NATIONAL REPORT

SUBMITTED BY MALAYSIA

1. ICG/PTWS Tsunami National Contact (TNC)

Name	**:**	**Mr. Muhammad Helmi bin Abdullah**
Organization	**:**	**Malaysian Meteorological Department**
Postal Address	**:**	**Jalan Sultan,** **46667 Petaling Jaya,** **Malaysia**
Email Address	**:**	
Telephone Number	**:**	
Fax Number	**:**	
Cellular Telephone Number	**:**	

2. ICG/PTWS Tsunami Warning Focal Point (TWFP)

Name	**:**	**Mrs. Azahani bt Abd Aziz**
Position	**:**	**Director of Technical Weather & Geophysics Division**
Telephone Number	**:**	
Email Address	**:**	
Postal Address	**:**	**Malaysian Meteorological Department** **Jalan Sultan,** **46667 Petaling Jaya,** **Malaysia**
Cellular Telephone Number	**:**	

TWFP 24x7 point of contact

Name of Office	**:**	**National Weather and Geophysics Operations Centre**
Email Address	**:**	
Telephone Number	**:**	
Fax Number	**:**	
Cellular phone number	**:**	

3. Tsunami Advisor

Name	**:**	**Dr. Chai Mui Fatt**
Position	**:**	**Principal Assistant Director**
Postal Address	**:**	**Malaysian Meteorological Department** **Jalan Sultan,** **46667 Petaling Jaya,** **Malaysia**
Email Address	**:**	
Emergency Telephone Number	**:**	
Emergency Fax Number	**:**	
Emergency Cellular Telephone Number	**:**	

4. Tsunami Standard Operating Procedures for a Local Tsunami

The **Malaysian Meteorological Department (MET Malaysia)** is an organisation responsible to identify and characterise tsunamigenic events. MET Malaysia continuously monitors seismic activities in and around Malaysia. When an earthquake takes place, MET Malaysia immediately determines the hypocentre and magnitude of the quake. If the earthquake occurs in an ocean area with tsunamigenic potential, MET Malaysia conducts the tsunami forecast operation using the database containing tsunami amplitude and travel time calculated by numerical simulation MET Malaysia issues warnings and/or advisories to all the coastal areas of Malaysia. MET Malaysia provides tsunami warnings and/or advisories for the national and local authorities and broadcasting stations for disaster prevention/mitigation. Governors of municipalities are responsible for evacuation of residents from the tsunami hazardous areas. Real-time sea-level data are gathered in MET Malaysia to monitor tsunami arrivals at coasts. When confirming a tsunami arrival, MET Malaysia announces tsunami observations. Tsunami warnings and/or advisories are cleared when MET Malaysia concludes that the dangerous situation has been over, namely, when the tsunami attenuates and the observed height becomes lower. Category of Tsunami warnings and/or advisories are depicted in **Figure 1**.

<table>
<tr><th rowspan="2">Location</th><th colspan="4">Criteria of Advisory/Warning</th></tr>
<tr><th>Depth (km)</th><th>Magnitud (M)</th><th>Tsunami height(metre) at coastal area of Malaysia</th><th>Type of warning</th></tr>
<tr><td>South China Sea, Sulu Sea, Sulawesi Sea, Indian Ocean (Andaman & Nicobar) Makassar Streat, Java Sea, Flores Sea and Banda Sea</td><td rowspan="3"><100km</td><td>M≥7.5</td><td>≥ 0.5m</td><td>Tsunami Warning</td></tr>
<tr><td></td><td>6.5≤M<7.5</td><td><0.5m</td><td>Tsunami Advisory</td></tr>
<tr><td rowspan="2">Out of area</td><td rowspan="2">M>7.9</td><td>≥ 0.5m</td><td>Tsunami Warning</td></tr>
<tr><td></td><td><0.5m</td><td>Tsunami Advisory</td></tr>
</table>

Figure 1

5. Tsunami Standard Operating Procedures for a Distant Tsunami

When a large earthquake occurs in an area distant from Malaysia, MET Malaysia determines the hypocentre and magnitude using seismic waveform data from the global seismological observation network, and exchanges information on the earthquake with the PTWC and the USGS. If there is a possibility of tsunami generation, MET Malaysia will immediately conduct the tsunami forecast operation in the same manner and criteria as the local tsunami procedures. Data of tsunami observations from foreign countries and historical records are also considered for the forecast of tsunami height along Malaysia coasts. The threshold or criteria for declaring a potential tsunami emergency is 0.5 or more for the potential height. Actions were taken in response to tsunami bulletins issued by PTWC, NWPTAC, and/or SCSTAC during the intersessional period by checking the modelling **via Tsunami Observation And Simulation Terminal (TOAST)** in every new information updated including the new datum.

The National Disaster Management Agency (NADMA) is an organisation that acts on the information provided by MET Malaysia, responsible for characterising the potential tsunami threat. Tsunami information is disseminated within country by text messages, facsimile, websites, social media and siren and earthquake operation centre is operated 24x7. When data from the international buoys or foreign sea level tide gauges recorded lower readings than the estimation, which

will be concluded in the updated tsunami model or when the national sea level tide gauges recorded no higher than the normal sea level readings, the emergency will be terminated.

6. National Sea Level Network

The Sea Level Network database consists of sea level gauges that are located within the South China Sea and the Strait of Malacca. The database is intended to include all near real-time seas. The data has been checked for accuracy and completeness via consultation with national and global network operators. Communication of all the tide gauges are using Very Small Aperture Terminal (VSAT) to make sure the stability in receiving and transmitting the data every minute.

MET Malaysia currently has 25 tide gauges stations located all over Malaysia as depicted in **Figure 2**.

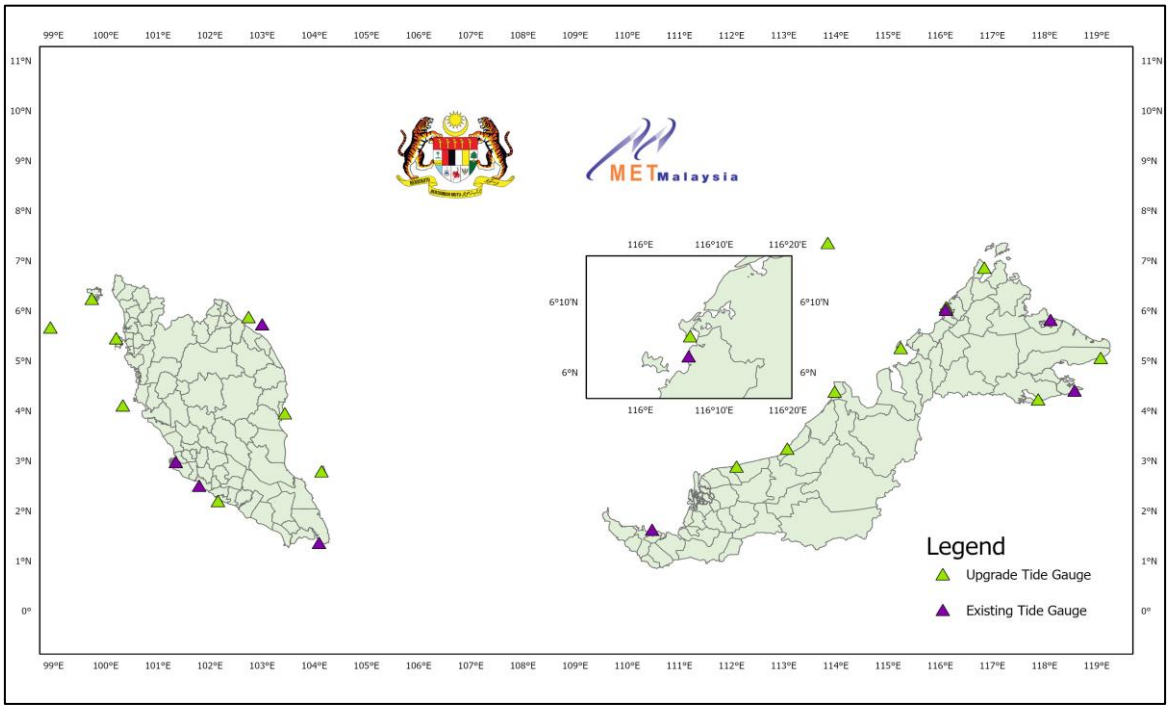

Figure 2

The location of the Malaysia Level Stations which are equipped with Pressure Level Sensor and/or Radar Level Sensor listed in **Table 1**.

NO	LOCATION	SENSOR TYPE
1	Jeti Pelabuhan Tanjung Beruas, **Melaka**	Pressure Level Sensor
2	Jeti Taman Laut Pulau Perhentian, **Terengganu**	Pressure Level Sensor
3	Pulau Perak, **Kedah**	Pressure Level Sensor
4	Jeti USM Cemacs, **Pulau Pinang**	Pressure Level Sensor
5	Jeti Awana Porto Malai, Langkawi, **Kedah**	Pressure Level Sensor
6	Jeti Pulau Tioman, **Pahang**	Pressure Level Sensor
7	Jeti Jupem Miri, **Sarawak**	Pressure Level Sensor
8	Jeti Bintulu Port, **Sarawak**	Pressure Level Sensor
9	Jeti LKIM Kuala Oyai,Mukah, **Sarawak**	Pressure Level Sensor
10	Jeti Labuan Port, **Wilayah Persekutuan Labuan**	Pressure Level Sensor
11	Jeti Tawau Port, **Sabah**	Pressure Level Sensor
12	Jeti Kudat port, **Sabah**	Pressure Level Sensor
13	Jeti Felda Sahabat, Lahad Datu, **Sabah**	Pressure Level Sensor
14	Jeti TLDM Teluk Sepanggar, **Sabah**	Pressure Level Sensor
15	Jeti TLDM Tanjung Gelang, **Pahang**	Pressure Level Sensor
16	Jeti Pulau Layang-Layang , **Sabah**	Pressure Level Sensor
17	Pulau Jarak, Perak	Pressure Level Sensor
18	Jeti Pusat Hidrografi Nasional (PHN) Klang, **Selangor**	Pressure Level Sensor & Radar Level Sensor
19	Jeti Penumpang Port Dickson, **Negeri Sembilan**	Pressure Level Sensor & Radar Level Sensor
20	Jeti TLDM Tanjung Pengelih, Johor Baharu, **Johor**	Pressure Level Sensor & Radar Level Sensor
21	Jeti Pulau Redang (Taman Laut Redang, Pulau Pinang), **Terengganu**	Pressure Level Sensor & Radar Level Sensor
22	Jeti UMS Kota Kinabalu, **Sabah**	Pressure Level Sensor & Radar Level Sensor
23	Jeti TLDM Sri Semporna, **Sabah**	Pressure Level Sensor & Radar Level Sensor
24	Jeti APMM Muara Tebas, **Sarawak**	Pressure Level Sensor & Radar Level Sensor
25	Jeti TLDM Sandakan, **Sabah**	Pressure Level Sensor & Radar Level Sensor

Table 1

7. Information on Tsunami occurrences

In 2004, Malaysia was also affected by tsunami Aceh as depicted in **Figure 3**. It is because of the location of the country close to the most two seismically active plate boundaries which is the inter-plate boundary between the Indo-Australian and Eurasian Plates on the west and inter-plate boundary between Eurasian and Philippine Plates on the east. These plates are depicted in **Figure 4**.

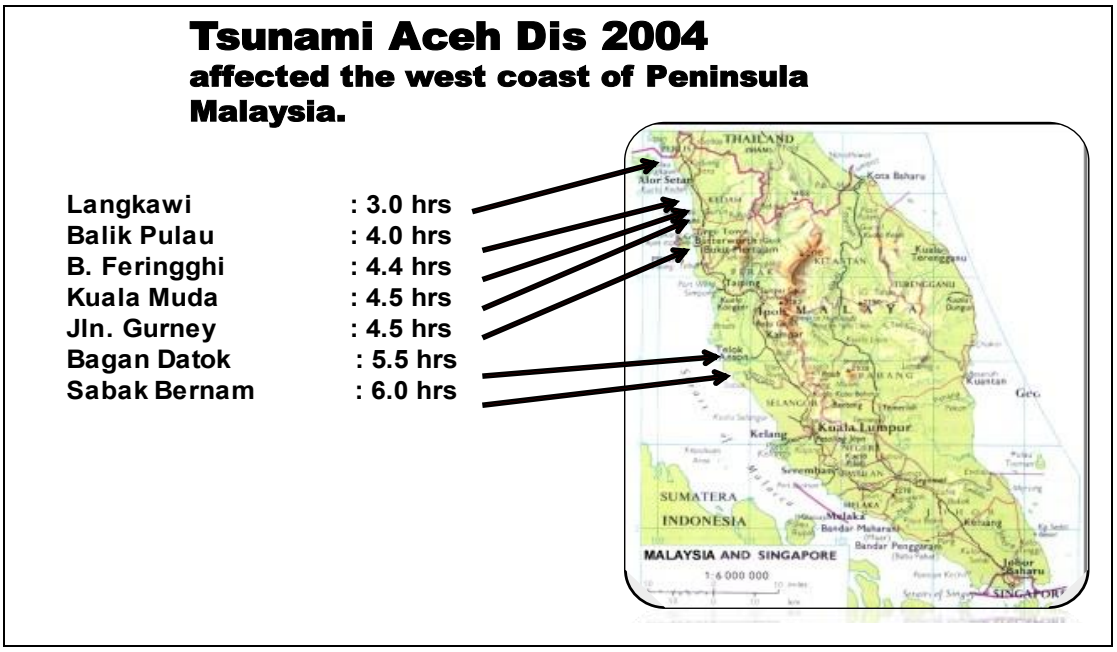

Figure 3

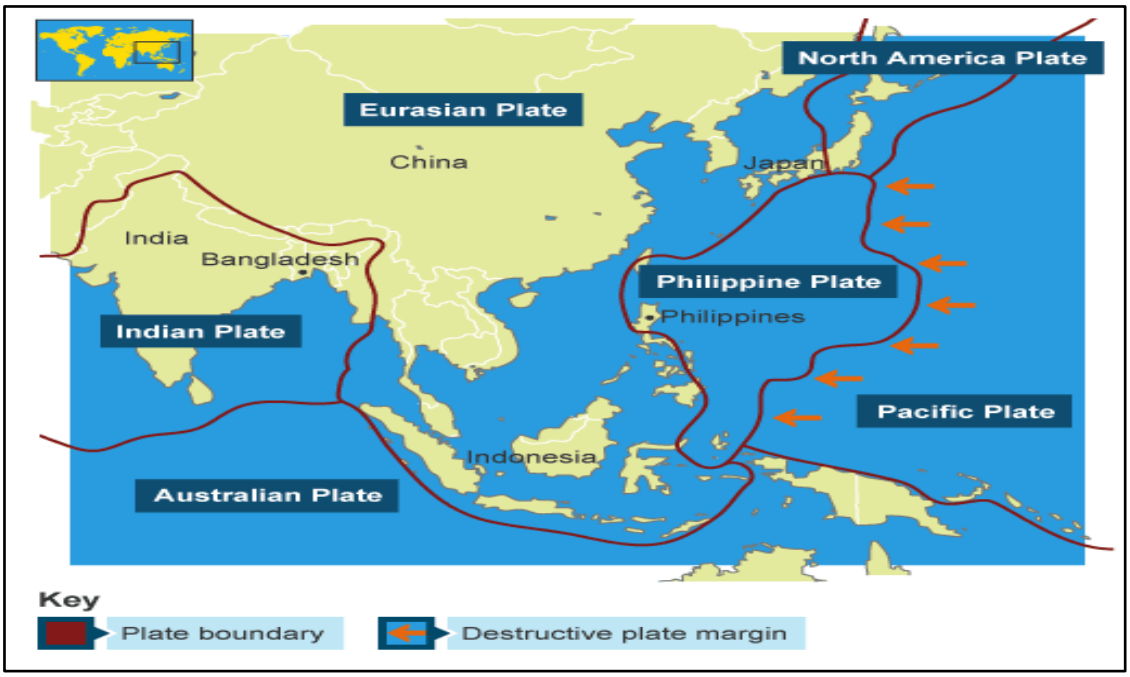

Figure 4

Significant progress has been made in the implementation of an end to end Tsunami Early Warning System in Malaysia. The Government of Malaysia had allocated RM19 million for the establishment of a National Tsunami Early Warning System since 2005 after the tsunami Aceh. The activities, which include the enhancement of Malaysia's seismic network, tide gauges and tsunami siren. The network of tidal gauges was installed in the high-risk areas to obtain additional data and information of the sea condition. Tsunami sirens were installed along the coastlines to warn the coastal communities. Various communications were used to disseminate information to the disaster management agencies and media which include the SMS, facsimile, media social etc.

8. Web sites (URLs) of tsunami related web sites

- http://mygempa.met.gov.my/docroot/view/index.php
- MET Malaysia website: www.met.gov.my
- NADMA disaster portal: https://portalbencana.nadma.gov.my/

9. Summary plans of future tsunami warning and mitigation system improvements

MET Malaysia will continuously maintain and enhance its seismic and tsunami networks. Public awareness campaigns and tsunami exercises are carried out in collaboration with the National Disaster Management Agency to prepare coastal communities and disaster management agencies in facing tsunami disasters. In 2022, MET Malaysia already installed **Tsunami Observation and Simulation Terminal (TOAST)** system.

TOAST is for:

i. tsunami simulation and comparison with observations;
ii. direct connectivity to SeisComP with On-the-fly simulation with optional GPU calculation and Calculation of SSH, SSHMax, isochrones, arrival times, coastal wave heights;
iii. automatic and interactive generation of rupture area and aggregation of scenarios to determine overall worst case; and

iv. generate bulletins based on predefined templates and works as Decision Support Systems (DSS)

In 2023, MET Malaysia installed the 3rd phase of the upgraded tsunami siren. The tsunami sirens are intended to be used as a warning when a distant tsunami approaches the shoreline. The primary focus of the sirens is to warn those who are outside in the inundation zone or those who are on the beach. The total of 83 units of tsunami siren is depicted in **Figure 5** and listed in **Table 2**.

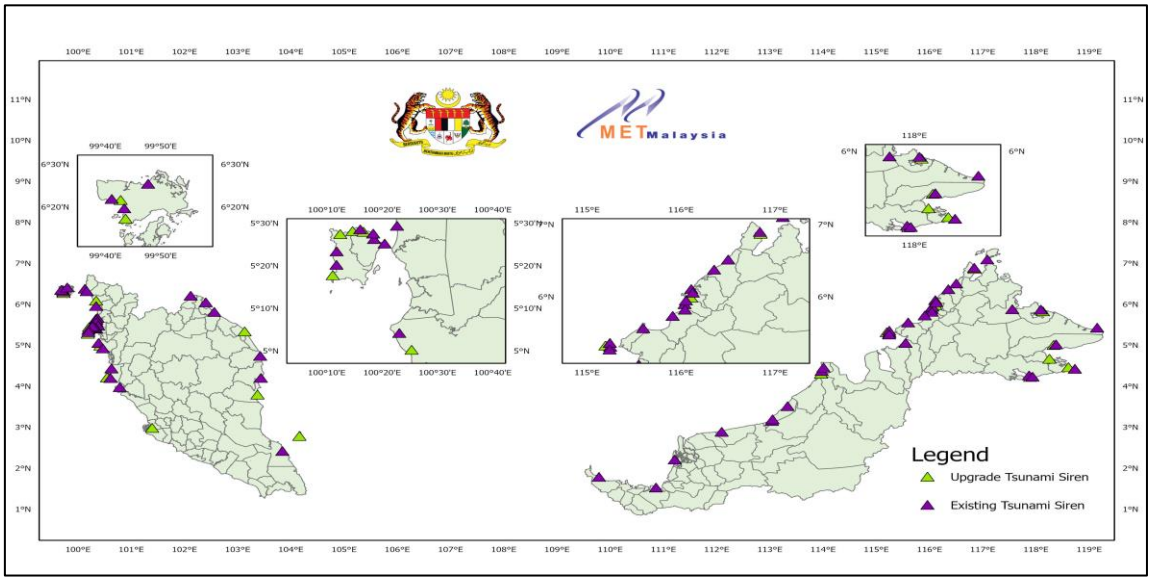

Figure 5

STATE	LOCATION	
PERLIS	1	**Kuala Perlis** Hotel Putra Brasmana
	2	**Kg. Sungai Baru** Masjid Ameer Fawwaz
KEDAH	3	**Padang Mat Sirat** Pusat Latihan Polis Langkawi
	4	**Telaga Harbour** Telaga Harbour Park
	5	**Pantai Pasir Hitam** Medan Niaga P. Pasir Hitam
	6	**Tg. Dawai** Balai Polis Tanjung Dawai
	7	**Pantai Cenang** Langgura Baron Resort
	8	**Kuala Teriang** Masjid Al-Istiqamah

	9	**Kuala Kedah** Masjid
	10	**Kota Kuala Muda** Masjid
	11	**Kuala Sala** Lembaga Kemajuan Ikan(LKIM)
	12	**Kuala Muda** Persatuan Nelayan LKIM Kuala Muda Kg Tepi Sungai
	13	**Pulau Sayak** Fish Research Institute, Kg. Pulau Sayak
	14	**Sungai Yu** Surau Al-Ibramsah, Kg. Sungai Yu
PULAU PINANG	15	**Kuala Muda, Penaga** Masjid Hidayah
	16	**Bagan Belat, Butterworth** Masjid Jamek
	17	**Kota Lama** Lot Pakir Dewan Sri Pinang
	18	**Persiaran Gurney** Kaw. Medan Makan
	19	**Tanjung Tokong** Balai Polis
	20	**Miami Beach** Kompleks Makanan
	21	**Kuala Sungai Pinang**
	22	**Kuala Sungai Burung** Pintu Masuk Ke2 Tmn Negara
	23	**Pasir Panjang** BTN
	24	**Teluk Bahang** LKIM
	25	**Batu Feringgi** Masjid
	26	**Tanjung Bungah** Masjid
SELANGOR	27	**Pelabuhan Klang** **Balai Polis**
PERAK	28	**Tanjung Piandang** Dewan JKKK
	29	**Pantai Remis** Pejabat Perikanan Daerah
	30	**Bagan Datoh** Jabatan Laut Wilayah Utara
	31	**Lumut** TLDM
	32	**Kuala Kurau** Kg. Nelayan
	33	**Pulau Pangkor** Teluk Nipah

	34	**Kuala Gula** Masjid Al-Taufiqiah, Kuala Gula
PAHANG	35	**Kuantan** Pantai Teluk Cempedak
	36	**Pulau Tioman** Jeti Kargo , Jabatan Laut
TERENGGANU	37	**Dungun** Rumah Daerah Dungun
	38	**Kemaman** Pejabat Perikanan Daerah
	39	**Kuala Terengganu** Pusat Perkembangan Perikanan
	40	**Besut** Pejabat Perikanan Dearah
LABUAN	41	**Labuan** Balai Bomba Layang-layangan
	42	**Kerupang** Masjid Al-Muttakin, Kg. Kerupang
	43	**Temiang** Masjid Al-Muzakirullah, Kg. Lubuk Temiang
	44	**Perbadanan** Menara Perbadanan Labuan
SARAWAK	45	**Bintulu** Ibu Pejabat Polis Marin Bintulu
	46	**Mukah** Kompleks LKIM , Mukah
	47	**Miri** Pantai Luak Bay Esplanade
	48	**Sematan** Pusat Perikanan Sematan
	49	**Sebuyu** Masjid An nur, Kampung Tebulu
	50	**Belawai** Pejabat Dearah Tanjung Manis
	51	**Bintulu (BDA)** Bintulu Development Authority(BDA)
	52	**Samalaju** Samalaju
	53	**Miri Central Park** Miri Central Park
	54	**Lutong** Lutong
	55	**Tawau 1** Kg. Batu Keramat
	56	**Tawau Batu Keramat** Masjid Al- Khauthar
	57	**Kunak** Balai Polis Kunak

SABAH	58	**Lahad Datu (FAMA)** Pejabat FAMA Daerah
	59	**Lahad Datu** Masjid Raudhah
	60	**Pulau Bum Bum** Masjid Dul Naim
	61	**Tambisan** Balai Polis Tambisan
	62	**Semporna** Masjid Daerah Semporna
	63	**Sandakan Tinosa 2** Masjid Kg.Tinosa 2
	64	**Sandakan** Masjid Daerah
	65	**Kudat** Pejabat Kastam
	66	**Pulau Banggi** Balai Polis Pulau Banggi
	67	**Kota Kinabalu** Masjid Bandaraya
	68	**Kota Belud** Pondok Polis Kuala Abai
	69	**Tuaran** Nexus Karambunai Resort
	70	**Putatan** Balai Cerap Al-Biruni
	71	**Tanjung Aru** Masjid Al-Kauthar
	72	**Sabah Port** Masjid Al-Ikhwan
	73	**Kinarut** Masjid Puncak Taqwa
	74	**Papar** Masjid Raudhatul Ilmiyyah, Kampong Kuala
	75	**Kudat (IPD)** Ibu Pejabata Polis Daerah Kudat
	76	**Kota Belud (Masjid Mustapah)** Masjid Imam Hj. Mustapah
	77	**Kuala Penyu** Balai Polis Kuala Penyu
	78	**Sipitang** Ibu Pejabat Polis Sipitang
	79	**Tawau (JKR)** Pejabat Jabatan Kerja Raya (JKR)
	80	**Beluran (IPD)** Ibu Pejabat Polis Dearah Beluran
	81	**Tumpat** Pantai Getting

KELANTAN	82	**Bachok** Padang Istiadat Bachok
JOHOR	83	**Mersing** Menara Tanjung

Table 2

10. Executive Summary

- The Malaysian Meteorological Department (MET Malaysia) is responsible for the operation of the earthquake monitoring system and tsunami early warning centre.
- MET Malaysia disseminates earthquake information within 8 minutes from the time of detection of an earthquake event.
- A tsunami warning is issued once all information has been verified that there is a tsunami threat to the Malaysia coast via the various channels.
- Public awareness programmes and activities are an integral part of the National Tsunami Early Warning System and conducted in close cooperation with the National Disaster Management Agency (NADMA) and MET Malaysia.

11. Narrative

- MET Malaysia is currently operating 80 seismic sensor (strong motion and weak motion) stations throughout Malaysia.
- MET Malaysia has installed the weak motion seismic sensor, with priority given to the western and central part of Peninsular Malaysia and central (Ranau District) and eastern part of Sabah (Tawau, Semporna and Lahad Datu Districts). Peninsular Malaysia experiences stronger ground shaking compared to other areas, therefore it is an urgent need to increase the weak motion seismic sensor in those areas.
- Under the 12th Malaysian Plan, 3 units of seismic stations (1 unit of weak motion in Peninsular Malaysia and 2 units of weak motion in Sarawak), 8 units of tide gauge and 30 units of tsunami siren were installed.
- Malaysia currently has 80 Seismic Stations. The Seismic Stations in Malaysia were installed in few phases as listed in **Table 3**.

2003-2008	• 14 SEISMIC STATION
2013	• 30 SEISMIC STATION
2014-2022	• 36 SEISMIC STATION
TOTAL NUMBER	• **80 SEISMIC STATION**

Table 3

- For coastal monitoring, currently MET Malaysia is operating 25 units of tide gauges that have been installed in 3 phases as listed in **Table 4**.

2006	• 7 TIDE GAUGE STATION
2013	• 10 TIDE GAUGE STATION
2021-2022	• 8 TIDE GAUGE STATION
TOTAL	• **25 TIDE GAUGE STATION**

Table 4

- For the dissemination of tsunami warning, various communication methods are used to disseminate information to the public such as siren, SMS, facsimile, media social etc.
- There were 3 phases of installation of tsunami sirens as listed in **Table 5**.

2006	• 23 TSUNAMI SIREN
2013	• 30 TSUNAMI SIREN
2021-2022	• 30 TSUNAMI SIREN
TOTAL	• **83 TSUNAMI SIREN**

Table 5

Public Awareness

- Public awareness campaigns have been carried out at tsunami high risk areas since 2007. The awareness campaigns also include extreme weather awareness and are held at various locations throughout Malaysia.
- The objectives of the public awareness campaign are to promote, educate and prepare the public with knowledge about hazard, risk, discipline, morale and spirit toward empowering the awareness and preparedness in the event of Extreme Weather, Earthquake and Tsunami. It is also for the purpose to disseminate

hazard and risk information about the extreme weather, earthquake and tsunami to government agencies and local authority related to NADMA and to promote the cooperation between NADMA with the other related response agencies with regard to the Malaysia National Tsunami Early Warning System Operation.

- Tsunami drills and public awareness that have been carried out are listed in **Table 6**.

Year	Tsunami Drill		Public Awareness Campaign		Comment
	Total	Participant	Total	Participant	
2006	1	2,000	0	0	Physical Event
2007	1	1,000	5	480	Physical Event
2008	0	0	15	2,169	Physical Event
2009	1	1,000	13	2,694	Physical Event
2011	4	2,500	5	793	Physical Event
2012	2	1,480	7	1,208	Physical Event
2013	2	1,372	7	1,014	Physical Event
2014	2	1,674	8	1,488	Physical Event
2015	0	0	6	1,159	Physical Event
2016	1	1,200	2	1,550	Physical Event
2017	2	1,150	2	1,150	Physical Event
2018	2	5,200	4	3,129	Physical Event
2019	1	1,200	10	2,900	Physical Event
2020	0	0	12	7,997	Online Campaign due to Pandemic Covid19
2021	0	0	13	22,918	
2022	0	0	7	6,930	
Total	**19**	**19,776**	**119**	**58,017**	

Table 6

Date: Name: