REPORT ON

MARINE TRAFFIC & NAVIGATION SAFETY

BEING PART OF *THE*

DETAILED ENVIRONMENTAL IMPACT ASSESSMENT (DEIA) *STUDY FOR*

Proposed Development of an Integrated Petroleum Hub and Maritime Industrial Park including Reclamation at Tanjung Piai, Johor, Malaysia

CONTENTS

1. INTRODUCTION

1.1 SCOPE OF WORK AND TERMS OF REFERENCE (TOR):

This Detailed Environmental Impact Assessment (DEIA) Marine Traffic and Navigation Safety report is prepared for a project entitled Proposed Development of an Integrated Petroleum Hub and Maritime Industrial Park including Reclamation of 3,485 acres at Tg. Piai, Johor, Malaysia ("the project").

The primary aim of this marine traffic and navigational study is to address the environmental issues associated with navigation to and from the Proposed Project Areas.

The study covers the dredging, reclamation, construction of jetties and operational issues. This study took into account factors and as much information which was available, regarding:

- Description of Marine Traffic - including statistics on sizes of ships calling the Port;
- Existing Facilities and Utilisation;
- Future Utilisation;
- Existing Port Operating Procedures;
- Accident Statistics;
- Navigation Approach Channels;
- Restrictions on Access to PTP;
- Potential Environmental Impacts, etc.
- Appropriate proposal for mitigation measures to reduce the impact on navigation safety both during construction and operational stages.
- Assessment of the requirements for navigation aids.

1.2 Methodology

Using qualitative and quantitative methods, including, local knowledge, experience, any data available from the project proponent, adjacent port operating companies, authorities and government agencies, interviews with fishermen and their associations, local communities, etc.

1.3 Scope of Work

1.3.1 Description of the Baseline Environment and Marine Traffic, (Existing Environment)

- *Describing the existing marine environment.*
- *Identifying and accessing the existing (baseline) commercial marine traffic, including fishing vessels (and determining areas with fishing activities) and any other marine traffic which transits, berths or uses the navigable waters of the study area (and also the waters adjacent to this area).*

1.3.2 Identification of Additional Marine Traffic during Construction and Operation

- *Identifying the additional marine traffic generated by the jetty constructional work, transport of personnel and construction materials, dredging, spoil dumping activities, & etc.*
- *Identifying the possibility of marine traffic congestion due to the movements of vessels / marine craft connected with the project, in addition to the baseline marine traffic, both during constructional and the operational stages.*
- *Identification of adjacent areas and marine facilities, which may be affected by the proposed project.*

1.3.3 Proposing Mitigating Measures

- *Proposing appropriate mitigation measures to reduce the impact on marine traffic and navigational safety both during the constructional and the operational stages.*

1.3.4 Identifying Residual Impacts

- Identifying and recording any residual impacts

1.3.5 Expected Output

The determination of existing marine traffic and safety conditions and route formation within the impact zone.

- Description of the existing marine environment within the study area.

- Identification and assessment of the existing commercial marine traffic, including fishing vessels (and determining areas where fishing activities are carried out) and any other marine traffic which transits the affected areas (especially in navigable channels leading towards the approaches to the proposed marine facilities and jetties) and also the marine traffic and fishing activities in the waters adjacent to these areas.

- Identification of the existing (baseline) marine traffic statistics.

- Identification of existing adjacent marine routes, estuaries, channels, and marine facilities, which may be affected by the proposed project.

- Proposing mitigating measures and identifying and recording any residual impacts.

Notes:

- ***Operational issues and the viability of the proposed project are not components of, and will therefore not be addressed by this study.***

- ***A formal Marine Traffic Risk Assessment (MTRA) is not a component part of this Marine Traffic and Navigational Safety Study.***

1.4 STATEMENT OF NEED

The project is to build a sustainable energy park and a leading oil and gas services hub for oil and chemical storage, logistics and trading and production process. With this in place the facilities at Tanjung Piai will be able to provide capacity for trade consolidation and develop a strong marine and logistics industry at Sg. Pulai. This will enable the Proposed Development Project to compete for regional demand, increase investment and income revenue, and strengthen the socio-economy in Iskandar Malaysia.

Spektrum Kukuh Sdn. Bhd.(hereby referred as the **Project Proponent**) also intends to fully develop the project in 3 phases over 15 years.

The main activities of the project are reclamation of 3,487 acres of land, the future construction of new jetties and capital dredging.

Section 34A of the Environmental Quality Act 1974 (EQA 1974) requires that an impact assessment is carried out for any developments with potential impacts to the environment, of

which these developments are categorised as “prescribed activities”. The project comprises three (3) prescribed activities under the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987, as listed below:

- Item 4Land Reclamation. Coastal reclamation involving an area of 50 hectares or more.
- Item 10 Ports. (a)Construction of ports.
- Item 12 Petroleum. (e)Construction of product depots for the storage of petrol, gas or diesel (excluding service stations) which are located within 3 kilometres of any commercial, industrial or residential areas and which have a combined storage capacity of 60,000 barrels or more..

Among the prescribed activities listed under the EIA Order 1987, 17 activities require a Detailed EIA (DEIA) study prior to commencement. A DEIA is required for the project given that it falls under Prescribed Activity (4) on land reclamation, which is one of these activities requiring DEIA.

As such, the proposed project is subjected to a Detailed Environmental Impact Assessment (DEIA) study for submission to the Department of Environment (DOE). The requirement of DEIA submission is also to satisfy the provisions under the Environmental Quality Act 1974 (EQA 1974) and the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987.

2. PROJECT OVERVIEW AND DESCRIPTION OF THE PROJECT AREA

2.1 Project Location

The project is located at the western part of the State of Johor, at the end of the Straits of Malacca. It is situated off Tg. Piai, the southernmost point of mainland Asia. Administratively, the project is within Mukim Serkat, District of Pontian. The project lies less than 1km south of the Tg. Bin Power Station and 3 km east of Serkat Town. Two (2) international borders lie between 4 and 7 km from the project site. The navigation channel for the Port of Tg. Pelepas (PTP) runs in parallel with the eastern boundary of the project site. The key features of the project location are shown in Figure 1.

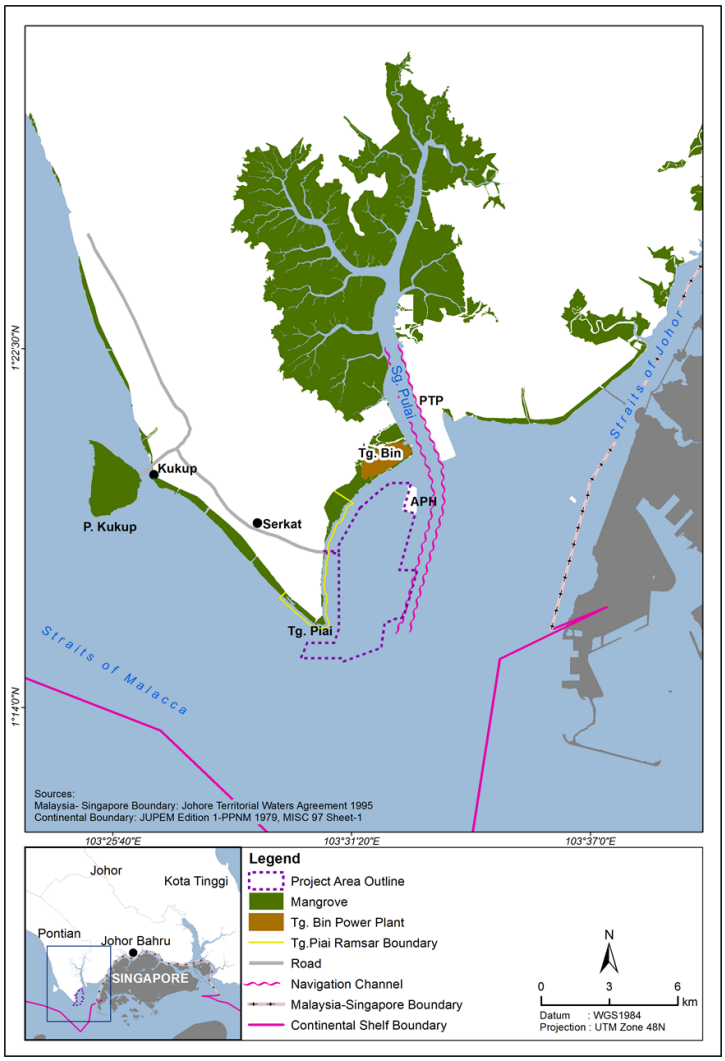


Figure 1: Location Of Project Area

The coordinates of the project boundary points shown in Figure 2 are listed in Table 1. The reclamation will cover a total area of 1,411 ha (3,487 ac) and extends at its farthest point

approximately 3 km out to sea. At its nearest point, the reclamation lies approximately 500 m from the mainland shoreline. The proposed site access will be following the existing road (i.e. Jalan Perpat Timbul), which connects Pontian town with Tg. Piai.

Location	Geographic coordinates (WGS84, degrees, minutes, seconds)	
	Longitude (E)	Latitude (N)
A	103° 32' 53.5194"	1° 17' 14.6400"
B	103° 32' 33.3594"	1° 16' 08.3994"
C	103° 32' 07.0800"	1° 16' 00.1194"
D	103° 32' 02.4000"	1° 15' 24.8394"
E	103° 31' 9.1194"	1° 15' 05.4000"
F	103° 31' 6.9600"	1° 15' 09.7194"
G	103° 30' 7.5594"	1° 15' 09.7194"
H	103° 30' 16.9194"	1° 15' 31.6794"
I	103° 30' 55.0794"	1° 15' 31.6794"
J	103° 31' 01.9200"	1° 15' 52.1994"
K	103° 31' 01.9200"	1° 17' 39.1200"
L	103° 30' 40.3200"	1° 17' 39.1200"
M	103° 30' 40.3200"	1° 17' 41.6394"
N	103° 31' 01.9200"	1° 17' 41.6394"
O	103° 31' 01.9200"	1° 17' 51.3600"
P	103° 31' 31.7994"	1° 18' 43.2000"
Q	103° 32' 14.2800"	1° 19' 18.4800"
R	103° 32' 44.5194"	1° 19' 18.4800"
S	103° 32' 33.7194"	1° 18' 39.9594"
T	103° 32' 50.2800"	1° 18' 35.2800"
U	103° 32' 27.9600"	1° 17' 15.0000"
V	103° 32' 31.5600"	1° 17' 15.0000"

Table 1: Boundary coordinates of the proposed project area

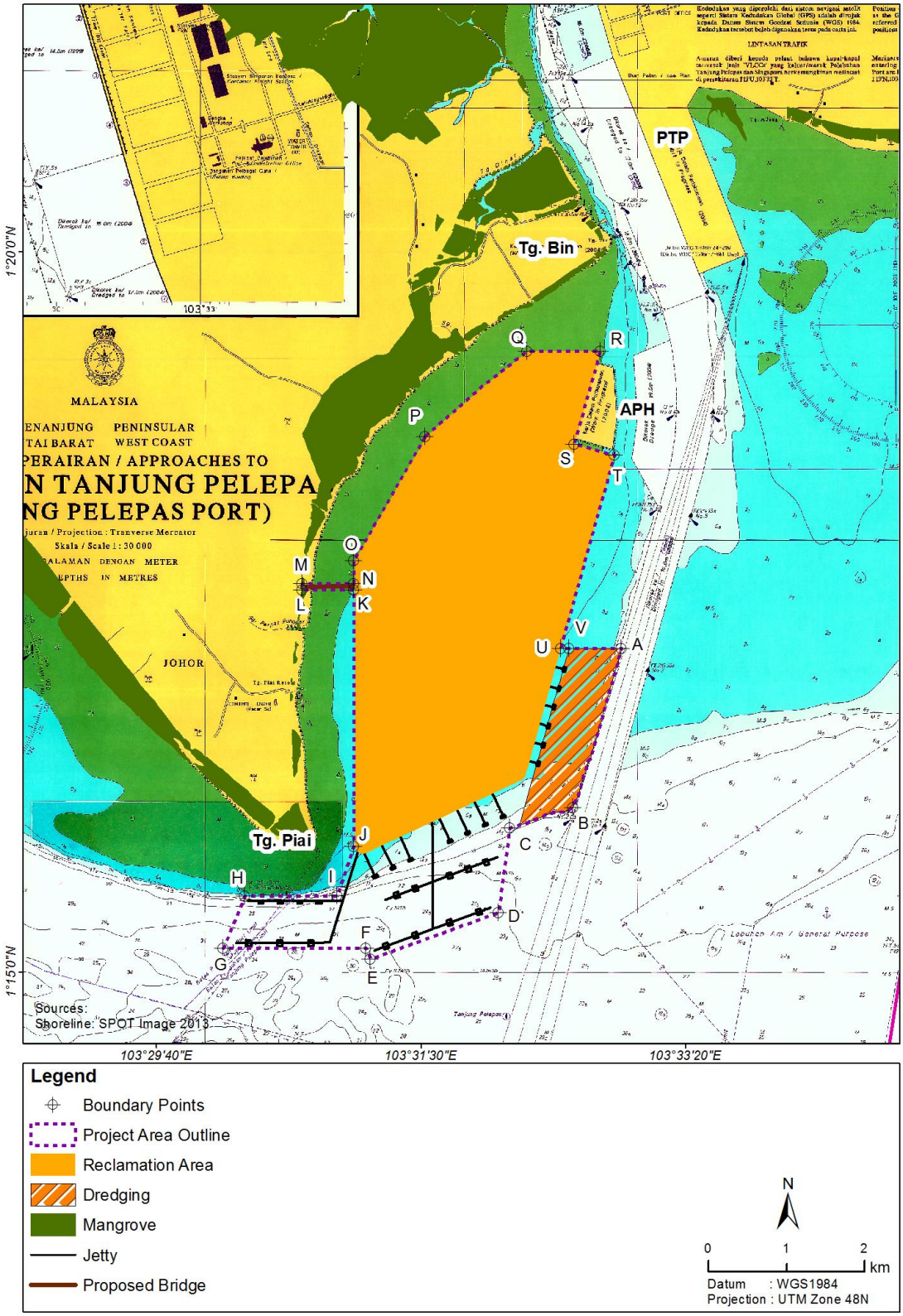


Figure 2: Project and boundary points (coordinates as per Table 1)

2.2 Project Components

The project comprises four (4) main components, namely reclamation, dredging, marine facilities and onshore facilities.

(a) Reclamation:

Reclamation will involve a total area of 3,487 acres. The reclaimed island will have a buffer of 500 m from the existing shoreline and adjoins the existing APH Island at the north-eastern side of the reclamation.

It is estimated that a total of 97 million m^3 of sand is required to form the island. The water depth within the reclamation area ranges from -1 m CD to -5 m CD and therefore below the low water level (sub-tidal). Sand for reclamation will be sourced from an approved sand source area offshore Muar, Johor. This borrow area is approximately 170 km from the project site.

Reclamation is expected to be carried out in three (3) phases as shown in Figure 3. The areas and reclamation volumes for each phase are as follows:

- Phase 1. Reclaimed area 1,080 acres, required fill volume 30.9 million m^3.
- Phase 2. Reclaimed area 1,008 acres, required fill volume 32.8 million m^3.
- Phase 3. Reclaimed area 1,399 acres, required fill volume 33.3 million m^3.

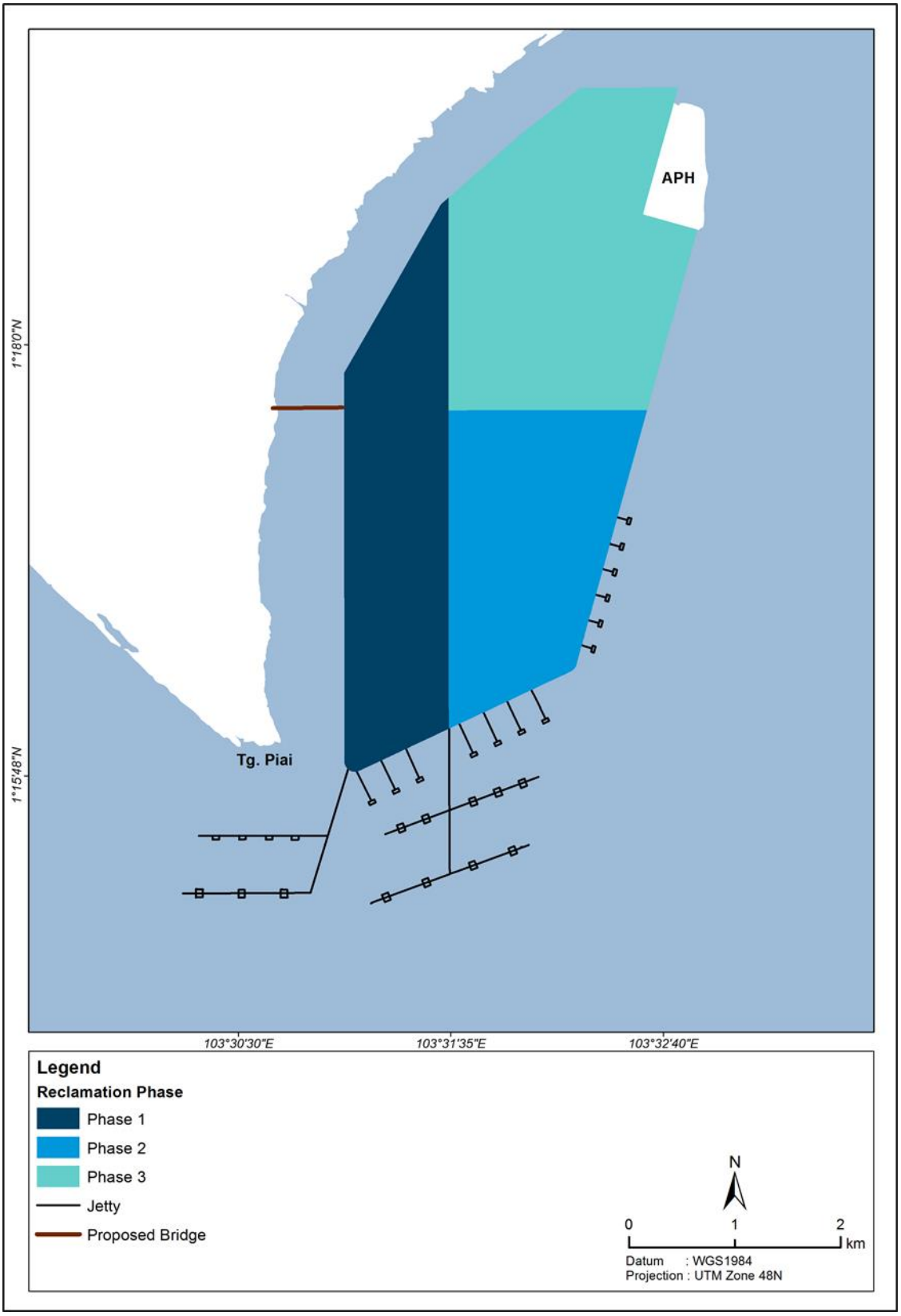


Figure 3: Reclamation Phasing

(ii) **Dredging**

Capital dredging will be required for the handling of oil tankers of 50,000 DWT at the berths proposed along the eastern boundary of the Phase 2 reclamation. To accommodate this a channel and berthing basin will be dredged along the eastern boundary of Phase 2 reclamation as shown in Figure 4. The basin will be located adjacent to the existing navigation channel for the Port of Tg. Pelepas (PTP) and will be dredged to -14 mCD. The estimated quantity of dredged materials is 10.8 million m3. These dredged materials will be disposed offshore at a designated disposal site. It is expected that this will be at Long Bank where a disposal site is located that has previously been used to dispose of dredged material from this area. This site is located approximately 40 nautical miles from the project site.

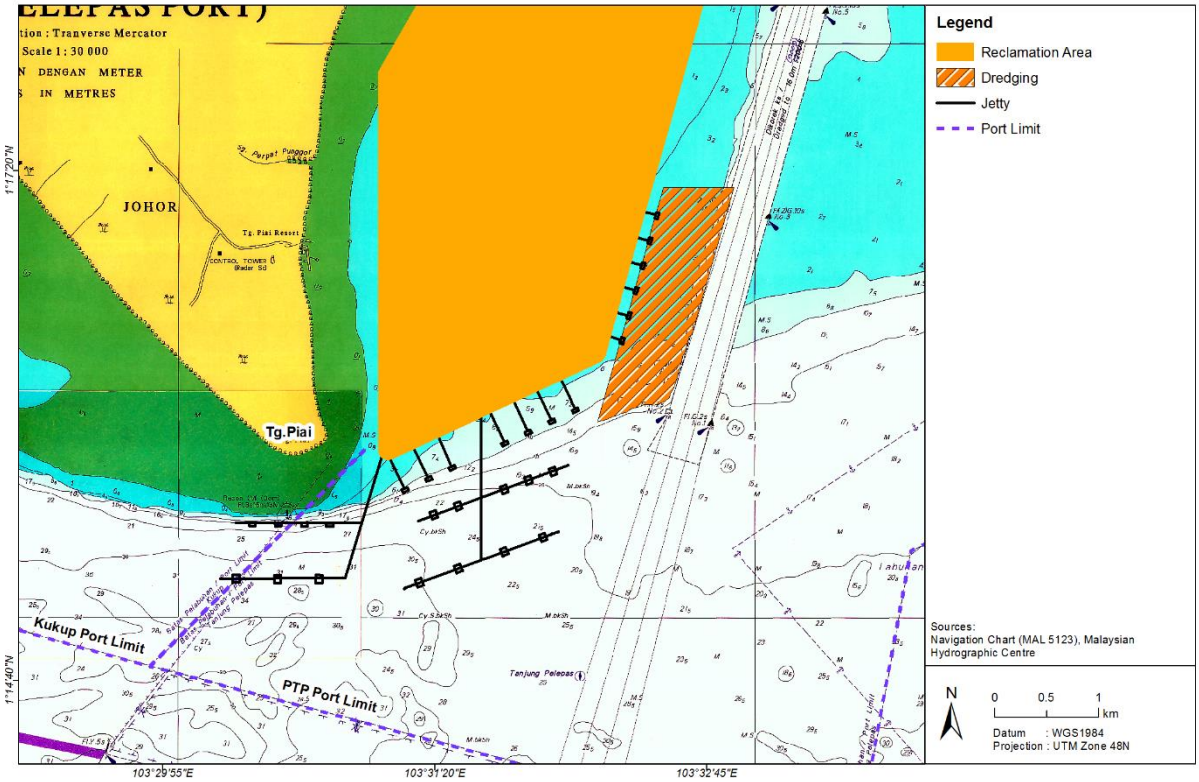


Figure 4: Area to be dredged to -14 mCD

(iii) **Marine Facilities**

The marine facilities consist of two (2) multi berth jetties incorporating a total of 28 berths and 13 shore connected berths for the handling of liquid petroleum and petrochemical products. The jetties will be built offshore to the south of the reclamation, and the shore connected berths along the southern and eastern boundaries of the reclamation as shown in Figure 5. The marine facilities to be constructed in phases with 10 berths in phase 1 and the remaining 31berths in phases 2 and 3.

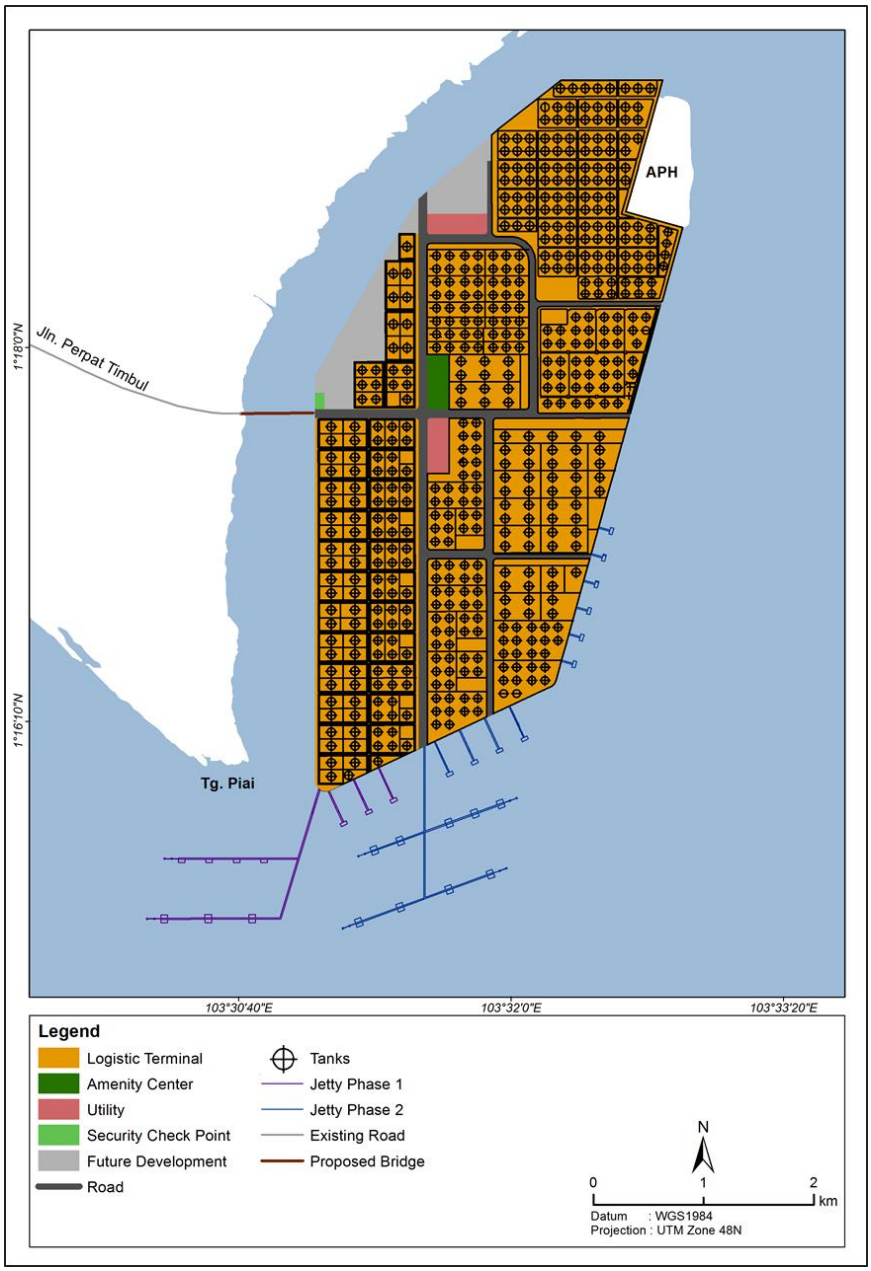


Figure 5: Jetty and tank storage development

The marine facilities are designed for a range of tanker sizes between 2,000 DWT and 350,000 DWT. The ship dimensions and drafts used in preparing the jetty layout and

assessing the required water depths are set out in Table 2.

Ship Size (DWT)	Length Overall (m)	Beam (m)	Laden Draft (m)
350,000 DWT (VLCC)	350	60	22
150,000 DWT	290	45	17
120,000 DWT	250	43	15.5
80,000 DWT	230	37	15
50,000DWT	200	32	12.5
20,000 DWT	175	23	10
10,000 DWT	130	17.5	8

Table 2: Design Ship Sizes

The estimated vessel calls for the development are set out in Table 3. These vessel calls are separated as follows:

- Ships calling at Jetty 1. These will serve the liquid petroleum storage facilities being constructed on the Phase 1 reclamation area.
- Ships calling at Jetty 2 and the shore connected berths. These will serve the liquid petroleum and petrochemical storage facilities being constructed on the Phase 2 and Phase 3 reclamation areas.

Ship Size (DWT)	No. of Ship Calls		
	Jetty 1	Jetty 2 / Shore Connected Berths	Total
350,000 DWT	212	117	329
120,000 – 160,000 DWT	195	188	383
80,000 – 120,000 DWT	35	395	430
20,000 – 50,000 DWT	115	468	583
10,000 – 20,000 DWT	690	2,591	3,281
<10,000 DWT	1,150	4,831	5,981
Total	**2,397**	**8,590**	**10,987**

Table 3: Estimated vessel calls at Jetties 1 and 2 and the shore connected berths

(iv) **Construction of storage tanks and terminaling facilities.**

Phase 1 – Strategic Oil Storage Terminal
A Strategic Oil Storage Terminal (SOST) will be the first industry to be developed on the reclaimed island. Crude oil and clean products will be stored at three (3) designated plots.

Phase 1 will be able to accommodate 129 units of steel tanks with a total storage capacity of 11,377,000 m^3. These tanks are 68.5 m and 75 m in sizes. Both tanks are 22 m tall. Apart from the storage facility, the SOST comprises of 13 berthing facilitates for vessels with sizes ranging between 10,000 DWT and 350,000 DWT (VLCC), receiving and distribution manifold, pumping facilities, firefighting facilities, instrumental and control system, utilities, roads and buildings.

Phases 2 and 3
The future phases are to be developed as logistics terminals for the petrochemical industry including its utilities clusters.

2.3 PROJECT ACTIVITIES

2.3.1 Construction Stage

The development will be carried out in four (4) stages:

1. Setting up construction infrastructure
2. Dredging and reclamation
3. Construction of marine facilities
4. Construction of onshore facilities.

The anticipated activities associated with these four stages are described in Table 4 below:

Component	Details
Setting up construction infrastructure	▪ Temporary site offices and construction workshops a. Utilities such as water, power supply, sanitation will be provided by portable unit. There will be no direct discharge of domestic sewage and construction waste into the sea. ▪ Construction jetty (temporary) to be constructed at the southern part of the reclamation to facilitate movement of construction material and machinery.
Dredging and reclamation	▪ Dredging for jetty access. a. It is anticipated that this will be carried out using a Trailer Suction Hopper Dredger or Cutter Suction Dredger b. Dredged material to be disposed of at an approved offshore site. ▪ Reclamation activities will include: a. Perimeter bund construction
Component	**Details**
	b. Hydraulic filling using imported fill and / or dredged material c. Construction of shore protection works d. Ground improvement works ▪ The perimeter bunds for the reclamation will be constructed in stages as the reclamation works progress. These are envisaged to be sand bunds. ▪ Reclamation will be carried out using a combination of trailer suction hopper dredgers dredging offshore, transporting sand fill to the site using sand barges, etc. ▪ There will be no double handling of reclamation fill at the site (that is, no dumping of material on the sea bed and re-dredging for placement in the reclamation area), all material will be pumped or placed directly into the reclamation area. ▪ Vertical drains will be inserted through the reclaimed land and soft subsoil strata, and preloading by filling the reclamation above the design levels may be used to accelerate settlement. ▪ Rock armoured shore protection will be installed on the outer face of the perimeter bunds after completion of the reclamation.
Construction of marine facilities	The key activities involved in construction of the jetty will include: ▪ Piling the jetty foundation ▪ Installation of precast concrete components and/or fabricated steel components. ▪ In-situ concrete work ▪ Installation of jetty topsides including pipework and loading arms. Jetty construction material will be transported to the project site by barge.
Construction of onshore facilities	Key construction activities include: ▪ Piling ▪ Erection of tanks ▪ Erection for petrochemical processing facilities (Phase 3) ▪ Pipelines and pumps ▪ Buildings and services ▪ Internal roads ▪ Construction of bridge to link mainland to reclaimed island ▪ Drainage system ▪ Landscaping Heavy bulk construction materials (e.g. steel plate for tank construction, piles, gravel, sand) will be delivered to the site primarily by barge.

Source: TOR document

Table 4: Activities Associated With The Proposed Project

2.3.2 Operational Stage

The operational stage will include commissioning of various component systems and final operation of the complete terminal. Marine vessels will transport all products. A causeway will be constructed to link the reclaimed island to the main land via Jalan Perpat Timbul, Kukup to cater for the operational work force and service providers.

The key operations to be carried out in the operational phase of the facility include:

- Berthing of petroleum tankers for the import and export of liquid petroleum products.
- Loading and unloading of tankers using loading arms and / or flexible pipelines between the ship and the jetty, and dedicated pipelines and pumps between the jetties and the storage tanks.
- Storage of liquid products in the onshore facilities.
- Provision of utilities and support facilities for the terminals including power, administration facilities, workshops and warehousing.

2.3.3 Project Implementation Schedule

The reclamation works shall be carried out in three phases, 1,080 acres to be reclaimed in Phase 1 and the remaining 2,485 acres will be reclaimed in Phases 2 and 3.

The target construction start date is in the first quarter of 2015. Phase 1 is anticipated to take about four years to complete (up to start of operations). The entire development is to be implemented on a 15-year time frame.

3. BASELINE SITUATION PRIOR TO THE PROPOSED PROJECT

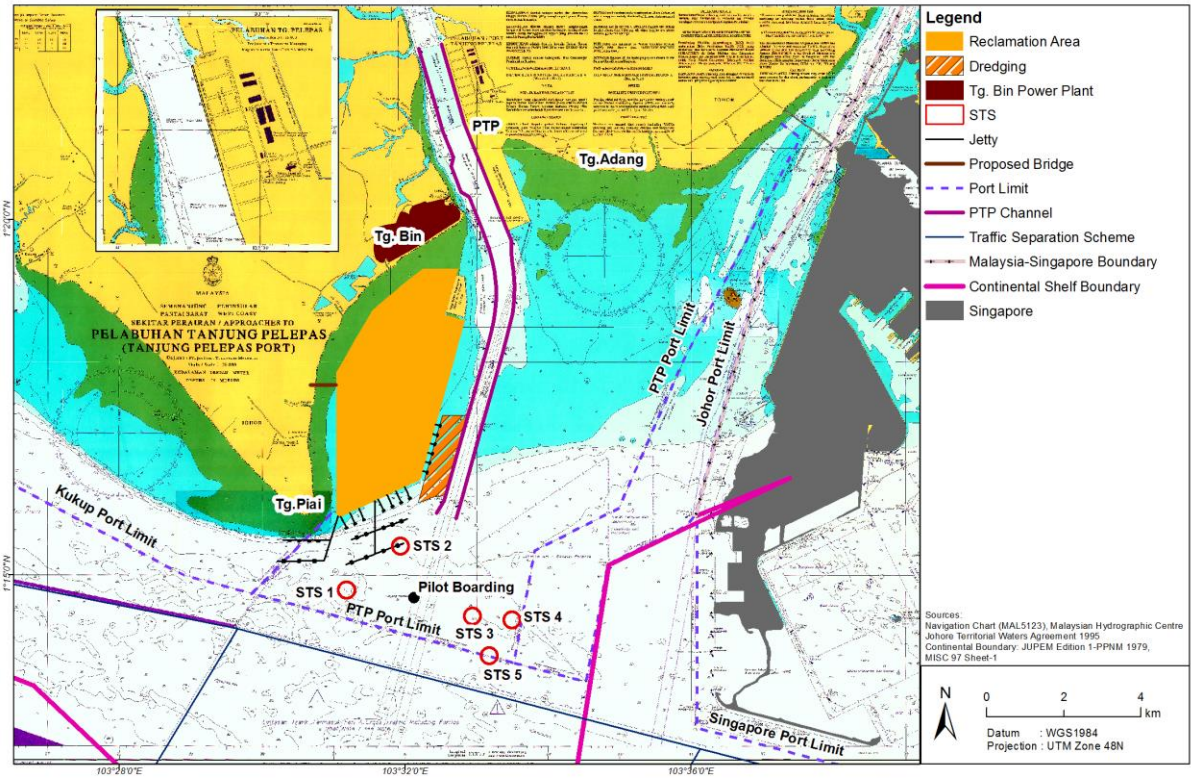


FIGURE 6: MAP OF AREA

3.1 OVERVIEW OF THE PROPOSED PROJECT AREA &BASELINE ACTIVITIES

The Proposed Project is located in PTP Port Limit offshore, specifically in Pontian, Johor. It is in an area located close to the Straits of Malacca in the westbound lane of the TSS. The closest adjacent Ports are Kukup and Johor Bahru, which mainly handle ferry traffic and some STS operations respectively. The other major port close to this will be port of Singapore.Between 2010 and 2013, the number of merchant vessels exceeding 300 GRT using the Straits increased by almost 5.2 per cent (see Table 5). LNG/LPG carrier using the Straits registered 18.7 per cent growth from 3,579 to 4,248 while tanker rose 12.6per cent over the same period. These figures exclude cross traffic and other vessel types plying the waterway. In addition almost 50 per cent of global energy shipments pass through the Straits annually. While reflective of the positive growth and relevance of the Straits in facilitating international trade, it also raises a whole set of challenges in balancing the economic viability and environmental sustainability of the area.

TYPE	2010	2011	2012	2013
VLCC / DEEP DRAFT CR	4333	4539	4732	4825
TANKER VESSEL	16247	16233	17345	18296
LNG / LPG CARRIER	3579	3830	4014	4248
CARGO VESSEL	8445	7996	7950	7613
CONTAINER VESSEL	24806	25552	24639	24658
BULK CARRIER	11642	10851	11678	12658
RORO / CAR CARRIER	2624	2545	2980	2998
PASSENGER VESSEL	1071	877	861	1063
LIVESTOCK CARRIER	45	47	38	55
TUG / TOW VESSEL	545	414	529	563
GOV / NAVY VESSEL	37	57	50	58
FISHING VESSEL	20	20	52	27
OTHERS	739	577	609	911
TOTAL	**74133**	**73538**	**75477**	**77973**

Source: Marine Department

Table 5: Number of merchant vessels using the straits

The Straits is not only a shipping lane. It is home to both living and non-living natural assets such as fisheries, mangrove forests, and coral reefs. It is a thriving marine culture and recreation resource centre, generating a wide range of marine life support systems as well as a critical source of economic livelihood for its coastal inhabitants. These assets are under tremendous pressure as the Straits becomes busier each year. Oil and chemical pollution, ballast water and solid waste discharges, vessel accidents and incidents are major threats to this delicate balance which if not properly managed, have the potential to adversely affect the livelihood of the surrounding communities and threaten the nation's long term economic sustainability.

3.1.1 Port of Tanjung Pelepas (PTP) Container Terminal

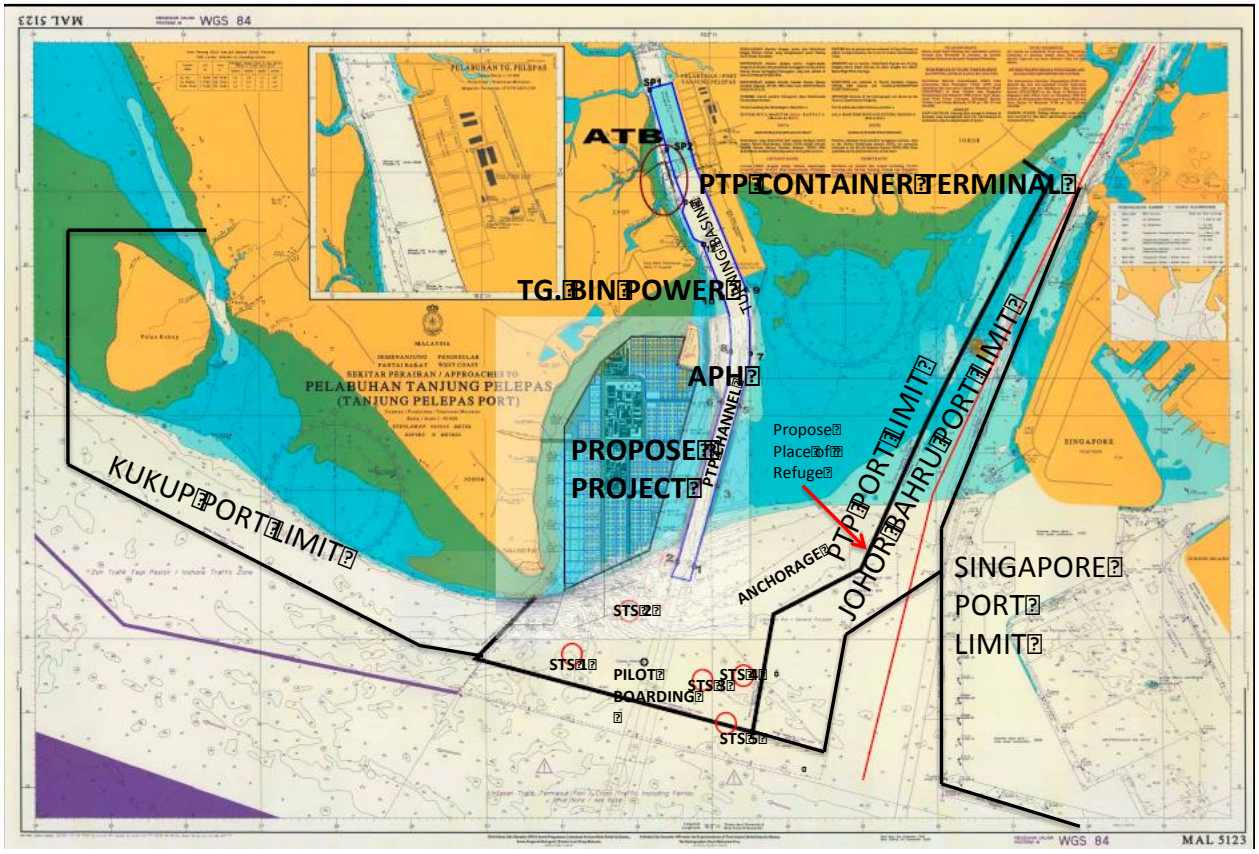


Figure 7: Port facilities at PTP Port limit

PTP is a world-class port with state of the art port infrastructure and facilities; PTP serves as the international gateway for the region through the excellent sea and multimodal connectivity that it offers. PTP has also been identified as one of the key components to the realisation of an integrated logistic hub within Iskandar Malaysia.

PTP operates 12 linear berth of 360 meters length each. It has the capacity to take the largest container vessel in the world, as the design is linear. The number of container vessels it handles as follow. Two additional berths are being constructed for completion in 2014.

Type	2010	2011	2012	2013
Container	4156	5095	4981	4793

Source: Marine Department

Table 6: PTP Container vessel call

3.1.2 VTTI (Also known as ATB Oil Terminal)

ATB Oil Terminal is used as an oil storage and blending facility for oil trading. It has a storage capacity of 841 000 m^3 and is able to handle oil tanker sizes including VLCC's. It has plans to increase the storage by 820 000 m^3. A jetty with five berths supports the storage facility.

ATB started operations on 9 April 2012 and when fully operational is expected to receive up to five vessels call per day inclusive of partially laden VLCC berthing on fortnightly basis.

Type	2012	2013
Liquid Bulk	388	1077

Source: Marine Department

Table 7: ATB vessel call

3.1.3 Tanjung Bin Power Plant Jetty

It has one coal unloading jetty that is capable of receiving a cape size bulk carrier and a fly-ash jetty.

There is an average of 6vessel calls per month. The type of vessel that calls is bulk carrier of the cape and panamax size.

Type	2010	2011	2012	2013
Dry Bulk	64	75	79	65

Source: Marine Department

Table 8: TG. BIN POWER PLANT Dry Bulk vessel call

3.1.4 APH Oil Terminal

This was planned for oil storage and blending terminal to be built on a 40 hectars of reclaimed land. However, the project is abandoned after some marine piling work has been executed

3.1.5 STS Operation

This involves the siting of a mothership anchored at designated location as floating storage unit (FSU). Daughter ships will berth alongside the mothership to pick up break bulk oil

cargo in smaller parcels for intra Asia and bunkering trade. To replenish the break bulk oil, monthly there will be Very Large Crude Carrier bringing in oil cargo to the mothership. The location of the 5 units mothership is adjacent to the entrance of PTP's approach channel. Two are located on the eastern side and another three on the western side of the approach channel. The size of the FSU is between 250000 -300000 Deadweight tonnes.

Type	2010	2011	2012	2013
Liquid Bulk	375	531	584	817

Source: Marine Department

Table 9: STS Operation

3.1.6 SINGAPORE PORT

The Singapore Port limits encompass the whole of Singapore as shown in Figure 7.The anchorages of the port of Singapore are divided into 3 sectors:

- Eastern sector
- Western sector
- Jurong sector

Jurong sector anchorage is for the following categories of vessel:

- Very Large Crude Carrier Anchorage - For loaded VLCCs
- LNG/LPG/Chemical Gas Carriers Anchorage - For non-gas free liquefied natural gas carriers, liquefied petroleum gas carriers and chemical carriers and for LNG, LPG carriers, chemical and oil tankers requiring immigration clearance.
- West Jurong Anchorage - For vessels waiting for berth facilities at the West Jurong Fairway, Pesek Basin and vessels under repairs or for special vessels and vessels including tugs and barges requiring immigration clearance.
- Tuas Petroleum Holding Anchorage - For port limit tankers which are waiting to service vessels at Anchorages in the Jurong Sector or waiting for berth facilities in the West Jurong Fairway and Pesek Basin or as directed by the Port Master.

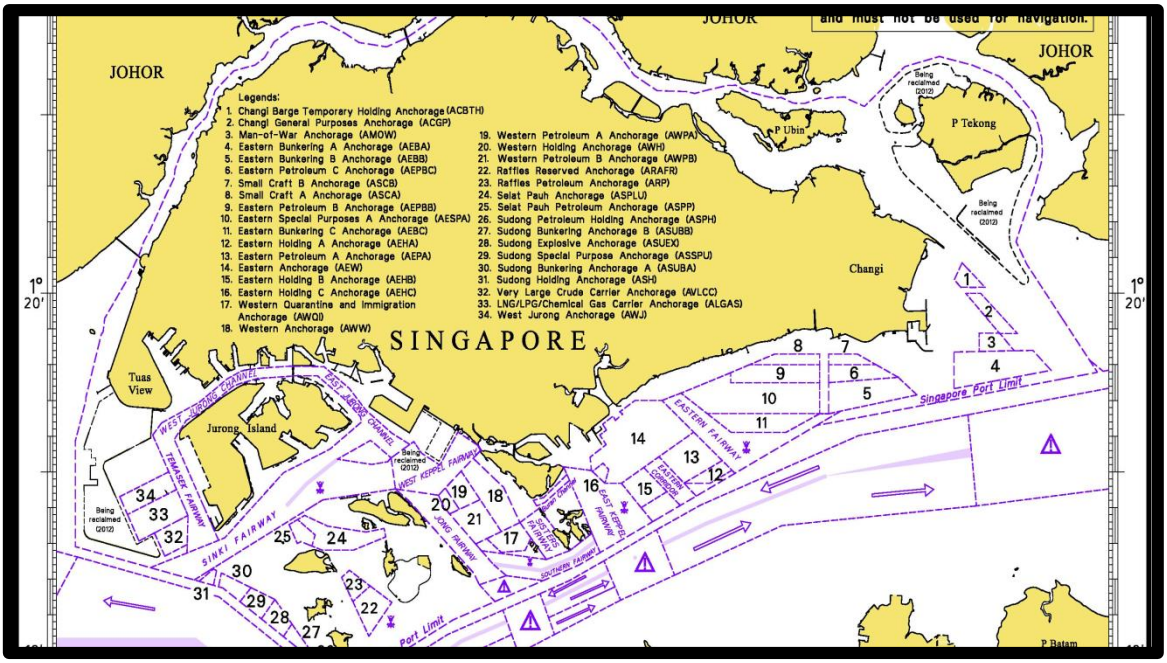


FIGURE 8: MAP PORT OF SINGAPORE

Singapore's port received more than 130,000 vessels totalling some 1.5 billion gross tons. Singapore's port handles a variety of cargoes at different terminals. About 30 million containers and 500 million tonnes of cargo are handled every year and more than 30 million tonnes of bunkers lifted annually. In addition, about a million visitors cruise into Singapore every year.

Type	2010	2011	2012	2013
Containers	18,967	19,290	18,567	17,798
Freighters	4,619	4,623	4,168	4,237
Coasters	4,123	3,907	3,935	3,753
Bulk Carriers	12,234	13,093	13,722	14,530
Tankers	21,355	22,280	22,230	22,617
Passengers	645	411	357	389
Regional Ferries	31,094	33,452	36,261	44,103
Barges	11,972	10,637	10,668	10,838
Tugs	12,551	11,065	11,102	11,732
Miscellaneous	9,739	9,240	9,412	9,420
Total	127,299	127,998	130,422	139,417

Source: MPA

Table 10: SINGAPORE PORT VESSEL ARRIVALS > 75 GT (BY NUMBER)

Purpose	2010	2011	2012	2013
Cargo	52,548	51,515	50,562	50,288
Repairs	8,631	8,235	6,657	6,881
Bunkers	35,572	37,753	38,082	38,614
Supplies	21,629	22,685	24,166	26,334
Others	64,145	65,918	69,885	78,904

Source: MPA

Table 11: SINGAPORE PORT VESSEL CALLS BY PURPOSE >75 GT (BY NUMBER)

3.2 POTENTIAL IMPACT TO NAVIGATION OF THE PROJECT TRAFFICS

3.2.1 Marine Traffic Risk Assessment

This report needs to be supplemented by a qualitative navigation study and marine traffic risk assessment to identify key areas of constraints and develop constraint management strategies. This study will review the information on the conditions that may affect movement of the design ships to the facility and assess the impact of these conditions on navigation based on the design parameters. Tabulated below are the typical ship sizes for conceptual design oil tankers together with the required dredge levels for berths to serve these ships.

3.2.2 Navigation Simulation

Navigation simulations have been conducted in a separate study to assess the suitability of the proposed layout of the marine facilities under different environmental conditions for movement of the design ships calling at the facility, and also the required manoeuvring areas and whether these impact the existing navigation routes. The following will be considered:

a) The proximity of the Project site location to the Pilot Boarding Area, General Purpose anchorage and the PTP approach channel.
b) The manoeuvring room required for mooring operations, project cargo discharge operations and unberthing operations during flood and ebb currents.
c) The effect of the prevailing winds during the monsoons and the Sumatras on the vessels during transit to and from the berth and at the berths.
d) A qualitative assessment of the impact of the mooring and unmooring operations during both the flood and ebb conditions on the through traffic flow will be considered; in terms of time and risk.

e) An evaluation of the impact of the marine operations on the marine traffic flow.

3.2.3 Local Climate at site and its impact on Navigation

Visibility

The visibility in the area is generally good. Periods of heavy rainstorms may temporarily cause a reduction in visibility. These periods last only a few hours and are not expected to have an impact on the movement of vessels to and from the waterfront facility.

There have been occurrences of haze in the area in previous years. This occurs during the southwest monsoon period when smoke from forest fires blows eastward.

Potential Impact:
With proper aids to navigation in place, shipboard electronic navigation equipment and the short channelling distance, the impact of the reduced visibility can be overcome for vessel operations.

Winds

The climate can be divided into two main seasons, the Northeast Monsoon and the Southwest Monsoon season, separated by two relatively short inter-monsoon periods.

The area is also subject to the Sumatras, which are lines of thunderstorms and usually occur between March and November each year. These squalls (lines of thunderstorms) develop at night over Sumatra or the Malacca Straits and move east towards Singapore and Peninsular Malaysia usually during the pre-dawn and early morning

Potential Impact:

As the designated site of the operations is relatively exposed, the ‘Sumatras’ havean impact on the vessel operations; especially since the vessel will be generally broadside to the wind. The moorings have to be designed to take the loads of the ship, during such conditions. The cargo operations may have to be suspended until the strong winds subside.

Tides

The tides within the area are co-oscillating tides of the Pacific and Indian Oceans.PTP has

two low tides and two high tides a day with the tidal range (difference between the high and low water) reaching being as low as 0.86m during low tide and as high as 3.34 metres during some spring tides.

Potential Impact:

The height of tide can be used to advantage for vessel transiting through the approach channel. As the approach channel and the berth boxes will be dredged to provide sufficient Under Keel Clearance (UKC), the impact of the tides is low.

Currents

The currents in the West Johor Strait generally flow along the direction of the West Johor Strait. Off the jetties, the current flows in a generally northerly and eastwards direction during flood tide. The ebb current tends to be stronger and flows the reverse direction. In the approach channel to PTP the currents are generally well aligned to the channel direction. Typical current patterns during spring tides in the vicinity of the proposed development are shown in Figure 9 (flood tide) and Figure 10 (ebb tide).

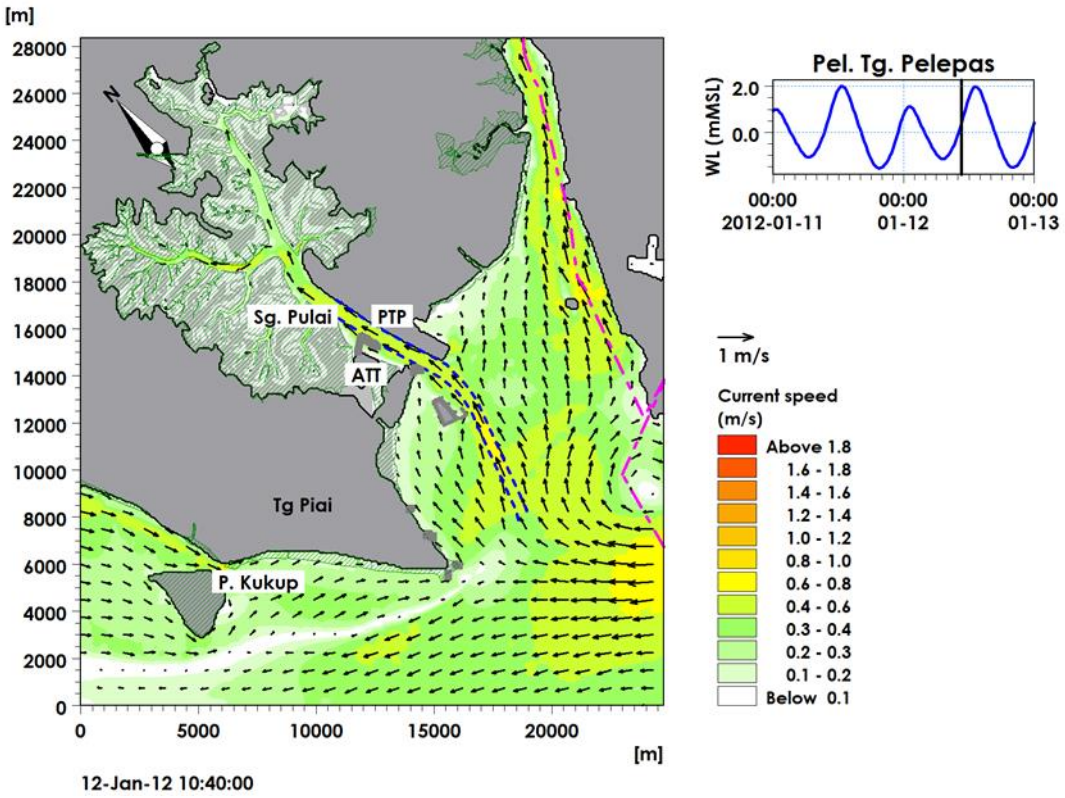


Figure 9: Typical Spring Tide Currents - Flood

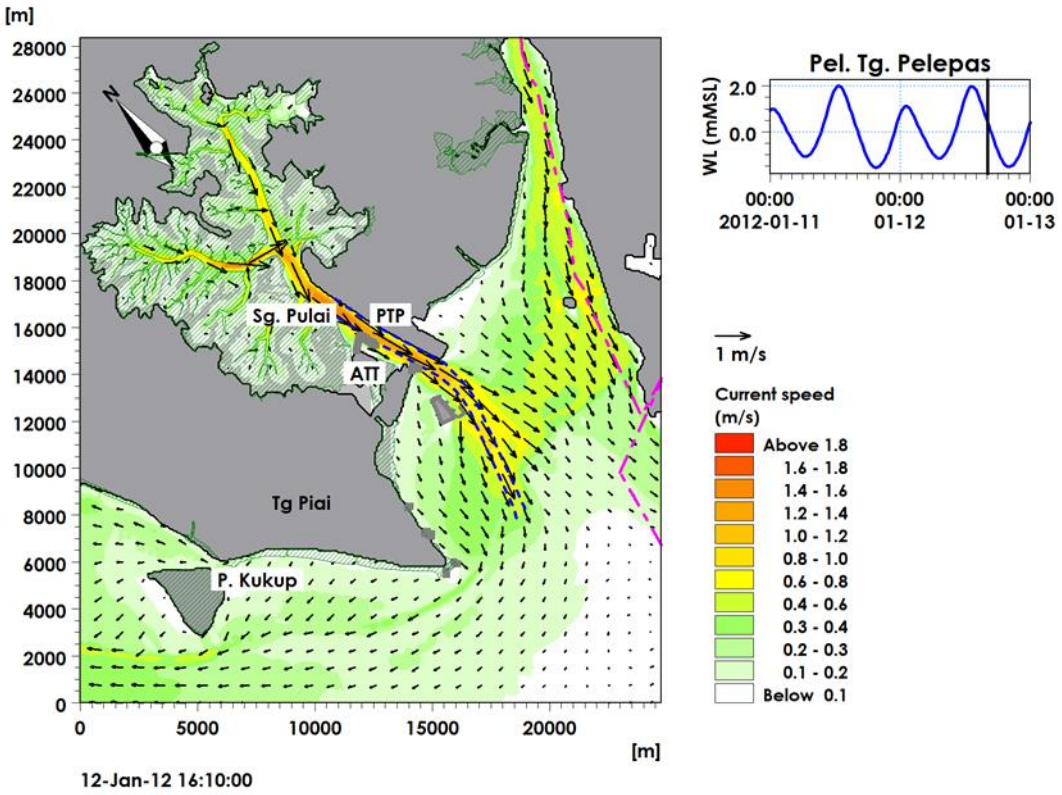


Figure 10: Typical Spring Tide Currents - Flood

Potential Impact:

Currents can impact the navigation safety and the manoeuvring space required for the shipping. This has been allowed for in the design and the desktop simulation exercises using the design vessel under various environmental conditions.

3.3 Ship Routing and Traffic Density Report

The Traffic Separation Scheme controls the navigation routes used by shipping in the vicinity of the Project and the deep-water channels to port facilities. The routes taken by shipping in a one week period from 1 to 7 July 2013 are shown in Figure 11. This figure also shows the location of the proposed reclamation and jetties relative to these shipping routes.

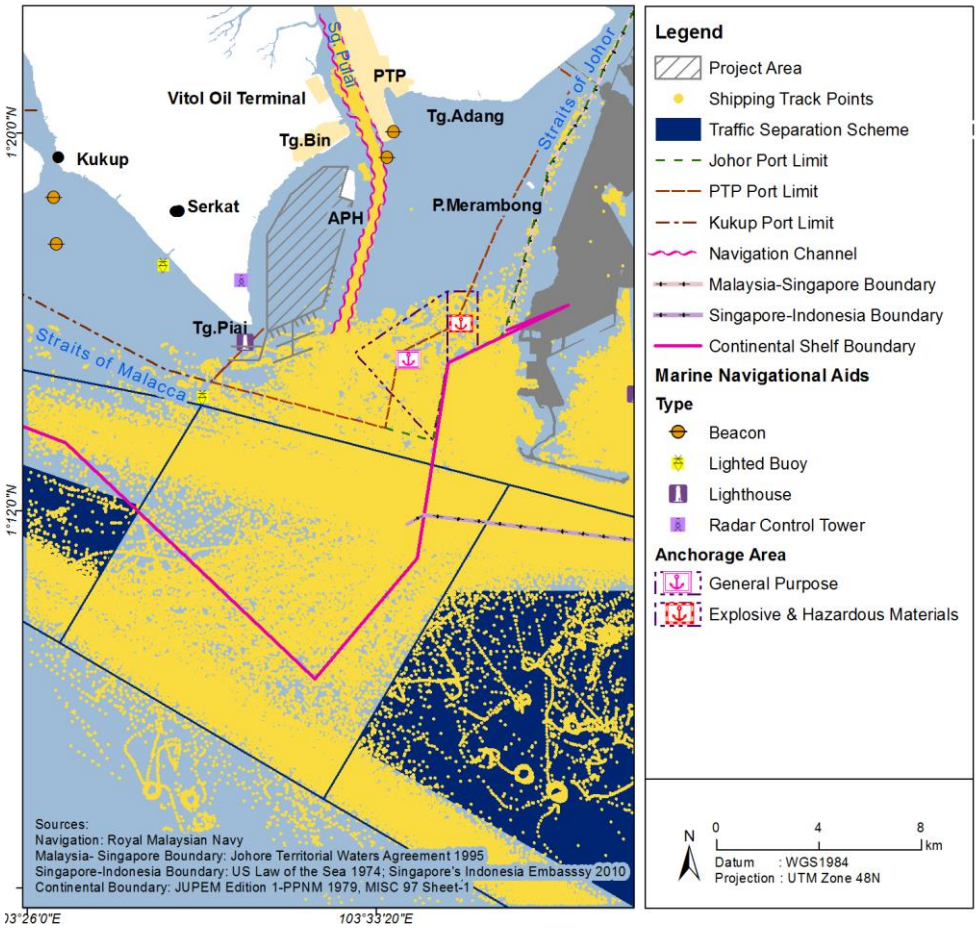


Figure 11: Shipping Traffic 1 to 7 July 2013

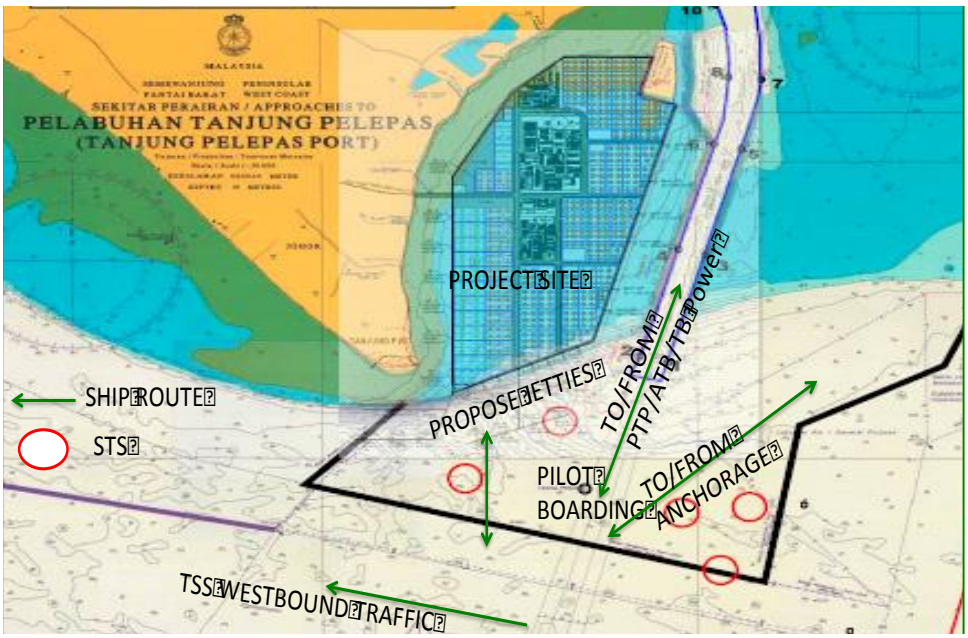
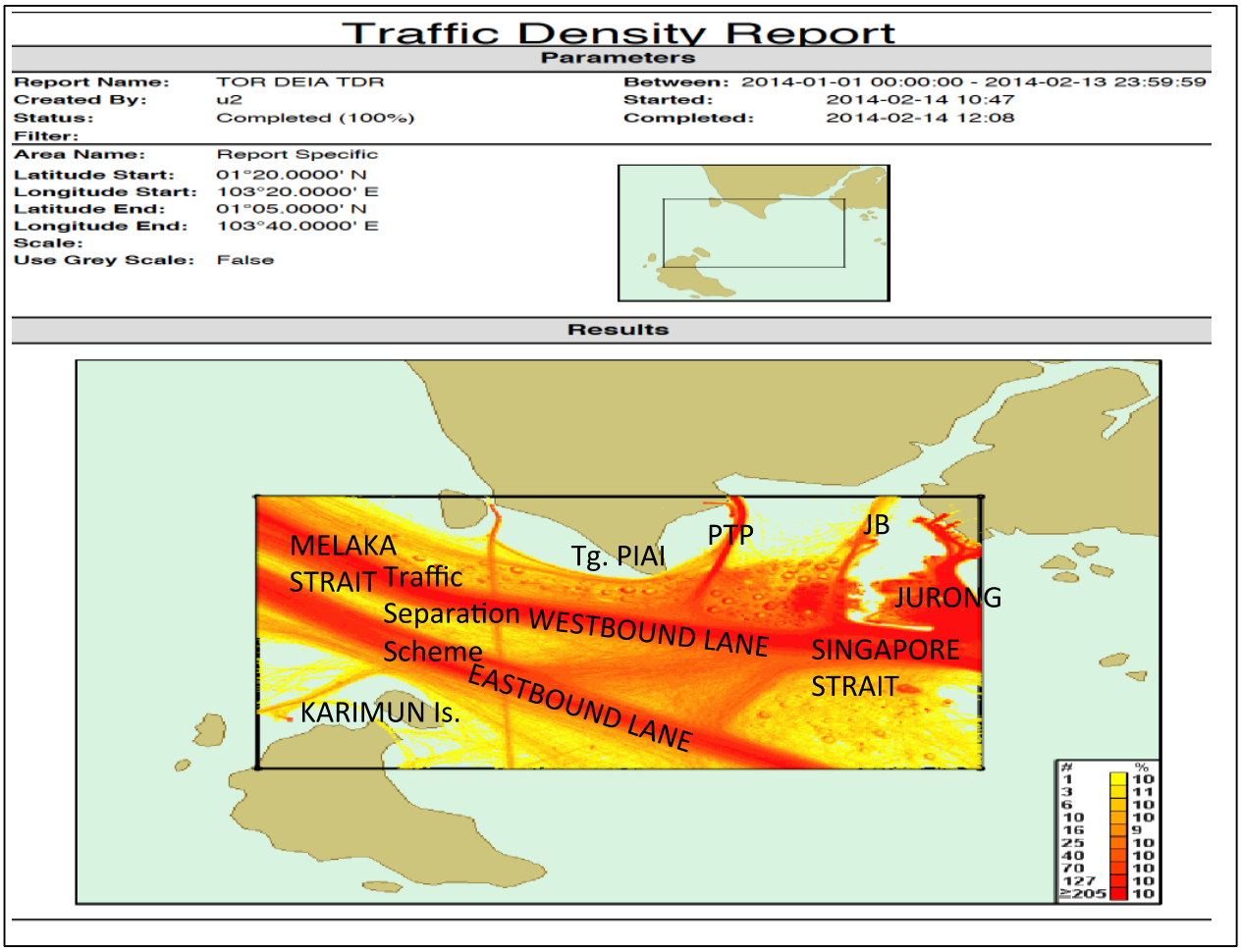


Figure 12: Ship Route Vicinity Of Project Site

The route used by ships moving in this area is mainly to/ from PTP container terminal, ATB

oil terminal and Tg. Bin Coal unloading Jetty. There are also movements of vessels to/from the anchorage and the TSS westbound traffic lane are closed to the project site. This is further illustrated in Figure 12.



Source: Marine Department

Figure 13: AIS Traffic Density Report

A request was made to the Marine Department for latest AIS image from their VTIS system for the following coordinates.

i) Lat.1deg. 20min. N, Long. 103deg. 20min. E
ii) Lat. 1deg. 20min. N, Long. 103deg. 40min. E
iii) Lat. 1deg. 05min. N, Long.103deg. 40min. E
iv) Lat.1deg. 05min. N, Long.103deg. 20min. E

A Traffic Density Report was provided as in Figure 12 for the traffic density from 1 January 2014 to 13 February 2014.

This report produces an analysis of the traffic in the chosen area and colours the chart according to the amount of traffic. The denser the traffic, the darker the colour will be. The

darker colours are mainly the traffic transiting through the Malacca Straits Traffic Separation Scheme (TSS), PTP, Johor Bahru and Singapore (Jurong).

3.4 Navigation Aids

Presently there is a light Beacon (off Tg. Piai), sector lights in the approach and channel buoys leading up Sg. Pulai located close to the project site. This needs to be reviewed with the Tg. Piai Intergrated Petroleum Hub and Maritime Industrial Park development in view of its importance to vessels navigating in the vicinity. The Tg. Piai Beacon will be affected by the physical development of the Jetties. The light beacon needs to be reviewed for a suitable new location with further consideration of its height and light intensity in view of the development. This is best done during the real time Full Mission Ship Handling Simulator.

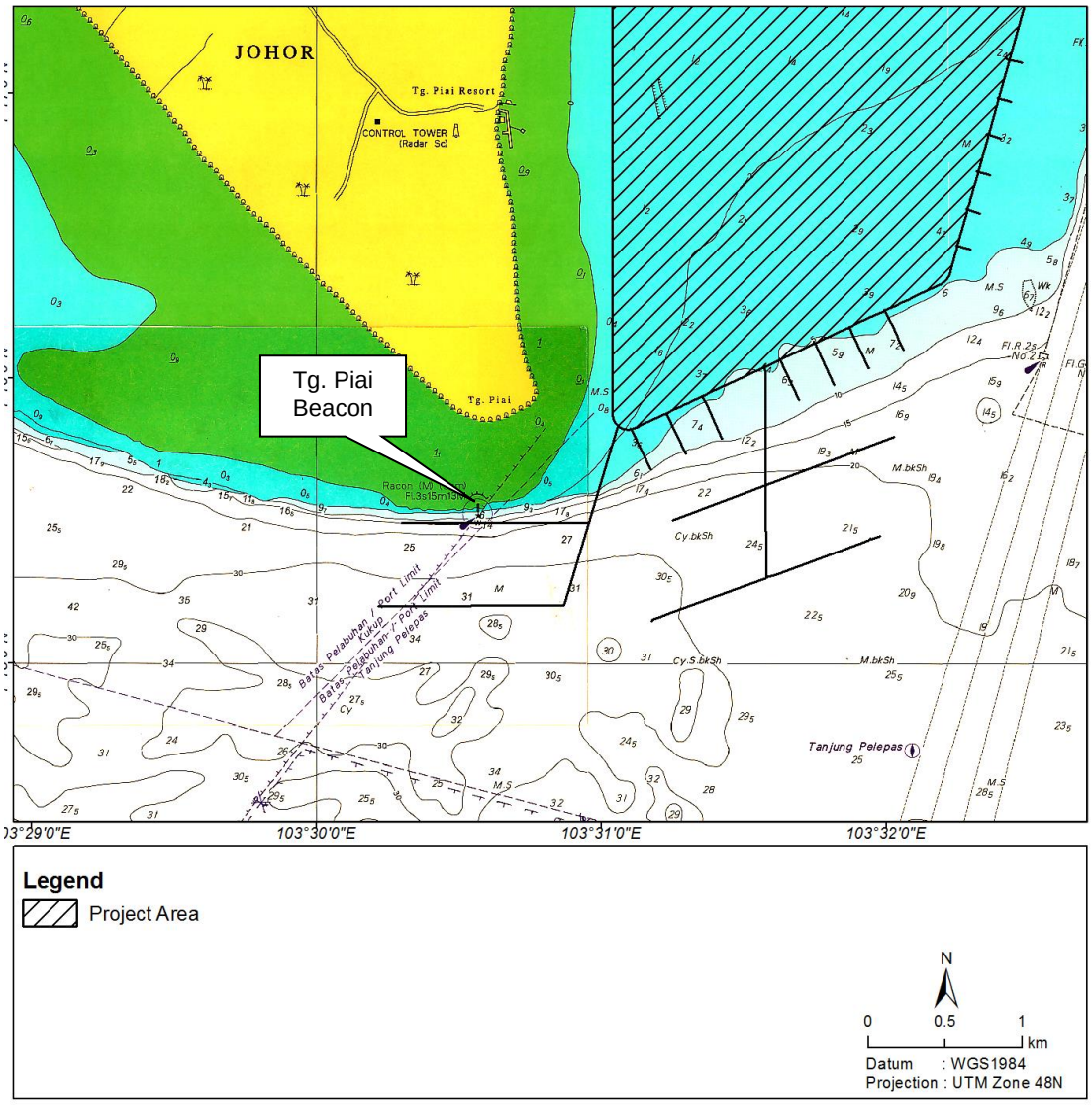


Figure 14: TG. PIAI BEACON AND JETTY STRUCTURE

3.5 Accident Statistics

The risk associated with the port operation is namely grounding, contact, and collision. Mitigation measures must be taken to reduce this risk to ensure the safe use of the port.

YEAR	CONTACT	COLLISION	GROUNDING
2006	0	0	1
2007	0	0	1
2008	0	0	0
2009	0	0	0
2010	0	0	0
2011	2	0	1
2012	1	1	0

Source: Marine Department

Table 12: Number of incidents at PTP

The risk and frequency of marine accidents with severe environmental impact are considerably high, as the number of incidents has shown that annually there are 1 to 3 incidents. The risk associated is namely contact, collision and grounding.

3.5.1 Risk and Mitigating Marine Accident

When planning a new port, it is essential to understand the impact on the surrounding waterways and the analysis of hazards in areas of congested and high volume marine navigation. As with any transport network, marine navigation increasingly requires assessment and review of potential risk.

Collision avoidance procedures exist that emulates the navigational logic applied in the real world and local procedures can be applied. Vessel parameters are applied to each vessel class that specify avoidance action. Grounding analysis is achieved through consideration of risk areas, vessel draught, water depth and grounding incident ratios. Vessel class details can be recorded together with volumes and distributions at each gate allowing evaluation of new port facilities or alternative navigational channels.

The risk in the vicinity of the anchorage and the approach to the project site is collision, contact and grounding. The mitigating measures that would need to be taken are:

i) The project vessels may encounter other vessels entering or departing from TSS, PTP and

anchorage. This can lead to a crossing situation that may affect the positioning of the project vessels to make a safe entry to the project site. Ensuring continuous keeping of a good lookout can mitigate collision and monitoring all vessels approaching so as to ensure risk of collision is avoided.

The mitigating measures in such an event are the licensed pilots that will be onboard the vessel. The pilot will help in communication and co-ordination with other vessels and to resolve any situation that may affect the approach of the project craft. Tugs assisting the project vessels will also be able to help in making a safe transit to the berths.

ii) The risk of contact is possible with vessels at anchorage and fix installation such as Jetty. Contact with jetty structures can be avoided with the usage of adequate number of tugs and the service of license pilots, which are familiar with the tidal condition and risks in the area. Contact with vessels at anchor can be avoided by keeping a wide berth when approaching them and avoid close quarter situation when navigating to and from the project site.

iii) Grounding can be mitigated by having the operational area fully surveyed, marked the area with grounding risk including navigational aids. The use of pilot would enhance the safety of navigation to the jetty giving it smooth communication and berthing at the jetty.

3.6 EXISTING MARINE TRAFFIC PROCEDURES AND SAFETY RULES.

3.6.1 MANDATORY SHIP REPORTING SYSTEM USED IN STRAITS OF MALACCA (STRAITREP)

The Proposed Project is located in sector 7 of the Straitrep. Sector 7reporting will be made to Singapore VTS on channel 73 of the VHF radio.

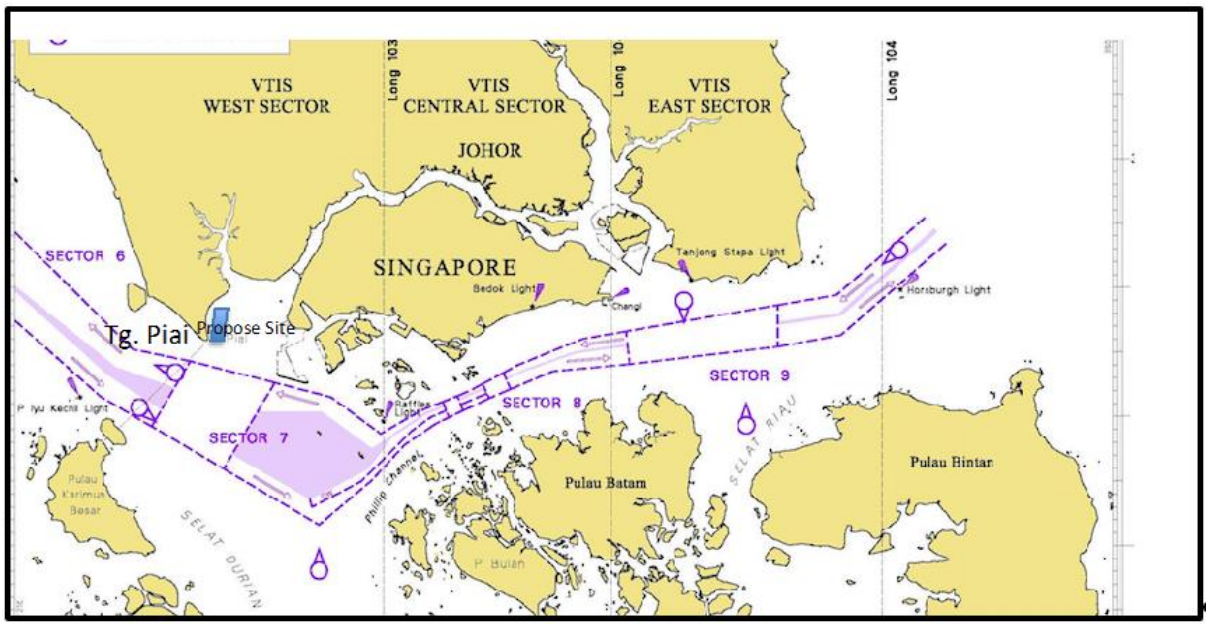


Figure 15: Mandatory Reporting System STRAITREP Sectors

STRAITREP is the Mandatory Ship Reporting System used in the Straits of Malacca and Singapore. The International Maritime Organisation (IMO) has adopted STRAITREP – the Mandatory Ship Reporting System in the Straits of Malacca and Singapore that was proposed by Indonesia, Malaysia and Singapore. Objectives of the STRAITREP:

1. Enhance the safety of navigation;
2. Protect the marine environment;
3. Facilitate the movements of vessels; and
4. Support SAR and oil pollution response operations.

STRAITREP took effect on 1 December 1998, 0000 hours UTC. Masters of vessels who need to use STRAITREP must comply with its requirements according to regulation V/8-1(h) of the International Convention of the Safety of Life at Sea, 1974, as amended in 1994. Note that a master who provides or receives information with STRAITREP is not relieved from any of his duties and responsibilities as a master.

The STRAITREP sectors and respective VHF channels and VTS authorities.

The sectors of the STRAITREP, their respective VHF channels and VTS authorities are tabulated.

SECTOR	VHF CHANNELS	VTS AUTHORITIES
Sector 1	VHF channel 66	KLANG VTS
Sector 2	VHF channel 88	KLANG VTS
Sector 3	VHF channel 84	KLANG VTS
Sector 4	VHF Channel 61	KLANG VTS
Sector 5	VHF Channel 88	KLANG VTS
Sector 6	VHF Channel 88	JOHOR VTS
Sector 7	VHF Channel 73	SINGAPORE VTS
Sector 8	VHF Channel 14	SINGAPORE VTS
Sector 9	VHF Channel 10	SINGAPORE VTS

Source: Marine Department

Table 13: STRAITREP Report

Format of ship the ship's report entitled "STRAITREP" must be made to the VTS authorities in the following format:

Designator	Function	Information required
A	Ship	Name and call sign
C	Position	A 4-digit group giving latitudes in degrees and minutes suffixed with N (north) or S (south) and a 5-digit group giving longitudes in degrees and minutes suffixed with E (east) or W (west); or
D	Position	True bearing (first 3 digits) and distance given in nautical miles from a clearly identifiable point (state landmark)
E	True course	A 3-digit group
F	Speed in knots and tenths of knots	A 3-digit group
P	Hazardous cargo on board	Indicate A Yes@ or A No@ to whether vessel is carrying hazardous cargo. If A Yes@ the class if applicable.
Q	Defects/damage/ deficiencies/other limitations	Brief detail of defects, deficiencies or other limitations
R	Description of pollution or dangerous goods lost overboard	Brief detail on type of pollution (oil, chemicals, (etc.) or dangerous goods lost overboard; position expressed as in (C) or (D)

Source: Marine Department

TABLE 14: CONTENTS OF REPORT

3.6.2 PORT CONTROL CENTRE

PTP Port Control Centre (PCC) monitors and regulates marine traffic in the Proposed Project Area and the respective navigable waters within the port limits. Movement of all vessels in Port must obtain prior permission from Tg.Pelepas Port Control. All vessels operating within the port limit are under the surveillance of the Port Radar System.(PRS)

Pilotage is compulsory within the limit of the Tanjung Piai. Port of Tanjung Pelepas Sdn Bhd provides Pelepas Port and the service round the clock. Minimum 7 days notification of ETA shall be given to Port Control Centre. Upon submission of Registration forms, Vessel Call Number (VCN) will be generated. Notice required to book pilot for both arrival and departure is 3 hours.

Communication by VHF radio can be established with “PTP CONTROL” as follows:

Channel1	PTP Emergencies/standby
Channel83	PCC (Port Control Center) to ships, Piloting
Channel64	Port Operations,T ugs, Pilots
Channel16	Calling, Distress and Safety
Channel12	VTS Control
Channel6	Ship to Ship

Source: Marine Department

TABLE 15: PTP Radio Control

Port of Tanjung Pelepas operates with 33 pilots,4 pilot boats and 8 tugboats.All tugboats are fitted with fire fighting equipment and 40-ton bollard pull with 3200 horsepower propulsion.

3.6.3 AUTHORITIES

The following Authorities are based at PTP.

- Port Health
- Immigration
- Marine Department
- Custom

3.7 Existing Navigation

The project site at Tanjung Piai is in the southwestern tip of the Peninsula Malaysia and in the Port Limit of Port of Tanjung Pelepas. It is strategically located in close proximity to the main shipping lane of Malacca Strait and the Singapore Strait. It is also close to the anchorages of Johor Bahru and Singapore (Jurong). The project site is also just west off PTP, a major reclamation and marine container terminal development. To the north is the oil storage and terminal facility of ATB and the coal-receiving berth of Tg. Bin Power Plant.

Port of Tanjung Pelepas terminals can be approached via the Southern entrance of Tg. Pelepas dredged channel. This channel is 420 meters wide and 7,000 meters in length. The declared depth is 16.0 meters ACD at approach channel and 17 meters in Phase 2 turning basin.

The pilot boarding area is located at **Lat.114’.7N; Long. 332’.2E**. A vessel waiting for the pilot can drift up to about1mile south of the above position.

The approach that would have to be taken by any ship proposing to enter the port limits of PTP would be by slowing down after executing the turn in the Traffic Separation Scheme in

order to be able to reduce to about two to three knots when entering the ports limits. The ship would have to stem the tide to maintain position and wait for pilot or further instructions from Port Control.

The Vessel Traffic Information System (VTIS) operating in the Singapore Strait and the port operations centres of both Singapore and Johor provide information to vessels to mitigate this risk. However, shipmasters approaching and leaving the PTP pilot station has to exercise extreme caution especially during the hours of darkness and in poor visibility.

Effect of winds on manoeuvring

The wind direction changes during the year. During the NE Monsoon, the winds are predicted to be from the north. Vessels approaching or leaving the project site will have the wind blowing offshore. During the SW Monsoon however the wind direction is at a greater angle to the Jetty orientation. The impact of the wind is onshore is thus greater impacting vessel using the Jetty. The 'Sumatra' winds blowing from the south to west quadrant are strong winds that can have a significant effect on a vessel moving through the approach channel or unberthing at the project site.

The presence of a pilot with experience in manoeuvring vessels in confined waters and local knowledge helps in mitigating the risks associated with the winds. The pilot, working with the shipmaster, will be able to decide if the assistance of the tugboats is sufficient to proceed through the approach channel in the prevailing circumstances and if additional tug assistance is required. During the 'Sumatras' however it may be more prudent to delay transit until the wind subsides. Fortunately these high intensity winds are of short duration.

Mooring and Unmooring Operations

The Phase 1 and 2 Jetty is located extended into the sea from the reclaimed shoreline. It is fairly protected from the waves and current. As a result there is very little impact on mooring and unmooring operation from the waves, current and passing ships except during the short period when the 'Sumatras' blow.

To reduce the risk, mooring and unmooring operations can be delayed until after the 'Sumatra' winds pass. These winds are seasonal, occur infrequently and are of short duration. Hence their impact on operations is minimal.

Impact on other marine traffic movements

The project site is located on the main marine traffic flow areas. The impact of vessels engaged in marine works for the project, such as dredging and construction, is significant. When operational, vessel movements to and from the project site will continue to be within the main traffic areas. However vessels moving to and from the General Purposes Anchorage and the terminals in Sg. Pulai may encounter and could possibly develop into a close-quarters situation with the vessels calling at the project site.

As pilotage is compulsory, this risk is mitigated by the pilot onboard the vessel proceeding to and from the oil jetties. He will be able to communicate and coordinate his vessel movement with the other vessels in order to prevent a close quarters situation from developing.

Proposed Anchorage

Present anchorage is proposed to serve the needs of the terminal. If additional anchorage is required it is suggested that deep-water area off Kukup and Johor Bahru Port Limit area be considered. If this is pursued it is recommended that the Kukup area be used for the oil terminal as this would reduce the crossing traffic.

Having the expanded anchorages in Johor Bahru port limit, which is close to the approach route to PTP, poses a danger to the transit vessels operating in close proximity to one another. The presence of vessels moving through the anchorage may not be obvious because of the obstruction by the vessels at anchor. Such a situation will be worse at night or during poor visibility. The reaction time to take evasive action is thus reduced.

Having pilots onboard all vessels moving in the anchorages can mitigate these risks. The vessel traffic information system could also provide advice on vessels moving in or out of the anchorages

Ship-To-Ship operation

In addition to the anchorage areas there are a number of licenced Ship to Ship (STS) transfer operations close to the southern port limit to the south of Tg. Piai. The location of these STS operation areas is shown in Figure 8. The experience in STS operation generally requires the pilot to be picked up as soon as entering the port limits and the vessel will then have to manoeuvre through the numbers of anchored vessels in the illegal anchorage between the TSS and the PTP port limits. If the current directions change while the ship is approaching the mother ship, then the swing of the mother ship would mean an aborted attempt by the daughter ship trying to approach the mother ship. In this case, the pilot would

have to negotiate other vessels at anchor and try to swing out to the Traffic Separation Scheme Precautionary Area and start all over again another approach. The time taken for this type of manoeuvre would be long and may end up about four hours. The risks are high when congestion at the anchorage is getting worse. In view of this the STS operation cannot coexist with this development.

The ships that intend to proceed for the terminals in Sungai Pulai will pick up the Pilot at the Boarding Area (PBA) and proceed to the approach channel. The course and distance will be as follows

From	To	Course	Distance
PBA	BuoyNo.1	25°(T)	1.3N.M.
BuoyNo.1	BuoyNo.7	16°(T)	3.0N.M.
BuoyNo.7	BuoyNo.9	01°(T)	0.6N.M.

Source: Marine Department

TABLE 16: PTP Course and Distance Table

Approach to Pilot Boarding Area

For vessels approaching the project site oil jetties from the east will transit through the Singapore Strait before entering PTP to pick up the pilot (Figure 6).Vessels approaching from the west they will transit the Malacca Strait and cross the Traffic Separation Scheme at the precautionary area to PTP. During this passage the vessels will encounter other marine traffic entering, leaving and transiting, awaiting pilot and anchored in the port waters of both Johor and Singapore. Some vessels are even anchored outside the port limits. This complex traffic situation is a hazard that extends beyond the 'Precautionary Area' of the traffic separation scheme in the Singapore Strait.

Consideration could also be given to review the position of Pilot Boarding area and the General Purposes Anchorage to provide more manoeuvring room for the vessel.

4. MARINE TRAFFIC DEMANDS, POTENTIAL IMPACTS AND MITIGATING MEASURES DURING THE CONSTRUCTION STAGE

4.1 Projected Marine Traffic Demand.

4.1.1 Marine Traffic other than the dredging activities.

i) During the setting up construction infrastructure there will be only the survey and mobilization traffic.

ii) During the construction of marine facilities there will be delivery of construction material, pile barge and associated marine craft.

iii) During the construction of onshore facilities, there will be delivery of construction material and workers.

4.1.2 Marine Traffic associated with the reclamation and dredging works for the Project

In addition to the baseline traffic as mentioned earlier, there will be an influx of marine craft during the dredging period. Dredging and reclamation will be carried out over a period of 24 months and the estimate marine traffic will be 8 to 9 dredger call per day.

The distance from the dredging area to the dumping area is approximately 80 nautical miles.

Other vessels utilised will most likely comprise of tugboats line towing large fully loaded / empty split hopper barges, workboats, passenger launches, etc.

There has been no detailed information regarding the types and number of dredging support vessels to be employed, but the above is an assumption based on what vessels have been used in the past for similar projects

Based on the information provided, it can be seen that the volume of marine traffic using the PTP waters will increase throughout the estimated two (2) years duration of the dredging work. The increase of marine traffic is expected to be eight to nine (8-9) dredger call a day.

4.2 POTENTIAL IMPACTS

4.2.1 Fishing

Fishing activities are not permitted within the PTP Port Limits, however, there is still some fishing carried out by small local fishing boats in the vicinity of the port. Fishermen do not frequent the areas adjacent to the entrance and approaches to the channel. Fishing gear could however be damaged and small boats may be damaged or sunk by a collision with larger vessel.

4.2.2 Marine Traffic Congestion

The proposed project will have a direct impact to current STS operation at PTP. STS 1 is obstructing the approach while STS 2location will be fully developed by the project. The current pilot boarding ground will be busy by, initially the dredger and eventually when operational by the additional tanker traffic which will effectively double the port traffic.

The traffic for Phase 1 and 2 will not use the PTP channel. However, when Phase 3 is developed than the traffic will add to the PTP channel traffic. There will be increase marine traffic as a result of the proposed dredging adjacent to and in the approaches to PTP of about 8 – 9 outbound (dredging) and inbound (reclamation sand) transits per day. With good coordination this is not expected to cause significant traffic congestion.

However, when the facilities becomes fully operationalised and have an additional 900 to 1,000 vessel call a month, it would require a fully operational vessel traffic management system to control traffic.

4.2.3 Damage to beacon, buoys, shore structures and embankments

The dredging may interfere with existing aids to navigation; such aids to navigation may need to be temporarily removed, then re-sited, perhaps in a new location, once the dredging is completed. Temporary aids to navigation may be established during the duration of the Proposed Project.

4.2.4 Dumping of Dredged Material

Dredged material may be accidentally, or intentionally, dumped in areas other than the designated approved dumping grounds which is sited at Long Bank in the Straits of Melaka about 40 nautical miles from the dredging area.

4.2.5 Pollution of the Sea by oil, chemicals, etc.

There will be an increased risk of pollution of the water by leaking, or spilled oil or other chemicals, as well as by other waste materials, which may be lost overboard or dumped into the water.

4.2.6 Port Safety

The increase in marine traffic will be a potential added risk to the safety within PTP Port Limit.
The dredging work itself with the movement of ancillary craft connected with the work will potentially add a greater degree of danger.

The Marine Department Malaysia, at the TOR meeting raised the need of providing place of refuge to vessels in distress. International Maritime Organization (IMO) Resolution *A.949 (23)Guidelines on places of refuge for ships in need of assistance* are intended for use when a ship is in need of assistance but the safety of life is not involved. Where the safety of life is involved, the provisions of the SAR Convention should continue to be followed

4.3 MITIGATING MEASURES

Based on the environmental conditions at the project site and the qualitative marine assessment, it is recommended that:

4.3.1 Fishing

Frequent security patrols should ensure that fishing activities are not carried out in, or at the approaches to, the areas to be dredged.
The dredging work will disturb the seabed equilibrium and as a result may interfere with the feeding grounds and breeding area of fishes and marine mammals; however this is beyond the scope of this study.

4.3.2 Marine Traffic Congestion

a) A clear passage should be provided from the pilot boarding ground to the works area.
b) All vessel movements to the Jetty are under compulsory pilotage and with tug assistance where necessary.
c) Temporary Aids to navigation are installed to mark the leading approach and limits of works area.
d) Movements of vessel in the vicinity are with the permission and under the guidance of the port control or vessel traffic control station.
e) A standard Operating Procedure is established to shipmasters on the details of the passage and the requirements for safe passage to and from the working areas.

4.3.3 Aids to Navigation

The Jetty close to the development area may obstruct the view of the Tg. Pia Beacon and need to be reviewed for its future continuous usage. This beacon is crucial for vessels entering/ exiting the Straits of Malacca. The possibility is to enhance its height and light intensity at the present site or relocation to the western site of the development area. Doing a Full Mission Shiphandling Simulation for the best-for-purpose position, height and light intensity should further refine this.

Should there be any need to remove, relocate, or re-establish any aid to navigation, the Malaysian Marine Department and the Johor Port Authority must be consulted and their prior approval obtained.

4.3.4 Dumping Ground and Reclamation Material

a) Dumping Ground

The designated dumping ground is Long Bank for the proposed project is the area enclosed by the following geographical coordinates:-

Point A: Latitude 01°19.4'N Longitude 104°07.7'E
Point B: Latitude 01° 20.2'N Longitude 103° 08.5'E
Point C: Latitude 01°22.9'N Longitude 103°04.2'E

Point D: Latitude 01° 23.6'N Longitude 103°04.9'E

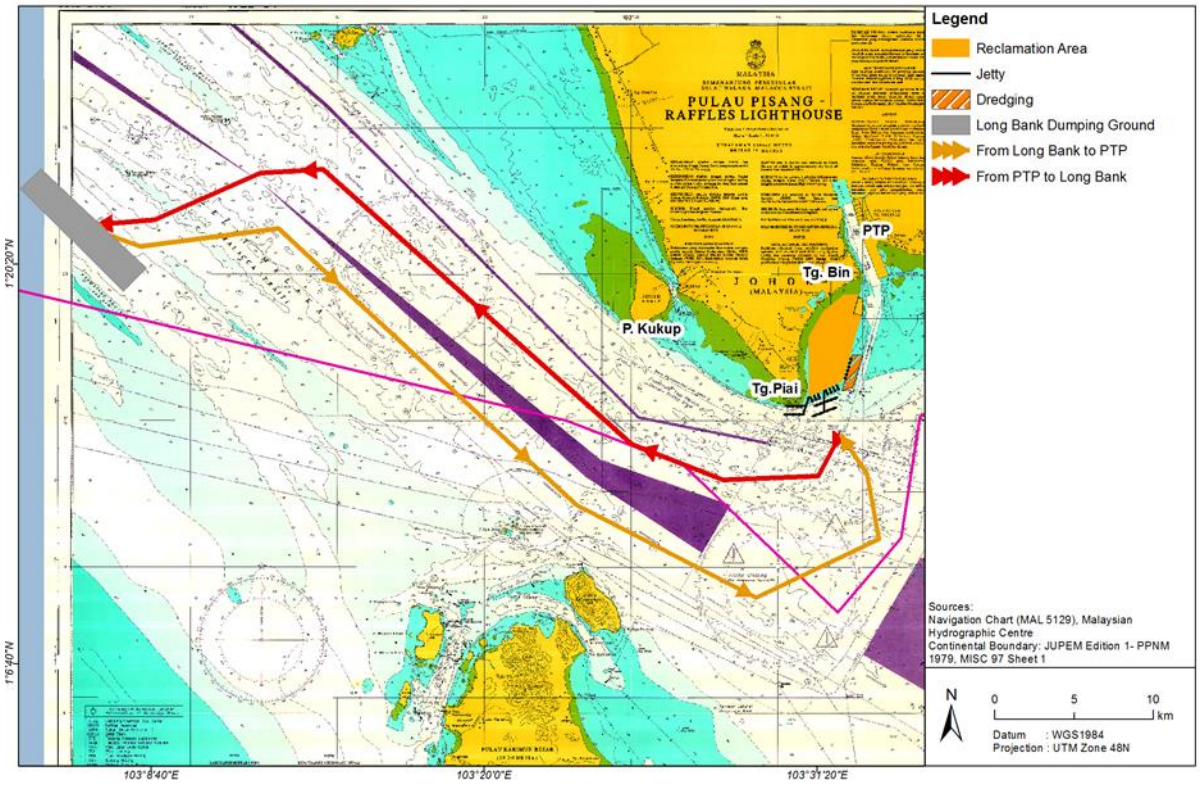


Figure 16: Dredger route from PTP to dumping ground Long Bank

Long Bank is about 40 nautical miles from the project area. These dumping site which lie in the Melaka Straits (LONG BANK) the route to and from the designated dumping area passes through the Traffic Separation Scheme in Melaka Strait which is the IMO Traffic Separation Scheme (TSS). All vessels, including the dredgers, spoil barges or other marine traffic associated with the Proposed Project, must follow the TSS routing. The TSHD and split hopper barges should all be fitted with devices, which automatically record and transmit both their location and the time that the hopper doors open to dump the dredged material. Dumping in any area other than within the specified Dumping Ground is strictly prohibited.

b) Reclamation Material

Sand for the reclamation will be sourced from an approved sand source area offshore Muar, Johor. This borrow area is approximately 133 km from the project site using the Inshore Zone.

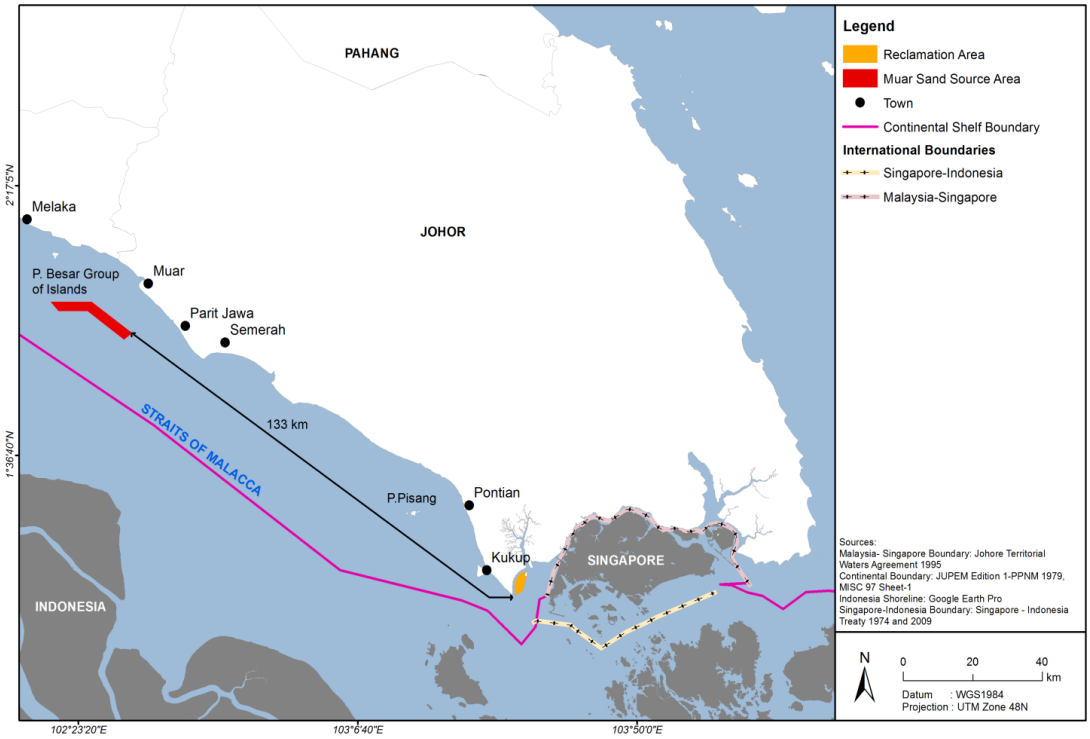


Figure 17: Sand Source off Muar and Reclamation area

4.3.5 Pollution of the Sea by oil, chemicals, etc.

- In order to reduce the risk of the spillage of oil, chemicals and other pollutants in to the sea, a comprehensive Oil Spill Prevention and Response Plan should be formulated; this plan will need to be pre-approved by Johor Port Authority, the Department of the Environment and all other relevant authorities.
- No dumping of waste, surplus materials or other debris should be carried out since this will cause marine pollution and would be a potential navigational hazard.

4.3.6 Port Safety

The potential impacts on the safety of navigation should be able to be mitigated to a large extent provided that the appropriate preventative measures are properly taken, these

include:

- Closely following and fully adhering to all the Rules, Regulations, Guidelines and other requirements of the relevant Malaysian marine authorities, namely the Port Authority which is the Johor Port Authority, the Marine Department Malaysia, Southern Region, and all other relevant government agencies, and in addition, ensuring that when transiting international waters all vessels fully comply with the International Regulations, all other requirements and guidelines at all times.
- The navigation channel to and from project area is adequately marked by lighted navigational aids to provide for safe day time and night time navigation by large vessels such as Trailer Hopper Suction Dredgers (TSHD).
- It is necessary that the local marine authority, which is the Johor Port Authority (Lembaga Pelabuhan Johor), be consulted before the proposed dredging work begins, as there may be a need to establish additional local navigation aids in the immediate vicinity of the project area.
- All fixed and movable structures, such as pipelines, barges, floating pipelines and any other structures erected in the water ways must be well illuminated by night and clearly marked so as to be highly visible by day.
- All work areas should be clearly marked with lighted marker buoys.
- Additional Aids to Navigation should be established if deemed necessary.
- All Rules and Regulations, both local and international appertaining to the manning, registration, licensing, operation, routing, equipping and management of all marine craft should be complied.
- Port pilots will have to be employed as is required by law.
- All traffic movements should be fully reported to the PTP Port Control Centre (PCC) by VHF radio, and if deemed necessary to the Johor Port Authority, a local marine traffic control and management sub-centre (This could be take the form of a Vessel Traffic Management & Information System [VTMIS] Centre.) should be established near to the dredging area in order to enhance the reporting procedure.
- Approval from the Johor Port Authority will have to be obtained before any temporary jetties are built, and a Foreshore Occupation License and a Handling of Goods Permit will have to be obtained from all the relevant authorities for each temporary jetty built.
- A restricted area will need to be established to encompass the entire working area, and this area should be clearly marked with lighted markers buoys.
- All marine craft involved with the dredging and transport of dredged spoil, should be fitted with Automatic Identification System (AIS) transponders (as a minimum Class B

AIS transponders) coupled with a Global Positioning System (GPS) receiver. This will enable them to be closely monitored all times by the Pasir Gudang Port Control Centre.

- A comprehensive Emergency Response Plan should be formulated; this plan will need to be pre-approved by the Johor Port Authority and all other relevant authorities.
- It is recommended that the hazardous and explosive anchorage be used for Place of Refuge as shown in figure 6. This location is sheltered and is furthest away from the commercial activity area of the port.

5. POTENTIAL IMPACTS AND MITIGATING MEASURES DURING THE OPERATIONAL STAGE

5.1 Marine Traffic

Once being fully operational it is expected that there will be additional traffic of about 916 vessel call per month and this will more than double the traffic using PTP.Marine vessel movements to and from the project Oil Jetties will continue to be close to the main traffic areas of the TSS, the General Purposes Anchorage and existing terminals in PTP. This encounter could possibly develop into a close-quarters situation with the vessels calling at the Oil Jetties and needs to have an effective traffic management system. Apart from ships accessing the new berths along the eastern side of the reclamation no direct impact on ships using the PTP approach channel.

The anticipated increase in marine traffic should not pose any major problem, provided that all the existing Rules, Regulations and Guidelines are closely followed, and all restrictions are fully adhered to. Advanced technology should be used to oversee port and marine service providers round-the-clock, making sure that the construction and operations being undertaken are safe and reliable.

As the local port planner, Johor Port Authority (Lembaga Pelabuhan Johor) is also responsible for the safe and optimal use of sea space and waterfront land. While PTP can accommodate today's largest ships, the project should be preparing for tomorrow's increased cargo and mega ships by deepening channels and fairways, and developing the next generation of terminals.

With guidelines, procedures and systems in place, it ensures that the port remains safe, secure and clean while maintaining a high level of reliability, speed and efficiency in its operations.

The guidelines, procedures and other information relating to the systems, activities and operations within the port should adhered to.

Project Proponent is required to submit all relevant documents and Standard Operating Procedures (SOP) pertaining to their project to Authorities namely Johor Port Authority and Marine Department. The Authorities would then vet through the submitted documents and consider the navigational and safety impact of the project. A pre-operational meeting is required if the project applied for possesses a navigational and operational constraint/risk to

other port user.

STS operation in the area should be reviewed for termination as the area is now earmarked for development.

The anchorage area to be managed for optimization and illegal anchoring in the vicinity should be subjected to exertive enforcement. PTP's anchorage is currently very limited and need to be reviewed for additional traffic, waiting for berth. There is possibility of increasing the PTP anchorage by expanding the port limit into the present Johor Bahru Port Limit and/or Kukup Port Limit.

All vessels in the Proposed Project should engage pilots as is required by the Johor Port Authority.

All relevant authorities such as, the Chief Marine Officer of Johor Port Authority (Lembaga Pelabuhan Johor) and their licensed port operator, PTP, the Port Officer, local Marine Department Officers, the Fisheries Department, etc., must be informed well in advance of any operation starting, and any required approvals, permits, licenses, etc., should be obtained well before any work commences, in addition this will enable Notices to Mariners and Port Circulars to be issued if this is deemed necessary. Johor Port Authority (Lembaga Pelabuhan Johor) is the Authority responsible for the Safety of Navigation within the PTP Port Limits, including the proposed project area. In Malaysia's coastal waters, the authority for safety of navigation is the Malaysian Marine Department.

To facilitate this, a Marine Traffic Risk Assessment (MTRA) is required to be undertaken to manage and mitigate all risk. However, this is beyond the scope of this study.

5.2 Traffic Management

In considering the movement of vessels to and from the proposed facility, the following will be considered:

a) The proximity of the selected location to the General Purposes anchorage and the main shipping lane and channel traffic.
b) The manoeuvring room required for mooring operations, project cargo discharge operations and unberthing operations during flood and ebb currents.
c) The effect of the prevailing winds during the monsoons and the Sumatras on the vessels during transit to and from the berth and at the berths.
d) A qualitative assessment of the impact of the mooring and unmooring operations during both the flood and ebb conditions on the through traffic flow will be

considered; in terms of time and risk.

e) An evaluation of the impact of the marine operations on the marine traffic flow.

f) Consideration of the Environmental Impact Assessment (EIA) report on marine operations. The mitigating measures recommended by the EIA

5.3 Impact on Existing Shipping Manoeuvres

The passage from the Pilot Station to the Jetty is about 1.4 km. The project vessels may encounter other vessels entering or departing from the existing PTP terminals and anchorage. This can lead to a crossing situation that may affect the positioning of the project vessels to make a safe entry to the Jetty.

The mitigating measures in such an event are the Port pilots that will be onboard the vessel. The pilot will help in communication and co-ordination with other vessels and to resolve any situation that may affect the approach of the project vessels. Tugs assisting the project vessels will also be able to help in making a safe transit to the berths.

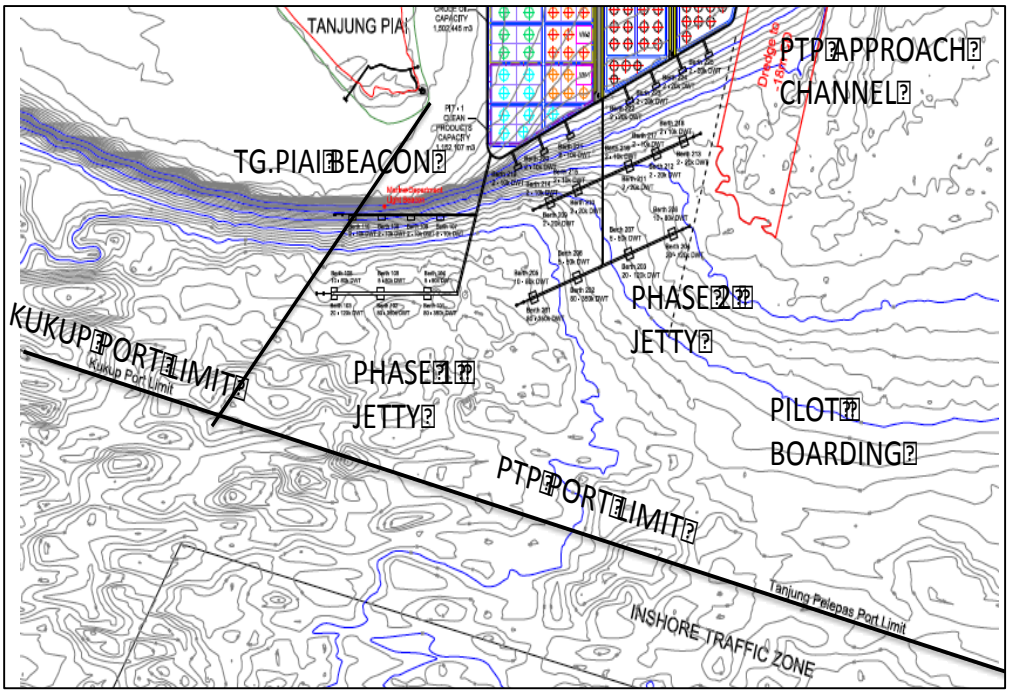


Figure 18: JETTY LAYOUT

The presence of the reclamation has the potential to change the current conditions in the existing PTP navigation channel and port areas. Numerical modelling for the DEIA has assessed the changes.

The maximum current speeds in the vicinity of the Project is shown in Figure 19, this plot shows the existing current conditions, conditions after the reclamation and dredging works for the Project are completed and the difference between these. These plots are for NE monsoon conditions with similar conditions being found for the SW monsoon and inter monsoon periods. From this it will be noted that the maximum current speeds in the PTP approach channel are between 1.5 and 2.0m/sec (3 to 4 knots). These are slightly increased by the reclamation with the maximum increase in the navigation channel being 0.1 m/sec (0.2 knots). There are no changes in current speeds at the PTP, Tg Bin Power Station and ATB berthing areas.

Figures 20 and 21 show typical spring tide currents for peak flood and ebb conditions. The existing conditions and after completion of the proposed reclamation and dredging. From these it will be noted that there are no significant changes in the current directions in the PTP navigation channel and the berthing areas.

As there are no significant changes in either current speed or direction it is concluded that the development of the reclamation will:

- Not have any impact on the navigability of the existing PTP approach channel;
- Not have any impact on ships manoeuvring in the vicinity of the PTP, Tg. Bin Power Station and ATB berthing areas.

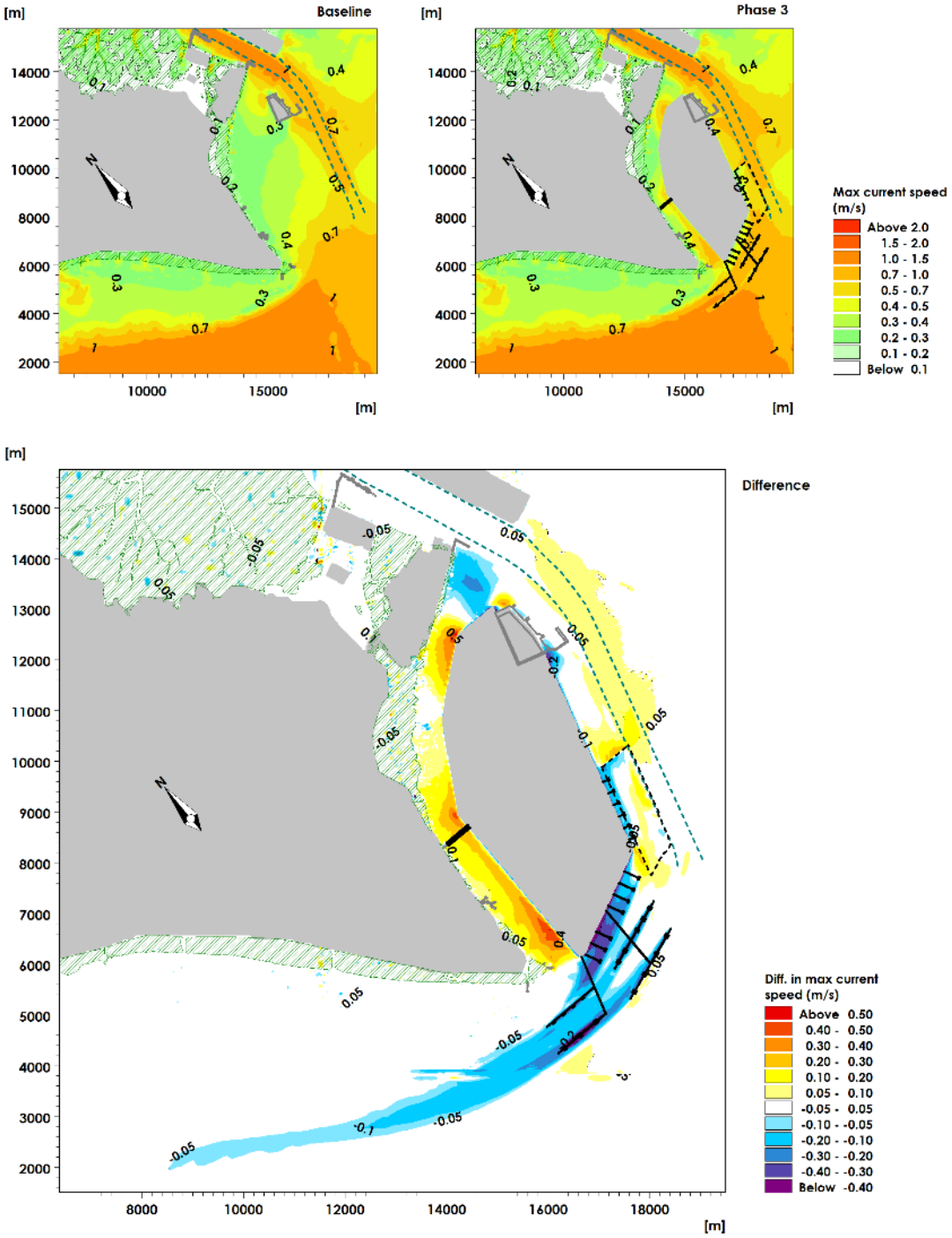


Figure 19: Change in Maximum Current Speeds during NE Monsoon

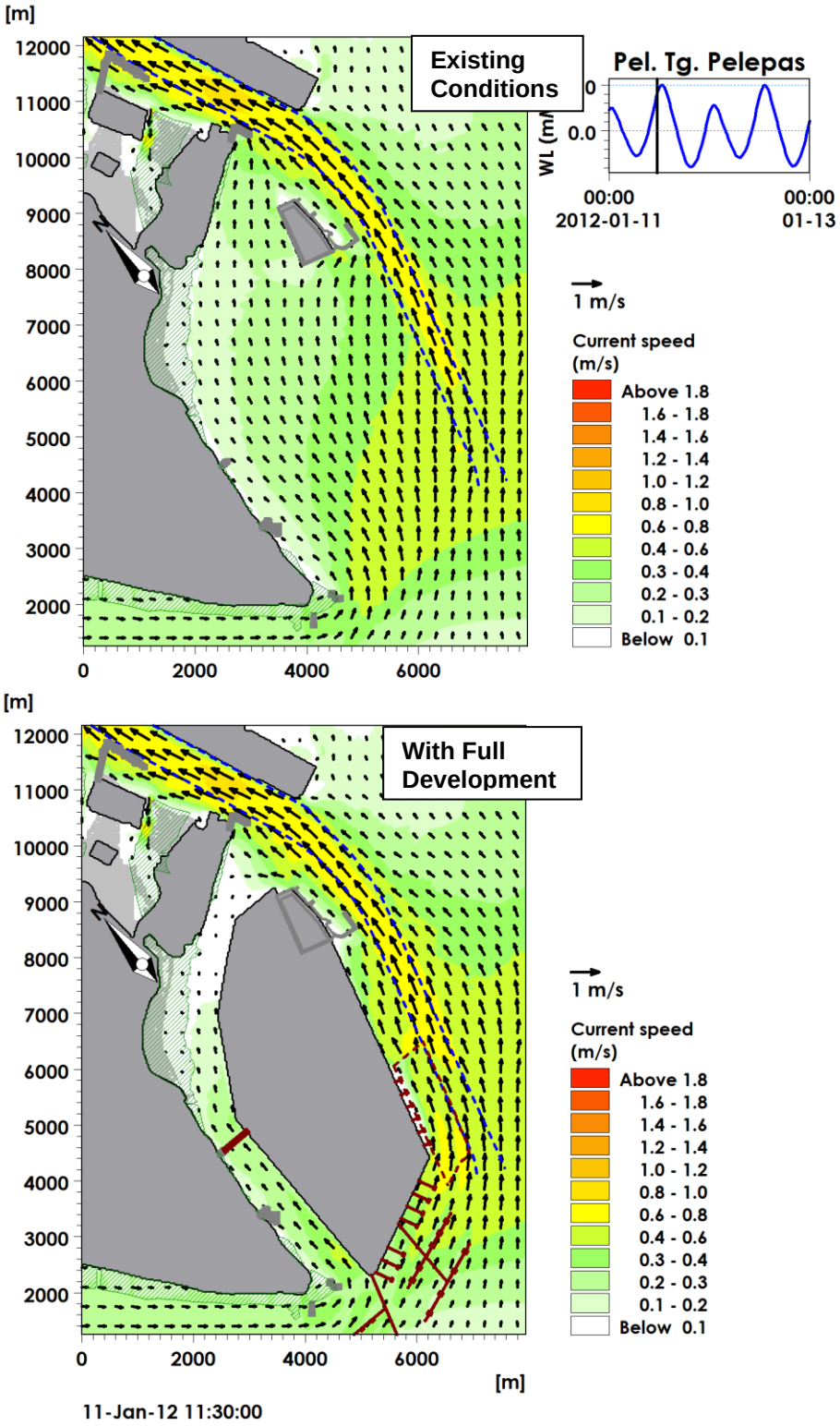


Figure 20: Typical flood tide currents during NE monsoon

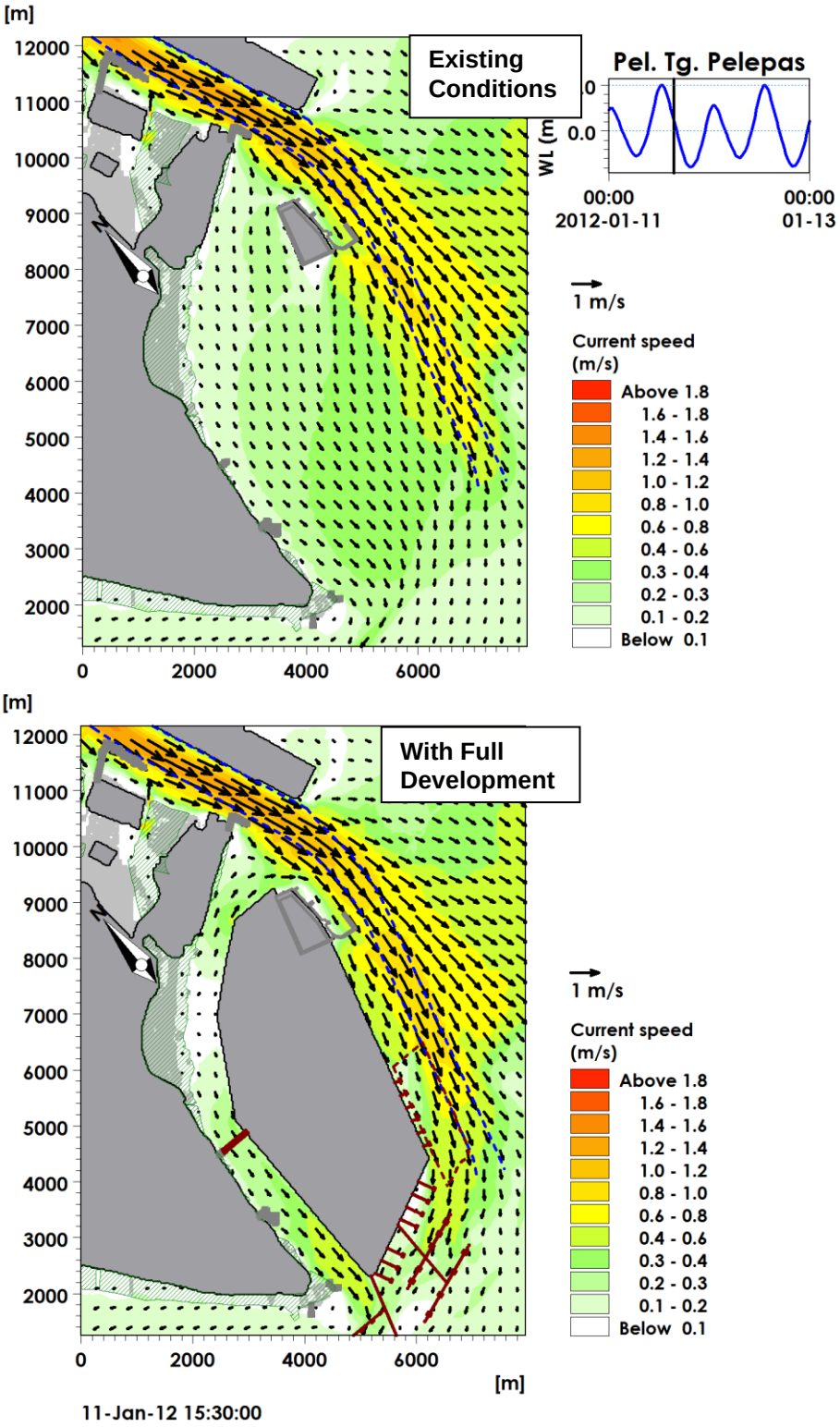


Figure 21: Typical ebb tide currents during NE monsoon

5.4 Mitigating Measures

The increase in marine traffic will necessitate enhanced control and coordination of vessel movements. Every precaution needs to be taken to ensure that the operation of the proposed facility will not have any adverse effect on the safety and commercial efficiency of the whole PTP traffic as well as on the traditional fishing activities carried out in the area.

In order to attempt to eliminate, or at least minimize potential impacts, the following mitigation measures should be affected:

5.4.1 Marine Traffic Congestion and Navigational Safety.

- Subscribe to a central port traffic control system, by using either the existing PTP Control Tower, or a yet to be established independent, efficient, professional and competent unified port control centre.

- Utilising the services of the existing Licensed PTP pilots and tugboats will be preferred as this will ensure coordination and will enhance safety. It should be noted here that there would be a need to increase the number of pilots and tug boats.

- To consider locating additional new Pilot Boarding area just south of the project site for vessels using the new development berths, as this will reduce the congestion at the existing position.

- Ensure that all vessels berthing at the Oil Jetties are thoroughly inspected prior to their initial call at the facility, and at regular intervals thereafter, to ascertain that they fully comply with all the international and local safety standards. Sub-standard vessels should be prohibited from using the Jetties.

- Carry out regular 'in-house' routine operational training and safety drills, and also participate in more comprehensive safety drills at both port and regional levels to train and re-train personnel in all emergency procedures.

- Set up and strictly enforce comprehensive Standard Operating Procedures (SOP), for both onshore and marine related activities.

5.4.2 Effects on Fisheries

- Strict adherence to all local Rules and Regulations and International Regulations should ensure that any navigational impacts are minimised.
- Good vessel management and good seamanship practices, as well as close cooperation with the local fishermen will help to prevent, or will at least minimise, any damage to fishing gear.
- Schedule regular dialogue sessions with local fishermen and their local fishermen associations should be undertaken, in order to educate the fishermen about potential risks and to remind them of their own responsibilities. They should also be reminded that fishing within the gazetted port limits is prohibited; therefore they are undertaking 'voluntary risk' by fishing within this area. Regular feedback from both sides should be encouraged.

5.4.3 Pollution of the waters by wastes, oil or chemicals

In order to reduce the risk of the spillage of oil, chemicals and other pollutants in to the sea, a comprehensive Oil Spill Prevention and Response Plan should be formulated; this plan will need to be approved by, the Department of the Environment, the Johor Port Authority, the Marine Department, in consultation with all other relevant authorities.

This will include having all the required equipment to be used at least for ‘in-house' 'first aid' measures, as well as additional equipment to be used during joint operations based on any Local Emergency Oil Spill Response Plan and also the National Emergency and Oil Spill Contingency Plans, depending upon the magnitude of the emergency.

Ensure that all vessels berthing at the Oil Jetty are thoroughly inspected prior to their initial call at the facility, and at regular intervals thereafter, to ascertain that they fully comply with all the international and local safety standards. Sub-standard vessels should be prohibited from using the jetty.

5.4.4 Simulation Study

A) Desk Top Navigation Simulation for the Proposed Facility

Desktop navigation simulations have been carried out. The studies on the desktop simulator provided information on the adequacy of the design width of the approach channel, the

turning basin and the berthing areas.

This provides more information to the port authorities to evaluate the Project. Preliminary recommendations made by the Desktop Simulator are as follows:

I) Berths should be in alignment with the spring currents:-

Some of the berths are at a small angle to the current directions. Berths should, as far as possible be in alignment with the actual direction of spring currents for safety reasons.

Mitigation measures for berths not in alignment would include:

a) Berthing and unberthing should be scheduled during periods where the tidal strengthis not more than1 knot.
b) Whilst alongside, tug or tugs assistance would be required during periods of strong west-going currents; and
c) Highlight the effects of the east and west-going currents and include this as an extra precaution required in the standard operating procedures for all vessels calling at the terminal.

II) Unberthing a laden tanker with strong following currents (i.e. current coming from astern) setting towards the cross berth or jetty at end berths:
This manoeuvre presents great dangers, as there is no room for errors, misjudgements or machinery failures. Any of this will set the vessel onto the cross-berth or jetty. Therefore it is recommended that such manoeuvres be undertaken in tidal strength of not more than 0.5 knots.

III) Operations at a New Terminal: -
Starting up operations at a new terminal has its challenges and one of it is unfamiliarity with the environment conditions. Therefore the following is recommended:

a) Real time monitoring and data collection of tidal currents, winds and waves at the jetties;
b) Full Mission Shiphandling Training and Familiarisation Course for the pilots;
c) Ship manoeuvres during the start up phase be restricted to:
    i) Daylight hours;
    ii) Tidal current strength not more than 1.0 knot;
    iii) Wind speed not more than 15 knots;
d) Number of tugs and minimum bollard pull:

i) Berthing laden VLCCs - 2 x 60 tonne + 2 x 45 tonne ASD tugs.

ii) Unberthing VLCCs in ballast - 2 x 45 tonne ASD tugs.

iii) Laden tankers with draft greater 10 metres - 2 x 45 tonne ASD tugs.

iv) Others - 2 x 30 tonne ASD tugs.

v) A third tug may be required in exceptional circumstances like strong on-berth winds for tankers in ballast.

The restrictions on ship manoeuvres may be gradually lifted after consultations with the pilots as they gain more experience. A Full Mission Shiphandling Simulation Studies with emergencies is therefore recommended to ensure best operational practices and adequate tug requirements.

e) Real time monitoring of lateral berthing speeds, especially for laden VLCCs and tankers close to the maximum designed displacement for the jetty.

IV) Standard Operating Procedures (SOP): -

These safety guidelines should include, but not limited to, the:

a) Maximum length overall (LOA);
b) Maximum draft;
c) Maximum displacement;
d) Maximum tidal current strength;
e) Maximum wind speed;
f) Maximum Lateral berthing speed;
g) Maximum Angle of approach;
h) Day/night;
i) Minimum under keel clearance (UKC); and
j) Number of tugs and minimum bollard pull.

V) Crash Barriers are recommended to protect the jetties with critical pipelines and cables rack.

B) Full Mission Simulation Study (FMSS)

It is necessary before operations commence to provide sufficient information to the regulators and pilots of the port in order to prepare the operating procedures, pilotage guidelines and the tug requirements.

The simulation study should, for example study and determine, amongst other things, manoeuvring strategies for:-

- The approaches to the Oil Jetty, the transits through the approach, the use of tugboats, etc.
- The turning around of vessels off the various berths.
- The berthing and unberthing of vessels.
- The maximum size / draft and maximum number of vessels which can safely use the various Jetty and berths.
- The safest route(s) for approaching to and departing from Oil Jetty.
- The required number and optimum size (bollard-pull) of tug boats and other support craft required to assist vessels mooring / unmooring, in both normal and adverse (worst case) weather conditions.
- The optimum location of the anchorages, waiting areas and pilot boarding ground.
- Appropriate actions in emergency situations

The Johor Port Authority and or the Marine Department may require any other matters as additional information.

6. CONCLUSION.

This above report has been made based on the information received, and this information has been combined with experience and local knowledge.

Where no information was received, assumptions have been made based on past experience and normal practices.

The potential impacts of the Proposed Project will be able to be mitigated to various extend, provided that the appropriate measures are properly taken and all the requirements of the Johor Port Authority, the Department of the Environment Malaysia, The Malaysian Marine Department and other relevant Malaysian government agencies conditions are followed and are fully adhered to.

AYCITY EMMAR TECHNOLOGIES SDN BHD

10 October 2014

LIST OF PERSONS AND ORGANISATIONS CONTACTED

Name **Post** **E-mail** **Telephone**	**Organisation**	
Dato' Captain Ahmad Othman ahmad@marine.gov.my tel 03 3346 7601	Marine Department HQ	Director General
Muhammad Razif b Ahmad razifahmad@lpj.gov.my tel: 07 2517721	Johor Port Authority	General Manager
Captain Jailani b Jalal jai@marine.gov.my tel: 07 507 2313	Marine Department Southern Region HQ	Director of Marine

Some web sites visited:

Marine Department Malaysia http://www.marine.gov.my/

Johor Port Authority http://lpj.gov.my/

PTPwww.ptp.com.my

MPA www.mpa.gov.sg

ATBwww.vitol.com

APPENDIX 2

LOCAL AND INTERNATIONAL REGULATIONS, RULES AND CODES OF PRACTICE

Merchant Shipping Ordinance 1952 (MSO), as amended, and all Rules and Regulations made under it

Note:
A few of the conventions to which Malaysia is a party have been incorporated into the Malaysian national legislation, as follows:

The *International Convention on Civil Liability for Oil Pollution Damage,1969 (CLC)* and the *International Convention on the Establishment of an International Fund forCompensation for Oil Pollution Damage, 1971 (Fund Convention)* are two of such examples.

Both conventions have been given effect to in the *Merchant Shipping (Oil Pollution) Act, 1995* upon Malaysia's ratification of the conventions on 6 April 1995. On the other hand, conventionslike the LOSC, which Malaysia ratified on 14 October 1996 (c.i.f for Malaysia on 14 November1996) and MARPOL 73/78, which Malaysia acceded to on 31 February 1997, have yet to beimplemented as national legislation. Some earlier conventions such as the *Geneva Convention on the Territorial Sea and Contiguous Zone, 1958* and the *Geneva Convention on the Continental Shelf, 1958* have been duly adopted into national laws albeit not in whole. In this instance, only particular elements of the Geneva Conventions have been enacted in the *Emergency (EssentialPowers) Ordinance, No. 7, 1969* and the *Continental Shelf Act, 1966*.

Source:
http://www.searesources.biz/Developing%20M%27sias%20National%20Coastal%20and%20Marine%20Strategy%20_3_.pdf

International Conventions, Codes, Regulations, etc.

- International Convention for the Safety of Life at Sea (SOLAS), 1974

(The International Ship and Port Facility Security (ISPS) Code is an amendment to SOLAS)

Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs)

- International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978
- International Convention on Maritime Search and Rescue, 1979

Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation, 1988

- International Convention on Load Lines, 1966

- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL)

The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009

- International Convention for the Control and Management of Ships' Ballast Water and Sediments

- International Convention on the Control of Harmful Anti-fouling Systems on Ships

FULL LIST OF IMO CONVENTIONS:

Maritime safety

International Convention for the Safety of Life at Sea (SOLAS), 1974
International Convention on Load Lines (LL), 1966
Special Trade Passenger Ships Agreement (STP), 1971
Protocol on Space Requirements for Special Trade Passenger Ships, 1973
Convention on the International Regulations for Preventing Collisions at Sea (COLREG), 1972
International Convention for Safe Containers (CSC), 1972
Convention on the International Maritime Satellite Organization (INMARSAT), 1976
The Torremolinos International Convention for the Safety of Fishing Vessels (SFV), 1977
International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978
International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F), 1995
International Convention on Maritime Search and Rescue (SAR), 1979

Marine pollution

International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78)
International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (INTERVENTION), 1969
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LDC), 1972.

International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), 1990
Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances, 2000 (HNS Protocol)
International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS), 2001
International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004

Liability and compensation

International Convention on Civil Liability for Oil Pollution Damage (CLC), 1969
International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND), 1971

Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material (NUCLEAR), 1971
Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL), 1974
Convention on Limitation of Liability for Maritime Claims (LLMC), 1976
International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS), 1996
International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001

Other subjects

Convention on Facilitation of International Maritime Traffic (FAL), 1965
International Convention on Tonnage Measurement of Ships (TONNAGE), 1969
Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation (SUA), 1988
International Convention on Salvage (SALVAGE), 1989

United Nations Convention on the Law of the Sea of 10 December 1982

As far as the writer of this knows, in Malaysia there are no comprehensive guidelines regarding good practice port operations are concerned.

There is however an excellent set of guidelines as practised in the United Kingdom, entitled:

A GUIDE TO GOOD PRACTICE ON PORT MARINE OPERATIONS

PREPARED IN CONJUNCTION WITH THE PORT MARINE SAFETY CODE
which can be found at this url:
http://www.dft.gov.uk/pgr/shippingports/ports/goodpracticemarineoperations.pdf