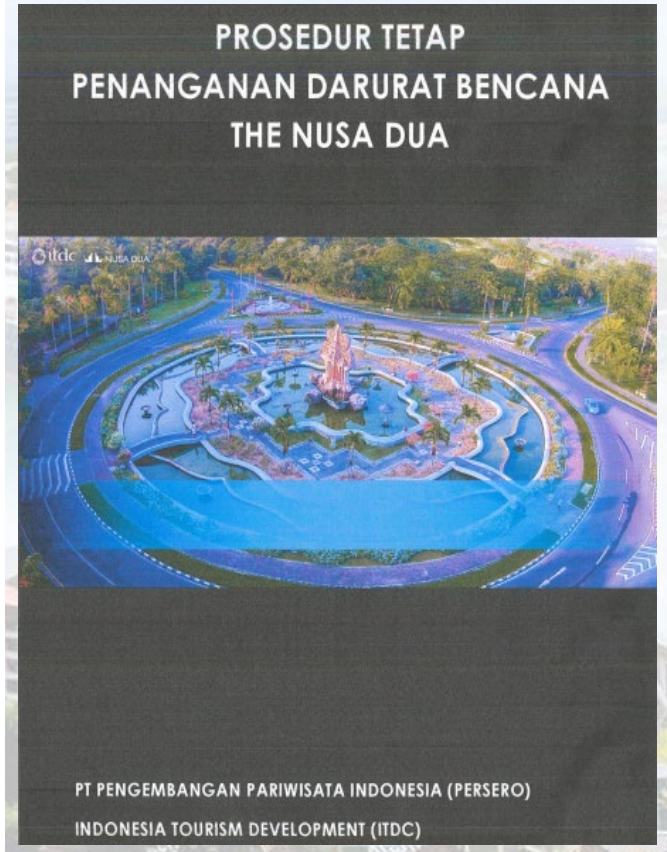
RESP-1: A community Tsunami Emergency Response Plan is approved

Emergency Plan Document

Should at least contain:

- Identification of potential earthquake and tsunami hazards.
- Data on management/staff and users/guests.
- SOPs (Standard Operating Procedures) for Earthquake Response and Tsunami Early Warning.
- Activation of emergency response, command posts, and personnel implementing the emergency response.
- Contact information for relevant institutions, including Focal Points for earthquake information and tsunami early warnings.
- Evacuation plan.
- Evacuation maps.
- Criteria for "safe" status
- Impact reporting

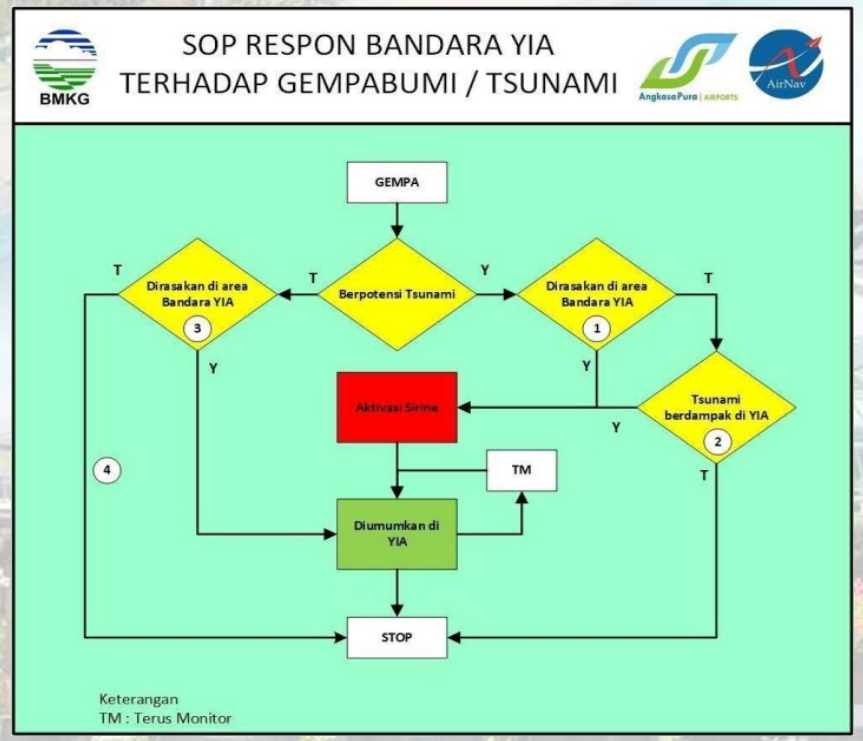


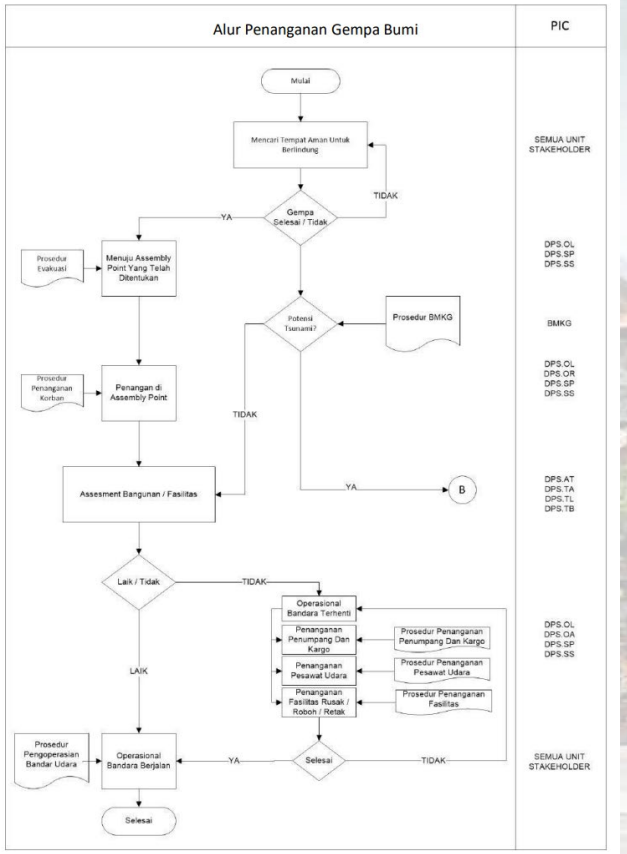


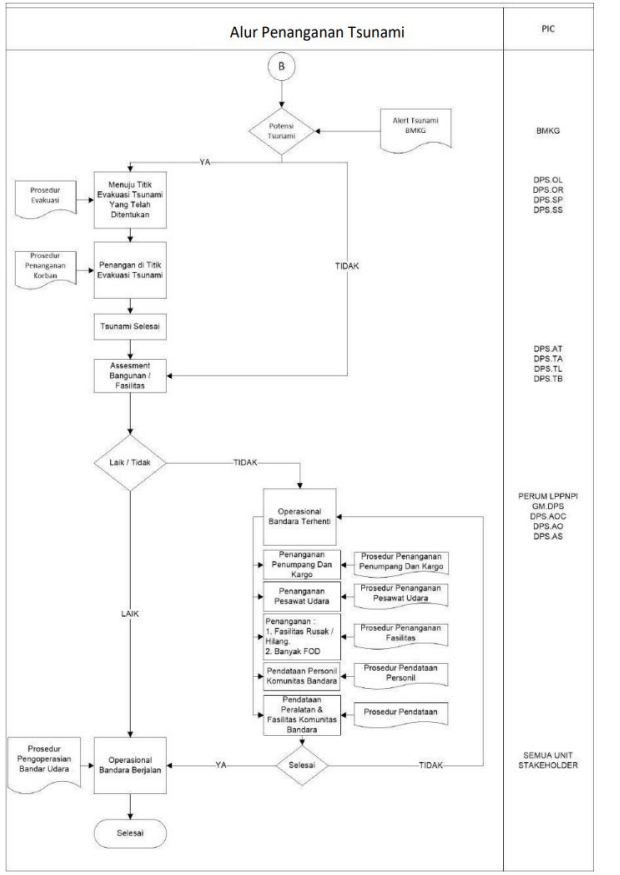
RESP-1: Tsunami Emergency Response Plan

SOP outlines evacuation decisions related to tsunami warnings and includes:

- Explanation of who, what, and how the tsunami warning chain is operated
- Explanation of what to do and what not to do during an earthquake and tsunami.
- clear SOP to response the warning
- Local government regulations as official guidelines for parties involved in tsunami early warning.

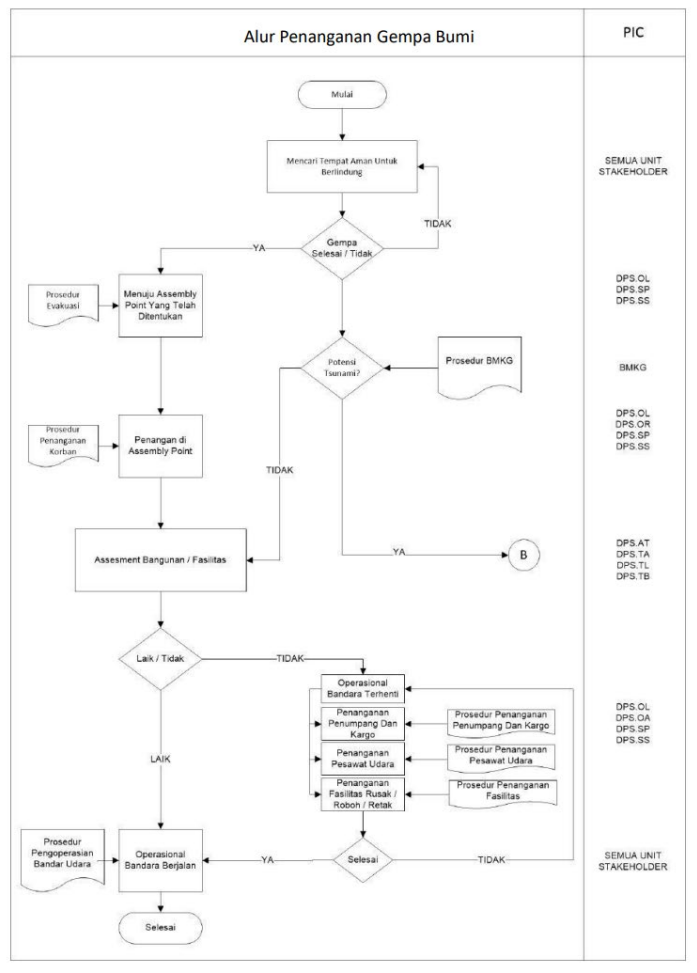


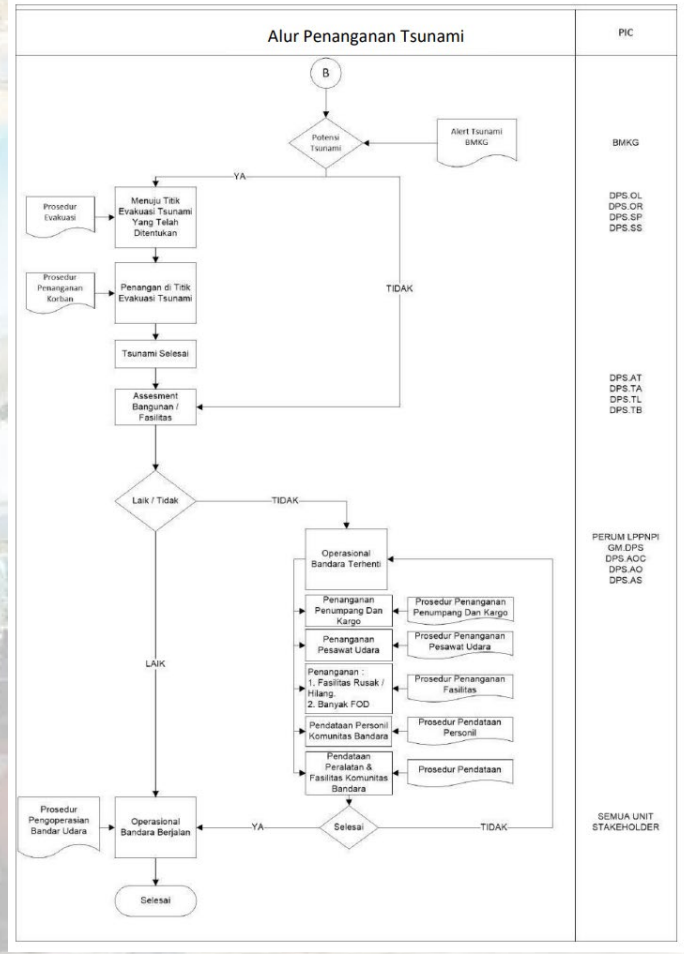


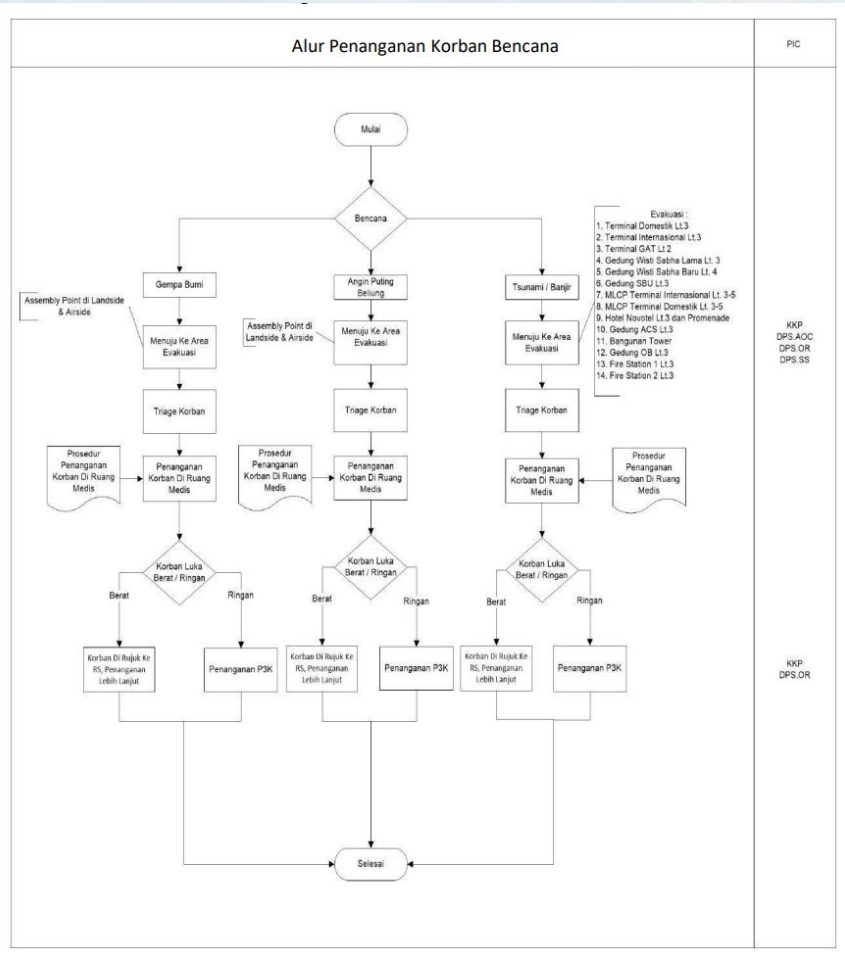


RESP-1: A community Tsunami Emergency Response Plan is approved

Example : Airport Disaster Management Plan







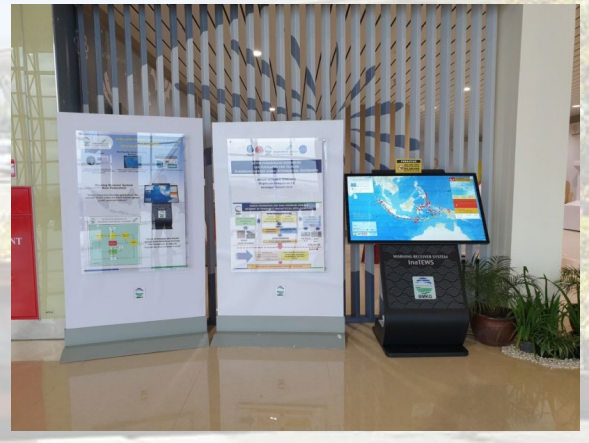
RESP-2: The capacity to manage emergency response operations during a tsunami is in place

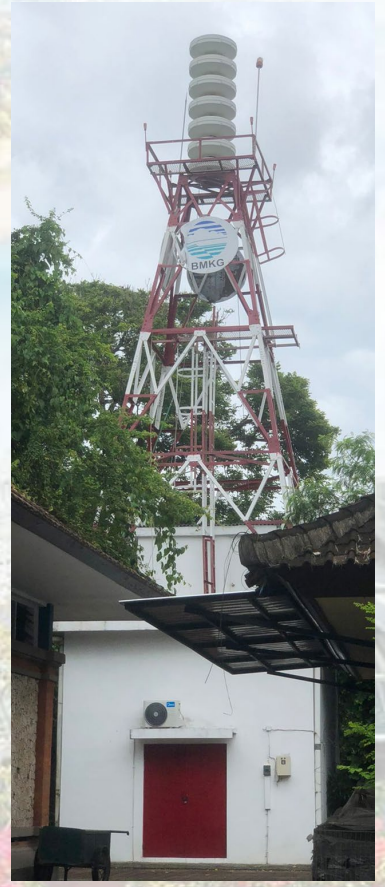
The Critical Infrastructures Authority should have the capacity to execute the response plan, including:

- Quick response team, with the ability and authority to execute tsunami warning and response actions.
- Has Command Centre located in safe zone
- Available on a 24-hour basis.

RESP-3 & 4: Redundant and reliable means to timely receive and disseminate 24-hour official tsunami alerts are in place

WRS New Generation





Sirine Tsunami ITDC Nusa Dua Bali

Equipment or means capable of directly receiving information from BMKG (Meteorology, Climatology, and Geophysics Agency) or BPBD (Regional Disaster Management Agency) can include:

- Warning Receiver System
- Radio
- Telephone
- SMS

Equipment or means capable of reaching all managers and users within the area include:

- Alarm;
- Public Announcement (PA) systems;
- Display screens;
- Telephone;
- Radio;
- Social Media Applications

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THANK YOU