

- **Tiga pantai** paling popular:

- Pantai Teluk Kepatang
- Pantai Tok Jembal
- Pantai Batu Buruk

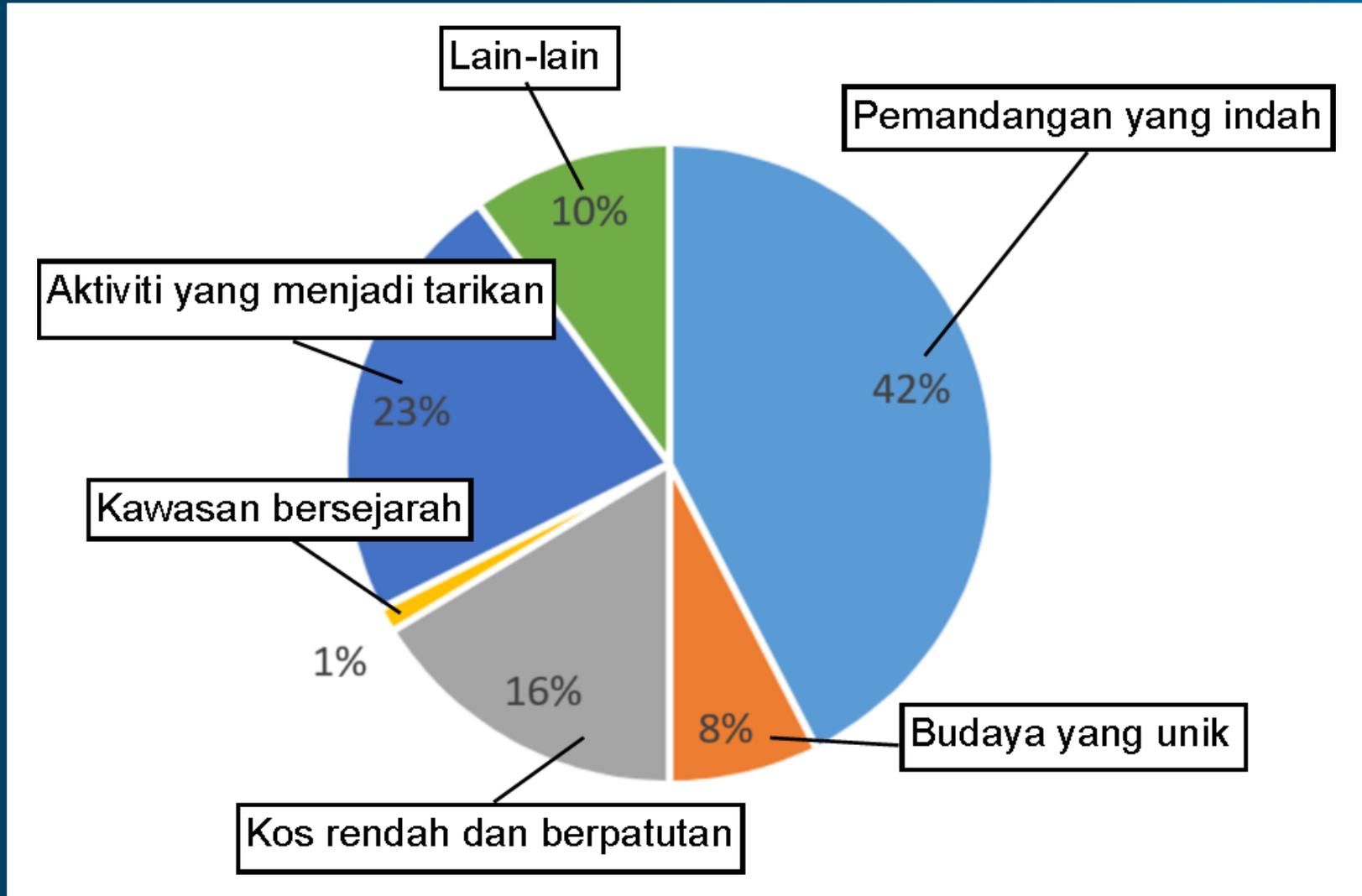


- Aktiviti rekreasi menarik di Pantai Teluk Ketapang:

- Memancing
- Joging
- Menunggang kuda
- Menikmati makanan tempatan, dll.



Sebab Melawat Kuala Terengganu



Persepsi Responden terhadap Pembangunan Projek

- Tidak mempunyai persepsi negatif selain potensi kesan kepada nelayan, alam sekitar dan tempat rekreasi.
- Berpendapat bahawa projek ini tidak akan menjejaskan kehidupan harian mereka dan keluarga mereka.



Kesan kepada Aktiviti Rekreasi dan Pelancongan

- Projek akan memberi **impak visual** kepada pengunjung Pantai Teluk Ketapang
- Landskap dan pemandangan indah dari Pantai Teluk Ketapang akan **digantikan dengan landskap perbandaran baru** (*new township*).
- Kawasan pantai baru, terusan and laluan pejalan kaki akan dibina di kawasan projek.



- Kontraktor hendaklah melaksanakan pembangunan mengikut pelan susun atur dan syarat yang telah diluluskan, termasuklah pantai baru, terusan dan laluan pejalan kaki (walkways).
- Reka bentuk seni bina mesti mengambil kira identiti budaya, imej dan perpaduan sosial antara projek-projek yang baru dibangunkan dengan persekitaran yang sedia ada.

Appendix K

Marine Traffic Assessment (MRA)



**MARINE RISK ASSESSMENT (MRA) FOR THE PROPOSED
RECLAMATION AND DEVELOPMENT OF THE SUNRISE CITY
MIXED DEVELOPMENT AT MUKIM SEBERANG TAKIR, DISTRICTS
OF KUALA NERUS, KUALA TERENGGANU, TERENGGANU**

**Report
Marine Risk Assessment (MRA)**

**KASI Report Ref. No.: 01.MC02.18.DHI
Date: 28th August 2019**

Project Proponent

Elcaa Properties Sdn Bhd

MTRA Consultant



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Marine Risk Assessment (MRA) for the Proposed Reclamation and Development of the Sunrise City Mixed Development at Mukim Seberang Takir, Districts of Kuala Nerus, Kuala Terengganu, Terengganu.

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This report is issued without prejudice to the rights and defence of relevant parties concerned and represents our findings at the time and place as stated herein. Any liability under whatsoever circumstances is hereby expressly excluded.

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1.0 Introduction

KASI (Malaysia) Sdn Bhd (KASI) was appointed by DHI Water & Environment (M) Sdn Bhd (DHI) to carry out a Marine Risk Assessment (MRA) for the Proposed Reclamation and Development of the Sunrise City Mixed Development at Mukim Seberang Takir, Districts of Kuala Nerus, Kuala Terengganu, Terengganu.

The proposed project involves reclamation of 1,860 acres of coastal area of Mukim Seberang Takir, Districts of Kuala Nerus, Kuala Terengganu, Terengganu for Mixed Development.

The proposed reclamation area is located next to the northern breakwater of Kuala Terengganu and approximately 10.6km away from the Chendering Port as shown in **Figure 1** below:

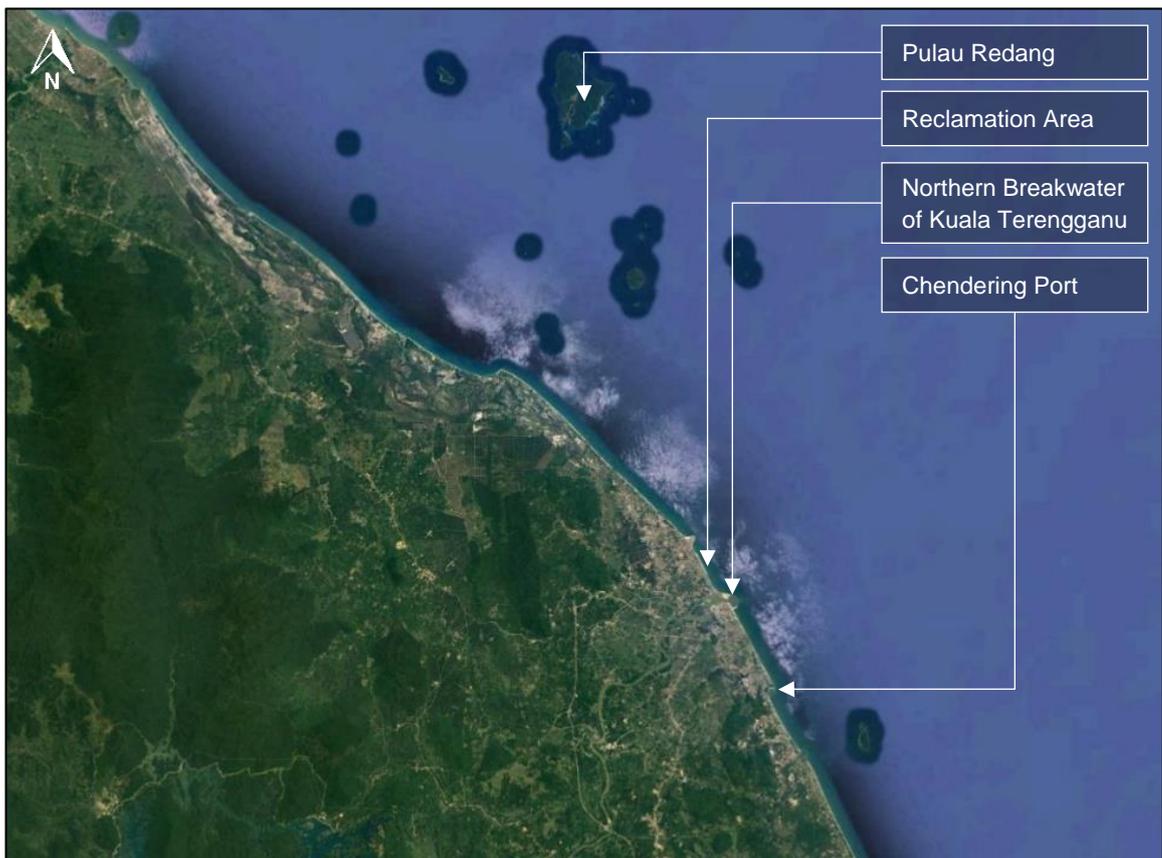


Figure 1: Location of the proposed reclamation area (source: Google Earth)

1.1 Layout of the Reclamation Area

Details of the proposed reclamation area are as follows:

- Reclamation Size : 1,860 acres
- Depths at Site : From -0.2 CD to -10.9m CD
- Reclamation Volume : 41 million m³ of sand
- Final Height : +1.55m CD

The layout of the proposed reclamation area is shown in below:



Figure 2: Layout of the proposed reclamation area (source: DHI)



Figure 3: Drone photographs of the proposed reclamation area

1.2 Bathymetry Survey of the Reclamation Area

The bathymetric study of the project site before reclamation works is shown in **Figure 4** below:



Figure 4: Bathymetric survey of the project site before reclamation works (source: DHI)

2.0 Data Collection and Review

2.1 Port Limits

The proposed reclamation area is partially located within the Kuala Terengganu Port Limit.



Figure 5: Kuala Terengganu Port Limit

2.2 Anchorage Area

There is one (1) charted anchorage area close to the project site, as shown in **Figure 6** below:

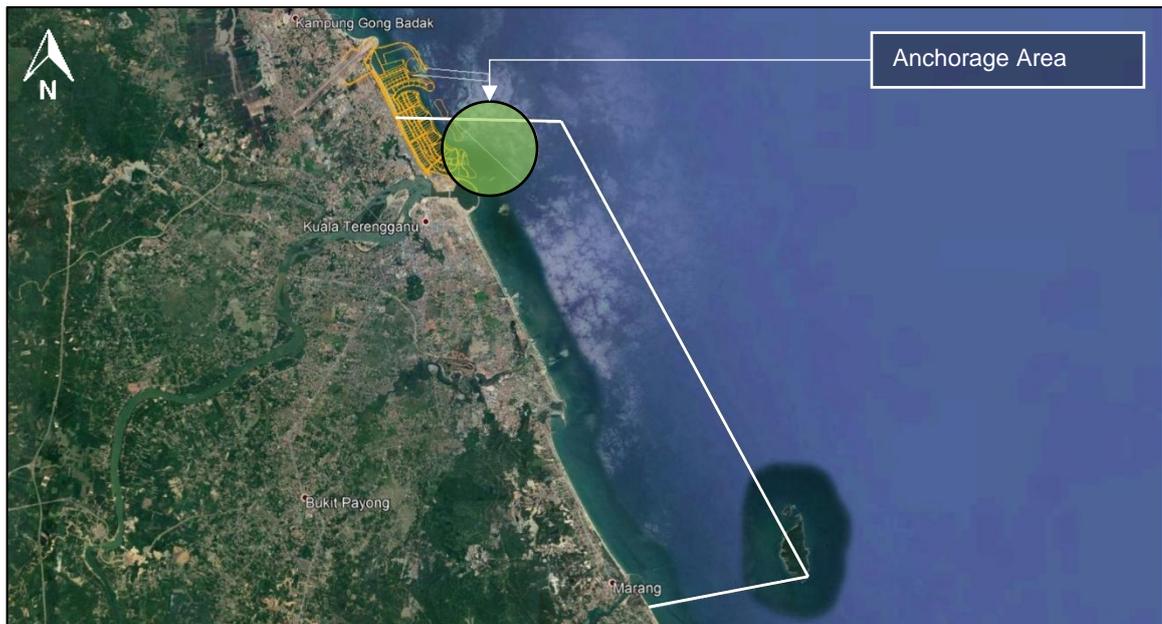


Figure 6: Charted anchorage area (highlighted in green)

The anchorage is for the use of cruise ships to harbour passengers to and from Kuala Terengganu. However, the anchorage is rarely used due to adverse weather conditions outside the breakwaters.

2.3 Ship-to-ship (STS) Areas

There are no STS areas close to the project site. The closest are three (3) ship-to-ship (STS) areas approved by Marine Department approximately 73km southeast of the study area as shown in **Figure 7** below:

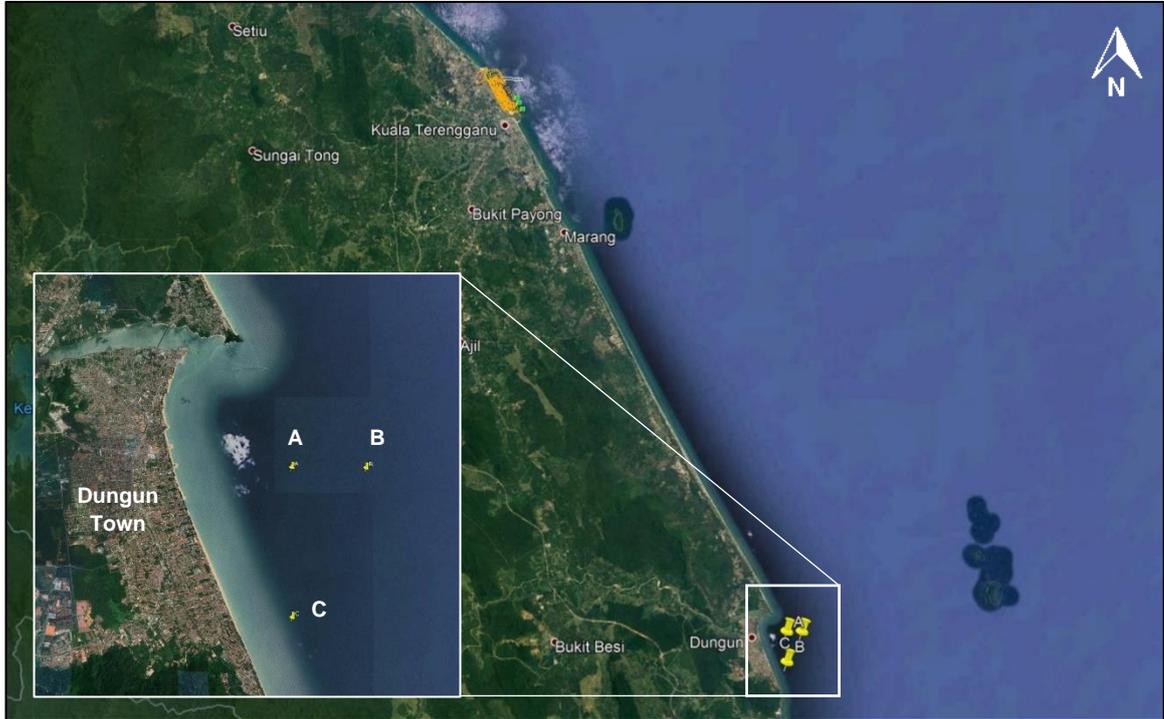


Figure 7: Approved STS areas (source: Marine Department)

The approximate coordinates of the STS area are as follows:

Point	Latitude	Longitude
A	4° 45.059' N	103° 27.053' E
B	4° 45.051' N	103° 28.061' E
C	4° 43.042' N	103° 27.054' E

Table 1: Coordinates of the STS areas

2.4 Marine Traffic Profile

2.4.1 Commercial Traffic

The nearest established commercial traffic route is located approximately 1.44km away from the edge of proposed dredge channel as shown below:

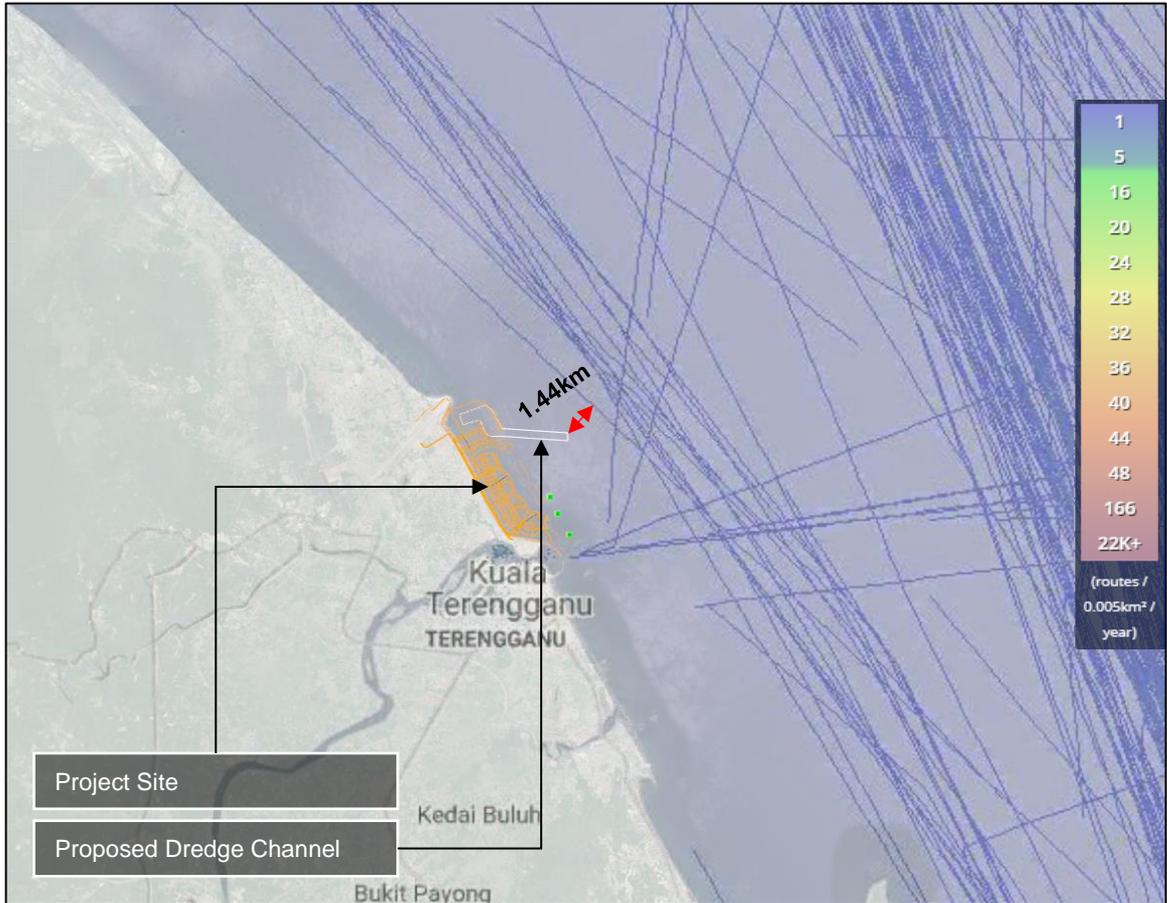


Figure 8: Commercial Shipping routes from Kuala Terengganu (source: www.marinetraffic.com)

2.4.2 Ferry Routes Passing Kuala Terengganu Coast

There is an active ferry route between Shahbandar Jetty, Kuala Terengganu and Pulau Redang, as shown in **Figure 9** below. The route is approximately 4.3km away from the edge of the proposed dredge channel.



Figure 9: Distance from project site to identified ferry route from Shahbandar Jetty – Pulau Redang

2.4.3 Offshore Supply Vessels (OSVs)

A daily transit of 6 inbound and 6 outbound were identified for Offshore Supply Vessels (OSV) to offshore crude oil production platform, Malong and Dulang Oil Fields, located northeast of Kuala Terengganu.

2.4.4 Patrol Boats and Marine Boats

APMM, Marine Department and Marine Police patrol boats conduct regular patrols which pass close to the proposed project site.

2.4.5 Research Vessels and Leisure Yachts

Research vessels from Universiti Malaysia Terengganu and leisure yachts also operate from Kuala Terengganu and are expected to pass close to the project site. However, these vessels do not have a specific schedule.

2.4.6

Fishing Activities

In general, fishing boats with bigger inboard engine would make two (2) to four (4) trips daily and smaller outboard engine fishing boats would make a trip daily. On average, inboard engine fishing boats would make 30 inbounds and outbounds per day; and 98 inbounds and outbounds per day for outboard engine fishing boats.

The fishing activities at major ports of Kuala Terengganu are shown below:

Districts	Inboard Engine	Outboard Engine	Total
Kuala Terengganu / Chendering	75	40	115
Marang	55	100	155
Merchang	-	280	280
Dungun	77	122	199
Paka	9	105	114
Kemaman / Kijal / Kuala Geliga / Kerteh	124	303	427
Total	340	950	1,290

Table 2: Fishing activities at major ports of Kuala Terengganu (source: Persatuan Nelayan Negeri Terengganu)

The photographs of fishing trawlers and fishing boats berthed inside northern breakwater at the Kuala Terengganu Port are shown below:



Fishing Trawlers



Fishing Boats

Figure 10: Fishing trawlers and fishing boats berthed inside northern breakwater at the Kuala Terengganu Port

Fish Aggregating Devices

Three (3) Fish Aggregating Devices (FAD) are installed close to the project site. The location of the FADs as shown in **Figure 11** below:

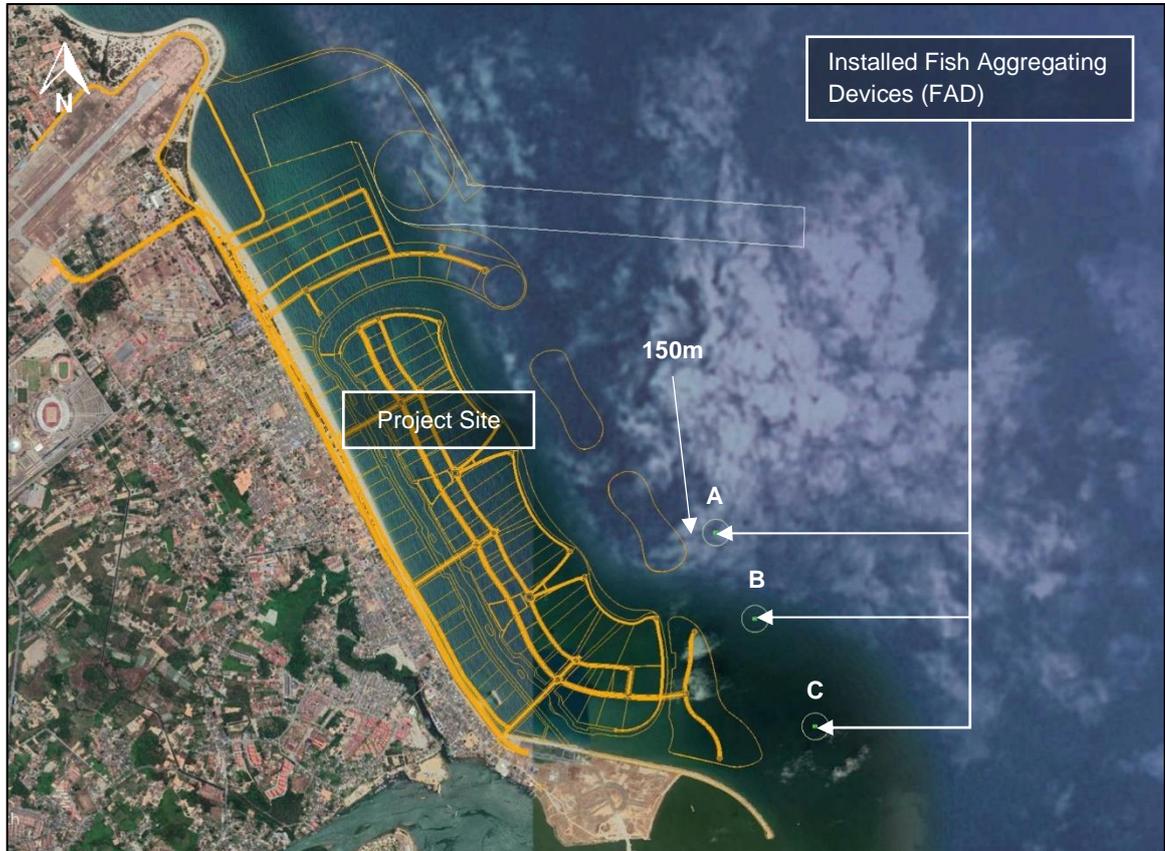


Figure 11: Location of FADs at the project site area (source: DHI)

It is a common knowledge for marines to stay at least 100m radius away from the centre of the FAD. The clearing distance between the outer radius to the project area is approximately 150m away.

The coordinates of the installed FADs are as shown in below:

FAD	Latitude	Longitude
A	5° 21.707' N	103° 9.041' E
B	5° 21.357' N	103° 9.199' E
C	5° 20.920' N	103° 9.444' E

Table 3: Coordinates of installed fish aggregate devices area (source: DHI)

2.5 Local Environmental Conditions

2.5.1 Wind

The wind conditions at the project area were extracted from three (3) points. The magnitude of wind speed is stronger (approximately 8 m/s) at offshore as compared to nearshore while the wind directions are similar at these locations. The wind roses at the three (3) extraction points are shown below:



Figure 12: Monthly wind roses at three (3) extraction points (source: DHI)

The winds travel predominantly from NE directions during NE monsoon (January, February, March and December) whereas the wind conditions during SW monsoon is mild and random in direction.

The monthly wind roses at point P1, which is nearest to the project site between 2006 and 2015 are shown below:

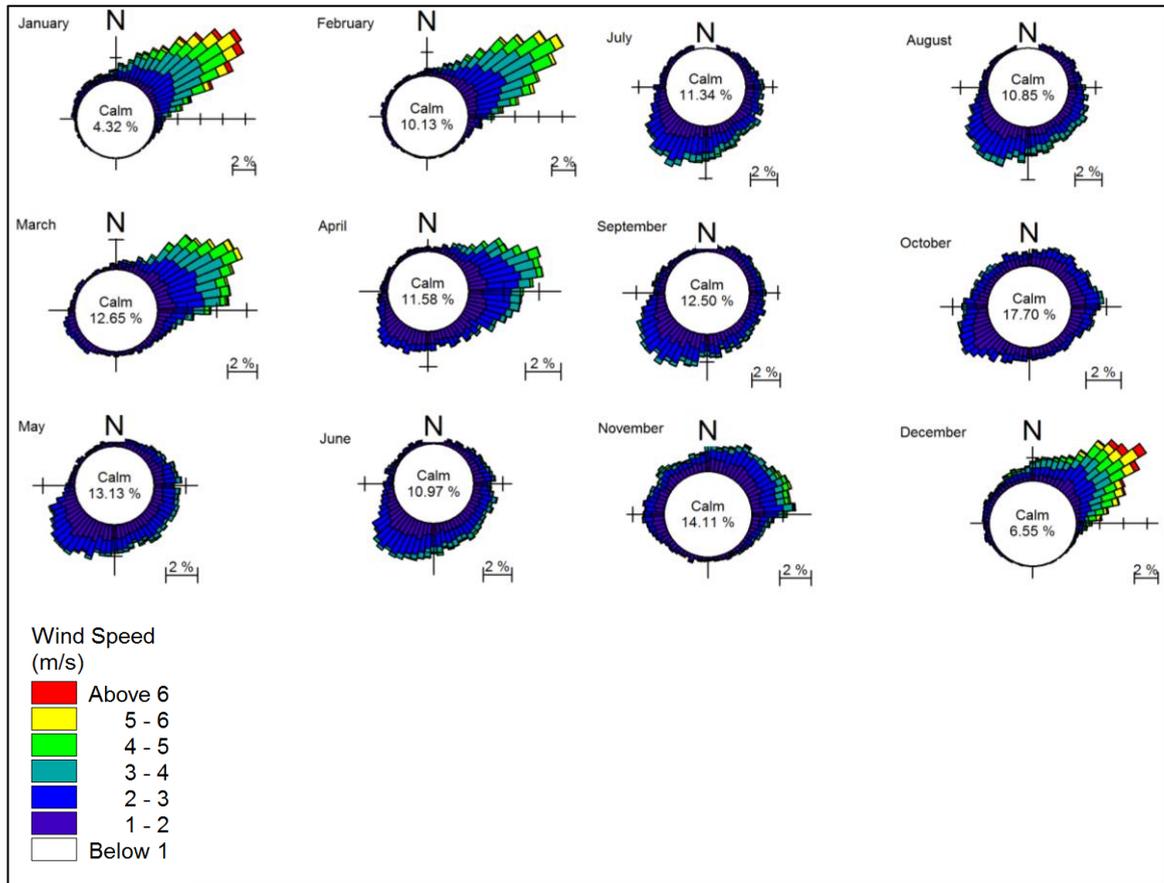


Figure 13: Monthly wind roses at point P1 between 2006 and 2015 area (source: DHI)

The wind speeds during NE monsoon at the project site are up to 6 m/s (approximately 11.66 knots).

2.5.2

Waves

The wave climate offshore of Kuala Terengganu is composed of locally generated wind waves and swell waves approaching the area from the South China Sea. The predominant wave directions are northwest and southeast with wave height of generally lower than 2m.

The predominant wave directions and maximum wave heights during NE and SW monsoons are shown below:

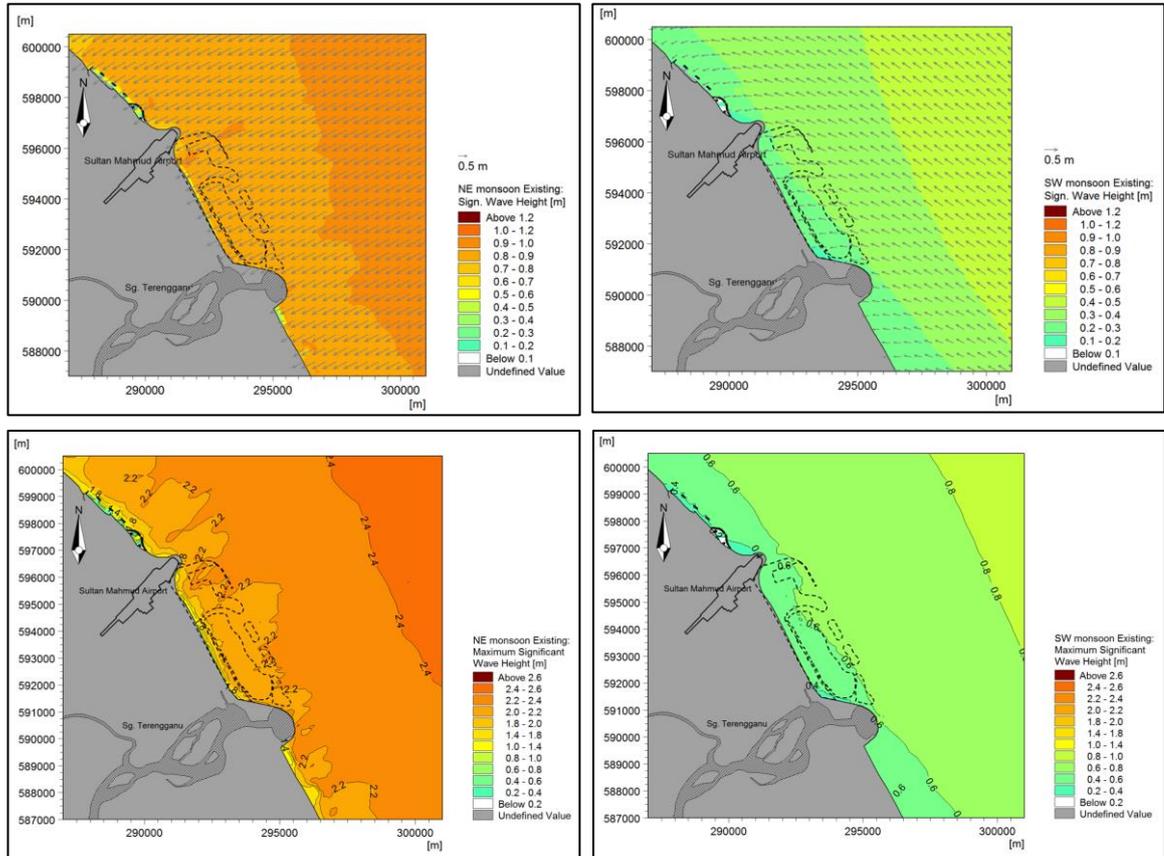


Figure 14: Predominant wave directions and maximum wave heights during NE and SW monsoons area (source: DHI)

2.5.3

Current

It is observed that flood tide currents are moving towards the south while ebb tide currents are going towards the north, with currents flowing along the coastline. The mean current speeds at the project site are up to 0.16 m/s, with maximum current speeds reaching up to 0.4 m/s.

The spring ebb and flood tides at the project site during NE monsoon are shown below:

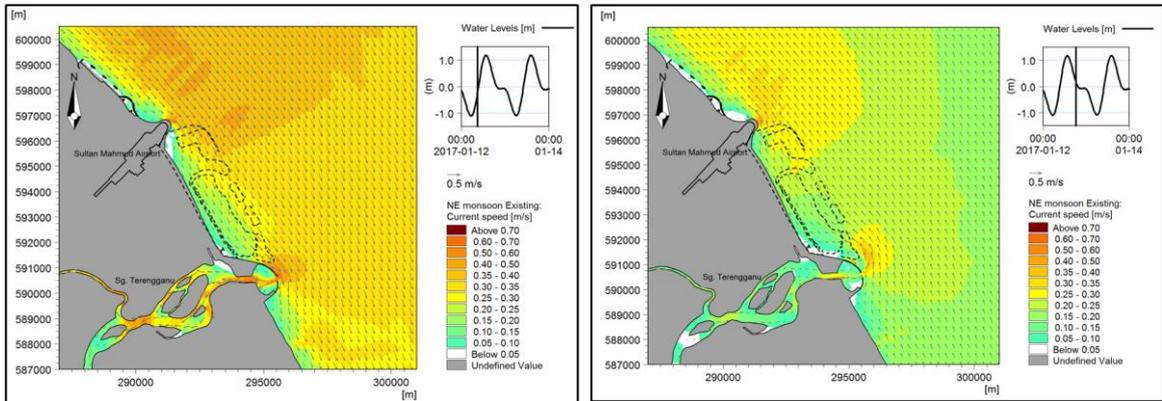


Figure 15: Spring ebb and flood tides at the project site during NE monsoon area (source: DHI)

Potential Impacts of Proposed Reclamation Area on Current Flow

An assessment of potential impacts on current flow was carried out for the five project phases of the development during a 28-day period of the NE, SW and inter monsoon periods.

The proposed reclamation works will change the current action around the reclamation area. The most pronounced changes are found around the waters off the northern and southern sides of the northern part of proposed reclamation.

The following magnitude of current changes are observed from the model results:

- The highest reduction of mean and maximum current speeds up to 0.1 m/s is predicted around the project development.
- The highest increase of magnitudes up to 0.05 m/s and 0.12 m/s for mean and maximum current speeds respectively.

The changes in current flow at the project site due to the proposed reclamation area are shown below:

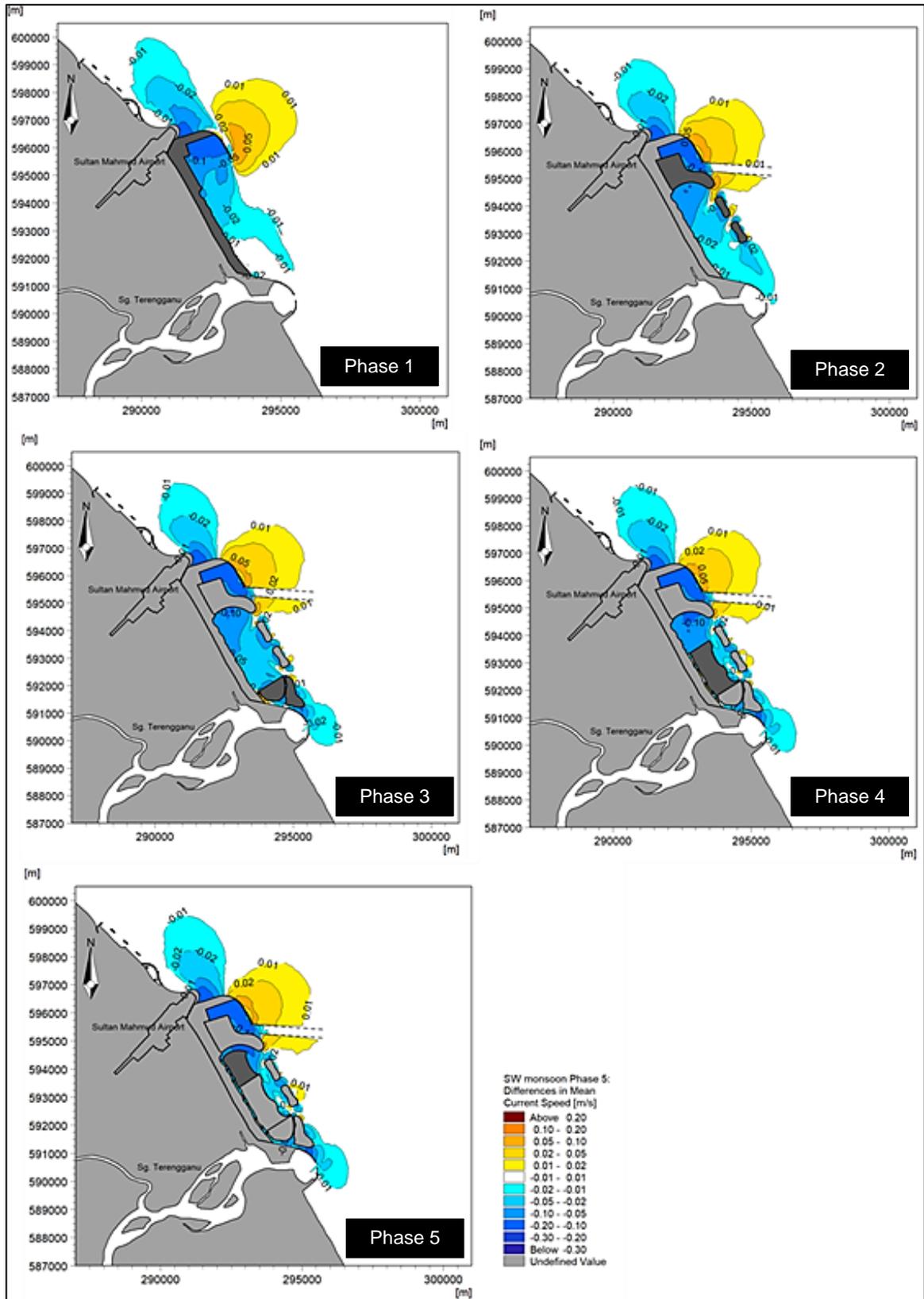


Figure 16: Changes in current flow at the project site due to the proposed reclamation area (source: DHI)

2.5.4

Tide Levels

The typical spring tidal range (MHHW – MLLW) at Sungai Terengganu is in the order of 2.04 m and the maximum (differences between HAT and LAT) is 3.02 m. The tide levels at Sungai Terengganu are as follows:

Tidal Levels	Values (m CD)
Highest Astronomical Tide (HAT)	3.02
Mean Higher High Water (MHHW)	2.47
Mean Lower High Water (MLHW)	1.93
Mean Sea Level (MSL)	1.45
Mean Higher Low Water (MHWL)	0.97
Mean Lower Low Water (MLLW)	0.43
Lowest Astronomical Tide (LAT)	0.00

Figure 17: Tide levels at Sungai Terengganu (source: DHI)

3.0 HAZARD IDENTIFICATION (HAZID) WORKSHOP

The Hazard Identification (HAZID) workshop was conducted on 21st August 2019 at Hotel Tanjong Vista, Kuala Terengganu. The key objectives of the HAZID Workshop was to identify potential navigational risks, assess the level of risks and to identify appropriate mitigation measures to lower the level of risk associated with the construction phase of the proposed development of Sunrise City Mixed Development at Mukim Seberang Takir, District of Kuala Nerus, Kuala Terengganu, Terengganu (the Project Site). It was attended by 15 participants, and facilitated by 3 representatives from KASI (Malaysia) Sdn Bhd. The participants' attendance record is tabulated as shown in **Table 4** below:

No.	Name	Company
1.	Johari bin Mohamed	Jabatan Laut Malaysia (Wilayah Timur)
2.	Azhabarudin bin Mat Amin	Jabatan Laut Malaysia (Wilayah Timur)
3.	Leftenan Komander Sahrin bin Sahmsuddin	Agensi Penguatkuasa Maritim Malaysia (APMM)
4.	Shireen Hing Chen Huey	Department of Fisheries
5.	Amier Shahran bin Adenan	Asal Jasa Sdn Bhd
6.	Suhaimi bin Abu Bakar	Asal Jasa Sdn Bhd
7.	Suzana Mohamad	Sejahtera Ferry Services Sdn Bhd
8.	Mohamad Shahril	Sejahtera Ferry Services Sdn Bhd
9.	Zamiruddin bin Omar Tajudin @ Ali	Duyong Marina & Resort
10.	Captain Mohd Tarmizi bin Mejam	AIMS Global Holdings Sdn Bhd
11.	Nur Syahida Badrol Hisam	AIMS Global Holdings Sdn Bhd
12.	Omar bin Mohamad	ELCAA Properties Sdn Bhd
13.	Mohd Yusman Abd Mutab	ELCAA Properties Sdn Bhd
14.	Uthama Selvan	ELCAA Properties Sdn Bhd
15.	Syed Mohazri bin Syed Hazari	DHI Water & Environment (M) Sdn Bhd
16.	Abdul Rahman Nair	KASI (Malaysia) Sdn Bhd
17.	Ahmad Zohri	KASI (Malaysia) Sdn Bhd
18.	Koay Yee Chen	KASI (Malaysia) Sdn Bhd

Table 4: Participant List



Figure 18: Group photograph of participants taken during HAZID workshop (21st August 2019)

3.1

Hazards Discussed during the HAZID Workshop

- Potential collision of reclamation vessels working at sand mining site
 - Reclamation vessel: 15,000 m³ Trailer Suction Hopper Dredger (TSHD)
 - Sand mining site: off Kijal
- Potential collision of reclamation vessels with merchant vessels (OSV, commercial vessels) whilst enroute between project site and sand source / aggregate landing point
- Potential collision of reclamation vessels with small crafts (fishing boats and fishing gears, other small crafts) whilst enroute between project site and sand source / aggregate landing point
- Potential collision of reclamation vessels with passenger ferries / fast crew boat whilst enroute between project site and sand source / aggregate landing point
- Potential collision of reclamation vessels working at project site
- Potential capsizing, sinking and stranding of reclamation vessels at project site

The above hazards were identified, assessed and mitigated during the HAZID Workshop.

The completed HAZID Worksheet is shown in **Section 3.2**.

3.2

HAZID Worksheet

No	Failure Scenarios / Fault Events	Contributing / Causal Factors	Severity Index (SI)	Frequency Index (FI)	Risk Index (RI)	Risk Control Measures (RCM)	Residual Risk Index (RI)
1	Potential collision of reclamation vessels working at sand mining site	a) Lack of awareness of presence of sand mining works	2	3	5	<ul style="list-style-type: none"> Issuance of Notices to Mariners by Jabatan Laut Engagement to the stakeholders, fishing communities Announcement through Radio Channel Compulsory to ensure minimum number of crew who can communicate in English/ Bahasa Suspend operation when weather is poor, and seek shelter area contingency Subscribe to weather forecasting monitoring Reporting to Kemaman Port Authority of the sand mining location, vessel information, ETA / ETD 	2
		b) Equipment failure of passing vessel		1	3		2
		c) Miscommunications (language, incorrect information)		1	3		2
		d) Unreported / unauthorized anchoring of vessels		3	5		2
		e) Adverse weather affecting visibility (Strong wind, haze, heavy rain)		3	5		2
2	Potential Collision of Reclamation Vessels with Merchant Vessels (OSV, Commercial vessels) whilst enroute between Project Site and Sand Source / Aggregate Landing Point	a) Equipment failure of passing vessel	3	1	4	<ul style="list-style-type: none"> Issuance of Notices to Mariners by Jabatan Laut Engagement to the stakeholders, fishing communities Announcement through Radio Channel Compulsory to ensure minimum number of crew who can communicate in English/ Bahasa Suspend operation when weather is poor, and seek identified shelter area for contingency plan Subscribe to weather forecasting monitoring 	1
		b) Miscommunications (language, incorrect information)		1	4		1
		c) Unreported / unauthorized anchoring of vessels		1	4		1
		d) Adverse weather affecting visibility (Strong wind, haze, heavy rain)		3	6		3
3	Potential Collision of Reclamation Vessels with Small Crafts (Fishing Boats and fishing gears, other small crafts) whilst enroute between Project Site and Sand Source / Aggregate Landing Point	a) Equipment failure of passing vessel	3	1	4	<ul style="list-style-type: none"> Issuance of Notices to Mariners by Jabatan Laut Engagement to the stakeholders, fishing communities Announcement through Radio Channel Compulsory to ensure minimum number of crew who can communicate in English/ Bahasa Suspend operation when weather is poor, and seek identified shelter area for contingency plan Subscribe to weather forecasting monitoring Project Proponent to submit all necessary information to Jabatan Laut for Issuance of Notices-to-Mariners Educate/request fishing vessels to clearly mark and light their fishing gears Ensure competent crew to be on watch To establish communication loop, e.g. VHF Channel, mobile tele-communication, public website to advertise movement, Person-In-Charge on marine coordination 	2
		b) Lack of manoeuvre capability of fishing boats		3	6		3
		c) Miscommunications (language, incorrect information)		3	6		3
		d) Unreported / unauthorized anchoring of vessels		1	4		1
		e) Adverse weather affecting visibility (Strong wind, haze, heavy rain)		3	6		3
4	Potential Collision of Reclamation Vessels with Passenger Ferries / Fast Crew Boat whilst enroute between Project Site and Sand Source / Aggregate Landing Point	a) Equipment failure of passing vessel	4	5	9	<ul style="list-style-type: none"> Issuance of Notices to Mariners by Jabatan Laut Engagement to the stakeholders, fishing communities Announcement through Radio Channel Compulsory to ensure minimum number of crew who can communicate in English/ Bahasa Suspend operation when weather is poor, and seek identified shelter area for contingency plan Subscribe to weather forecasting monitoring Crew to be vigilant about likelihood of engine failure of the ferries and establish communication in the event of equipment failure To ensure project vessels to be equipped with working navigation system such as radar, AIS, VHF 	4
		b) Miscommunications (language, incorrect information)		1	5		1
		c) Unreported / unauthorized anchoring of vessels		1	5		1
		d) Adverse weather affecting visibility (Strong wind, haze, heavy rain)		3	7		4
5	Potential Collision of Reclamation Vessels Working at Project Site	a) Lack of awareness of presence of dredging, trenching, reclamation and breakwater construction works	2	3	5	<ul style="list-style-type: none"> Issuance of Notices to Mariners by Jabatan Laut Engagement to the stakeholders, fishing communities Announcement through Radio Channel Compulsory to ensure minimum number of crew who can communicate in English/ Bahasa Suspend operation when weather is poor, and seek shelter area contingency Subscribe to weather forecasting monitoring Installation of Aids to Navigation (AtoNs) Prioritization of constructing the breakwater and shelter area 	2
		b) Equipment failure of passing vessel		1	3		1
		c) Miscommunications (language, incorrect information)		1	3		1
		d) Unreported / unauthorized anchoring of vessels		3	5		2
		e) Adverse weather affecting visibility (Strong wind, haze, heavy rain)		3	5		2
6	Potential Capsizing, Sinking and Stranding of Reclamation Vessels at Project Site	a) Equipment failure affecting manoeuvring ability	3	3	6	<ul style="list-style-type: none"> Pre-plan sequence of discharging Ensure good conditions of equipment prior to operation Suspend operation in poor weather conditions Subscribe to weather forecasting monitoring To ensure anchoring equipment to be sufficient and maintain in good condition Report to Lima Tango Reporting Authority (Kuala Terengganu, Jabatan Laut) 	3
		b) Loss of stability		3	6		3
		c) Adverse weather affecting visibility (Strong wind, haze, heavy rain)		3	6		3

3.3 Outcome from HAZID Workshop

The identified marine navigational hazards associated with the construction phase of the proposed development of Sunrise City Mixed Development Project has been discussed during the HAZID workshop and the risk mitigation measures are included in **Section 5.0**.

4.0 ADDITIONAL RISK ASSESSMENT

4.1 Potential Impacts on Navigation of Existing Marine Traffic Due to the Changes in Current Flow

Potential impacts on the navigation of existing marine traffic due to the changes in current flow at the project site after the development of proposed reclamation area was assessed.

The main commercial marine traffic flow at the project site is through the Kuala Terengganu northern breakwater at the Sungai Terengganu estuary. Based on the potential changes in current flow stated in **Section 2.5.3**, there is a potential reduction of current flow rate by maximum 0.03 m/s which is about 0.06 knots in this area. This current flow rate reduction is considered not to adversely affect vessel manoeuvrability in and out of Kuala Terengganu northern breakwater as the current flow is either with the vessel motion or against it (not cross currents).

5.0 PROPOSED RISK MITIGATION MEASURES

The following risk mitigation measures are proposed:

5.1 Monitoring of Environmental Conditions

- Subscribe to weather forecasting monitoring
- Establish adverse weather contingency plan
- Pre-identify weather sheltered areas
- When in adverse weather affecting visibility and reclamation vessels are operating at sand mining or project site, mariners should suspend operations and proceed to anchor at sheltered area
- When in adverse weather affecting visibility and reclamation vessels are in enroute between sand mining and project site, mariners should suspend operations and proceed to anchor at sheltered area

5.2 Construction Vessels / Aggregate Carriers

- All vessels must pass the Port State Control (PSC) and Flag State Control inspection
- All vessels (except non-self-propelled barges) to have mandatory installation of AIS onboard vessels and is turned on
- All towed vessels compulsory to have towing arrangement certificate
- All towing and towed vessels and vessels engaged in dredging or sand mining or reclamation works, to display lights and shapes in compliance with COLREGS
- All vessels are to report on the appropriate VHF channels, all movements if in the vicinity of:
 - Kemaman Port - to Kemaman Port Authority
 - Kerteh Port – to Kerteh Port Marine Control Operator
 - Kuala Terengganu Port – to LIMA TANGO (Jabatan Laut Terengganu)
- At least one (1) member of the crew who is conversant in Malay as the main language of communication and English as the secondary language
- Ensure competent crew to be on watch (especially on bridge equipment such as radar and VHF Radio), at all times during vessel transits and during vessel working at Sand Source Site and at Project Site

- Vessels engaged in Sand Mining, Dredging and Reclamation activities to be for daylight operations only
- Route between Sand Mining Area or Aggregate Rocks Source and Reclamation Area at Project Site to be identified and way-pointed

5.3 Regulatory Requirement or Port Control Measures / Procedures

- Pilotage requirement subject to Jabatan Laut Kuala Terengganu
- Project Proponent to provide necessary information to the Marine Department so that Notices-to-Mariners (NTMs) can be issued
- Project Proponent to ensure engagement with relevant stakeholders and respective fishing communities
- Project Proponent to establish communication loop with the respective Kemaman, Kerteh, Dungun and Kuala Terengganu Ports operators

6.0 CONCLUSION

The HAZID committee concluded that the identified marine navigation hazards associated with the construction phase of the proposed Sunrise City Mixed Development Project at the Seberang Takir waterfront, Kuala Terengganu, Terengganu, can be mitigated to acceptable levels, subject to compliance with the mitigation measures identified during the HAZID Workshop.

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