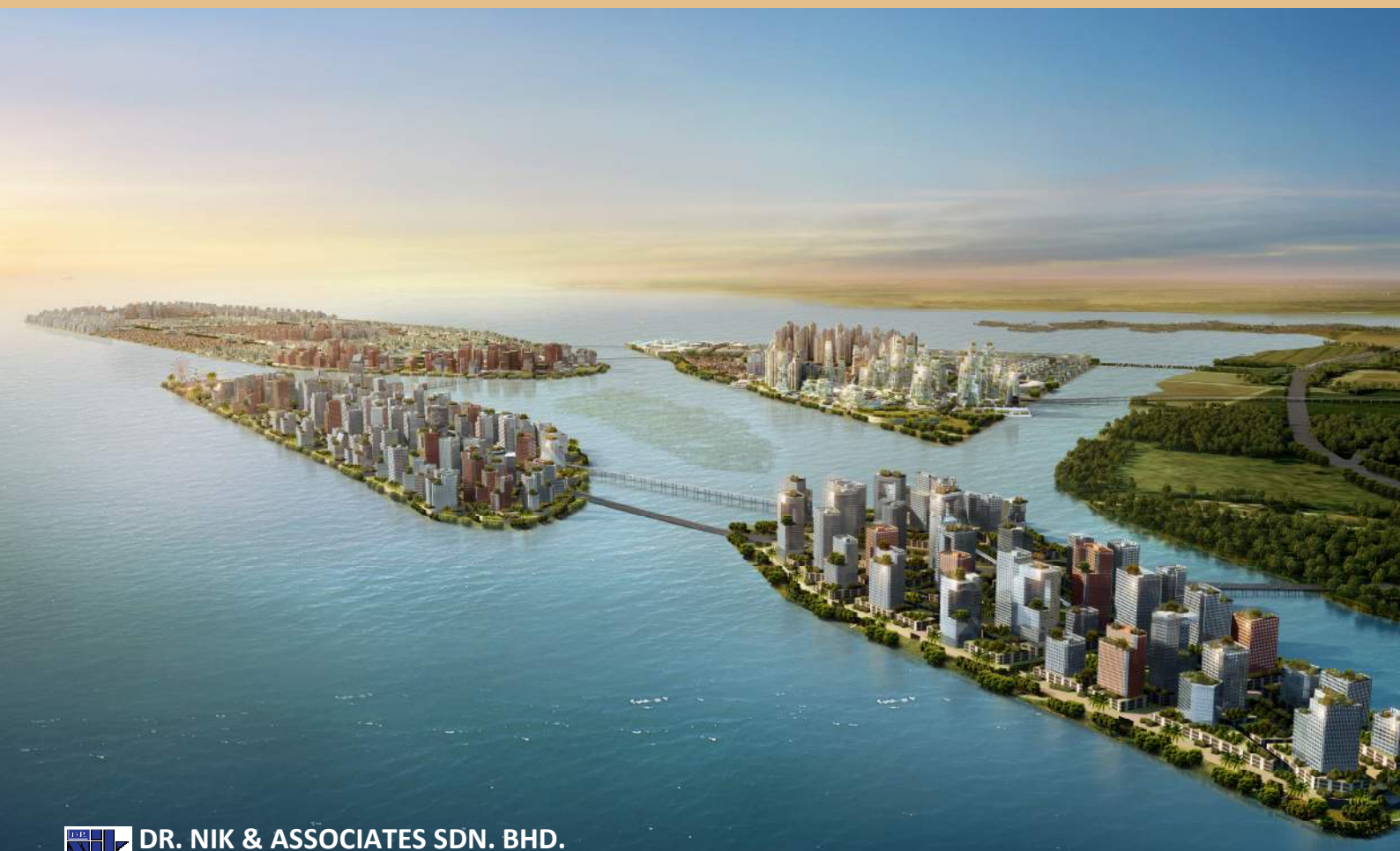
The Proposed Forest City Island Reclamation and Mixed Development, Johor

Detailed Environmental Impact Assessment

Volume 1: Executive Summary

Country Garden Pacificview Sdn. Bhd.

October 2014



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THE PROPOSED FOREST CITY ISLAND RECLAMATION & MIXED DEVELOPMENT, JOHOR

DETAILED ENVIRONMENTAL IMPACT ASSESSMENT

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1 Executive Summary

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Executive Summary

1.0 Introduction

Country Garden Pacificview Sdn. Bhd. (hereafter referred to as the "Project Proponent") intends to undertake land reclamation activities adjacent to the Port of Tanjung Pelepas and the coastline of Tanjung Kupang, Johor. The development is located on the Western Straits of Johor where the major aspects of it will be the formation of four man-made islands. These islands are intended to be developed as mixed development.

The project for which this Detailed Environmental Impact Assessment (DEIA) report is prepared is titled "DETAILED ENVIRONMENTAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED FOREST CITY ISLAND RECLAMATION AND MIXED DEVELOPMENT, JOHOR" (hereafter referred to as the "Project").

2.0 Project Background and Chronology

The success of the Iskandar Malaysia project since its establishment in 2006 has paved the way for the viability and realisation of the proposed Project. Following the trend of development in Johor which is concentrated along the coastline, Country Garden Pacificview Sdn. Bhd. has become the Project Proponent for a Project commonly known as "Forest City Project". All of the land lots of the proposed Project are located in *mukim* Tanjung Kupang, district of Johor Bahru whereby the land for this Project was alienated on 8th November 2013. *Figure ES2.1* shows the land lot numbers and their respective locations.

However, in June 2014 while the Phase 1 reclamation was ongoing, transboundary issues were raised which then led to the requirement of Detailed EIA and Hydraulic studies. In view of the situation, the Proponent has voluntarily stopped its reclamation activities at the site and pledged to resume works once the DEIA and Hydraulic studies are approved.

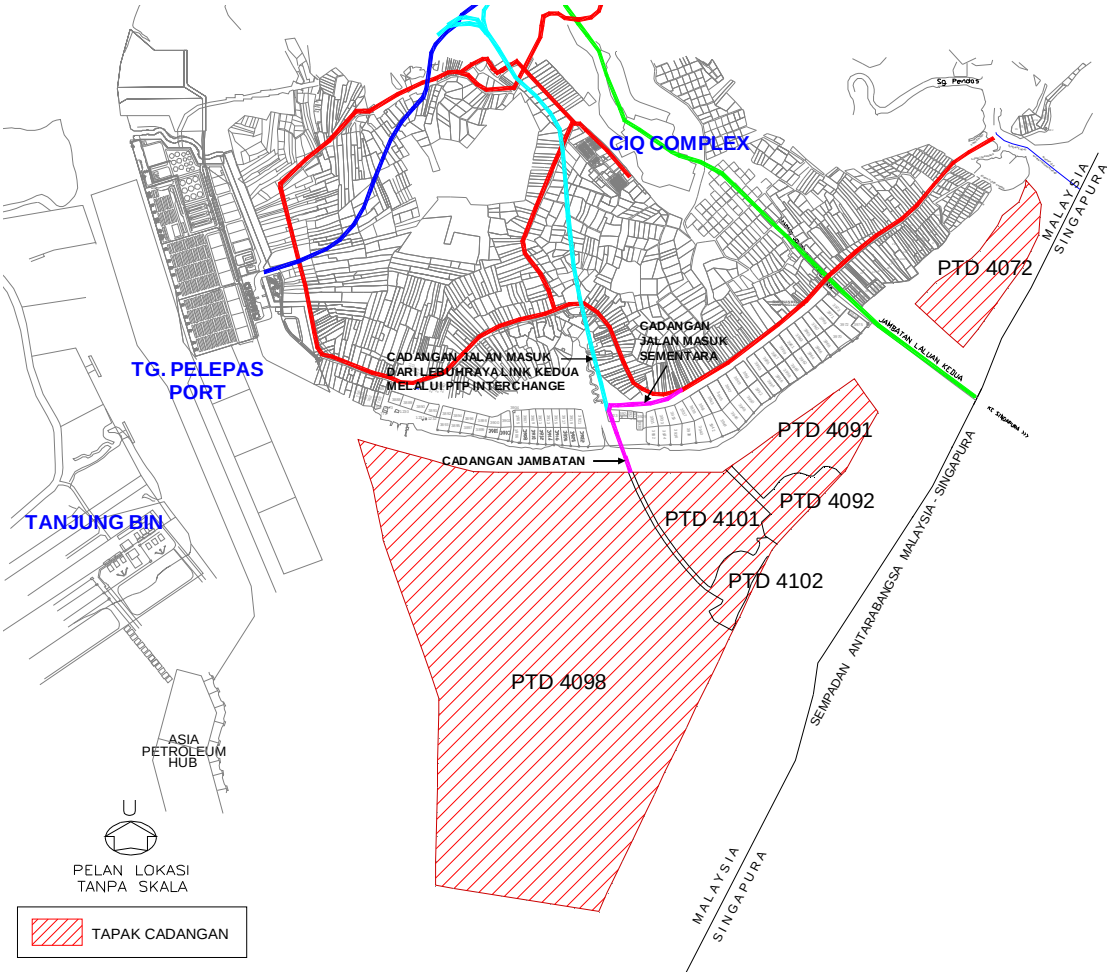


Figure ES2.1
Allocated Land Lots for the Overall Development

DOE Putrajaya has also requested for a Preliminary Assessment to be carried out to assess the impacts of the partially reclaimed Phase 1 and its related transboundary issues. The detailed assessment of Phase 1 reclamation and its related mitigating measures are further described in Volume 4 of the DEIA report.

The Project's chronology is as *Table ES2.1*.

Table ES2.1
Project Chronology

Date	Remarks
2013	Country Garden Holdings Ltd. and Esplanade Danga 88 Sdn. Bhd., a company related to Kumpulan Prasarana Rakyat Johor (KPRJ), have joined forces to create Country Garden Pacificview Sdn. Bhd (CGPV).,
8th November 2013	Land alienation was obtained by Country Garden Pacificview for comprising PTD 4091, 4092, 4098, 4101 and 4102. The total area is 4,887 acres.
13th January 2014	DOE Johor has issued PAT approval for the Phase 1 reclamation.
20th January 2014	The Proponent intended to implement its Phase 1 reclamation on PTD 4102 encompassing an area of 49.3 ha. A Preliminary Site Assessment (PAT) for Phase 1 was submitted to DOE Johor.
22nd January 2014	Commencement of Phase 1 reclamation works.
1st June 2014	KML for PTD 4102 was submitted to MPJBT.
2nd June 2014	DOE Johor issued a letter for mitigation works to be done on site.
6th June 2014	DOE Johor issued a letter requesting for a Detailed EIA for the proposed reclamation be prepared for approval.
12th June 2014	DOE Putrajaya has called the Proponent and the related agencies for a meeting to discuss on the transboundary issues being raised. Following which, the Proponent was requested to submit a Preliminary Assessment Report to assess the impacts of the partially reclaimed Phase 1 and address the transboundary issues for submission to DOE Putrajaya by the 23rd June 2014. In addition to that, Detailed EIA and Hydraulic Studies for the overall reclamation were required to be submitted for approval. Hence, the appointment of Dr. Nik & Associates Sdn. Bhd (DNASB) as the Environmental and Hydraulic Consultant to prepare the Preliminary Assessment Report as well as the DEIA and Hydraulic studies.
15th June 2014	The Proponent has voluntarily stopped reclamation works and pledged to resume works until the Detailed EIA and Hydraulic studies have been approved by DOE and DID. The progress of reclamation has covered almost 40% of the intended 49.3 ha. This includes a temporary access road (termed as *CG Causeway*) from the mainland to the partially reclaimed island.
17th June 2014	Following the voluntarily stop work by the Proponent, DOE Putrajaya has issued a letter to ensure all activities (transportation of sand by barges, sand filling, treatment of fill material, excavation, etc.) at site are put on hold. Meanwhile, the Proponent was requested to undertake the necessary mitigating measures such as installation of double-layered silt curtain, daily water quality monitoring and online water quality monitoring.

Table ES2.1 *(cont'd)*

Date	Remarks
23rd June 2014	Submission of the Preliminary Assessment report to DOE Putrajaya on the impacts of the partially reclaimed Phase 1 and transboundary issues.
24th June 2014	DOE Johor issued a *Notis Arahan Serta Merta (Ref: AS(B)J/50/011/200/262)* to the Proponent which includes an immediate maintenance of the existing silt curtain installed at site; installation of double-layered silt curtain; submission of marine water quality monitoring report; appointment of an Environmental Officer.
9th July 2014	Presentation of the Preliminary Assessment of Phase 1 to DOE, expert panels and government agencies at DOE Putrajaya. It was agreed upon by the Proponent and DOE that based on the initial assessment, the CG Causeway shall be removed to avoid further impacts on the seagrass bed (Merambong Shoal) and to allow for smooth water flow within the western Straits of Johor.
1st July 2014	KMP and Building Plan were submitted simultaneously to OSC for Phase 1 reclamation.
7th July 2014	Submission of DEIA Terms of Reference (TOR) for the initial allocated land lots.
3rd August 2014	Meeting with State Planning Committee (Technical) at JPBD Johor with regards to planning issues. A final landform upon consideration of hydraulic inputs which consists of four islands (4,012.5 acres) was
4th August 2014	Meeting with SPC, chaired by the Menteri Besar of Johor.
14th August 2014	Review Panel Meeting for DEIA TOR at DOE Putrajaya (initial landform of 5000 acres). However, a revised TOR incorporating the new landform was required.
4th September 2014	Submission of the DEIA Revised TOR which covers the finalized landform of four islands (4,012.5 acres).
14th September 2014	Focus Group Discussion (FGD) was held with the affected stakeholders namely UEM Sunrise, Sunway Iskandar, Putri Harbour, Medini, PTP and Lido Boulevard.
14th September 2014	FGD with the villagers was held at Dewanraya Kampung Pok comprising the Penghulu Gelang Patah; Ketua of Kampung Tanjung Adang, Kampung Pok, Kampung Tiram Duku, Kampung Pendas,
21st September 2014	Public Dialogue was held at Dewan Raya Kampung Pok.
29th September 2014	FGD with the Village Representatives attended by three Executive Directors from the Proponent.
30th September 2014	FGD with the representatives from Kampung Pok for discussion on the alternatives for Main Access Road Alignment.

Table ES2.1 *(cont'd)*

Date	Remarks
30th September 2014	Engagement with Kampung Pendas Baru residents.
1st October 2014	Engagement with Kelab Alami Tanjung Kupang.
3rd October 2014	FGD was held with the residents of Kampung Paya Mengkuang and Kampung Pok.
8th October 2014	FGD was held with the Orang Asli of Kampung Simpang Arang at Dewan Tarbiah, Kampung Simpang Arang. Also attended by representative from Jabatan Kemajuan Orang Asli (JKOA).
8th October 2014	Another FGD was conducted in the afternoon with the fishermen and local residents at Restoran Sungai Pendas.
10th October 2014	FGD was held with the residents of Kampung Tiram Duku and Tanjung Adang.
10th October 2014	The DEIA Revised TOR has been approved by DOE Putrajaya.

3.0 Project Initiator

The Project Initiator or Proponent is Country Garden Pacificview Sdn. Bhd. with its office in Teluk Danga, Jalan Skudai, Johor Bahru.

This DEIA study was carried out by Dr. Nik & Associates Sdn. Bhd. which head office is in Pusat Bandar Wangsa Maju, Kuala Lumpur.

4.0 Statement of Need

4.1 Concept of "Forest City"

This large-scale, commercial mixed development has the potential of resulting in significant impacts to the surrounding areas which include the Port of Tanjung Pelepas, Tanjung Kupang and Gelang Patah in the southern part of the state and also to Singapore in providing competition in the investment, trade and tourism sectors. The development concept of "Forest City" is an aspiration towards a development that centres on wellness by emphasising a lifestyle that is harmonic and healthy, in a sustainable environment and in an urban setting that is efficient and comfortable to live, work and study in, and for recreation.

4.2 Strengthen Malaysia-Singapore Bilateral Relations

The Project has easy access to the North-South Expressway that connects the three countries of Thailand, Malaysia and Singapore and is close to the Second Link that binds the latter two countries. It has the potential of attracting investors from land-starved Singapore to commit international investments as a way to benefit from the planned facilities and thereby resulting in gains for both countries.

4.3 Southern Johor's Surging Economy Creates a Booming Business Opportunity

The proposed development has the potential of opening international investment opportunities which would then help to propel Johor's economy as the main gateway in the south of the country. Peninsular Malaysia has many advantages and capabilities including efficient accessibility and its proximity to Singapore, which is widely regarded as the most modern centre in the Asian region. The economic impacts would come about through business, investment and job opportunities which could be capitalised by the people, especially the young, and thereby creating a better and more secure life for all through income generation and higher-quality facilities and infrastructure.

4.4 Johor Bahru as an International City

The state and federal governments have the vision to upgrade Johor Bahru into becoming an international city and as a National Regional Centre. This internationalisation is focused towards seven strategic components, of which the proposed Project will significantly contribute towards these.

4.5 Realisation of the State of Johor Being a Global Economic Hub

This Project is expected to encourage international foreign investments and will make Johor capable of competing with the other cities which have become global economic hubs like Dubai, Singapore and so on.

4.6 Generating Local Economic Growth

Forest City will also contribute to bring additional income to the State in the form of tax payment, premiums, quit rent, assessment fee, submission fee, licensing fee and etc.

In addition, upon completion of the development, a projected 62,200 new employment opportunities comprising various sectors will be created.

4.7 Modernisation of infrastructure and Urban Development

There will be investments of around RM 700 million for upgrading works involving the infrastructure in the areas surrounding the proposed Project. These will cover the existing road and public transportation systems, and will benefit the population living around Gelang Patah, Tanjung Pelepas and Nusajaya especially.

5.0 Project Description

5.1 Project Location

The proposed Project is located on the east of Port of Tanjung Pelepas and south of Tanjung Kupang within the Straits of Johor. The Project area stretches along the coastline of Tanjung Adang to Sungai Pendas where the reclamation will cover an area of 4,012.5 acres. The proposed reclamation is geographically located within the coordinates listed in *Table ES5.1* and as illustrated in *Figure ES5.1*.

Table ES5.1
Coordinates of the Project Area

Point	Latitude	Longitude
A	103° 34' 2.777" E	1° 16' 2.466" N
B	103° 34' 50.433" E	1° 16' 21.46" N
C	103° 35' 45.719" E	1° 18' 47.609" N
D	103° 35' 35.677" E	1° 19' 30.236" N
E	103° 34' 37.214" E	1° 18' 28.915" N
F	103° 34' 45.033" E	1° 19' 6.23" N
G	103° 34' 40.871" E	1° 20' 29.865" N
H	103° 36' 7.224" E	1° 20' 29.865" N
I	103° 36' 45.284" E	1° 20' 26.967" N
J	103° 36' 33.991" E	1° 20' 36.092" N
K	103° 37' 3.774" E	1° 21' 3.649" N
L	103° 37' 9.965" E	1° 20' 59.267" N
M	103° 36' 50.149" E	1° 20' 14.589" N
N	103° 36' 27.675" E	1° 20' 5.581" N
O	103° 35' 58.152" E	1° 19' 14.092" N
P	103° 36' 1.24" E	1° 18' 45.972" N

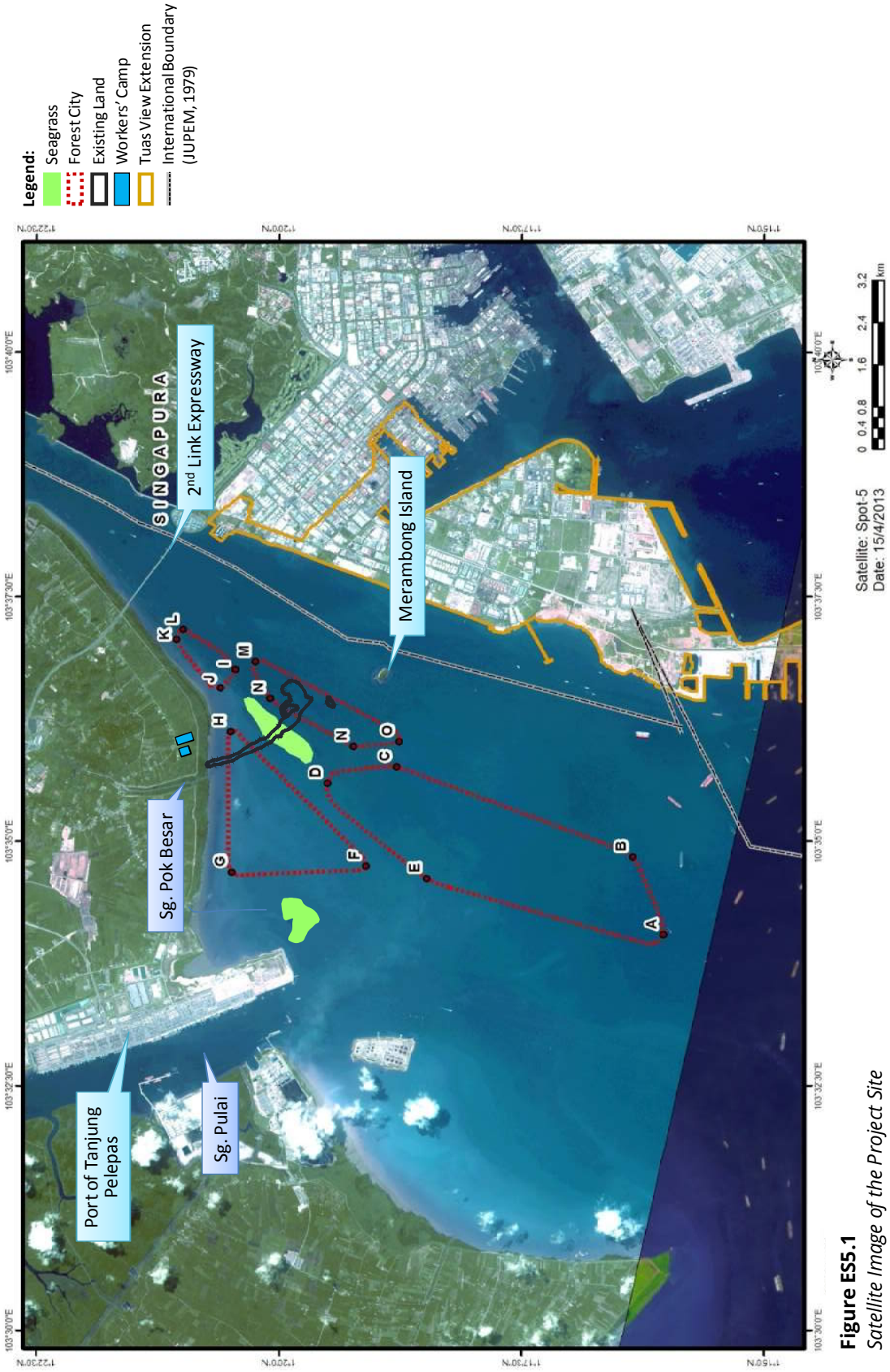


Figure ES5.1
Satellite Image of the Project Site

5.2 General Site Description

The existing site features within the 5-km radius from the Project area are briefly covered in this section. The existing site conditions are described according to the following sections:

a) Project site (Tanjung Pelepas - Sungai Pendas);
b) Sungai Pulai;
c) Western Shoreline (Tanjung Bin – Tanjung Piai); and
d) Eastern Shoreline (Sungai Pendas - Kota Iskandar).

5.2.1 Project Site

Land clearing has been done at the entrance of the Project site on the mainland for the construction of access road and workers' hostels for the proposed Project. There is an existing piece of reclaimed land (partially completed Phase 1 reclamation) which is connected to the entrance on the mainland by a causeway which runs through Merambong Shoal. Port of Tanjung Pelepas (PTP) which sits on the eastern bank of the Sungai Pulai river mouth is the most dominant landmark within the immediate vicinity of the Project site. Another man-made feature is the Malaysia-Singapore Second Link Bridge that spans across Selat Johor between Kampung Ladang in Gelang Patah, Johor and Tuas in Singapore. There is a seagrass bed namely Merambong Shoal located within the Project area while Merambong Island sits just next to Project site boundary.

5.2.2 Sungai Pulai

Sungai Pulai has a catchment area of approximately 345 km². The river is dominated by mangrove forest known as the Sungai Pulai Forest Reserve. This forest reserve is the largest mangrove forest in Johor and the second-largest in Peninsular Malaysia. It has been declared as a Ramsar site on 31st January 2003 (JNPC 2008). There are five major tributaries within the Sungai Pulai system namely Sungai Karang, Sungai Redan, Sungai Jeram Choh, Sungai Ulu Pulai and Sungai Jeram. Various small rivers also drain into Sungai Pulai namely Sungai Tiram Duku, Sungai Senapang, Sungai Dinar, Sungai Chengkeh and Sungai Boh. Several aquaculture areas can be found within the upstream of Sungai Pulai, comprising fish and prawn cage culture. There are four jetties located on the banks of Sungai Pulai within immediate vicinity of PTP which are the Marine Department jetty, Marine Police jetty, a jetty owned by DynaMac Engineering Sdn. Bhd. and the Customs Department jetty.

5.2.3 Western Shoreline

The western shoreline described herein runs from Tanjung Bin to Tanjung Piai. Tanjung Bin is primarily covered with industrial landmarks namely Tanjung Bin Power Plant, ATB Oil Terminal and APH Oil Terminal. The shoreline of Tanjung Bin is lined with mangroves and of several tributaries that drain into Sungai Pulai which are Sungai Sam, Sungai Chokoh Kecil, Sungai Nibong and Sungai Chokoh Besar. The shoreline of Tanjung Piai is characterised by mangroves and mudflats which were gazetted as a forest reserve as well as a Ramsar site. Tanjung Piai is also known as "the Southernmost Tip of Continental Asia" and has become a tourist attraction.

5.2.4 Eastern Shoreline

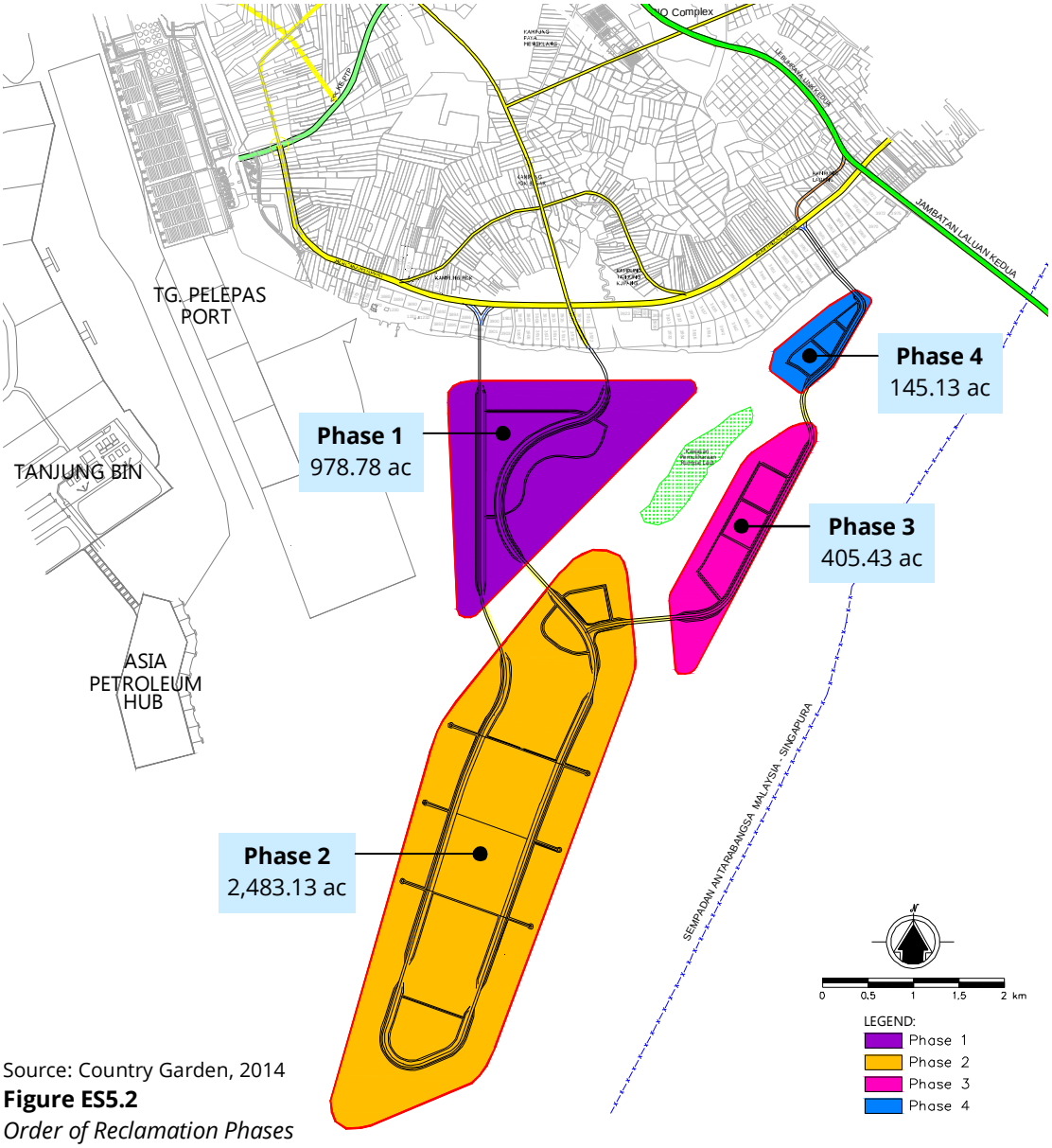
The northeast shoreline reaches Kota Iskandar which is the main administrative centre for the Johor State Government. The administrative centre consists of the State Assembly building, and Chief Minister's and State Secretariat's offices. Situated next to Kota Iskandar is Puteri Harbour, a waterfront precinct developed as an integrated waterfront and marina that spans 688 acres. There is an international ferry terminal called Puteri Harbour International Ferry Terminal connecting Puteri Harbour with Tanjung Balai, Indonesia. Situated between Puteri Harbour and the Project site are two mangrove forest reserves, namely Kemudi and Sungai Bahan Forest Reserves. These two mangrove forests, which are located next to each other, cover a combined area of 155.6 ha and were gazetted as forest reserves in 1961.

5.3 Project Concepts and Components

The proposed Project consists of a cluster of four man-made islands with a total area of 4,012.5 acre (1,623.8 ha). The total quantity of fill material needed for the reclamation is 161,891,980m^3.The main components of the proposed development is made up of serviced apartments, mixed commercial, clubhouse, neighbourhood centre, health centre, education facility, business park and water element.

5.4 Project Phases

The proposed Project is made up of four different islands whereby each island will represent one phase of the overall development. The order of the phases is illustrated in *Figure ES5.2* while the duration for each phase is tabulated in *Table ES5.2.*



Source: Country Garden, 2014

Figure ES5.2

Order of Reclamation Phases

Table ES5.2

Project Phasing

Island	Reclamation Starts	Reclamation Ends	Topside Development Starts	Topside Development Ends
Island 1	2015	2018	2015	2025
Island 2	2018	2028	2020	2045
Island 3	2028	2033	2030	2040
Island 4	2033	2038	2035	2045
Duration	23 years		30 years	

5.5 Project Activities

The Project activities discussed within this section covers land reclamation and dredging works, and topside development. Pre-reclamation consists of installing silt curtain at the Project site. Meanwhile, land reclamation and dredging works comprise of dredging at the designated area, disposal of dredged material, transportation of fill material and placement of fill material at the reclamation area. Post reclamation will cover the topside developments.

5.5.1 Reclamation

5.5.1.1 Silt Curtain Installation

Silt curtain will be installed around the reclamation area as one of the measures in mitigating sediment dispersion. Double-layered silt curtain will be used for the proposed Project. It should be noted that a specific method will be used for silt curtain installation at the seagrass area, where GI pipe will be used instead of the normal sinker block.

5.5.1.2 Placement of Fill Material

The total fill material needed to complete the overall reclamation is 161,891,980 m^3. For the first stage, the placement of fill material utilises a combination of CSD, conveyor barge and HDPE pipeline. The conveyor barge will pump the fill material to the CSD via a jointed pipeline, where the CSD in turn will pump sand to the filling area. Meanwhile, for the second stage, land machineries will be used to level and spread the fill materials above the water level. Earth-moving equipment (bulldozers, excavators and dump trucks) will be used for the handling of surcharge materials.

5.5.1.3 Construction of Perimeter Bund

A perimeter bund is constructed in order to contain any dispersion of sediment and plume resulting from the reclamation activities. The perimeter bund will be formed before the placement of fill material. Formation of the bund will be by using 230 g/m^2 of woven geotextile. The height of the bund shall be above the highest tidal. The slope of the bund will be within the range of 1: 8 to 1: 11 in order to avoid any potential circle slip.

5.5.1.4 Treatment of Fill Material

Soil improvement will be done on the reclaimed area in order to accelerate the consolidation of soft soil. Wick drain (PVD) will be used first for treatment followed by surcharging method. Compaction test is carried out to determine the rate of compaction.

5.5.1.5 Instrumentation and Monitoring of Works

The instrumentation shall be installed to monitor the ground movement and soil/pore water pressure at the construction boundary (slope) and other adjacent structures. It enables evaluation of impact of the changes in the soil on the stability of the reclamation fill and adjacent structure before, during and after reclamation works.

5.5.1.6 Construction of Shore Protection Structure

The construction of shore protection works will commence once the sand reclamation has been filled up to the required level and the profile slope is within the acceptable tolerance. Levelling and trimming of slope profile will be done as preparation before the geotextile can be laid. Geotextile fabric (with a width of 15 m and length of 40 m) will be laid at each panel using a laying barge. For construction of primary armour, flat-top barges will be used to lay the rocks which will act as the core material from the seabed until they reach the water level. As for secondary armour, temporary rock bund will be constructed at the water level along the 40 m interval. Then, the laying of armour rocks will be done using long arm excavators from the water level until the top of the platform level.

5.5.2 Source and Transportation of Fill Material

For initial phases of the reclamation, the fill material required will be sourced from Ramunia Shoal as shown in *Figure ES5.3*. The fill material will be extracted from the sand borrow area utilizing dry dredging method. Three Conveyor Barges will transport the sand from the borrow area to the reclamation site.

5.5.3 Dredging

The area between Island 1 and the coastline of Tanjung Kupang will be deepened in order to prevent sedimentation from occurring at that area. The areas to be dredged are shown in *Figure ES5.4* while the design summary of the proposed dredging works is tabulated in *Table ES5.3*. Based on the hydrographic survey, most of the dredging will be done in areas with shallow water of less than 2 m in depth during low tide. Therefore, Cutter Section Dredger (CSD) with hopper barges will be utilized for the dredging work. High-density polyethylene (HDPE) pipeline will connect the CSD with the barges. The dredged material will be pumped through the pipe. The estimated target of daily output is 20,000 m^3

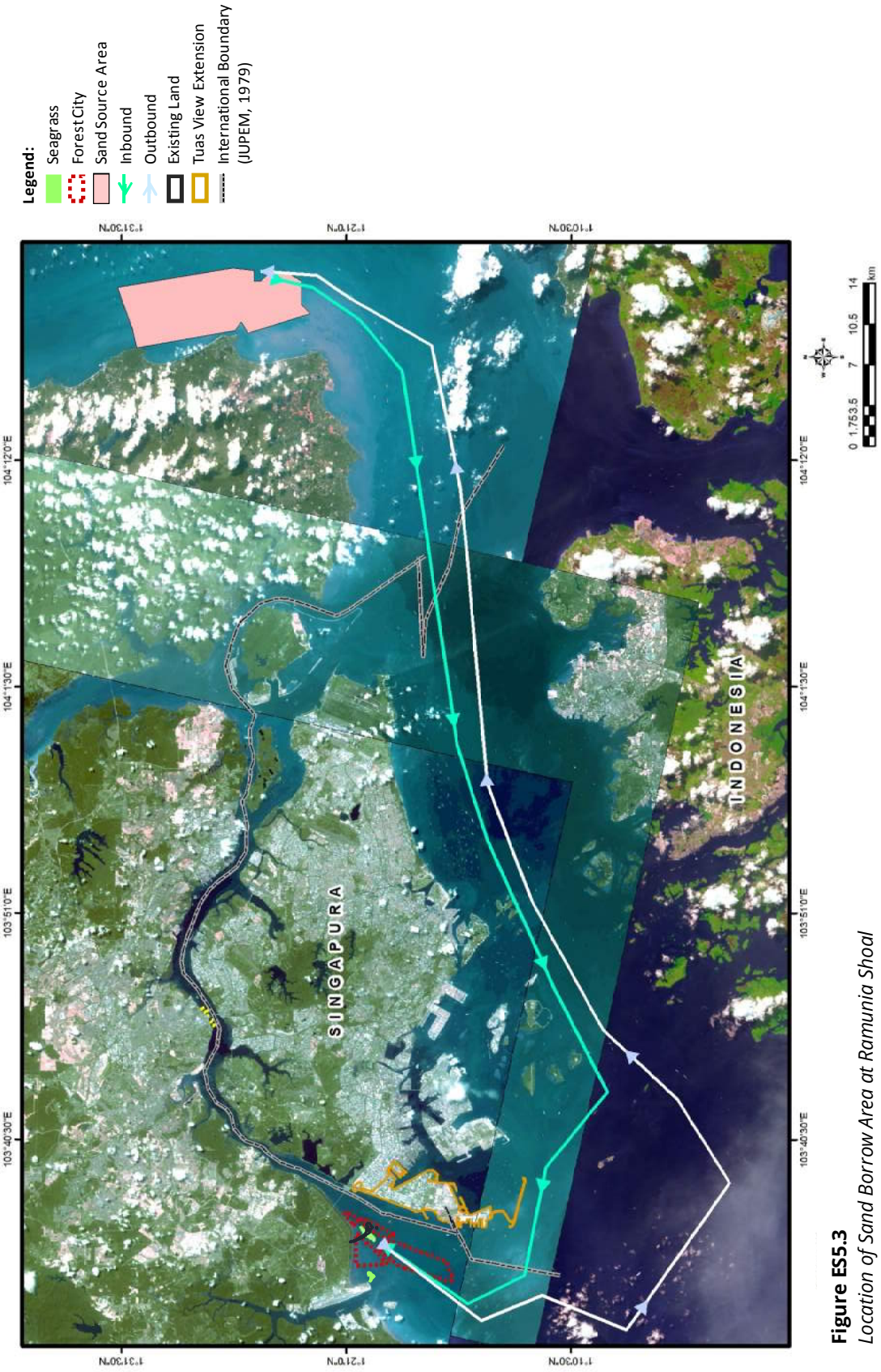


Figure ES5.3
Location of Sand Borrow Area at Ramunia Shoal

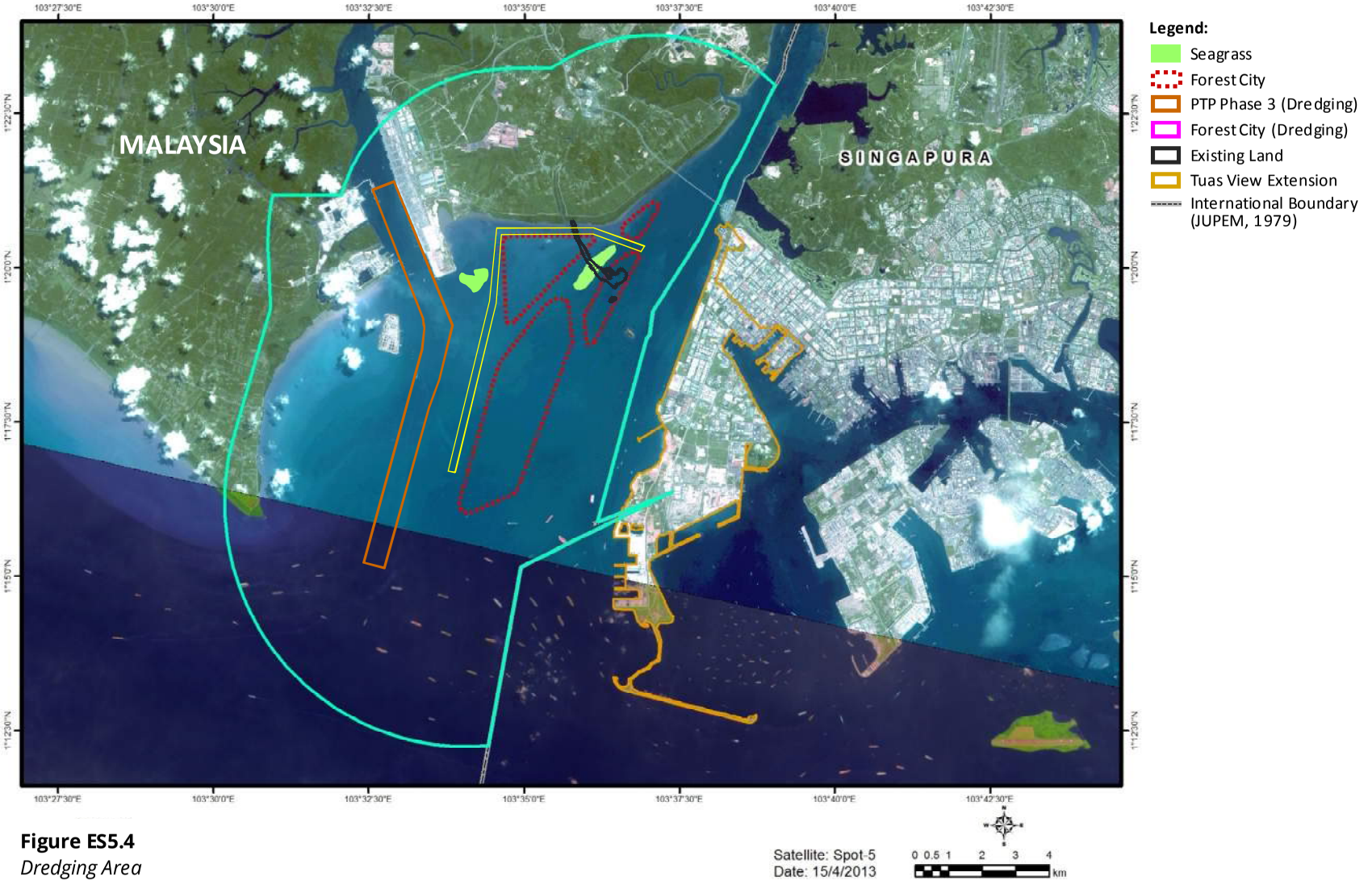


Figure ES5.4
Dredging Area

Design Characteristics	Properties
Design depth	3.0 m below CD
Channel width	200 m
Channel length	11,900 m
Estimated Area	2,594,200 m^2
Estimated volume	7,500,000 m^3
Dredging rate	3,000 m^3/day
Side slope	1V: 3H
Dredge material	Mixture of sand, shale and clay

Table ES5.3
Design Criteria of the Dredging Works

5.5.4 Disposal of Dredged Material

A potential disposal area that is Tanjung Balau which is approximately 80 NM away. 7,500,000 m^3 of dredged material will be transported to the disposal site using barges. Bottom discharge method will be used for the disposal operations.

5.5.5 Development on Newly-Reclaimed Land

5.5.5.1 Roads and Bridges

The four islands will be interconnected via bridges. The construction of bridge will involve cast-in-place bored pile foundation, bearing platform construction, pier construction, capping beam construction, pre-casting and installation of U girders, pre-casting and installation of T girders, bridge decking, etc. Meanwhile, the road construction will entail sub-grade works (surface cleaning, sub-grade filling, drainage, side slope protection, culvert pipe construction, etc.), pavement works (including graded base and asphalt concrete surface) and traffic facilities.

5.5.5.2 Water Supply

Source of water supply for the proposed Project will be tapped from the existing water supply tapping point or existing reservoir in *mukim* Tanjung Kupang, subject to the approval of Syarikat Air Johor (SAJ). Once the overall development is completed, it is expected that the total demand for water supply will be 40.63 MGD. The plan for water reticulation and the locations of reservoir sites are illustrated in *Figure ES5.5*.

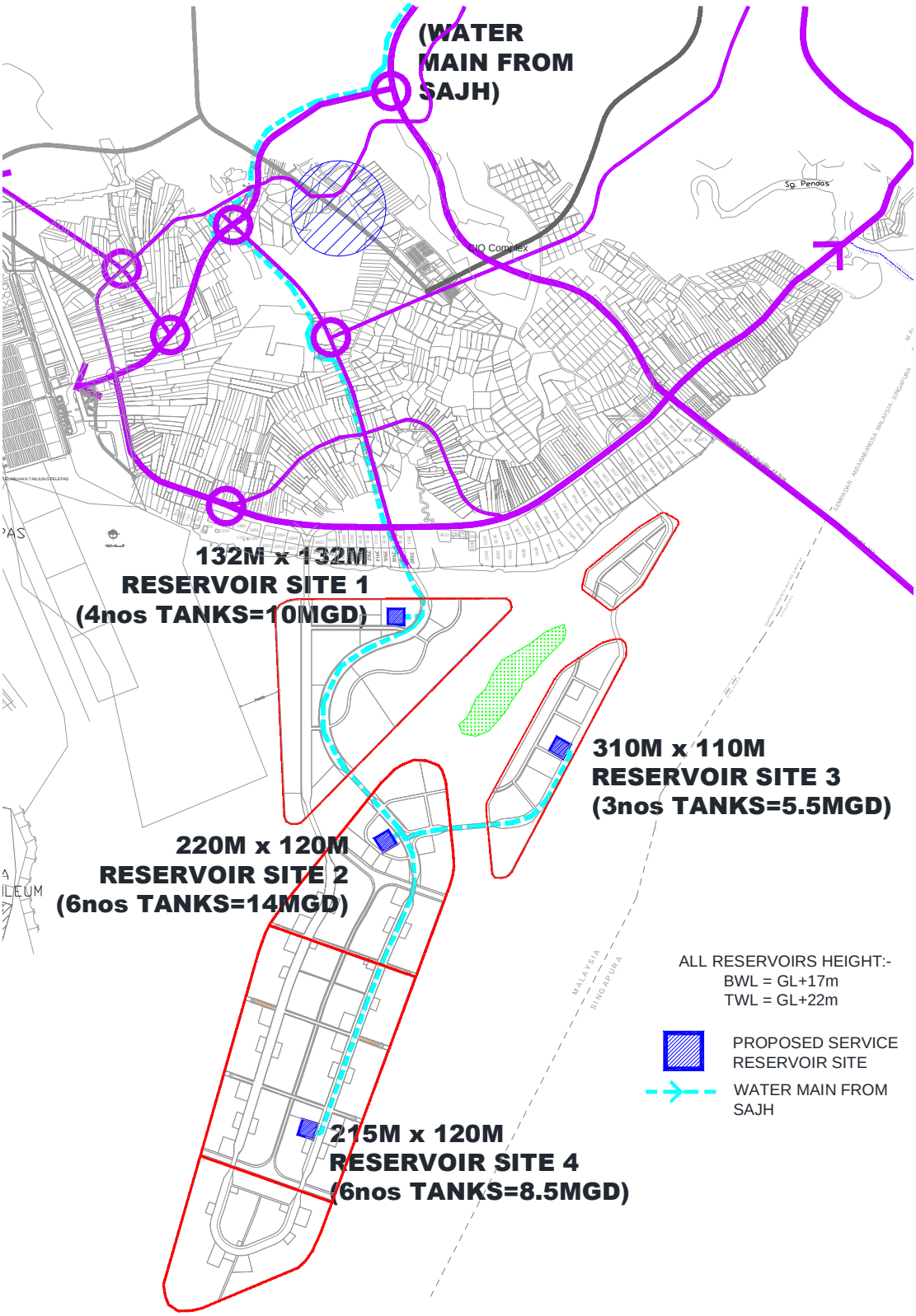


Figure ES5.5
Location of Reservoir Sites

5.5.5.3 Sewage Management

The Proponent has proposed for two Sewage Treatment Plants (STP) and two Intermediate Pumping Station (IPS) to be built in order to handle the sewage produced from the proposed development. The proposed type of STP to be built is Sequential Batch Reactor (SBR). The sewer of Phase 1 will be discharged to two modules of 200,000 PE STP1 while four modules of 400,000 PE STP2 will be built to cater for further development (Phase 2 until completion). The location of STP and IPS are shown in *Figure ES5.6*.

5.5.5.4 Solid Waste/Municipal Waste Management

At full operation, the total amount of municipal solid waste generation is expected to be at 720 tonnes per day. The solid waste produced will gradually increase until it hit 145 tonnes per day by the year 2020 when Island 1 is fully occupied. In this regard, the existing landfills at Seelong and Tanjung Langsat should be able to receive the waste from the development.

5.5.5.5 Drainage and Stormwater Management

The design of the drainage system was based on the new Urban Stormwater Management Manual (Manual Saliran Mesra Alam – Masma II). All main drains within the development area will be grass-lined channel with RC dry weather flow and turfed slope embankment, designed base on 100-year ARI. These are designed to cater for all surface runoff from the development area and outfall discharge from inland flow through the Project site. There are two types of main drain designed with 30 and 60 m reserve areas. *Figure ES5.7* shows the typical cross section of the main drain. The main drain will cut through the development are and flow into the Straits of Johor via Tidal Control Gate.

5.5.5.6 Power Supply

The total estimated load for the whole development is approximately 1,000 MVA. In order to cater for the estimated demand, a 275 kV TNB Transmission Main Intake (275 kV PMU) is required for the development. This 275 kV PMU will be built on mainland and the supply source is either from the PTP TNB Exchange or Tanjung Bin Power Station, subjected to TNB's review and approval. The 275 kV PMU will then distribute the supply to 12 other proposed 132 kV PMUs located across the development as shown in the *Figure ES5.8*.

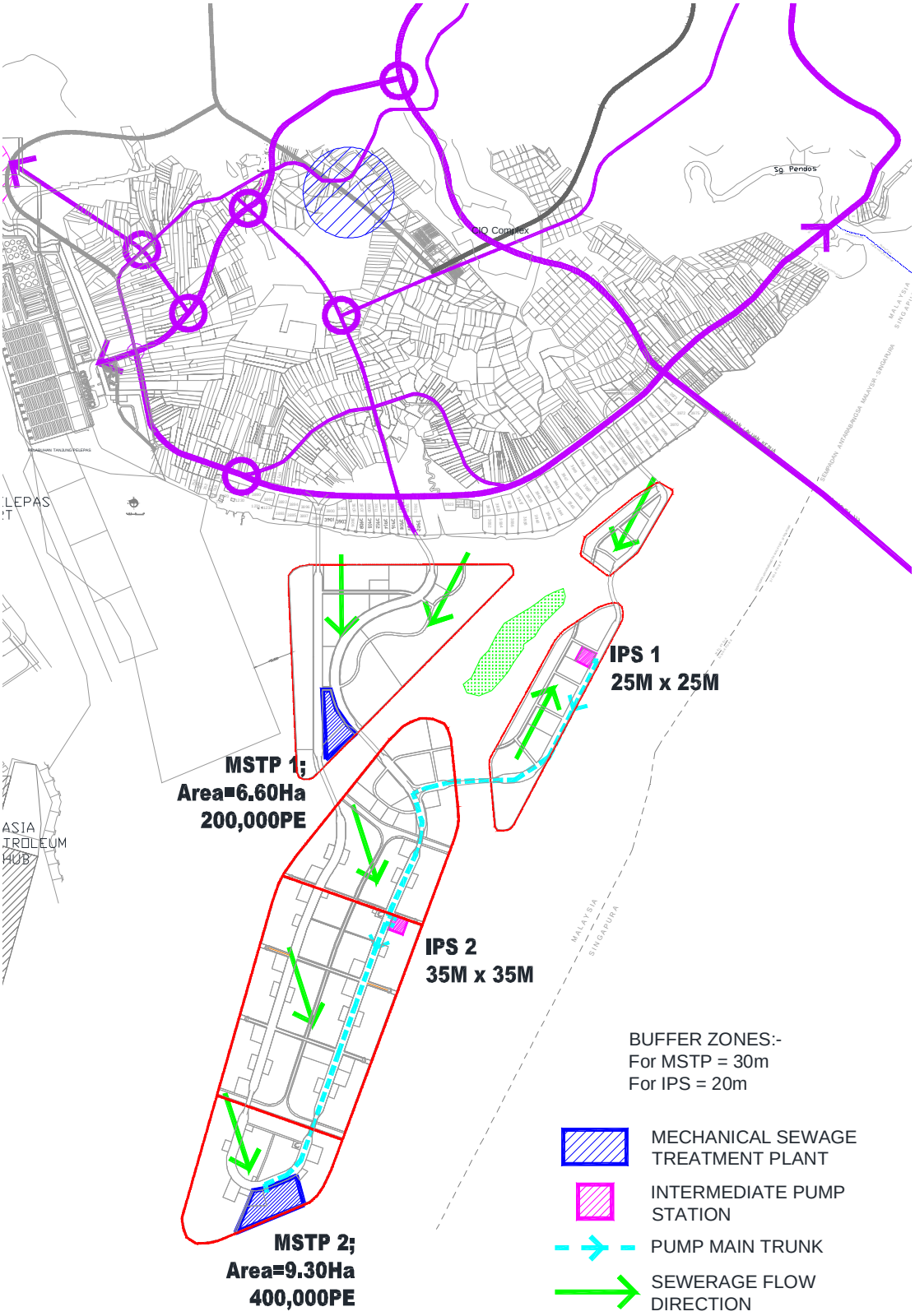


Figure ES5.6
Location of STP and IPS

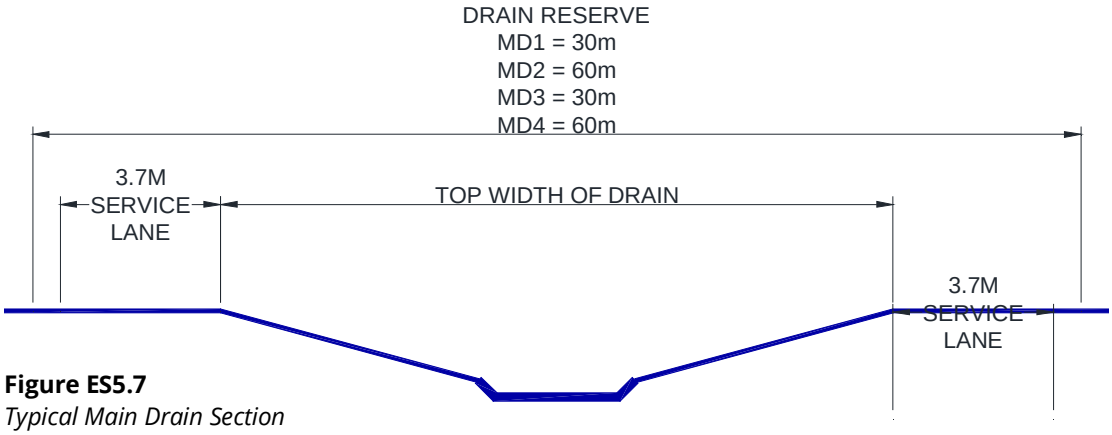


Figure ES5.7
Typical Main Drain Section

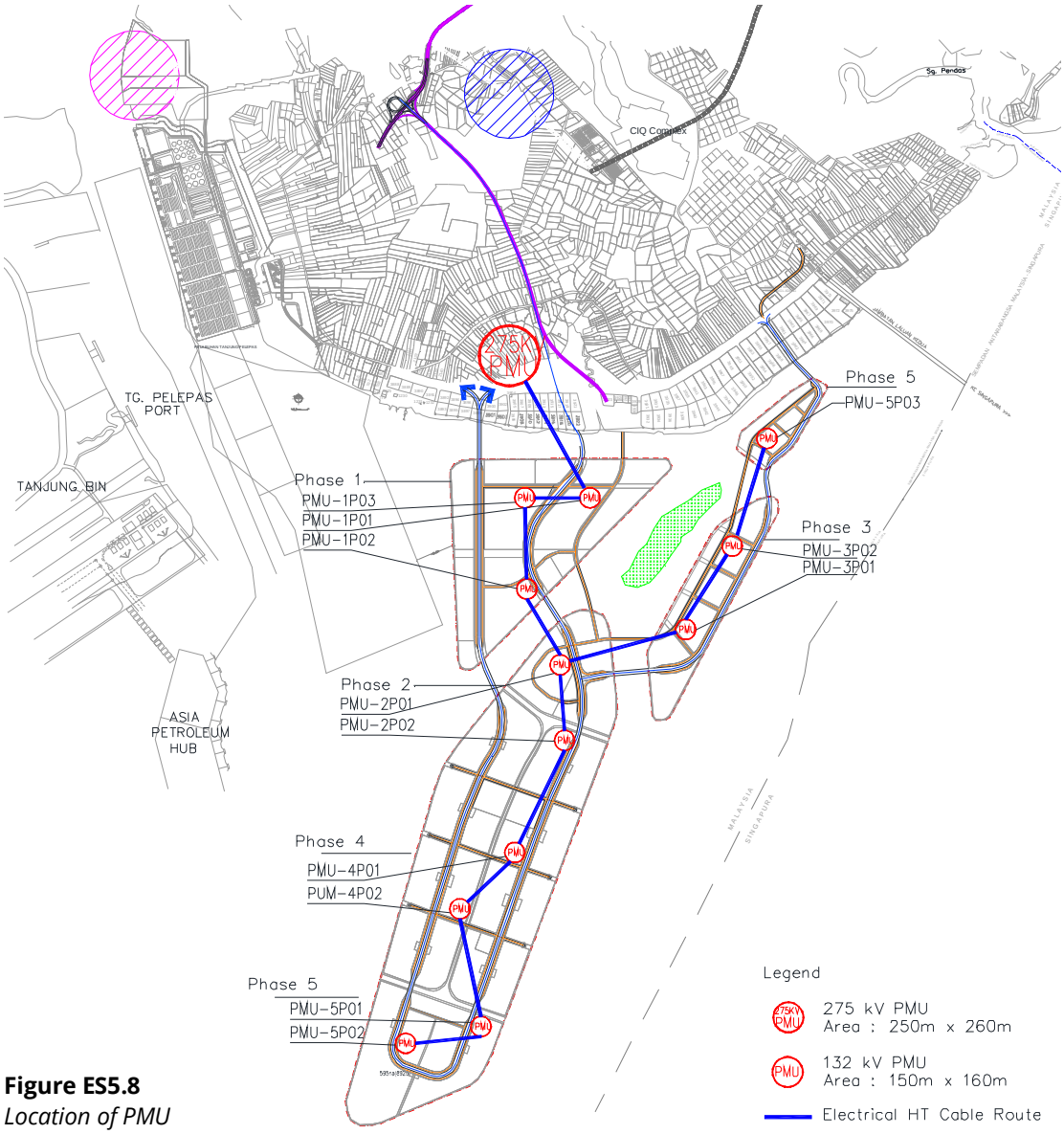


Figure ES5.8
Location of PMU

5.5.5.7 Telecommunications

For the whole development, it is estimated that the number of telephone lines required is approximately 147,580 lines. The proposed supply source for the telephone line will be from the existing TM (TMX F002) at the mainland and JC9Cs along the new proposed road and main link bridge to the development, subjected to TM's review and approval.

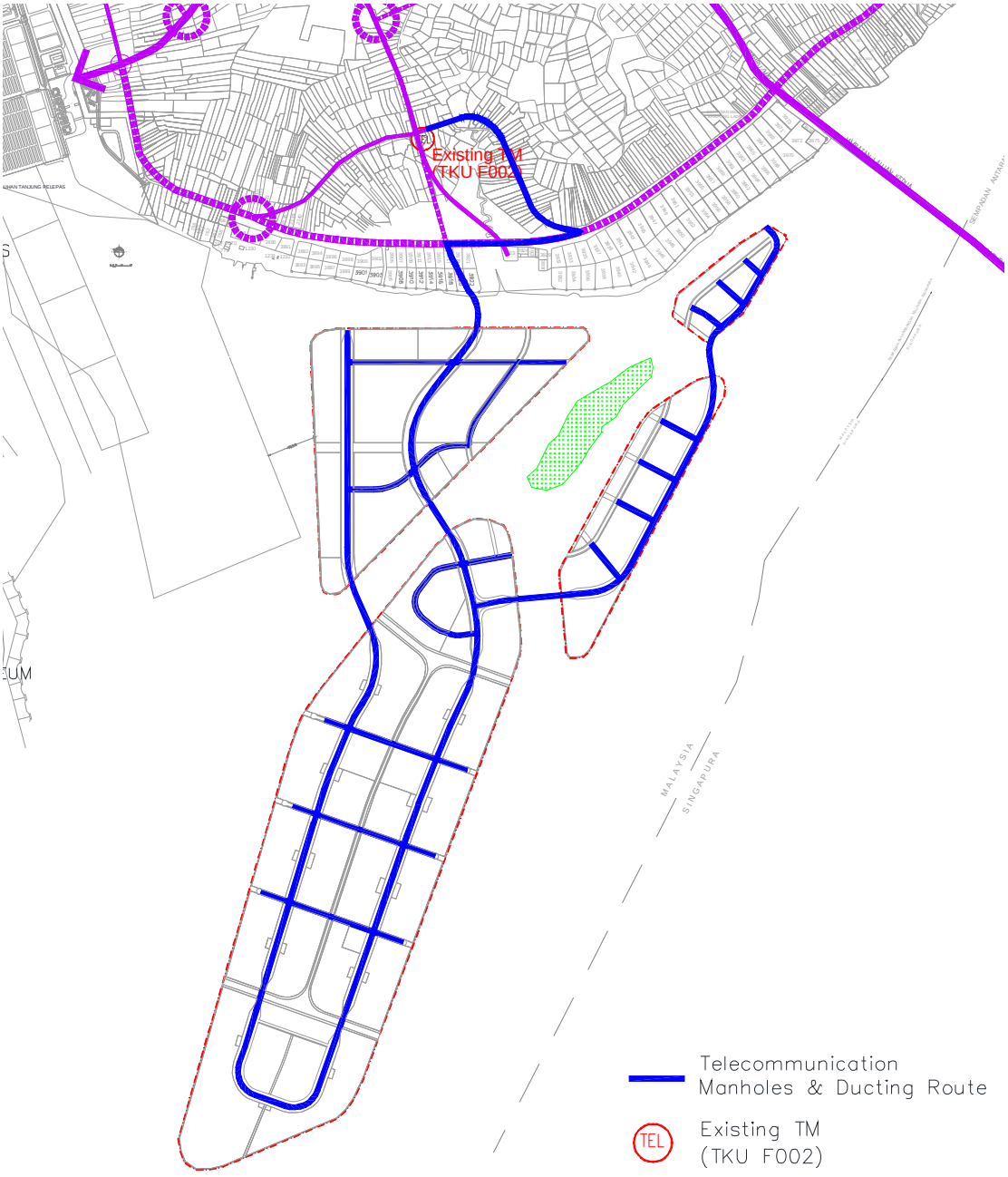


Figure ES5.9
Location of Source Supply and Telephone Line Route

6. Project Options

6.1 Reclamation Configuration

The initial plan to reclaim the islands was mainly to utilise the whole 5,000 acres of land based on the Land Title awarded to the Project Proponent (*Figure ES6.1*). However, various considerations and requirements were then looked into and assessed to refine the best possible landform to be opted. Among the major determining criteria that set the final landform of the islands are:

a) Environmentally Sensitive Areas (ESA) nearby;
b) Hydraulic components such as wave, current, flow, bed level changes, etc.;
c) Malaysia-Singapore International Boundary;
d) Existing structures nearby; and
e) Committed development surrounding the proposed Project area.

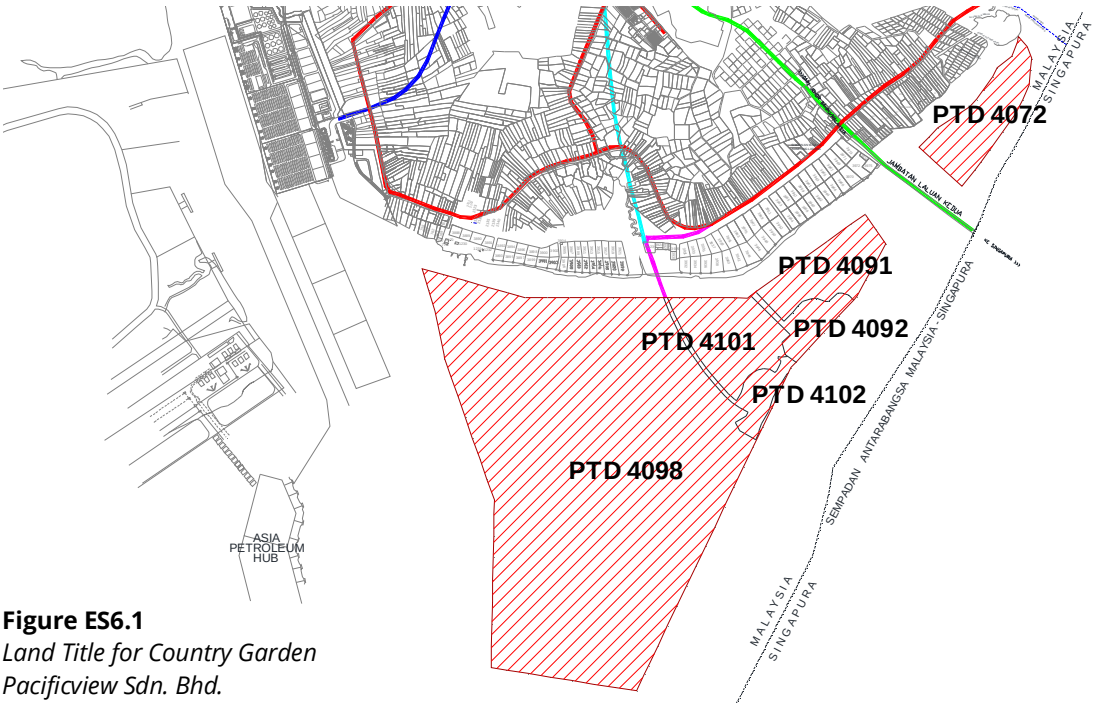


Figure ES6.1
Land Title for Country Garden Pacificview Sdn. Bhd.

The final layout (Option 4) which will involve 4,012.5 acres is chosen because its landform has taken into consideration the following requirements:

a) 200 to 500 m buffer zone for Environmentally Sensitive Area (ESA) namely Merambong Shoal;
b) 600 m from the Environmentally Sensitive Area (ESA) of Merambong Island;
c) Removal of the existing causeway (CG Causeway) for temporary access road of 1.5 km in length and 50 m in width. The CG Causeway was reclaimed partly on the

Merambong seagrass bed and has split the ecosystem into two. Hence, its removal is an immediate action plan to rectify and prevent it from further demolishing the seagrass area and its associated fauna;

d) A 1 km buffer from Port of Tanjung Pelepas' future expansion works (Phase 3);
e) 200 to 300 m away from the mainland (Tanjung Kupang) to accommodate access for small boats (local fishermen);
f) A distance of at least 1 km away from the Second Link;
g) A distance of at least 1 km away from the Malaysia—Singapore International Boundary;
h) ±10% allowable maximum change of current speed within Singapore waters; and
i) ±10% allowable maximum change of current speed within Malaysian waters (if unmitigated).

6.2 "No Build" Option

The coastline of Tanjung Kupang and the surrounding waters of Merambong Island will remain as they are. However, the Government will lose a source of income through foreign investments, premiums, land taxes, assessment fees, submission fees and licensing fees. The RM700 million for infrastructure upgrading works will not materialise. In addition, the 62,200 new employment opportunities and various new businesses will also not come about.

7.0 Existing Physical Environment

7.1 Land Use

The land use of the study area refers to the area within the 5 km radius from the proposed Project (*Figure ES7.1*). In general, the land use pattern in the area is mainly residential, mangrove forest reserves and swamps/wetland forest with PTP, Tanjung Bin power plant and its supporting industrial cluster concentrated around the confluence of Sungai Pulai to Johor Straits as well as along the north-eastern coast of Johor Straits.

The proposed site is covered under two separate Local Plans, namely Johor Bahru District Local Plan (Amendment) 2020 and Pontian District Local Plan (Amendment) 2020, and is also accounted under the Iskandar Malaysia Blueprint 2025 (Integrated Land Use). The proposed development area falls under the jurisdiction of Majlis Perbandaran Johor Bahru Tengah (MPJBT) and Majlis Daerah Pontian (MDP).

Water bodies are the main land use component which constitutes 37.40% of the overall land use within the sub-planning block. These water bodies are mainly derived from Sungai Pulai and its tributaries within the Tanjung Pelepas planning block as well as the waters of the Straits of Johor.

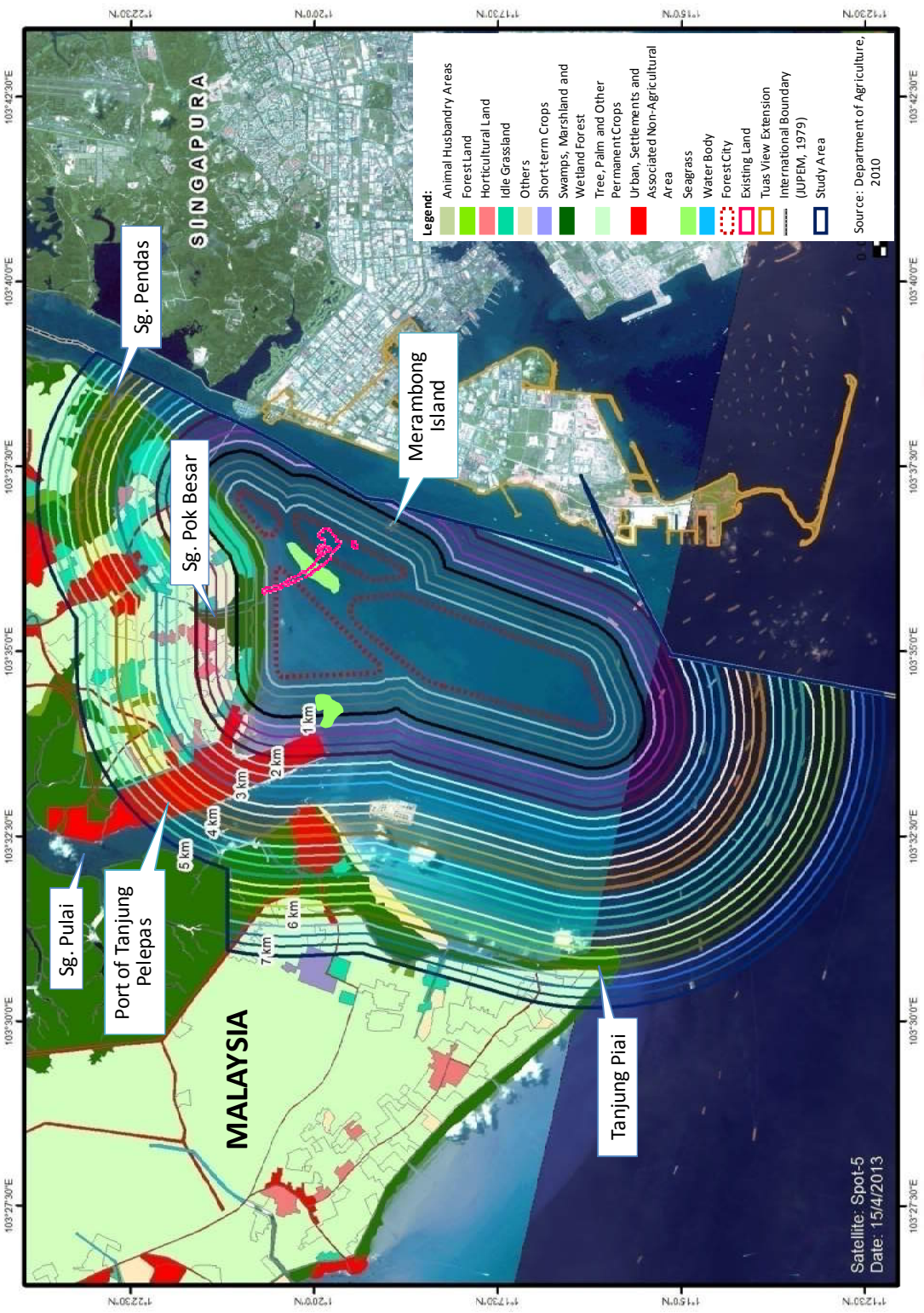


Figure ES7.1 *Existing Land Use*

Mangrove forest covers 23.14% of the overall land usage within the Tanjung Pelepas planning block. The mangrove forest coverage is inclusive of a portion of the Sungai Pulai Ramsar site (total area is 9,126 ha), which was declared by the Ramsar Secretariat as "Internationally Important and Significant", as well as indigenous wetland forest surrounding the Sungai Pulai Ramsar site.

With regards to the Integrated Land Use Blueprint for Iskandar Malaysia, the proposed Project is closest to Flagship B: Nusajaya and Flagship C: Tanjung Pelepas—Tanjung Piai. The majority of land usage for Iskandar Malaysia accounts for urban (existing and future) which is 42.95% of the overall area. The second-highest land usage is agricultural land, which is 27.35% and is the focus in the development of Iskandar Malaysia. The existing urban footprint indicates areas which are already built-up and in general being served by urban services, particularly infrastructures and utilities.

Tanjung Bin is one of the special management areas and the largest privately owned Rank 1 Core Conservation Area. It is situated within the estuary of Sungai Pulai, which is the most important ecological site in Iskandar Malaysia. There are two major activities in Tanjung Bin which are the Tanjung Bin Power Plant and Port of Tanjung Pelepas. The other main activities at Tanjung Bin are eco-tourism, research and education. The Ramsar site, mangrove forests, forest reserves and seagrass are areas of high conservation value and of importance to Iskandar Malaysia.

7.2 Committed Developments

There are 4 main committed developments close to the proposed Project. These are the Tanjung Piai breakwaters, Port of Tanjung Pelepas (PTP), Integrated Petroleum Hub and Maritime Industrial Park and Sunway Iskandar. The shoreline of Tanjung Piai had long been reported to have experienced coastal erosion. Action is being taken by the Department of Irrigation and Drainage (DID) to alleviate the erosion problem considering the importance of the Tanjung Piai shoreline which also houses the Tanjung Piai Ramsar site. It is approximately 9 km from the proposed Project.

PTP intends to implement its Phase 3 development from its overall master plan which will involve dredging and land reclamation works. The existing berth will be further extended where new berths will be constructed, hugging the navigational channel, and expected to begin in 2015.

The Integrated Petroleum Hub and Maritime Industrial Park is situated off Tanjung Piai and within *mukim* Serkat in Pontian district and involves reclamation. The reclamation will cover a total area of 3,485 acres where an integrated petroleum hub and maritime industrial park will then be developed.

Sunway Iskandar is a proposed mixed development to be built within Iskandar Malaysia's "Flagship Zone B". The Project will be developed on 1,800 acres of land surrounding

Sungai Pendas comprising of low-density residential and commercial properties. There will also be riverine estates traversed via Sungai Pendas.

7.3 Hydraulic Components

Currents within Malacca and Singapore Straits flow into Western Straits of Johor during flood flow. The presence of the Johor-Singapore Causeway prevents the flow from mixing with waters from the Eastern Straits of Johor . Water flows out from Western Straits of Johor during ebb flow. The mudflats and mangrove-forested area within the Project area are exposed at various stages of low water events. The current speed is quite variable in the Project area.

The orientation of the coastline around the Project site and reclamations at Singapore Island as well as the mudflat provide varying degrees of wave sheltering to the coastline depending on the direction of wave propagation.

There is a slight change in the erosion and sedimentation patterns within and around the Project site for the Northeast and Southwest Monsoon conditions.

7.4 Geology and Geotechnical

A geological and geotechnical study was undertaken to evaluate the subsurface soil/rock condition on the Project site. The evaluation encompasses determination of the soil profiles and corresponding design parameter for key geotechnical issues namely the stability of the reclaimed land and coastal protection structure. The geological map of Malaysia indicates that the site is situated over marine and continental deposits from the Quaternary Period.

The soil stratigraphy of the site generally consists of the following soil composites:

a) Layer 1: Soft marine clay;
b) Layer 2: Alluvium soil consists of deposited silt or gravel; and
c) Layer 3: Boulders consists of granite/shale/quartzite.

7.5 Hydrology and Drainage

The proposed Project will be built entirely on reclaimed land situated within the Straits of Johor. Therefore, it is not expected to cause any disturbance to the catchment area for the existing river system. However, as most of the river regimes empty within the immediate vicinity of the Project site, the presence of new landmass may influence the current course of the river regimes. The main river catchments are Sungai Pulai, Sungai Pok Besar, Sungai Pok Kecil and Sungai Pendas.

7.6 Water Quality

Fifteen water quality sampling stations were established within the study area as shown in *Figure ES7.2. In-situ* measurements of the physical parameters and sampling of water were carried out on 2^{6th} June 2014. Details of the water-quality sampling are as listed below. The water samples taken from the study area were analysed by an accredited laboratory, and in situ analyses were made using portable analytical meters which comply with the standard methods as specified by the U.S. Environmental Protection Agency procedures.

a) **Dissolved Oxygen (DO)** - Although saline, and in the straits sea, the existing DO levels are already rather low, at about 3 to 4 mg/L (3.08 to 4.75 mg/L). Low DO values are common in forested or mangrove areas due to the presence of tannic and humic acids. There was no significant stratification of DO values between the three water-column layers, indicating well-mixed waters.

b) **Turbidity and Suspended Solids** - The in-situ measured turbidity values recorded at all stations were low i.e. all values were below 5 NTU, indicating very clear waters. Overall, the SS values were generally below the Malaysian Marine Water Quality Standard and Criteria (MWQSC) level of 50 mg/L, indicating excellent marine water quality with respect to Suspended Solids (SS).

c) **Oil and Grease** - In this study, it was found that O&G levels were below 10 mg/L at all points and depths where the recorded values ranged from non-detectable (ND) to about 3 mg/L. Seeing that the straits is plied by ships and boats, the 1 - 3 mg/L values are expected, where such traffic occurs.

d) **Organic Contents** - The COD values range from very low (3 mg/L) to relatively high (127 mg/L). The elevated COD values (around 100 mg/L) could also be due to mangrove-region organics. Those COD and BOD values show that the water at the proposed Project area is already polluted by dissolved organics.

e) **Ammoniacal Nitrogen** - The levels of ammoniacal nitrogen in the sea water samples taken ranged from moderate (1.06 mg/L) to very high (5.71 mg/L) for sea water, indicating contamination by sewage and confirming the suggestion by the BOD values as mentioned above.

f) **Coliform** - The levels of faecal coliform were all non-detectable, that is less than 2 MPN/100mL at all points.

g) **Heavy Metals** - Levels for all metals in the straits waters at the proposed Project site are non-detectable except for Chromium and Iron. However, those for Chromium are still well below the MWQSC level of 0.01 mg/L while there is no stated limit for Iron.

Figure ES7.2
Water Quality Sampling Stations

Table ES7.1
Water Quality Sampling Stations

Points	Coordinate	Type of Water	Description
W1	1° 22′ 32.33″ N, 103° 38′ 22.26″ E	Estuarine	River mouth of Sungai Pendas
W2	1° 22′ 35.94″ N, 103° 38′ 45.84″ E	Saline	Approximately 4 km northeast of the Project site
W3	1° 21′ 52.71″ N, 103° 38′ 19.33″ E	Saline	Adjacent to the Malaysia-Singapore international boundary
W4	1° 20′ 56.59″ N, 103° 37′ 51.56″ E	Saline	Near Tuas Checkpoint
W5	1° 18′ 59.93″ N, 103° 36′ 26.09″ E	Saline	Merambong Island
W6	1° 16′ 41.00″ N, 103° 35′ 41.00″ E	Saline	Approximately 1 km from south of the Project site
W7	1° 17′ 14.83″ N, 103° 33′ 52.48″ E	Saline	Nearby the anchorage point
W8	1° 19′ 47.72″ N, 103° 33′ 57.00″ E	Saline	Tanjung Adang Shoal
W9	1° 19′ 40.56″ N, 103° 35′ 49.38″ E	Saline	Merambong Shoal (South)
W10	1° 20′ 21.96″ N, 103° 36′ 18.06″ E	Saline	Merambong Shoal (North)
W11	1° 20′ 43.87″ N, 103° 35′ 33.34″ E	Estuarine	River mouth of Sungai Pok
W12	1° 19′ 59.18″ N, 103° 37′ 21.95″ E	Saline	Near international boundary
W13	1° 17′ 48.53″ N, 103° 36′ 34.10″ E	Saline	Near international boundary
W14	1° 21′ 53.74″ N, 103° 32′ 25.72″ E	Estuarine	River mouth of Sungai Pulai
W15	1° 17′ 53.31″ N, 103° 31′ 28.18″ E	Saline	In front of Sungai Nibong

Table ES7.2
Details of Water Quality Sampling

Items	Marine
Physical	Temperature, salinity, pH, conductivity, turbidity, dissolved oxygen (DO), total suspended solids (TSS)
Anions	Ammoniacal nitrogen, phosphate, nitrate, sulphide
Cations/Heavy Metals	Cr, Cd, Cu, Ni, Fe, Pb, Mn, As, Hg
Organics	BOD, Total Organic Carbon (TOC), oil and grease
Microbial	Faecal coliform, *E.coli*, *Enterococci*
Number of Stations	Fifteen (15)
Depths	Three depths (surface, middle and bottom)
Tides	Spring (Flooding)

7.7 Sediment Quality

Three sediment quality sampling stations were established within the study area. Sediment samples were taken using a Van Veer Grab. Chemical analyses were done in accordance to the relevant standards. Baseline sediment quality results as per the table below show that all parameters fall under the "Non Polluted" category as stipulated by the US EPA Standard. In general, the sediment quality surrounding the Project area can be considered to be in good condition.

Table ES7.3
Sediment Quality Analyses

Parameter	Unit	US EPA Standard			Results		
		NP	MP	HP	S1	S2	S3
Zinc as Zn	mg/kg	<90	90-200	>200	51.500	22.530	40.769
Nickel as Ni	mg/kg	<20	20-50	>50	5.625	0.602	8.284
Copper as Cu	mg/kg	<25	25-50	>50	13.125	0.904	3.846
Chromium as Cr	mg/kg	<25	25-75	>75	11.500	2.952	19.763
Lead as Pb	mg/kg	<40	40-60	>60	15.813	5.000	22.071
Arsenic as As	mg/kg	<3	3 – 8	>8	<0.001	<0.001	<0.001
Cadmium as Cd	mg/kg	-	-	>6	0.875	0.361	0.473

7.8 Air Quality

The ambience air quality sampling was done on 17th to 19th July 2014. The parameters observed were Total Suspended Particles (TSP), Sulphur Dioxide (SO_2), Carbon Monoxide (CO) and Nitrogen Dioxide (NO_2). Seven stations have been selected for the study. The stations' locations are as shown below while the baseline air quality results are tabulated in *Table ES7.5.*

Table ES7.4
Air Quality Stations

Station	Coordinates	Location	Malaysian Recommended Environmental Air Quality Guideline
A1	1° 21' 35.44" N, 103° 36' 45.25" E	Kampung Ladang	TSP :260 µg/m^3 SO_2 :105 µg/m^3 NO_2 :320 µg/m^3 CO :35 µg/m^3
A2	1° 21' 03.34" N, 103° 35' 57.26" E	Kampung Tanjung Kupang	
A3	1° 21' 18.38" N, 103° 33' 50.00" E	Kampung Tanjung Adang	
A4	1° 19' 50.04" N, 103° 36' 35.74" E	On reclaimed land (Island 3)	
A5	1° 18' 53.09" N, 103° 36' 46.21" E	Merambong Island (facing Singapore)	
A6	1° 19' 07.95" N, 103° 35' 30.47" E	At proposed Island 2	
A7	1° 19' 40.20" N, 103° 31' 20.43" E	Kampung Sungai Dinar	

Table ES7.5
Air Quality Monitoring Baseline Results

Parameter		**Total Suspended Particles (TSP)**		
Monitoring Date		17—18/07/2014	17—18/07/2014	18—19/07/2014
Sampling Time	**Start**	8.45 am	8.30 am	8.00 am
	Stop	8.45 am	8.30 am	8.00 am
Sampling Duration (min)		1,440	1,440	1,440
Air Volume Samples (m^3)		1,627	1,627	1,627
Weight of Suspended Pariculates Collected (µg)		60,190	40,670	43,920
Concentration of TSP (µg/m^3)		37	25	27
Parameter		**Sulphur Dioxide (SO_2)**		
Monitoring Date		17—18/07/2014	17—18/07/2014	18—19/07/2014
Sampling Time	**Start**	8.45 am	8.30 am	8.00 am
	Stop	8.45 am	8.30 am	8.00 am
Sampling Duration (min)		1,440	1,440	1,440
Air Volume Samples (m^3)		2.909	2.880	2.880
Concentration of SO_2 (ppm)		<0.001	<0.001	<0.001
Parameter		**Nitrogen Dioxide (NO_2)**		
Monitoring Date		17/07/2014	17/07/2014	18/07/2014
Sampling Time	**Start**	8.45 am	8.30 am	8.00 am
	Stop	9.45 am	9.30 am	9.00 am
Sampling Duration (min)		60	60	60
Air Volume Samples (m^3)		0.122	0.121	0.121
Concentration of NO_2 (ppm)		<0.001	<0.001	<0.001
Parameter		**Carbon Monoxide (CO)**		
Monitoring Date		17/07/2014	17/07/2014	18/07/2014
Sampling Time	**Start**	8.45 am	8.30 am	8.00 am
	Stop	9.45 am	9.30 am	9.00 am
Sampling Duration (min)		60	60	60
Air Volume Samples (m^3)		2.82	0.122	0.121
Concentration of CO (ppm)		<5	<5	

Note: Malaysian Recommended Environmental Air Quality Guideline = 260 µg/m^3

7.9 Noise

Noise measurements were carried out to measure and establish the existing background noise levels at the surrounding area along the proposed plant in order to establish the existing background noise levels at the affected residential and sensitive areas. Existing background noise levels' measurements were performed according to the International Electro-technical Commissioning (IEC) specifications. The noise descriptors are L_{eq}, L_{10}, and L_{90}. The levels were monitored simultaneously for a duration of at least fifteen minutes in dBA. In addition, the minimum and maximum noise levels, L_{min} and L_{max}, which define the range of noise level data during the measurements' undertaking, were also recorded in dBA. Seven locations (*Figure ES7.3*) were chosen as the noise sampling stations while the baseline noise results are tabulated in *Table ES7.6*.

Table ES7.6
Noise Sampling Stations

Station	Coordinates	Location	Measurement
N1	1° 21′ 35.44″ N, 103° 36′ 45.25″ E	Kampung Ladang	L_{min}, L_{max}, L_{10}, L_{50}, L_{90}, L_{eq} (24 hours profile)
N2	1° 21′ 03.34″ N, 103° 35′ 57.26″ E	Kampung Tanjung Kupang	
N3	1° 21′ 18.38″ N, 103° 33′ 50.00″ E	Kampung Tanjung Adang	
N4	1° 19′ 50.04″ N, 103° 36′ 35.74″ E	On reclaimed land (Island 3)	
N5	1° 18′ 53.09″ N, 103° 36′ 46.21″ E	Merambong Island (facing Singapore)	
N6	1° 19′ 07.95″ N, 103° 35′ 30.47″ E	At proposed Island 2	
N7	1° 19′ 40.20″ N, 103° 31′ 20.43″ E	Kampung Sungai Dinar	

7.10 Existing Land Traffic

The proposed development site is located in the western part of Nusajaya, which is easily accessible from the Tanjung Pelepas Highway and the Second Link Expressway. The existing road networks nearby the Project area are shown in *Figure ES7.2*. The major routes in this network are Jalan Pendas Laut and Jalan Tanjung Kupang, which form the state road of J4. Other existing routes are Second Link Expressway and the Tanjung Pelepas Highway.

Traffic survey for roadways and intersections was carried out on 6th February 2014. The survey involved roadside count surveys, field reconnaissance survey and road inventory survey. Data on vehicular movements, compositions, turning volume, roadway and intersection inventories were also recorded. The classified manual counts for both roadways' and intersections' turning movements were carried out following the standard

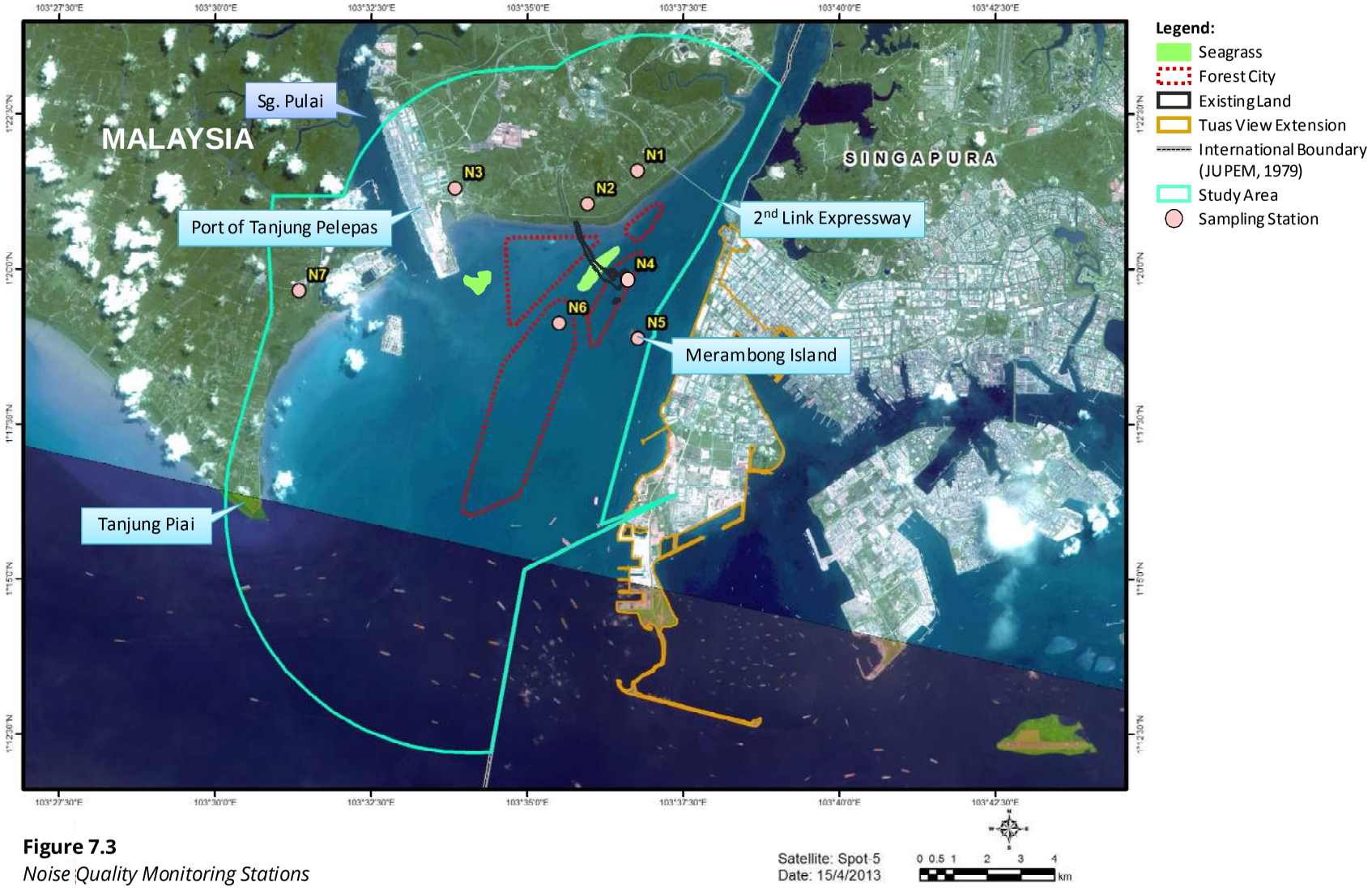


Figure 7.3
Noise Quality Monitoring Stations

as suggested in the "Arahan Teknik (Jalan) JKR 8/86" to enumerate the actual volume of traffic along the selected roadways and intersections. *Table ES7.7* below summarises the existing roadway operating conditions and their corresponding level of service (LOS).

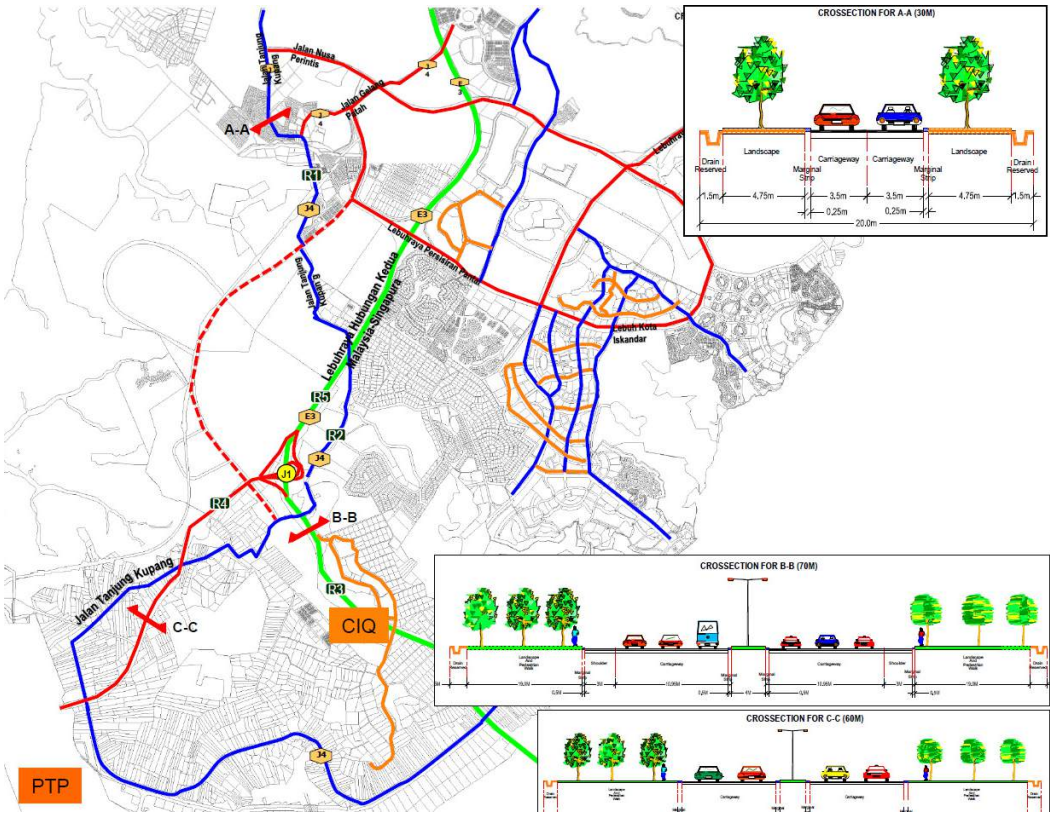


Figure ES7.4
Existing Road Network

Table ES7.7
Existing Roadway Operating Conditions

Stations	Type of Lanes	Flow Direction	Existing Peak Hour Traffic (pcu)	Peak Hour Flow Rate (pc/h)	Level of Service (LOS)
R1 – Jalan Pendas Laut	S1	North Bound	585	1,328	C
	S1	South Bound	677		
R2 – Jalan Tanjung Kupang	S1	North Bound	505	1,090	C
	S1	South Bound	529		
R3 – Second Link Expressway (Near CIQ)	D3	North Bound	461	169	A
	D3	South Bound	3,871	1,419	D
R4 – Tanjung Pelepas Highway	D2	East Bound	473	260	A
	D2	West Bound	1,666	916	D
R5 - 2nd Link Expressway (near Leisure Farm)	D3	North Bound	864	317	A
	D3	South Bound	5,468	2,005	D

8.0 Environmentally Sensitive Areas

There are several Environmentally Sensitive Areas (ESAs) found within the vicinity of the proposed Project site. It should be noted that the NPP2 has clearly stated the importance of preserving environmentally sensitive areas when undertaking any development. The ESAs found within the port area are highly valuable to the local ecosystem with several of them being classified as "Rank 1". These ESAs, their locations and distances to the Project site are as shown in *Table ES8.1*.

Table ES8.1
List of ESAs within the Vicinity of the Project Area

ESA Rank	ESA	Location	Closest Distance from the Project Site (km)
Rank 1	Seagrass	▪ Tanjung Adang Shoal ▪ Merambong Shoal	0.69 0.28
	Island	Merambong Island	0.80
	Coral Reefs	Merambong Island	0.80
	Mangrove Swamps	▪ Coastline of Tanjung Piai ▪ Coastline of Tanjung Kupang ▪ Sungai Pulai Estuary	5.63 0.43 5.45
	Ramsar Site	▪ Tanjung Piai ▪ Sungai Pulai	5.67 5.63
	Tourist Attraction/ Landmark	The Southernmost Tip of Mainland Asia	5.93
Rank 2	Populated Area (within study area circumference)	▪ Kampung Tanjung Adang ▪ Kampung Tanjung Kupang ▪ Kampung Pekajang Lurus ▪ Kampung Pekajang Bengkok ▪ Kampung Tiram Duku ▪ Kampung Pok Besar ▪ Kampung Pok Kechil ▪ Kampung Ladang ▪ Kampung Paya Mengkuang ▪ Pendas ▪ Kampung Pendas Laut ▪ Kampung Bukit Kuching ▪ Kampung Sungai Sam ▪ Kampung Sungai Dinar ▪ Kampung Sungai Chengkeh Besar ▪ Kampung Chengkeh	1.34 1.03 3.12 4.06 4.54 2.60 2.00 1.32 3.57 1.32 4.06 5.12 6.01 5.63 6.70 6.55
	Mudflat	▪ Northern Shoreline (Tanjung Kupang - Pendas) ▪ Western Shoreline (Tanjung Bin - Tanjung Piai)	5.67 5.63

Table ES8.1 *(cont'd)*

ESA Rank	ESA	Location	Closest Distance from the Project Site (km)
Others	Aquaculture	Near Sungai Pendas	4.00
	International Boundary	Malaysia—Singapore International Boundary	1.59
	Eroding Coastline	Tanjung Piai	6.33

8.1 Seagrass Bed (Tanjong Adang and Merambong Shoal)

The seagrass beds at Merambong and Tanjung Adang Shoals are considered as the most important in Peninsular Malaysia. The seagrass beds sustain a diverse mixture of animals and some of them are considered as endangered species such as seahorse and dugong while the commercially important fishes, crabs, prawns and invertebrates like sea stars, sea cucumbers and anemone also thrive in the area.

These seagrass beds are expected to be heavily impacted by the proposed development as both seagrass beds are located within the Project site. The close proximity and very little buffer between the beds and the Project site will render mitigation measures to be less effective. In order to protect the seagrass beds, the mitigation measures proposed must be properly planned, flawlessly implemented and reliably maintained.

8.2 Merambong Island

Merambong Island is a 2.75 ha of rocky island that demarcates the Malaysia-Singapore border and is vegetated by patches of mangroves and shrubs. From the field survey done for this Project, there are a total of 59 taxa in 53 genera from 35 families. The flora includes not only trees but also palms, shrubs, herbs, ferns and climbers.

There are also patches of seaweed and soft and hard corals that inhabit the water around the island. The area is recognized as a habitat for seahorse (*Hippocampus kuda*), pipefishes and sea hares. Merambong Island is also an important research site for local universities conducting researches on marine organisms as rich marine ecosystems are known to inhabit the island.

8.3 Ramsar Site (Sungai Pulai and Tanjung Piai)

Sungai Pulai Forest Reserve is the biggest mangrove forest reserve in the state of Johor. Covering a broad area of 8,353.23 ha, it is also the largest intact riverine mangrove area

in Malaysia. It has been declared as a Ramsar site on 31st January 2003. Diversity-wise, the Sungai Pulai mangrove habitat supports 24 true mangrove plant species and 21 associate species, representing 84% of Malaysia's mangrove species, 79% of Malaysia's exclusive mangrove species and 37% of the world's true mangrove species.

The Tanjung Piai mangrove forest consists of 8 km coastal mangrove and approximately 400 ha of intertidal mudflat. The mangrove habitat here is double-gazetted. Most coastlines within the area are exposed. The coastline is primarily in various degrees of erosion. The mudflats are relatively wide and extensive. Diversity-wise, a total of 59 taxa in 41 genera from 31 families of plant species were reported. From the 59 mangrove flora species, 36 species were exclusive mangrove (94.8% of Malaysian total exclusive), 19 non-exclusive and four associates.

8.4 Mudflat

There are substantial proportions of mudflat ranges from Tanjung Piai to Tanjung Bin and along the coastline of Tanjung Kupang. The mudflat has a span of about 11.1 km with coastal bund present at most part of the coastline. The mudflat area extends up to about 2 km adjacent to PTP wharves tapering to about 100 m at Sungai Pulai western estuary. The presence of PTP Phase II wharves create a calm condition in the lee of the structure that has resulted in the formation of extensive mudflat.

8.5 Aquacultures

There are aquaculture activities nearby to the Project area. These aquaculture activities, including fish cage cultures, are found scattered along the estuary of Sungai Pendas. The major systems being practised were brackish water cage culture and canvas rearing. Most fishermen do not have other incomes and their wives are mostly home-makers, which make them highly dependent on the fisheries activity to survive for their living. The fishermen may lose their source of income should any deterioration of water quality and marine life occurs.

8.6 Populated Areas

The locale surrounding the proposed Project area are mainly small fishermen villages. Most of the families were local residents living in the area for more than 30 years. Considering the magnitude of the proposed Project, it is expected that the impacts from the implementation of the proposed development will not only be on the environment but also on the population of the surrounding area. The condition on the existing human environment is described extensively in *Chapter 11—Existing Human Environment*.

8.7 Coastline Conditions

The coastline around Tanjung Bin Power Plant, located across the Sungai Pulai river mouth, is stable while the coastline between PTP's Phase 2 and Tanjung Kupang is accreting. Coastline stability is afforded by coastal protection provided for Tanjung Bin power plant. As noted in the Shoreline Management Plan for Iskandar Malaysia (SMP), the Project site is relatively sheltered from offshore waves. The permitted current and future land use within the management unit is primarily port-based industry.

Oil spills from the open waters have also impacted the mangroves along the coastline resulting in diebacks and a receding shoreline. Mangroves along the coastline have previously been cleared for agriculture and aquaculture; this has further stressed the coastal mangroves contributing to the erosion process.

9.0 Existing Biological Environment

The main biological components assessed within the study area are terrestrial flora (mangrove), mammals, birds, reptiles, amphibians, fishes and aquatic macro-invertebrates. The description of these components is based on the field surveys conducted and supplemented by available published and unpublished data of the various institutes and government agencies.

9.1 Terrestrial Flora (Mangroves)

The survey of mangrove flora was conducted using two approaches. Firstly, general survey following 11 transects along coastline/rivers to document all coastal/riverine and mangrove plant species. Secondly, 14 of the study plots measuring 50 m x 20 m (0.1 ha) were established to gain information on species composition, diversity and also estimation of above-ground biomass. All trees with a diameter at breast height (DBH) of 5 cm and above were recorded. Species of conservation interest or are rare were highlighted based on the IUCN Red List Categories and Criteria for mangrove species. However, all flora surveys are secondary data and for plots study, 11 of 14 plots study results are primary data. The locations for the flora survey and plot study are as listed in *Table ES9.1*.

From all 23 study sites, a total of 144 plant species were recorded that include trees, shrubs, palms, herbs, ferns, grasses, sedges and climbers. Most of the species are commonly found in wetland areas except for three rare tree species. Based on the IUCN Red List Categories and Criteria, *Bruguierahainesii* is "Critically Endangered", *A. rumphiana* is "Vulnerable" and *Brownlowiatersa, C. zippeliana* and *S. ovata* are "Nearly Threatened".

Table ES9.1
Locations for Flora Survey and Plot Study

Sites	Types	Location	GPS Coordinates	Data Status
A	Flora survey	Tanjung Adang—Tanjung Kupang—Sungai Pendas	01° 21' 8" N 103°36'48.822"E	Secondary
B	Flora survey	Sungai Pok	01° 21′ 02″ N 103° 35′ 28″ E	Secondary
C	Plot study	Sungai Pendas	01° 24′ 39″ N 103° 38′ 44″ E	Secondary
D	Flora survey	Kampung Tanjung Adang/PTP	01° 20′ 51″ N 103° 33′ 42″ E	Secondary
E	Plot study	Sungai Redan I	01° 25′ 30″ N 103° 28′ 42″ E	Primary
F	Plot study	Sungai Redan II	01° 25′ 22″ N 103° 28′ 46″ E	Primary
G	Plot study	Sungai Karang I	01° 22′ 36″ N 103° 30′ 04″ E	Primary
H	Plot study	Sungai Karang II	01° 22′ 47″ N 103° 29′ 45″ E	Primary
I	Plot study	Sungai Karang III	01° 23′ 15″ N 103° 20′ 49″ E	Primary
J	Plot study	Sungai Karang IV	01° 23′ 04″ N 103° 30′ 58″ E	Primary
K	Flora survey	Sungai Dinar	01° 20′ 26″ N 103° 32′ 00″ E	Secondary
L	Flora survey	Sungai Chengkih Besar	01° 20′ 55″ N 103° 31′ 22″ E	Secondary
M	Flora survey	Sungai Chengkih Kecil	01° 21′ 30″ N 103° 31′ 57″ E	Secondary
N	Flora survey	Sungai Chokoh to Fish Farm	01° 18′ 27″ N 103° 30′ 16″ E	Secondary
O	Flora survey	Sungai Chokoh to Kampung Perepat Timbul and Tanjung Piai Resort	01° 17′ 42″ N 103° 30′ 40″ E	Secondary
P	Plot study and flora survey	Taman Negara Tanjung Piai to border of Ramsar Site	01° 16′ 18″ N 103° 30′ 14″ E	Secondary
Q	Plot study and flora survey	Menara Pemerhati Satu	01° 16′ 04″ N 103° 30′ 24″ E	Secondary
R	Plot study	Tanjung Piai National Park 1 (TPNP1)	01° 16′ 07″ N 103° 30′ 35″ E	Primary
S	Plot study	Tanjung Piai National Park 2 (TPNP2)	01° 16′ 06″ N 103° 30′ 38″ E	Primary

Table ES9.1 *(cont'd)*

Sites	Types	Location	GPS Coordinates	Data Status
T	Plot study	Tanjung Piai National Park 3 (TPNP3)	01° 16′ 01″ N 103° 30′ 41″ E	Primary
U	Plot study	Tanjung Piai National Park 4 (TPNP4)	01° 15′ 59″ N 103° 30′ 42″ E	Primary
V	Flora survey	Merambong Island	1°18'55.632"N 103°36'41.676"E	Secondary
W	Plot Study	Sungai Kemudi—Sungai Bahan	01° 24′ 39″ N 103° 38′ 44″ E	Secondary

9.2 Terrestrial Fauna

Fauna assessments within the proposed Project are carried out for the following objectives:

a) To establish baseline information of the terrestrial volant and non-volant mammals and birds within the immediate area of the proposed Project (within a 5 km circumference); and
b) To identify the presence of any protected or rare species.

The location of field survey and trapping sites are as listed in table below:

Table ES9.2
Locations of Field Survey and Trapping Sites

Sites	Location	Birds	Herpeto-fauna	Mammals	GPS Coordinates
1	Sungai Pendas (Kampung Pendas Jaya)	/		/	01°22.502′N, 103°38.391′E
2	Sungai Simpang Arang	/		/	
3	Sungai Tiram Duku	/		/	
4	Tanjung Piai National Park	/	/	/	01° 15′ 59″ N, 103° 30′ 42″ E
5	Sungai Pulai Ramsar Site	/	/	/	01° 20′ 51″ N, 103° 33′ 42″ E

In addition, secondary data is sourced from the combination of SMP for Iskandar Malaysia (2010) and DEIA for Phase 3 Dredging and Reclamation at PTP (2014).

a) **Mammals**: Large-mammals surveys were conducted at least for 3 days at each study site along existing trails in mangrove forest. At each study site, surveys were conducted at least within 1 km transect. Mammals are identified through footprints and droppings that are found during surveys. Reports from interviews with the locals and other agencies will be included in the mammal species list.
b) Information regarding the mammal species from primary data pointed out to being forest species and generalists, which are uniquely adapted to hard life on the coastal areas. Although there are relatively low in number of species, a variety of mammal species do exist in the mangrove ecosystems, but their ecology and association with the mangroves are poorly known.
c) The Long-tailed macaques are prevalent in the study area. The most prevalent large mammal in the study area is the wild pig (*Sus scrofa*). The wild pigs and primates are all protected under the Wildlife Conservation Act 2010.
d) **Birds**: The shore and water birds are very much dependent on the intertidal mud flats, sand flats and associated mangrove areas because these important wetland habitats support very rich benthic fauna, especially the actively accreting mangrove forests. The mudflats serve as a rich feeding ground for migratory shorebirds and resident water birds.

Overall, there are no record of any threatened species because of the short duration of sampling. The total number of bird species does not reflect the true picture of bird diversity in this area. A more comprehensive work is required to include the migratory seasons.

9.3 Marine Biology

9.3.1 Seagrass

Seagrass is an ecologically important habitat that forms the basis of many complex marine ecosystems of the sea. The seagrass sheltering effects and plethora of sufficient food make it the preferred breeding site, nursery ground and temporary shelter for fishes and crustaceans.

There are established seagrass beds at Tanjung Adang Laut Shoal, Merambong Shoal and other areas along the Sungai Pulai. The Macrophytes (seagrass and seaweed) present at the shoal were assessed both qualitatively and quantitatively. Details of the seagrass species recorded from the field survey conducted are as in *Table ES9.3*.

Tanjung Adang Shoal	Merambong Shoal
Enhalus accoroides *Halophila* spp. *Halophila spinulosa* *Syringodium isoetifolium*	*Enhalus accoroides* *Halophila ovalis* *Halophila spinulosa* *Thalassia hemprichii* *Cymodocea rotundata* *Halodule pinnifolia* *Halodule uninervis*

Table ES9.3
Seagrass Species in Tanjung Adang Shoal and Merambong Shoal

9.3.2 Fish and Fisheries

The Straits of Johor provides a complex macrocosm of fresh-estuarine and marine ecosytem for fish communities. The Ramsar site of Sungai Pulai provide a good protected areas for both terrestrial flora and fauna as well as their associated aquatic organisms. Therefore, the ecosystem provides and plays an integral roles as the major habitat/biotopes for wide spectrum of fish species ranging from fresh, estuarine and marine waters fish communities.

Artisanal fishermen from the surrounding coast have traditionally exploited the fishes resources surrounding the areas using various traditional gears such as *kelong*, traps, trolling, long lining and gill/trammel netting.

Survey and assessment of marine fishes are based on the occurrence of demersal and pelagic species during ebbing and flooding tides in the study area. Gill nets and trammel nets were used and set up at random at different tidal regimes, to capture the pelagic and demersal fish species. In addition to the field survey, data of fish landing also were gathered from the traditional fishermen operating in the study areas. A checklist of the fish species in the Study Area is as *Table ES9.4*.

Seahorse and pipefish have become iconic fish species living in the seagrass of Merambong Shoals. The results of the present survey denoted that this cryptic species uses seagrass bed as their primary habitats and major disturbance presently exerted on the ecosystem will most likely drive them away.

Dugongs are one of the twenty marine mammals inhabiting Malaysian waters. In Malaysia, little is known about these creatures due to a lack of trained personnel and also limited funding to study the animal. The dugongs' presence are made aware of from occasional sightings, stranding and deaths which attracted public and media attention, especially in the year 1999. They are also known as "sea cows" due to their main feeding activity which is grazing seagrass meadows in coastal waters. The present dugong seagrass e.g. Halophila and Halodule provide a major grazing habitat for the dugong species. Data gathered from past stranding recorded confirmed the existence of this marine mammal species in the vicinity of the study area.

Table ES9.4
Past Stranding Recorded of Dugong (Dugong dugong) in Vicinity of the Study Areas

No of Cases	Date	Number	Gender	Localities
1	14.05.2003	1	Cow	Tanjung Pelepas, Johor Bahru
2	23.07.2003	1	Female cow	Merambong Island, Johor Bahru
3	18.10.2004	1	Unrecorded	Merambong Island, Johor Bahru
4	14.01.2006	1	Unrecorded	TLDM Pengerang, Kota Tinggi
5	11.04.2006	1	Unrecorded	Simpang. Arang, Gelang Patah, Johor Bahru
6	28.07.2006	1	Female	Pengkalan Pendas Laut, Johor Bahru
7	2.09.2006	1	Female	Pulau Kapas, Terengganu
8	23.01.2007	1	Female	Pulau Tuba, Pulau Langkawi, Kedah
9	11.092007	1	Male	Sungai Pendas, Johor Bahru

10.0 Marine Traffic and Navigation

The primary aim of this marine traffic and navigation study is to address the environmental issues associated with the proposed development towards navigation within the Project area. The report has been made based on the information received and from research specifically done on the subject matter, and has taken into account various factors regarding:

a) Existing marine facilities and utilisation;
b) Existing marine traffic and navigation channel;
c) Marine traffic accident statistics;
d) Conditions of local climate; and
e) Existing marine traffic procedure and safety rules.

The assessment was done using qualitative and quantitative methods including local knowledge, experience, data available from the Project Proponent, adjacent port-operating companies, government authorities and agencies; interviews with fishermen, their associations and local communities, etc.

10.1 Existing Marine Facilities and Utilisation

a) Existing major marine facilities close to the proposed project include Port of Tanjung Pelepas, Port of Singapore, ATB Oil Terminal, Tanjung Bin Power Plant, and APH Oil Terminal. There are also STS Operations which involve the sitting of a mothership anchored at a designated location and functioning as a floating storage unit (FSU).

b) Fishing Vessels' Activities

Fishing activities have traditionally been carried out in the estuary of Sungai Pulai, which is now the location of the approach channel to PTP, Tanjung Bin Power Plant, APH Terminal and the turning basin leading to the ATT Tanjung Bin Oil Terminal abreast of PTP Container Terminal Berths.

There are numerous small wooden jetties situated along the coastline to the east of PTP as far as the bridge linking Malaysia and Singapore (Second Link) are normally small boats powered mainly by outboard engines of between 15 to 60 hp. The total number of fishing boats based in the estuary of Sungai Pulai is estimated to be 200. These consist of both licensed and unlicensed fishing craft. It should be noted that fishing takes place all over the study area, by day and by night, and at various stages of the tide.

c) Existing Marina

There are two (2) marinas located on the eastern side of the Second Link, namely Puteri Harbour and Danga Bay. It should be noted that the Danga Bay marina has been closed permanently and it is no longer possible to berth there. The area will be absorbed into a huge satellite residential development that has been taking place in the area for the last 2 years.

10.2 Existing Marine Traffic and Navigation Channel

PTP can be approached via the Southern entrance of the navigational channel. This channel is 420 m wide and 7,000 m in length. The declared depth is 16.0 m ACD at the approach channel and 17 m at the Phase 2 turning basin. In addition to the anchorage areas, there are a number of licensed Ship-to-Ship (STS) transfer operations close to the southern port limit to the south of Tanjung Piai.

Besides the PTP navigation channel, there is another navigation channel that lies between Merambong Island and the Malaysia-Singapore international boundary. This channel traverses approximately 7 km from south to the 2nd Link and it is located within the Johor Port limit. Recreational boats and yachts use this channel to and from Johor Bahru.

10.3 Conditions of Local Climate

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

The area is also subject to “the Sumatras”, which are actually lines of thunderstorms that usually occur between March and November each year.

The tides within the area are co-oscillating tides of the Pacific and Indian Oceans. The area has two low tides and two high tides a day with the tidal range (difference between the high and low water) being as low as 0.86 m during low tide and as high as 3.34 m during some spring tides.
The currents in the western side of Johor Straits generally flow in a northerly and eastwards direction during flood tides. The ebb current tends to be stronger and flows in the reverse direction.

10.4 Existing Marine Traffic Procedures and Safety Rules

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. The objectives of STRAITREP are to: (a) Enhance the safety of navigation; (b) Protect the marine environment.

10.5 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. Movements of all vessels in port must obtain prior permission from PCC. All vessels operating within the port limits are under the surveillance of the Port Radar System (PRS). Pilotage is compulsory within the limits of PTP.

11.0 Existing Human Environment

11.1 Introduction

This section discusses and highlights the socio-economic profile of the locals including the fishermen who will be impacted and to gauge their level of awareness and perception towards the impending Project as the area fronting the vicinity of the Project site is strung with rows of traditional fishing villages.

The study also seeks to establish the level of social acceptability of the area with regards to the proposed Project. This is because social acceptability would be crucial in determining the smooth implementation of the proposed development. For the purpose of this study, the zone of impact will be confined to the coastline and settlements within a circumference of 5 km from the Project boundary, which mainly comprise of traditional and fishing villages.

11.2 Methodology

Primary and secondary data were collected for the socio-economic analysis, which included a household survey that was conducted within the zone of impact of the proposed Project area. This survey was conducted by direct enumeration using four enumerators. Besides the survey, published and unpublished secondary data from various government departments and agencies such as from the Fisheries Department, Ketua Kampung, Penghulu and Ketua Unit Nelayan were also utilized.

As the study area is relatively specific, exact social statistics on its surroundings are not available. The procurement of such micro data could only be feasibly generated by conducting a social survey which, among others, would enable not only the background of the residents in the area to be known but, more importantly, their views and assessment of the proposed Project.

A sample of 180 or about 10% respondents comprising heads of households from among the local residents and fishermen numbering 143 (79.4%) and 37 (20.6%) respectively were drawn randomly from the study area using a random sampling technique, as shown in table below:

Table ES11.1
Distribution of Respondents by Components and Settlements nearby the Proposed Project Area

Sampling Area	Estimated Population*	Estimated Household No.	Sample Size		
			Public	Fishermen	Overall
Kampung Tiram Duku	1,100	220	8	2	10
Kampung Pekajang Bengkok	1,600	320	6	2	8
Kampung Pekajang Lurus	700	140	8	-	8
Kampung Pok Besar	1,200	240	14	1	15
Kampung Pok Kechil	600	120	15	-	15
Kampng Tanjung Kupang	400	80	16	6	22
Kampung Tanjung Adang	400	80	19	4	23
Kampung Ladang/Pendas	1,100	220	12	8	20
Kampung Pendas Baru	600	120	2	6	8
Kampung Paya Mengkuang	300	60	12	-	12
Kampung Bukit Kucing	400	80	14	-	14
Sub-Total	8,400	1,680	126	29	155
Kampung Sungai Dinar**	1,000	200	17	8	25
Total	**9,400**	**1,880**	**143**	**37**	**180**

*Source: Penghulu Gelang Patah/Tanjung Kupang
** In the *mukim* of Serkat, Pontian

A public dialogue was also conducted on 21 September 2014 at Dewan Raya Kampung Pok, Tanjung Kupang to enable the rest of the interested public to participate in a dialogue about the Project, providing an opportunity for them to air their views and seek clarification on matters that are vague or which they are concerned with. Two Focus Group Discussion (FGD) sessions were previously conducted before that involving the local leaders and the nearby developers.

11.3 Findings

The community or the respondents' profile is necessary in order to discern the type of population prevailing at the study area. It is the makeup of a society that often determines the kind of reaction, impacts and degree of acceptability. The analysis of data gathered from the questionnaire survey revealed the community profile in respect of its demography, social and economic characteristics.

The survey managed to capture 64.4% of the general target respondents i.e. the household heads and the remaining 35.6% the respondents' spouse and other adult household members/sons in place of the absent heads. However, among the fishermen, 97.3% were successfully interviewed with the remaining 2.7% comprising the adult children. The study area is a Malay-dominated area; hence almost all of the respondents were Malay. The Chinese respondents captured among the general public was less than 1%.

Economically, with the exception of the fishermen who were solely employed in their respective sector, two occupational categories i.e. private sector employees and entrepreneurs stood out as the main occupations of the general public as seen in the table below:

Table ES11.2
Economic Profile of the Respondents

Respondents' Economic Background	Public	Fishermen	Overall
Occupation:			
Fisherman	0.0	100.0	20.6
Public sector employee	6.3	0.0	5.0
Private sector employee	37.8	0.0	30.0
Entrepreneurs	14.0	0.0	12.2
Others	19.6	0.0	15.6
Not working	21.0	0.0	16.6
Total	**100.0**	**100.0**	**100.0**

11.3.1 Perceptions Towards the Proposed Project

An analysis of the respondents' ratings pointed to an almost consensus agreement among the locals, both the public and the fishermen, that the Project would only bring about improvements in basic amenities, increase in property value and living standards whilst increased business opportunities was fairly significantly perceived only by the public and not the fishermen. Nonetheless, the locals did not concur with increased employment opportunities which normally is perceived as the benefits that would come with a new Project. They also did not see that it would bring about increased opportunities of property ownership for them.

Table ES11.3
Rating of Perceived Socio -economic Advantages and Disadvantages Brought about by the Proposed Project (Percent Saying Yes)

Perception	Public	Fishermen	Overall
Advantages:			
Employment opportunities to your household members	30.8	24.3	29.4
Employment opportunities to local population	57.3	40.5	53.9
Improvement of basic amenities	89.4	81.1	80.6
Increased value of land/property	88.1	89.2	88.3
Increased standard of living	81.1	83.8	81.7
Increased business opportunities	60.8	48.6	58.3
Increased opportunity for property ownership	30.8	21.6	28.9
Disadvantages:			
Loss of employment	11.2	21.6	13.3
Loss of source of income	10.5	43.2	17.2
Shrinkage of fishing ground	79.7	94.6	82.8
Displaced	2.1	0.0	1.7
Loss of property	9.8	18.9	11.7
Marginalization of existing population	48.3	75.7	53.9

On the positive side, most felt that it would create opportunities for commercial ventures and house rental as well as the fulfilment of the need for the population threshold to initiate and support local economic development. The area would also be faced with rapid development. For those who were not sure, their hesitancy was due to not being able to predict what will happen as they have not been faced with such a situation before.

11.3.2 Project Assessment and Local Acceptability

Analysis of the data on respondents' assessment of the Project showed that they were split in opinion, with the Project perceived to be more advantages to the public but more disadvantages to the fishermen. Nevertheless, more than two-thirds of the public agreed to the implementation of the Project. On a whole, more than half of the respondents agreed to the implementation of the Project whilst 35% disagreed and the remaining 6.7% was not sure.

The reasons given by respondents for agreeing and disagreeing with the Proposed Project are as in the following table:

Table ES11.4
Respondents' Reasons for Agreeing with the Proposed Project

Perception	Public	Fishermen
Reasons for Agreeing:	n=100	n=6
Attract outsiders and increased property value	29	16.7
For progress and development	23	16.7
Employment opportunities and improved infrastructures	17	0.0
Increased business opportunities to the locals	13	50.0
Benefit to future generation	7	16.6
No choice, already developed	11	0.0
Total	**100.0**	**100.0**
Reasons for Disagreeing:	n=35	n=28
Marginalization of locals and influx of outsiders	14.3	0.0
Worry of marine water pollution	42.9	14.3
Environmental problem and affecting mangroves	11.4	10.7
Income and livelihood of fishermen will be affected	5.7	32.1
Shrinkage of fishing ground	11.4	14.3
Obstruction to local fishing route	14.3	28.6
Total	**100.0**	**100.0**
Other Reasons:	n=87	n=23
Excessive dust along Project route, need monitoring	36.8	21.7
Threat to safety from movement of construction vehicles	18.5	13.0
Fishermen's income affected, to compensate	8.0	8.7
Locals and fishermen should be consulted regarding location of reclamation	8.0	8.7
Too close to fishing ground	8.0	21.7
Tugboats, etc., pose danger to fishermen and destruction to fishing gears	12.7	8.7
Disturbance to spawning of marine life	8.0	17.5
Total	**100.0**	**100.0**

11.3.3 Feedbacks from the Public Dialogue

The public dialogue was intended to provide a platform for those who did not participate in the social survey to air their grievances, views and opinions. Those who attended the public dialogue generally were rather mixed with the presence of more non-locals with a few coming from as far as Kuala Lumpur. A few familiar faces that were around during the KPTC public dialogue in Pengerang in 2013 were also seen present in the Tanjung Kupang public dialogue. The local Malay population was seen to be less discernible among the crowd.

The main concerns made about the Project can be summarized as follows:

a) The Project planning aspects,
b) The components of development and utilities,
c) The influx of foreigners, and
d) The benefits to the locals.

Nevertheless, there are still issues of concern that are worrying to the locals which had been voiced in the dialogue. The locals' concerns and fear could be summarised as:

a) They being left out in the development of their area, from influx of foreigners,
b) The future fate of fishermen when their fishing area will be turned into islands, and the issue of compensation, and
c) Land acquisition to make way for overland access road.

11.4 Existing Public Health

Most of the households have good coverage for safe drinking water supply. For sanitary latrines, Johor has a very excellent coverage in both rural and urban. These data indicate the tremendous efforts by the government in reducing and controlling food- and water-borne diseases in the state.

The study area is otherwise free from cholera, diphtheria, leptospirosis, malaria, measles, melioidosis, influenza A, acute poliomyelitis, typhus and viral encephalitis. Thus, diseases like STDs, dengue fever, hand-foot-mouth disease and tuberculosis are among the important communicable diseases in the study area that need more attention and appropriate mitigating measures.

11.5 Conclusion

The social profile of the existing communities in the study area is characterized by a young population of educated background, mainly working as salaried workers, business persons and fishermen. Majority were local residents having been living in the area for

30 years or more. Only about 40% knew about the proposed Project but perceived that it would not be economically advantageous to them and that it would prove to be a source of water pollution and loss of income as a result of shrinkage or limited fishing ground. Being highly dependent on fishing as their main source of livelihood, it is not surprising that 75.7% of the fishermen respondents disagreed with the proposed Project. Reasons being the shrinkage of their fishing ground would jeopardise their source of livelihood and income and obstruction to local fishing route.

12.0 Erosion and Sediment Control

Soil erosion and sedimentation is one of the most crucial environmental impacts arising from a new development, especially one that is located near water bodies. Soil erosion is the process by which the land surface is worn by the action of wind, water or gravity. Sedimentation is the deposition of detached particulate matter that has been eroded or otherwise detached from its source (soil surface) and transported by flowing water (surface runoff).

12.1 Erosion and Sediment Control Plan (ESCP)

The proposed Erosion and Sediment Control Plan (ESCP) is based on the Urban Storm Water Management Manual for Malaysia (2000). The ESCP will be read with the engineering plans or written instruction that may be issued in relation at the Project site.

12.2 ESCP Measures

Barrier fencing will be installed as shown on the plan and elsewhere at the discretion of the Supervision Engineer to ensure traffic control and prohibit unnecessary site disturbance.

Soil material will be replaced in the same order they are removed from the ground. It is particularly important that all sub soils are buried and top soils remain on the surface at the completion of the works.

All earthworks, including waterways, drains and spillways and their outlets, will be constructed to be stable in at least the design storm event. During windy weather, large, unprotected areas will be kept moist (not wet) by sprinkling with water and keeping dust under control.

Water will be prevented from directly entering the permanent drainage system unless it is relatively sediment free.

12.3 Design of Sediment Fence

Sediment fence will be installed to contain the coarse sediment faction (including aggregate fines) as near as possible to their source. The fence will have a catchment area not exceeding 0.4 ha, a length not exceeding 30 m, or a total outflow not exceeding 50 L/s for a 1-year ARI. The fence also will have a storage depth (including both settling and settled zones) of at least 0.6 m, and internal dimensions that provide maximum surface area for sediment to settle.

12.4 Design of Sediment Basin

Sediment basin will be constructed according to the guidelines provided in the Urban Storm Water Management Manual for Malaysia, based on the design event of 3-month ARI. The collected sediment will be flocculated first before discharging.

12.5 Site Inspection and Maintenance

A self-auditing programme will be established in order to maintain the measures put into place are working as intended. The site inspection should be done at least weekly immediately before site closure and immediately following any rainfall event that has caused runoff.

12.6 Overall ESCP

Since the slope of the existing ground is very gentle due to the entire site being newly-reclaimed land, the quantity of the soil loss due to erosion and sedimentation is very minimal and can be adequately controlled with the implementation of ESCP.

The existing soil type mostly consists of coarse sand (reclaimed land) with high water permeability; therefore soil erosion will be tremendously reduced due to the major portion of the rainfall infiltrating into ground rather than translating into surface runoff across soil surface (a major cause of soil erosion).

13.0 Potential Impacts and Mitigation Measures on the Physical and Biological Environment

A summary of the potential impacts and mitigation measures on the physical and biological environment is shown in *Table ES13.1*.

Table ES13.1
Summary of Impacts on Environmental Components due to Project Activities

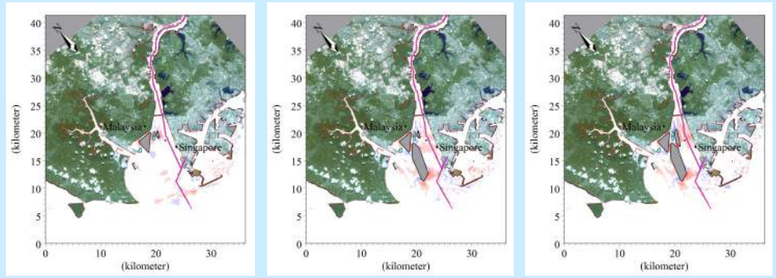
Affected Environmental Components	Project Activities	Potential Impacts	Mitigation Measures
Hydraulic and Hydrology	**<u>Land Reclamation and Dredging</u>** **Land Reclamation** Area: 4,012.5 acre Volume of Fill Material: 161,891,980 m^3 Phases: 4 Duration: 23 years **Dredging** Depth: 3 m below CD Width: 200 m Length: 11,900 m Area: 259.42 ha Volume: 7,500,000 m^3 Dredging Rate: 16,000 m^3/day Slope: 1V:3H	**<u>Currents</u>** ▪ Mean and maximum speed decrease is about 12 and 7% at Merambong Shoal for the full development and with the presence of the other committed developments respectively; ▪ The mean and maximum speed at Tanjung Adang Shoal is 0.1 and 0.3 m/s respectively. The current speed change is up to about 48 and 43% for full development and with other committed developments respectively; ▪ The mean and maximum speed at Merambong Island is less than 0.3 and 0.8 m/s respectively. The current speed change is less than 7 and 9% for full development and with other committed developments respectively. This indicates an improvement in flow with the presence of the other surrounding developments; ▪ The mean and maximum speed decrease is less than 7 and 6% for with full development and with committed developments' scenario respectively at the Second Link Bridge; ▪ The baseline mean and maximum current speed Sungei Buloh Wetland, Merawang Beacon and mangroves at Pergam is less than 0.1 and 0.4 m/s respectively. The mean and maximum speed change is less than 10 and 25% respectively at these locations with full development. ▪ The mean and maximum speed at Tuas Checkpoint is 0.2 and 0.6 m/s respectively. The current speed change is less than 3 and 7% for full development and with the presence of the other committed developments respectively; ▪ The mean and maximum current speeds at various locations near PTP's berths are less than 0.2 and 1.1 m/s. The current speed change due to the Project and including the other committed developments is up to 13 and 68% respectively. Maximum current speed change  Scenario 1 Scenario 2 Scenario 3 Scenario 4 Scenario 5	No mitigating measures are required.

Table ES13.1 *(cont'd)*

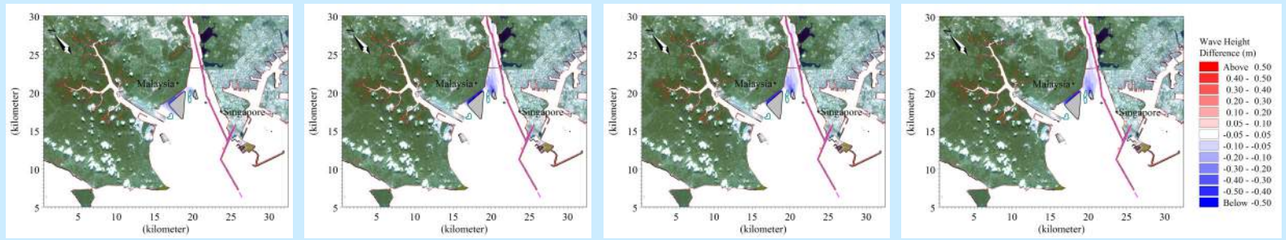
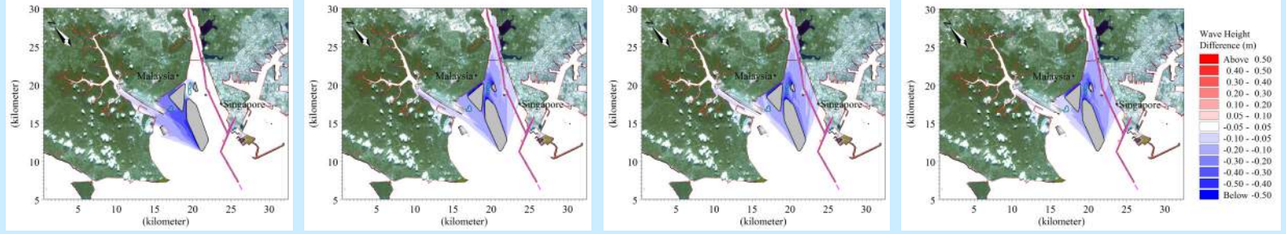
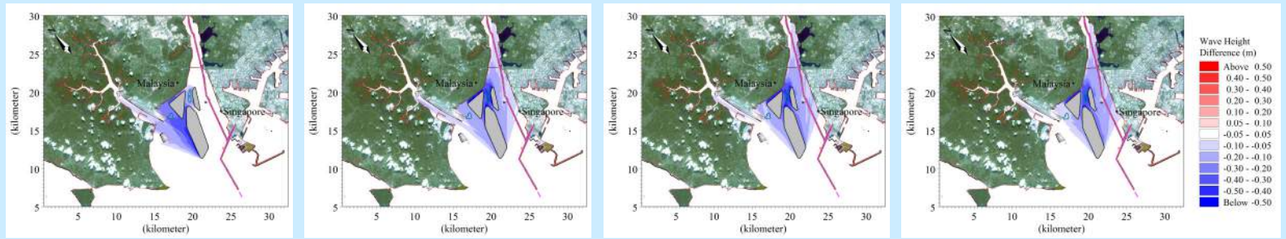
Affected Environmental Components	Project Activities	Potential Impacts	Mitigation Measures
Hydraulic and Hydrology	**Land Reclamation and Dredging**	**Waves** ▪ General wave height decrease in the lee of the reclaimed land based on individual wave propagation resulting in calmer waters of varying degree; ▪ Tanjung Adang shoreline will primarily experience wave height reduction due to the presence of the man-made islands; ▪ Localised wave height decrease of up to about 0.6 m occurs along the shoreline in the lee of the reclamation of Islands 1, 3 and 4 towards Sungai Pok Besar outlet for waves propagating from 180 and 210°N; ▪ The changes in wave heights due to the full development do not affect Tanjung Piai and the adjacent environmentally sensitive areas.  Scenario 1 150°N 180°N 210°N 240°N  Scenario 2 150°N 180°N 210°N 240°N  Scenario 3 150°N 180°N 210°N 240°N	No mitigating measures are required.

Table ES13.1 *(cont'd)*

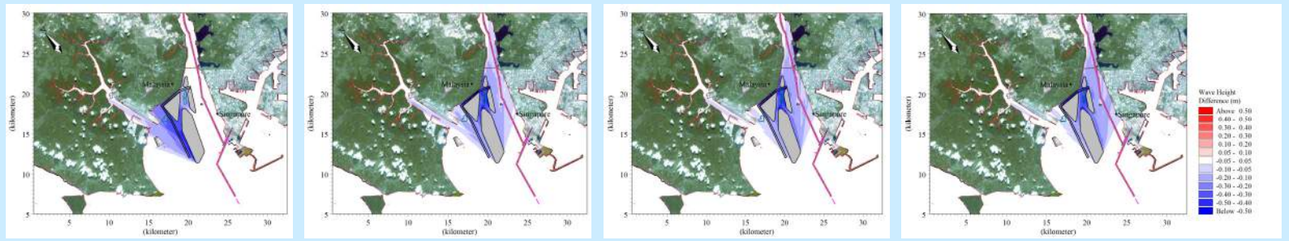
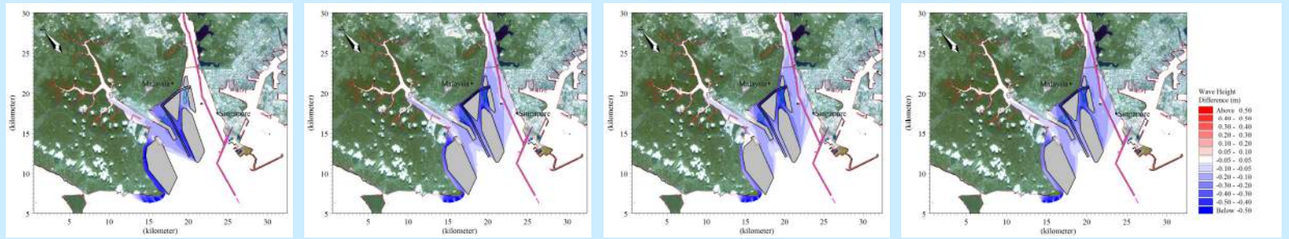
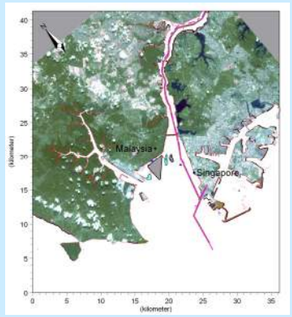
Affected Environmental Components	Project Activities	Potential Impacts	Mitigation Measures
Hydraulic and Hydrology	**Land Reclamation and Dredging**	**Waves** *(cont'd)*  Scenario 4 150°N 180°N 210°N 240°N  Scenario 5 150°N 180°N 210°N 240°N	

Table ES13.1 *(cont'd)*

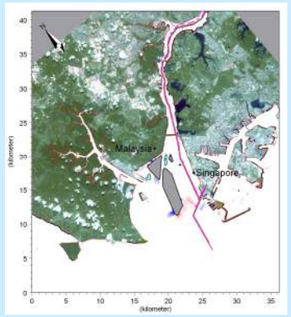
Affected Environmental Components	Project Activities	Potential Impacts	Mitigation Measures
Hydraulic and Hydrology	**Land Reclamation and Dredging**	**Sedimentation and Erosion** Average Sedimentation Rate at ESAs	**Erosion:** ▪ The Project Proponent shall mitigate coastal erosion that is caused by the proposed development. ▪ Perimeter treatment at these areas needs to be properly designed to account for potential erosion. ▪ The type and level of protection as well as ship wakes are to be accounted for in the engineering design. ▪ Monitoring is recommended to ensure mitigation works are conducted promptly. ▪ A collective approach to apportionate the cost of the mitigation works is suggested should the erosion be found to be caused by the proposed development and development(s) conducted by other developer(s) along Western Johor Straits. **Sedimentation:** ▪ The Project Proponent shall conduct periodic maintenance dredging works at intervals of 3 to 5 years within the waterways of the development that experience sedimentation to ensure effective flushing. ▪ Monitoring is recommended to ensure mitigation works are conducted promptly. ▪ A collective approach to apportionate the cost of the mitigation works is suggested should the sedimentation be found to be caused by the proposed development and development(s) conducted by other developer(s) along Western Johor Straits.

Point	Location	Average Sedimentation Rate (m/yr)				
		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
SA	Mangroves at Sungai Mandai Kechil	0	0	0	0	-0.1
SC	Sungei Buloh Wetland	0	0	0	0	0.1
SD	Lim Chu Kang Fish Farms	0	0	0	0	0
ME	Aquaculture at Sungai Melayu	0	0	0	0	0.3
MF	Mangroves at Sungai Melayu	0	0	0	0	-0.4
MO	Mangroves along Tanjung Kupang	0	0	0	0.1	0.1
MR	Tanjung Adang Shoal	0	0	0	0	0.2
MT	Tanjung Piai bird habitat	0	0	0	0	-1.3

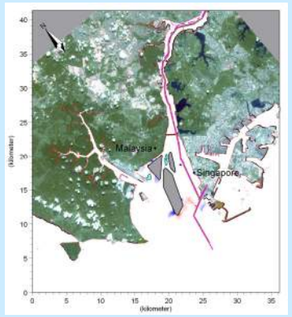
Projected annual bed level change



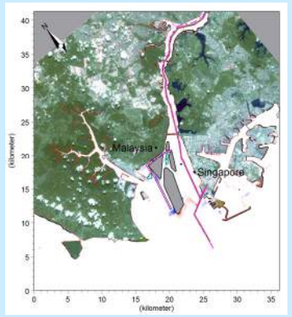
Scenario 1



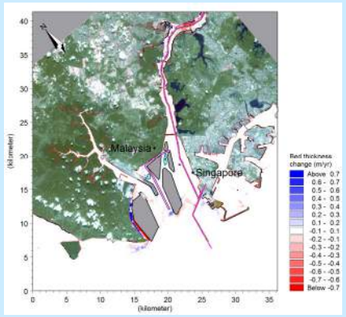
Scenario 2



Scenario 3



Scenario 4



Scenario 5

Table ES13.1 *(cont'd)*

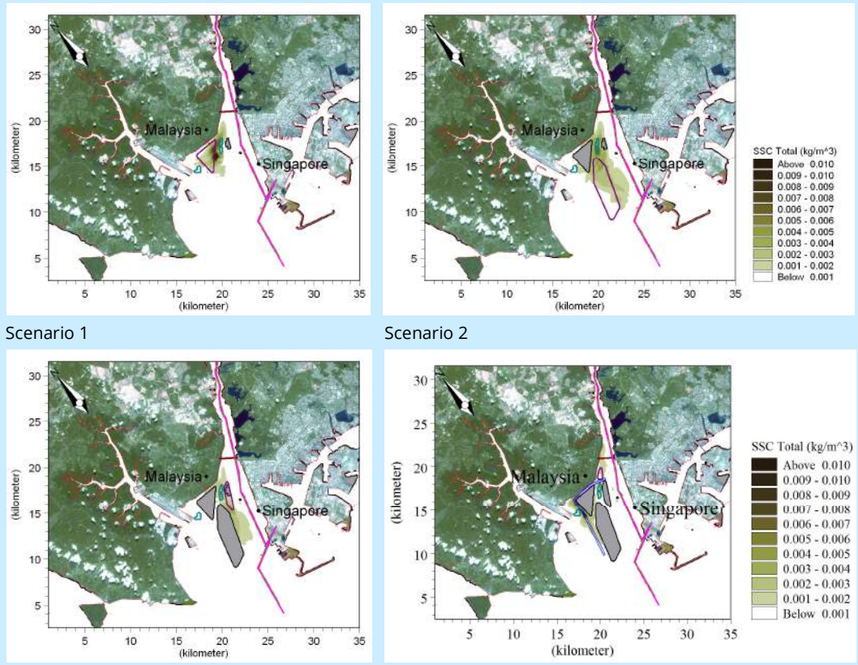
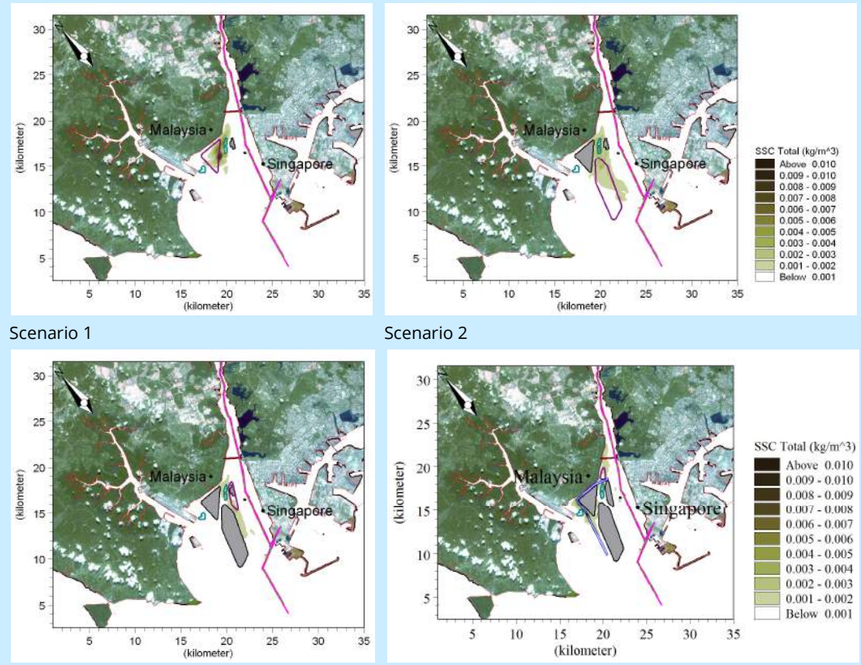
Affected Environmental Components	Project Activities	Potential Impacts	Mitigation Measures
Hydraulic and Hydrology	**Land Reclamation and Dredging**	**Sediment Dispersion** ▪ Dispersion of suspended sediment to the surrounding water causing high turbidity level and TSS concentration; ▪ Under worst case scenario, maximum suspended sediment concentration of above and 5 mg/L disperses as far as 6.0 km and 1.8 km respectively. Maximum excess concentration for uncontained condition  Scenario 1 Scenario 2 Scenario 3 Scenario 4	▪ A silt curtain should be used to prevent or divert suspended sediment away from reaching environmentally sensitive areas. ▪ It is to be placed extending far enough to allow suspended sediment to settle. ▪ The use of silt curtain may not be feasible at areas with high current flows. This can be mitigated by temporarily stopping the contributing activities during periods of fast current flows during spring period. Maximum excess concentration for contained condition (with silt curtain)  Scenario 1 Scenario 2 Scenario 3 Scenario 4
Water Level and Flooding	**Land Reclamation and Dredging**	There is insignificant change in water levels after full development. Thus, there will be no impacts of backwater flow on the existing river systems surrounding the project area.	No mitigating measures are proposed.

Table ES13.1 *(cont'd)*

Affected Environmental Components	Project Activities	Potential Impacts	Mitigation Measures
Water Quality	**Land Reclamation and Dredging**	▪ Resuspension of contaminants found in sediment in the water column. ▪ Oil and grease from the vessels may spilled into the sea. ▪ Improper handling of waste from the vessels.	▪ Barge operator must operate according to the correct methods in order to avoid material spillage. ▪ Overloading is strictly prohibited. ▪ Vessels involved in the transportation of dredged material must be well -maintained and working properly.
	Transportation of Fill Material Source: Ramunia Shoal Type: Sand Volume: 161,891,980 m^3 Vessels: Conveyor Barge (3 units) Sailing Time: 10-15 hours	Spillage of material along the transportation route.	
	Transportation of Dredged Material Disposal Site: Tanjung Balau Type: Mixture of sand, shale and clay Volume: 7,500,000 m^3	Benthic communities will be smothered at the disposal site.	▪ The movement of the dredgers to the disposal sites must be monitored at all times using the Dredging and Disposal Management Systems (DDMS) and Vessel Traffic Management System (VTMS); ▪ Recommended guidelines formulated by DOE regarding disposal site and method of disposing must be strictly followed.
	Post-Reclamation Construction on the Newly-Reclaimed Land	▪ Waste discharge from the base camps. ▪ Sewage and sullage generated by the workers. ▪ Substantial amount of construction waste will be produced.	▪ Sufficient mobile toilets must be provided at the base camps. ▪ All mobile toilets and treatment units provided must comply with specifications stipulated by the Ministry of Health (MOH) and National Water Services Commission (SPAN) ▪ Only treated effluents which comply with the Environmental Quality (Sewage) Regulation 2009 (EQ(S)R, 2009) can be discharged to the environment. ▪ A sufficient number of covered garbage bins should be provided at suitable locations ▪ Open burning of waste is strictly prohibited.
	Operation	**Water Quality Modelling** ▪ Changes in water quality are seen to be relatively similar for Scenarios 2 to 5 and for Scenarios 6 and 7. ▪ The impacts for Scenarios 2 to 5 show a reduction in DO and increase in BOD, nitrate, phosphate ammonia concentration occurring in a localised manner at the Project site. ▪ Faecal coliform concentrations are concentrated at river mouths. ▪ The changes due to the operation of the STP and 10-year stormwater event discharge (non-point source) are relatively small. The impact is localised at the outfall location with the STP in operation. ▪ The impact for non-point source is insignificant as the concentration released from the Project area is similar with the surrounding waters for DO and BOD. The nitrate, ammonia and phosphate concentrations are well-diluted in the open waters due to good mixing within the relatively wide and deeper waters at the straits' entrance. ▪ The changes for each parameter are mainly due to the presence of the respective developments within Western Johor Straits.	▪ The STP should have a polishing stage to ensure the STP effluent, even at Standard A, would not further degrade the water quality in the surrounding area. A polishing stage with media to protect and breed the slow growing nitrifiers would help precipitate the phosphate as the biofilm formed would have both aerobic and anoxic layers. ▪ Regular monitoring of the STP condition is necessary to optimize its performance and minimize operating costs. Monitoring of MLSS concentration and composition should be carried out every month in the first six months or until the system is stable. After that measurements once every six months should be sufficient.

Table ES13.1 *(cont'd)*

Affected Environmental Components	Project Activities	Potential Impacts	Mitigation Measures
Marine Traffic and Navigation	Land Reclamation and Dredging	▪ Erosion of up to about 0.3 m/year would probably occur within the PTP navigation channel. This will assist in keeping the PTP channel open and requiring less maintenance dredging. ▪ Island 2 of the proposed reclamation intrudes into the heavily-used anchorage area. This will adversely impact vessel movements. ▪ Reclamation and dredging may interfere with existing navigational aids.	▪ The Project Proponent is required to submit all relevant documents and Standard Operating Procedures (SOP) pertaining to their Project to the Authorities, namely Johor Port Authority and Marine Department. A pre-operational meeting is proposed if there is a navigational and operational constraint/risk to other port users. ▪ Ship Simulation Study and Marine Risk Assessment are required to be undertaken for approval by the relevant authorities. ▪ Adhere 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 guidelines at all times. ▪ The navigation channel to and from Project area is adequately marked by lighted navigational aids ▪ Project Proponent is required to submit all relevant documents and Standard Operating Procedures (SOP) pertaining to their Project to the Authorities namely Johor Port Authority and Marine Department ▪ 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 ▪ Additional Aids to Navigation should be established if deemed necessary
	Transportation of Material	▪ Barges transporting fill and dredged material will cause additional traffic load in the approach to PTP and at the traffic load at the current pilot boarding ground. ▪ Low visibility at night or during inclement weather may heighten the risk of vessel collision.	
	Post-Reclamation	▪ The newly-reclaimed islands will occupy massive space on the western Straits of Johor which will impose restriction on the available manoeuvrable space for vessel plying through the area. ▪ High number of vessels sharing the limited space will cause high probability for collision to occur.	
Environmentally Sensitive Areas	Land Reclamation and Dredging	**Seagrass** ▪ Increasing level of TSS and turbidity will affect sunlight penetration which will disturb the photosynthesis process. ▪ Settled suspended sediments may smother seagrass. **Aquatic Organisms** ▪ Potential spawning ground may be smothered by sediment. **Mangrove** ▪ Mangroves are sensitive to oil spill. Oil may cover the tree pores, causing asphyxiation. ▪ Susceptible to toxic elements.	▪ Online monitoring of turbidity and TSS level ▪ Sedimentation monitoring at seagrass bed (Merambong Shoal) must be carried out. ▪ Installation of silt curtain at critical areas. ▪ The movement of sediment plume should be monitored closely. ▪ Intervention program should be formulated with various parties i.e. the Proponent, IRDA, NGOs, local universities. ▪ Relocation of sensitive marine life at Merambong Shoal to seagrass meadows located nearby.
	Operation	▪ Effluent discharges may introduce contaminants such as BOD and nutrient. ▪ Excessive nutrient may cause eutrophication. ▪ Degradation of water quality will affect plankton productivity. ▪ Changing hydrodynamics may threaten seagrass survivability.	▪ Strict monitoring on the performance of the sewage treatment plant. The treatment process must work efficiently at all time so that the discharge effluents are within the stipulated limit. ▪ Nutrient removal must be included in the overall design of the sewage treatment plant. ▪ Sullage produced from the residential area must not be directly discharge to the waterways/drainage system. Proper collection system for sullage for recycle or treatment should be fitted. ▪ The use of fertilizer should be limited and fertilizing works must be prohibited during raining season. ▪ A good landscape maintenance programme must be established that includes best practices, water management and waste management.

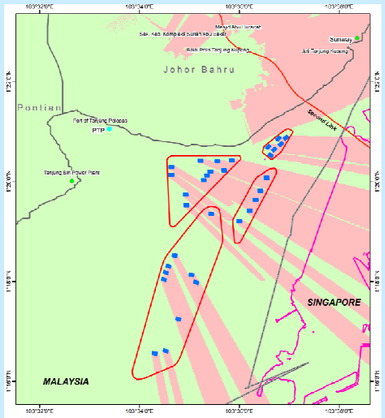
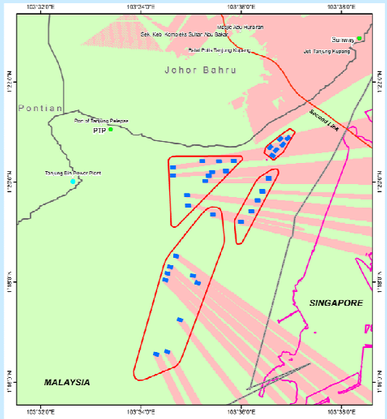
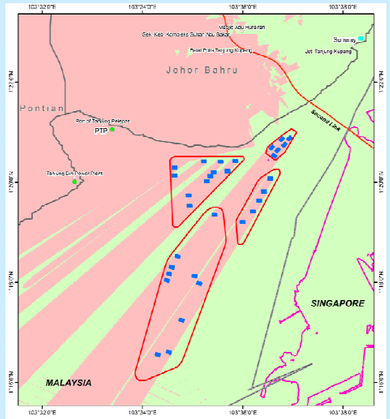
Table ES13.1 *(cont'd)*

Affected Environmental Components	Project Activities	Potential Impacts	Mitigation Measures
Aquatic Flora and Fauna	Land Reclamation and Dredging	▪ Dredging of the sea bottom will cause a total loss of living benthic organisms while land reclamation will completely smother the seabed forever. ▪ High TSS and turbidity level will trigger stress on the aquatic life as turbid water will reduce the light penetration and hence, will retard primary productivity rate. ▪ High water temperature and reduction in dissolved oxygen caused by sediment load will impair the metabolism of most benthic organisms. ▪ Dredging activities may cause nutrient and contaminants that are present in the sediment to be released into the water body.	▪ Mitigating the occurrence of algal bloom should be carried out through constant monitoring of nutrient content in the water column. Should there be a sudden increase in the content of nutrients, the Department of Fisheries, DOE, local fishermen and aquaculture operators should be notified immediately. ▪ Good practice on land reclamation and dredging works should be employed to minimize sediment dispersal at the Project site ▪ Online monitoring of turbidity level and TSS concentrations will provide real time data on the water quality on the area surrounding the Project activities. All reclamation and dredging should cease operation if the TSS and/or turbidity level has reached the trigger value ▪ Installation of silt curtain at several identified locations will reduce the impact of sedimentation and turbidity. Regular maintenance of the silt curtain should be done so it will remain effective.
	Transportation of Fill Material and Disposal of Dredged Material	▪ Oil discharge or leakages from the vessels may pollute the pelagic and benthic ecosystems. ▪ Spillage of material will increase turbidity which in turn will affect the marine life.	
	Operation	▪ Effluent discharged from the islands may contain high number of nutrient which will trigger eutrophication.	
Mudflats	Land Reclamation and Dredging Dredging area= 259.42 ha	▪ Mudflat supports various benthic and sessile organisms such as polychaete, gastropods and bivalves which will be totally wiped out from the area. ▪ However, this is only a temporary and short term impact. ▪ Over the years, a new sea bed will form along the dredged channel via resettlement of sediment and subsequently form new soft bottom substrates.	▪ Since the loss of benthic community during dredging activities is a temporary impact, there will be no mitigating measures. The communities will be restored in due time by the natural processes. ▪ Mitigating the episodes of algal bloom should be carried out through monitoring of nutrient content in the water column. ▪ Monitoring of algal bloom before, during and after dredging should be carried out. The monitoring programme should also include satellite imageries (ocean colours) taken several days before and after the event. ▪ Good dredging practices should be employed to minimize sediment dispersal at the dredging sites. ▪ As for the aquaculture business which may be affected by dredging, due compensation must be paid through fair negotiation. However, it is important to note that there are no aquaculture activities within this area. ▪ Loss of the existing mudflat due to creation of the new islands is permanent and unmitigated. However, a new coastline will be created. In due course, the marine intertidal life will be re-established and the coastal birds (residents and migrants) are expected to resume their feeding and foraging activities in the newly established coastline.
Terrestrial Fauna		▪ No significant impacts on the fauna as the Project does not physically intrude into any of the gazetted natural reserves. ▪ Migratory birds may be affected by the loss of mudflats.	▪ Birds will move away to richer and less disturbed foraging grounds such as Pulau Kukup, thus no mitigating measures is needed for the terrestrial fauna.

Table ES13.1 *(cont'd)*

Affected Environmental Components	Project Activities	Potential Impacts	Mitigation Measures
Fishing Ground	Land Reclamation and Dredging	▪ The overall size of this fishing ground would be reduced and may affect the fishing activities of the local fishermen and their catch. ▪ Reclamation and dredging may cause an economic loss as they may have to move to other fishing grounds further away. ▪ Additional fuel cost and high fuel price would reduce their profit margin further.	▪ If seawater pollution from suspended solids is unavoidable, the fishermen ought to be given prior warning or be informed of the impending activities well in advance to reduce loss or potential loss of income. ▪ The fishermen's fear of losing their livelihood should not be overlooked or unheeded. Some forms of compensation, where applicable, should be looked into and worked out with the affected parties through their representatives and should be settled accordingly and amicably. ▪ Compensation ought to be based on several considerations, such as claims from genuine cases, the types of inconveniences faced and the duration affected etc. in order to arrive at the quantum of the compensation. Other aspects of payment such as its nature (in cash or kind), frequency (one-off or over a period of time) and the paying agency such as UPEN should also be considered.
Air Quality	Land Reclamation and Dredging	▪ Open surface with loose soil is susceptible to wind erosion. ▪ Movement of lorries and machineries will generate significant dust problems if unmitigated.	▪ The soil at the cleared areas for access road on the mainland must be stabilised. Several stabilising techniques that can be used are hydromulch, chemical stabilisation, vegetation or water. ▪ Hoarding that acts as a wind screen can be erected at the access road area that is located nearby sensitive receptors. ▪ Dust abatement procedure such as water spray must be carried regularly at the access road especially during dry and windy condition. ▪ Wash trough should be installed at the access point. Wheels and undercarriage of the vehicle should be regularly unsoiled. ▪ Stockpiles should be covered at all time.
	Post-Reclamation	▪ Movement of lorries and machineries will generate significant dust problems if unmitigated. ▪ Stockpiles of construction materials such as sand and cement may become a source of airborne particulate.	
	Operation	No impact on air quality is expected during this phase.	
Land Traffic		▪ Analysis shows that the existing state road of Jalan Pendas Laut and Jalan Tanjung Kupang will be able to accommodate the increasing traffic volume until 2025. ▪ Tanjung Pelepas highway will reach capacity by 2025. ▪ Second Link Expressway will reach capacity by 2045.	▪ The proposed main access road (Access 1) need a minimum of 3 lanes for each carriageway in 2025 ▪ Unless a new access with a direct tapping from the Second Link is instigated, the Tanjung Pelepas highway need to be upgraded to three, four and five lanes by the year 2025, 2035 and 2040 respectively ▪ The Second Link Expressway needs to be upgraded to 4 lanes by the year 2045. ▪ Comprehensive development of integrated public transportation system.
Noise	Land Reclamation and Dredging	As these activities take place far from the mainland and generate minimal land traffic, it is expected that there will be no significant impacts on the ambient noise level.	▪ Full operation of construction works should be done from 7.00 am to 10.00 pm only. It is advisable that only minimal works are carried out during the night time and public holidays; ▪ The movement of vehicles involve during the construction phase should be minimised during night time; ▪ Ancillary plants, such as generators, compressors and pumps should be placed behind existing physical barriers; ▪ Noise monitoring must be conducted periodically to ensure the noise level does not exceed the guidelines set by the DOE which is not more than 65 dBA during daytime and 55 dBA during night-time; and ▪ Plant, machineries and equipments used should be fitted with the effective exhaust silencers and are maintained in good working order.
	Post-Reclamation	▪ The machineries and equipment deployed for the construction works may contribute to noise pollution. ▪ Additional land traffic and vehicular movement generated will increase the ambient noise level.	
	Operation	Additional land traffic and vehicular movement generated will increase the ambient noise level.	

Table ES13.1 *(cont'd)*

Affected Environmental Components	Project Activities	Potential Impacts	Mitigation Measures
Viewscape	Operation	Areas that could be impacted by the proposed development are Sunway Iskandar, PTP and Tanjung Bin Power Plant. Viewscape  From PTP  From Tg. Bin Power Plant  From Sunway Iskandar	No mitigating measure is required.

14.0 Potential Impacts and Mitigation Measures on the Human environment

14.1 Project Activities

The Project activities discussed within this section covers pre-reclamation, dredging and reclamation works, and topside development. Nevertheless, the discussion of impacts herewith is done from the overall perspective of the phases related to construction, i.e. pre-construction and construction. Potential socio-economic impacts anticipated out of these activities would relate to the local fishermen and their fishing activities, project contractors, labour force in terms of economic gains or otherwise, socio-cultural impacts and safety.

14.2 Pre-construction Phase

14.2.1 Potential Impact on Location and Site

A major part of the proposed Project is to be developed in the waters of Management Unit 3-9 (MU 3-9) of the Shoreline Management Plan for Iskandar Malaysia. It is designated to protect Merambong Island and the seagrass bed of Merambong Shoal. The nature of the proposed Project is one which will result in high impact development from high-density commercial and residential components of the development plan. Although mitigations could be sought to reduce the damage that may accrue, the area has to be degazetted from being a protected area.

Mitigation Measures

a) The process of degazetting the protected zone of the Management Unit 3-9 of the Shoreline Management Plan for Iskandar Malaysia in which the proposed Project is to be located has to be sought from the planning authority of Iskandar Malaysia.

14.3 Construction Phase

14.3.1 Potential Impact on Labour

The manpower requirements for reclamation will be in the range of 5,000 workers during the peak of the reclamation works. The workforce will comprise engineers, skilled workers and semi-skilled workers. The requirements of several hundred workers will boost the local labour market or employment. This will lead to a boost in the local economy, thus improving the economic standing of the locals as they are generally from the relatively low-income group.

Although employment of foreign workers is expected during the reclamation phase, engaging totally foreigners would forfeit this advantage to the locals. Furthermore, increased employment opportunities for the local population, which was perceived by some 17% of the locals as one of the advantages of the Project, was also used as one of the reasons for supporting the Project.

The activities would also require the deployment of contractors and the mobilization of vehicles and equipment. These would again boost local participation and the economy. Nevertheless, the immediate locals should be given priority in contracting works that they could participate in, as voiced by them in the Focus Group Discussions and Public Dialogue organised to get feedbacks about the proposed Project during the course of the study.

Mitigation Measures

a) The boost in local employment would only be effective if a portion of the labour required is recruited from within the local area.
b) Recruitment of labour from among the locals would be most beneficial if taken from the unemployed source or new entrants to the labour market and not pinching from other employments.
c) It should also be similarly applied to employing local contractors and sub-contractors who should be given priority in the selection process.

14.3.2 Potential Impact on Livelihood

Although the setting up of the Project would entail the creation of numerous economic opportunities, it would also pose inconveniences to the local fishermen, especially in disrupting their activities, affecting local marine life (although temporarily) and damaging their fishing gears. The newly-formed islands would reduce the size of the local fishing ground. This had been iterated in our survey findings when the local fishermen perceived that they would lose their work and livelihood as well as being displaced from their normal fishing ground.

The deployment of 5,000 workers would push up the current population size of the study area. Increased population size would bring about increased demand in basic goods and services.

Mitigation Measures

a) The installation of the silt curtain.
b) The boundary of the reclamation activities and sand barges' route should be marked with buoy markings.
c) Compensation ought to be based on several considerations, such as claims from genuine cases, the types of inconveniences faced and the duration affected etc. in order to arrive at the quantum of the compensation. Other aspects of payment

such as its nature (in cash or kind), frequency (one-off or over a period of time) and the paying agency such as UPEN should also be considered.

d) Concerted arrangements should be made to involve the locals.

14.3.3 Potential Impact on Safety

Safety issues are also a major consideration in any stage of the construction. Industrial accidents may have the potential to occur if the workers were not properly supervised and managed. Safety is not only a consideration at the construction site but also on the road. The additional traffic loads from the transportation of machineries and construction materials would make the traffic condition in the area stressful and hazardous.

Mitigation Measures

a) "*Safety first*" should always be stressed upon.
b) Transport operators should be more considerate and always observe safe driving at all times.
c) Stress on the existing road system during the transportation of machineries and construction materials could be minimized if a proper traffic-flow system is designed by the contractor to streamline the movement.
d) Transportation of materials to and from the construction sites should be carried out during non-peak hours.

14.3.4 Potential Impact on Tranquillity and Aesthetics

The natural panorama of the sea view fronting the Tanjung Kupang coasts would be lost forever. But in its stead, four built-up islands would be put in place in the near future. They may have their own charms and the aesthetic value of the sea front would be in the eyes of the beholders.

14.3.5 Impacts on Construction and Operation of Workers' Camps

Workers' camps is a potential source of health and safety hazards and are also not without their socio-cultural implications. During occupation of the accommodation provided, crowding may occur not only on a per-room basis but the overall arrangement of the lodging blocks may also tend to be close to one another.

Accommodating and putting foreign workers or workers from other states of Malaysia together under the same roof or within the same workers' camp complex may have its repercussions. The presence of foreign workers, probably numbering up to several hundreds and coexisting alongside the locals, could disrupt the cultural and racial balance of the area, thus transforming the social makeup of the area into a more

cosmopolitan entity. Physical conflicts could easily develop as a result of the differences in culture and subculture, values, attitude and tolerance level among the different ethnics and races.

Other associated problems are those of social and health which were also voiced by one-fifth of the respondents when their views were sought regarding the future influx of foreign workers into their area. Such views are normally based on the alleged increase in crimes and diseases previously unknown to the country or the reappearance of those which had long since been eradicated such as malaria and tuberculosis

Mitigation Measures

a) The condition of the base or workers camps would have to fit into certain decent living standards that provide well-ventilated space, basic amenities, proper sanitation and non-crowding.
b) The implication of social and cultural problems arising from accommodating foreign workers within one complex could be avoided if workers of different cultural backgrounds would be housed separately but sharing common facilities to promote social integration.
c) Racial clashes and other social problems could be avoided if workers' interest could be looked after, cordial relationship maintained and cultural understanding and tolerance inculcated.
d) The emergence and rise of new strains of diseases, which have often been associated with foreign workers, could be checked and overcome by having proper recruitment procedures and health screening before permission to work is granted.

14.4 Development on Newly-reclaimed Land

14.4.1 Potential Impact on Employment

At the peak of the development of the newly reclaimed land a labour force of 5,000 is expected to be employed. Meanwhile, during the operational phase, an estimated 62,200 employment opportunities will be created. The impact on employment could be significant depending on the ratio of those labour recruited from the local area. The impact of the external labour would be different depending on the number moving or not moving into the locality and those who move with or without family.

Mitigation Measures

a) The proposed Project should strive to have some local recruitment ratio for it to be relevant in the development of the area.

14.4.2 Potential Impact on Income and Revenue

Direct employment render direct income earned from the salary paid. This is a definite positive remuneration and contribution to additional local earnings and from those spent locally would contribute to additional local income. However, the additional contribution would very much dependent on the amount or proportion of earnings spent locally by the outside workers who may or may not move into the local area either bringing in or not bringing in family as mentioned above.

The capital investment in the proposed Project will be significant to other related agencies. If the percentage of total expenditure on goods and services (excluding labour) that would be spent in the local area in purchasing local goods and services is significant then the local economy would thrive.

There are also rates such as assessment rates, quit rent, fees and royalties to be paid and this would create net change in local authority receipts pointing to surpluses or higher returns. Other utilities and services providers for water supply and electricity would also tend to benefit from rate collections.

14.4.3 Potential Impact on the Wider Multiplier Effects

The workforce, which may be substantial (and well paid), can generate considerable retail expenditure in the locality, on a whole range of goods and services. This may be a considerable boost for the local retail economy. The proposed Project itself requires supplies ranging from components from local engineering firms, to provisions for the canteen. Such demands create employment, additional to that directly created by the proposed Project. The additional workforce may demand other services locally such as health, education, and housing, which may generate additional construction. These demands will create additional employment. Such wider economic impacts are considered as beneficial and long-term in nature.

14.4.4 Potential Impact on Demography, Housing and Other Services

The employees recruited from beyond daily commuting distance can be expected to move into the development area permanently during operation. Some of these employees will bring families into the area. In-migrant workers and their families will have several effects on the locality. They will result in an increase in the population of the area and possibly changing the age and sex structure of the nearby local population. They also will require accommodation or housing and place additional demands on a range of local services, including schools, health and recreational facilities, police and emergency services.

Mitigation Measures

a) If population increase is to be checked, the most basic mitigation would be to encourage the maximum recruitment of labour from within daily commuting distance of the Project site, thereby reducing the number of workers and families from moving into the impact zone.
b) Local accommodation impacts can be mitigated by either providing additional accommodation for the workforce or to encourage the use of unoccupied or under occupied accommodation into the impact zone, depending on condition of local housing and accommodation market.

14.4.5 Potential Socio-Cultural Impacts

With an estimated population size of 300,000 people living in the newly created islands, the magnitude of the social impacts would be enormous. Social and cultural conflicts and frictions may become the order of the day if measures for cordial and harmonious living are not promoted.

Mitigation Measures

a) Problems of integration and clash of lifestyles may lead to failure and disappointment. These could be avoided if the residential areas created would not be exclusively enclave; equal opportunities are open to all to participate in the everyday doings and regular happenings in the local area or impact zone.
b) The role of the local authority and management body is crucial in seeing to the implementation of the events by involving all in whatever amenities provided and functions organised for the area. The creation of the feeling of oneness is important in determining that all members of the public would feel that they belonged.
c) With regards to the marginalization of the locals, it could be mitigated by identifying deserving local manpower to be recruited and trained for specific skills required by the multifaceted development in the area.
d) Alienation could also be overcame by ensuring the integration of the surrounding population with the new development through the provision of proper access, infrastructures, and high level of connectivity to and from the area.

15.0 Residual Impact

15.1 Introduction

This chapter details the potential residual impacts of the proposed Project. Residual impacts are defined as impacts which may remain even after the mitigating measures

are adopted into the design and construction management of the Project. These include the following:

a) Decline in marine water quality;
b) Disruption to the sensitive ecosystems;
c) Sedimentation and erosion;
d) Increase in land traffic;
e) Increase in marine traffic;
f) Loss of fishing ground;
g) Foreign influx;
h) Impacts on socio-economy; and
i) Changes in viewscape.

15.2 Decline in Marine Water Quality

Considering the proposed development is surrounded completely by sea, the occurrence of marine water pollution may happen if solid waste, sewage and sullage are not properly managed. For sewage, even if it is treated to Standard A, the discharge from the outfall will introduce additional loading to the surrounding area, which host a number of sensitive ecosystem namely seagrass, corals and mangroves.

15.3 Disruption to the Sensitive Ecosystems

The creation of four new islands will upset the interconnectivity of seagrass, mangroves and corals, which will cause disruption to these sensitive ecosystems. In addition, should degradation of water quality occurs, these sensitive ecosystems would be affected.

15.4 Sedimentation and Erosion

The development primarily affects the area within the direct vicinity of the Project site. There is insignificant impact to bed level change at the ESAs due to the full development. However, sedimentation is expected at the Sungei Buloh wetland and erosion at the mangrove area of Sungai Melayu with the presence of other committed developments. Sedimentation of about 0.1 m/yr is detected at Singapore's coastline in front of Pantai Lido for full development (Scenario 4). However, erosion of up to about 0.6 m/yr is experienced at Singapore's coastline fronting Lido Boulevard reclamation for full development with the presence of other committed development (Scenario 5).

15.5 Increase in Land Traffic

There will be a substantial increase in land traffic on the surrounding area due to the additional commercial activities and population living on the reclaimed islands. Unless the proposed upgrade on major road and intersection networks connecting to the Project site is implemented, there will be a considerable disruption on the traffic flow caused by trip generated by the several hundred thousands of new residents, workers and visitors.

15.6 Disruption to Marine Traffic

The Project location is originally busy with various marine traffic plying through such as ferries, barges, yachts and fishermen boats. With a high number of vessels sharing the same space, disruption may occur.

15.7 Loss of Fishing Ground

The land reclamation will cause permanent loss of fishing ground as the local fishermen can no longer fish there. The Project area has traditionally been the usual fishing ground for the local fishermen as it is very rich in marine resources. Not only that, the proposed development is also expected to cause considerable impacts on important ESAs namely seagrass meadows and mangroves which are very important to the fishes.

15.8 Foreign Influx

Considering the fact that the majority of the new residents will be outsiders, the magnitude of the social impacts would be enormous. The impacts could be further exacerbated if a large number of this new population is made up of foreigners. A large number of people living together with different social, economic and cultural backgrounds may cause social and cultural conflicts and friction.

15.9 Impacts on Socio-economy

This significant boost in employment opportunities can be beneficial to the locals if they are given priority during the recruitment process. Direct employment of the locals will render direct income being earned from the salaries paid, which will then contribute to the improvement of the communities' economic standing. A significant boost in the population number will generate additional retail expenditure in the locality, on a whole range of goods and services. This will be a considerable improvement for the local retail economy.

However, there is a possibility for the locals to be left out from reaping the benefits of this development. If this happens, the local communities will feel marginalized and alienated. The bitter feelings can be further aggravated considering that the new residents coming in will have better economic standing than the locals.

15.10 Changes in Viewscape

Seaward view facing the reclaimed island will be changed. In terms of aesthetic, the view provided by the new islands is a subjective one. However, with a well-planned and landscaped development, the island will offer a new panorama where the sea is still prominent, complementing the current viewscapes.

16.0 Economic Valuations of Environmental Impacts

Only incremental environmental costs and benefits are considered in the analysis. Considering only "incremental costs and benefits" means that only marginal costs and benefits that arise as a result of choosing the "with Project" option (instead of "without Project") is included in the study.

16.1 Valuation of Cost and Benefits

Of the six components listed in *Table 16.1*, four are significant enough to be considered for evaluation. These are i) the loss in mudflat/muddy seabed due to reclamation, ii) the removal of mudflat/muddy seabed due to dredging work, iii) degradation in seagrass bed, and iv) loss of fishing ground. The proposed Project is expected to reduce the environmental services obtainable from the affected area.

16.2 Overall Assessment

After discounting at the rate of 8%, the total present value of the stream annual loss amounts to RM116.0 million over a 50-year period. At 6 and 4% discount rates, the corresponding value are RM145.6 million and RM193.2 million respectively. This study notes that the sum should not be construed as indicating Project feasibility. They rather provide some indication of the magnitude, in monetary terms, of the reduction in the flow of environmental services as a result of the implementation of the Project over the evaluation period.

17.0 Environmental Management Plan

A summary of the proposed monitoring programme is as per *Table ES17.1*.

18.0 Conclusion

From the overall assessment, it can be concluded that the proposed development is expected to cause various degree of negative and positive impacts on the environment, social as well as surrounding land use. Huge commitment is needed from the Proponent in implementing all mitigation measures proposed so that this development will be beneficial not only to the Proponent, but also to the local communities and the State of Johor.

Table ES17.1
Proposed Monitoring Programme

Item	Parameter	Monitoring Stations	Sampling Frequency	Environmental Quality Criteria	Reporting Requirement
Water Quality	Temperature, Salinity, pH, Conductivity, Turbidity, DO, BOD, COD,TOC, TSS, and Oil and Grease, AN, Phosphate, Nitrate, Heavy Metals, Faecal Coliform, *E.coli*, *Enterococci*	As per *Table 7.11*, *Chapter 7—Existing Physical Environment*	Monthly	Results will be compared to the baseline and Malaysia Marine Water Quality Criteria and Standard (MWQCS) and Malaysia-Singapore Joint Committee on the Environment (MSJCE) Protocol.	Report to be submitted to DOE monthly and quarterly.
	Total Suspended Solids and Turbidity	Merambong Shoal and Merambong Island	Daily	Results will be compared to the baseline and Malaysia Marine Water Quality Criteria and Standard (MWQCS).	-
Sediment Quality	Nitrogen, Phosphorus, Arsenic, Cadmium, Chromium, Copper, Lead, Zinc, Mercury and Nickel	As per *Table 7.15*, *Chapter 7—Existing Physical Environment*	Once every month during dredging period	Results will be compared to the baseline and US EPA Standard.	Report to be submitted to DOE monthly during dredging period.
Air Quality	TSP, NO_2, SO_2 and CO	As per *Table 7.19*, *Chapter 7—Existing Physical Environment*	Once every 3 months	Results will be compared to the baseline and Recommended Malaysian Air Quality Guidelines (RMAQG).	Report to be submitted to DOE quarterly.
Noise	(L_{Aeq}, L_{A5}, L_{A10}, L_{A50}, L_{A90} and L_{A95}); and (L_{Amax})	As per *Table 7.22*, *Chapter 7—Existing Physical Environment*	Once every 3 months	Results will be compared to the baseline and DOE's Interim Guidelines for Maximum Permissible Sound Levels by Receiving Land Use (Schedule 1 and 2).	Report to be submitted to DOE quarterly.

Table ES17.1 *(cont'd)*

Item	Parameter	Monitoring Stations	Sampling Frequency	Environmental Quality Criteria	Reporting Requirement
Bathymetric Survey	Nearshore and Bed Level Change	As per *Figure 17.2*	Once every 3 months (during reclamation phase) Once every 6 months (post-reclamation)	Results will be compared to the baseline condition.	Report to be submitted to DID not later than 3 months after the completion of each survey.
Sedimentation Monitoring	Settled Suspended Sediment	Merambong Shoal and Merambong Island	Every 2 weeks	Results will be compared to the proposed Impact Severity Matrix for each ESA.	Report to be submitted to DOE monthly.
Ecological	Health and condition of the ESA	Merambong Island, Tanjung Adang Shoal and Merambong Shoal	Once every 3 months	The ESA condition should be compared to a control site and/or the initial condition before the start of dredging and reclamation activities.	Report to be submitted to DOE quarterly.
Environmental Audits	To audit the compliances with the EIA approval conditions and the relevant environmental regulations and guidelines.	The whole project's implementation and its activities	Monthly	Environmental Audits should be carried out by a third party Environmental Auditor (registered with DOE).	Report to be submitted to DOE monthly.

Ringkasan Eksekutif 2

Kandungan

Jadual

Rajah

Volume 1

Ringkasan Eksekutif

1.0 Pengenalan

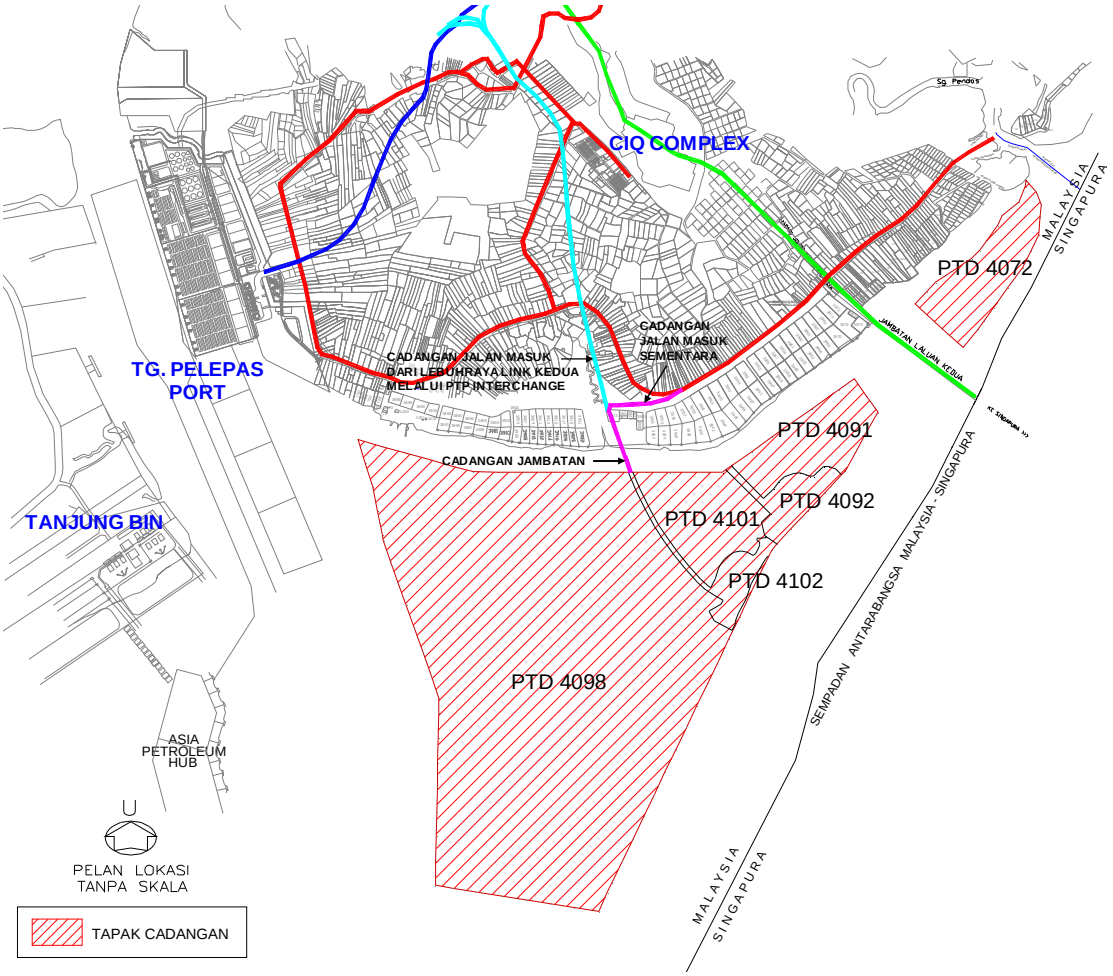
Country Garden Pacificview Sdn. Bhd. (selepas ini akan dirujuk sebagai "Penggerak Projek") berhasrat untuk melaksanakan aktiviti penambakan berhampiran dengan Pelabuhan Tanjung Pelepas dan persisiran pantai Tanjung Kupang, Johor. Pembangunan ini terletak di sebelah barat Selat Johor dan aspek utama projek ini adalah pembentukan empat pulau buatan manusia. Pulau-pulau ini akan dibangunkan sebagai pembangunan jenis campuran.

Projek ini menyediakan Laporan Penilaian Impak Alam Sekitar Terperinci (DEIA) di bawah tajuk "PENILAIAN IMPAK ALAM SEKITAR TERPERINCI UNTUK CADANGAN PENAMBAKAN DAN PEMBANGUNAN CAMPURAN PULAU FOREST CITY, JOHOR" (selepas ini akan dirujuk sebagai "Projek")

2.0 Latar Belakang dan Kronologi Projek

Kejayaan projek Iskandar Malaysia sejak penubuhannya pada 2006 telah membuka jalan kepada kebolehlaksanaan projek cadangan. Country Garden Pacificview Sdn. Bhd. telah menjadi Penggerak bagi sebuah projek yang dikenali sebagai "Projek Forest City" selari dengan corak pembangunan di Johor yang tertumpu di kawasan persisiran pantai. Semua lot tanah yang terlibat dalam cadangan Projek terletak di dalam mukim Tanjung Kupang, Johor Bahru. Lot tanah ini telah diberi pemilikan pada 8 November 2013. *Rajah RE2.1* menunjukkan nombor dan lokasi lot tanah terlibat.

Semasa proses penambakan fasa pertama pada Jun 2014, isu pencemaran rentas-sempadan telah timbul dan menyebabkan Kajian Impak Alam Sekitar Terperinci (DEIA) dan Kajian Hidraulik perlu dijalankan. Oleh itu, Penggerak Projek telah memberhentikan aktiviti penambakan secara sukarela dan akur untuk menyambung semula kerja di tapak setelah kajian DEIA dan Hidraulik diluluskan.



Rajah RE2.1
Lot Tanah yang Diberikan untuk Pembangunan

Selain itu, pihak pemaju telah diminta untuk mengemukakan Kajian Penilaian Awal kepada pihak Jabatan Alam Sekitar (JAS) Putrajaya untuk menilai kesan daripada sebahagian dari penambakan Fasa 1 dan isu berkaitan pencemaran rentas-sempadan.

Kronologi Projek adalah seperti *Jadual RE2.1*.

Jadual RE2.1
Kronologi Projek

Tarikh	Ulasan
2013	Country Garden Holdings Ltd. dan Esplanade Danga 88 Sdn. Bhd., sebuah syarikat yang berkaitan dengan Kumpulan Prasarana Rakyat Johor (KPRJ), telah berkerjasama dalam membentuk Country Garden Pacificview Sdn. Bhd (CGPV) sebagai Penggerak Projek bagi pembangunan Forest City.
8 November 2013	Pemilikan tanah telah diperolehi oleh Country Garden Pacificview yang merangkumi lot kawasan 4091, 4092, 4098, 4101 dan 4102 dengan jumlah keluasan 4,887 ekar.
13 Januari 2014	JAS Johor telah meluluskan PAT bagi penambakan Fasa 1.
20 Januari 2014	Penggerak berhasrat untuk melaksanakan tambakan di kawasan PTD 4102 yang berkeluasan 49.3 hektar. Penilaian Awal Tapak (PAT) bagi Fasa 1 telah dikemukakan kepada JAS Johor.
22 Januari 2014	Kerja penambakan Fasa 1 telah dimulakan.
1 Jun 2014	KML untuk kawasan PTD 4102 telah dikemukakan kepada MPJBT.
2 Jun 2014	JAS Johor mengeluarkan surat arahan supaya kerja langkah kawalan dijalankan di tapak Projek.
6 Jun 2014	JAS Johor meminta agar kajian EIA Terperinci dikemukakan untuk kelulusan.
12 Jun 2014	Penggerak dan agensi berkaitan telah dipanggil mesyuarat oleh JAS Putrajaya bagi membincangkan isu rentas-sempadan. Hasil daripada mesyuarat ini, Laporan Penilaian Awal untuk menilai impak sebahagian kawasan yang telah ditambak dalam Fasa 1 dan isu-isu rentas-sempadan perlu dihantar kepada JAS pada 23 Jun 2014. Selain itu, Kajian EIA Terperinci dan Hidraulik diperlukan bagi semua kerja penambakan bagi mendapatkan kelulusan. Oleh yang demikian, Dr. Nik & Associates Sdn. Bhd. (DNASB) telah dilantik sebagai Perunding Alam Sekitar dan Hidraulik untuk menyediakan Laporan Penilaian Awal serta Kajian DEIA dan Hidraulik.
15 Jun 2014	Penggerak telah memberhentikan kerja penambakan secara sukarela dan berjanji untuk menyambung semula kerja di tapak setelah kajian DEIA dan Hidraulik diluluskan oleh pihak JAS dan JPS. Kerja penambakan ketika ini mencapai 40% daripada keseluruhan 49.3 hektar. Ini termasuklah jalan masuk sementara (yang dipanggil Tambak CG) daripada tanah besar ke sebahagian pulau yang telah ditambak.

Jadual RE2.1 *(samb')*

Tarikh	Ulasan
17 Jun 2014	Setelah pemberhentian kerja oleh Penggerak, JAS Putrajaya telah menghantar surat untuk memastikan segala aktiviti di kawasan terlibat (pengangkutan pasir dengan tongkang, pengisian pasir, rawatan tambakan pasir, pengorekan dan lain-lain) ditangguhkan buat sementara waktu. Sementara itu, Penggerak telah diminta untuk melakukan kerja langkah kawalan seperti pemasangan tirai kelodak-dua lapisan, pemantauan harian kualiti air, pemantauan kualiti air secara atas talian.
23 Jun 2014	Laporan Penilaian Awal ke atas impak sebahagian kawasan tambakan Fasa 1 dan isu-isu rentas-sempadan telah dikemukakan kepada JAS Putrajaya.
24 Jun 2014	JAS Johor telah menghantar Notis Arahan Serta Merta (Ruj: AS(B) J/50/011/200/262) kepada Penggerak yang melibatkan keperluan segera penyelenggaraan tirai kelodak sedia ada di kawasan tersebut, pemasangan tirai kelodak-dua lapisan; penyerahan laporan pemantauan kualiti air marin; perlantikan Pegawai Alam Sekitar.
9 Julai 2014	Pembentangan Penilaian Awal bagi Fasa 1 kepada JAS, panel pakar dan agensi kerajaan diadakan di JAS Putrajaya. Berdasarkan penilaian awal, persetujuan antara Penggerak dan JAS telah dicapai berhubung pengorekan semula Tambak CG untuk mengelak impak lanjutan kepada hamparan rumput laut (Beting Merambong) dan bagi pengaliran air yang baik di barat Selat Johor.
1 Julai 2014	KMP dan Pelan Pembangunan telah dihantar secara serentak kepada OSC bagi Tambakan Fasa 1.
7 Julai 2014	Terma Rujukan DEIA (TOR) bagi penambakan (5,000 ekar) telah diserahkan.
3 Ogos 2014	Mesyuarat bersama Jawatankuasa Perancangan Negeri (Teknikal) di JPBD Johor diadakan berhubung isu perancangan. Bentuk akhir kawasan tambakan iaitu 4 pulau (4,012.5 ekar) telah dibentangkan dengan berpandukan input hidraulik.
4 Ogos 2014	Mesyuarat dengan SPC telah dipengerusikan oleh Menteri Besar Johor.
14 Ogos 2014	Mesyuarat Panel Pengulas untuk TOR DEIA di JAS Putrajaya (kawasan asal tambakan seluas 500 ekar). Namun, TOR yang telah dikemaskini merangkumi bentuk baru kawasan tambakan perlu dikemukakan semula kepada JAS.
4 September 2014	Penyerahan TOR DEIA yang telah dikemaskini termasuk bentuk akhir kawasan tambakan bagi 4 buah pulau (4,012.5 ekar).
14 September 2014	Perbincangan Kumpulan Sasaran (FGD) telah diadakan dengan pihak berkepentingan seperti UEM Sunrise, Sunway Iskandar, Puteri Harbour, Medini, PTP dan Lido Boulevard.

Table ES2.1 *(cont'd)*

Date	Remarks
14 September 2014	FGD dengan masyarakat kampung diadakan di Dewanraya Kampung Pok yang melibatkan Penghulu Gelang Patah; Ketua Kampung Tanjung Adang, Kampung Pok, Kampung Tiram Duku, Kampung Pendas, Persatuan Nelayan Kawasan Johor Selatan dan pemilik restoran.
21 September 2014	Dialog Umum telah diadakan di Dewanraya Kampung Pok.
29 September 2014	FGD bersama dengan wakil kampung yang turut dihadiri oleh tiga Pengarah Eksekutif Penggerak Projek.
30 September 2014	FGD bersama dengan wakil Kampung Pok untuk perbincangan tentang alternatif bagi Penjajaran Jalan Masuk Utama.
30 September 2014	Perjumpaan dengan penduduk Kampung Pendas Baru.
1 Oktober 2014	Perjumpaan dengan Kelab Alami Tanjung Kupang.
3 Oktober 2014	FGD bersama penduduk Kampung Paya Mengkuang dan Kampung Pok.
8 Oktober 2014	FGD telah diadakan bersama Orang Asli Kampung Simpang Arang di Dewan Tarbiah, Kampung Simpang Arang. Jabatan Kemajuan Orang Asli (JKOA) turut menghadiri mesyuarat ini.
8 Oktober 2014	FGD turut diadakan bersama nelayan dan penduduk tempatan di Restoran Sungai Pendas pada sebelah petang.
10 Oktober 2014	FGD bersama penduduk Kampung Tiram Duku dan Tanjung Adang.
10 Oktober 2014	TOR DEIA yang telah dikemaskini telah mendapat kelulusan JAS Putrajaya.

3.0 Penggerak Projek

Penggerak Projek ialah Country Garden Pacificview Sdn. Bhd. yang beroperasi di Teluk Danga, Jalan Skudai, Johor Bahru.

Kajian DEIA dan Hidraulik telah dijalankan oleh Dr. Nik & Associates Sdn. Bhd. yang berpusat di Pusat Bandar Wangsa Maju, Kuala Lumpur.

4.0 Keperluan Projek

4.1 Konsep "Forest City"

Pembangunan komersil berskala besar ini mempunyai potensi untuk menghasilkan impak yang signifikan kepada kawasan persekitaran termasuk Pelabuhan Tanjung Pelepas (PTP), Tanjung Kupang, Gelang Patah di bahagian selatan negeri Johor dan Singapura dalam menyediakan persaingan dalam sektor pelaburan, perdagangan dan pelancongan. Pembangunan berkonsepkan “Forest City” adalah aspirasi kepada sebuah pembangunan yang memfokus kepada kesejahteraan. Ini dapat dicapai melalui penekanan gaya hidup yang harmoni dan sihat, persekitaran yang lestari dan suasana urban yang efisien dan selesa untuk hidup, bekerja, belajar serta rekreasi.

4.2 Mengukuhkan Hubungan Dua Hala Malaysia-Singapura

Projek ini mempunyai hubungan langsung dengan Lebuhraya Utara-Selatan yang menghubungkan tiga buah negara iaitu Thailand, Malaysia dan Singapura. Selain itu, Projek ini berdekatan dengan Link Kedua yang menghubungkan dua Malaysia dan Singapura. Kemudahan yang telah dirancang ini akan memberi keuntungan kepada kedua-dua negara kerana akan membuka peluang bagi menarik kedatangan pelabur dari Singapura untuk terlibat dalam pelaburan di Malaysia.

4.3 Kepesatan Ekonomi di Wilayah Selatan Johor Memacu Peluang Pembangunan

Kepesatan ekonomi di wilayah selatan Johor telah membuka peluang bagi Projek ini memantapkan lagi ekonomi Johor dan menjadikannya sebagai pintu gerbang utama selatan negara. Lonjakan kesan sosial yang positif kepada masyarakat setempat boleh dicapai melalui penglibatan masyarakat dalam bidang perniagaan, pelaburan dan peluang pekerjaan. Sepanjang tempoh pembangunan ini, dianggarkan sebanyak 62,200 peluang pekerjaan bakal ditawarkan. Kehidupan yang lebih baik dan terjamin daripada Projek ini boleh terhasil melalui penjanaan pendapatan dan peningkatan kualiti kemudahan dan infrastruktur.

4.4 Johor Bahru sebagai Bandar Bertaraf Antarabangsa

Kerajaan negeri dan kerajaan persekutuan mempunyai visi untuk membangunkan Johor Bahru sebagai bandar bertaraf antarabangsa dan menjadi Pusat Kebangsaan Serantau. Projek cadangan ini akan menyumbang secara signifikan dalam tujuh komponen strategik bagi mencapai taraf pengantarabangsaan ini.

4.5 Merealisasikan Johor sebagai Hub Ekonomi Global

Projek ini dijangka akan menggalakkan pelaburan antarabangsa dan seterusnya, Johor akan mampu bersaing dengan bandar hub ekonomi global lain seperti Dubai, Singapura dan lain-lain.

4.6 Menjana Pertumbuhan Ekonomi Tempatan

Forest City akan menyumbang pendapatan tambahan kepada negeri dalam bentuk cukai bayaran, premium, cukai tanah, yuran penilaian, cukai penyerahan, cukai pelesenan dan lain-lain. Tambahan lagi, sebanyak 62,200 peluang pekerjaan baru meliputi pelbagai sektor terhasil selepas pembangunan ini siap.

4.7 Pemodenan Infrastruktur dan Pembangunan Bandar

Pelaburan sekitar RM 700 juta dijangka dapat diperolehi dalam kerja menaik taraf infrastruktur di kawasan persekitaran Projek cadangan. Ini meliputi jalan raya sedia ada, sistem pengangkutan awam, sekaligus memberi manfaat bagi penduduk setempat terutama di Gelang Patah, Tanjung Pelepas dan Nusajaya.

5.0 Perihal Projek

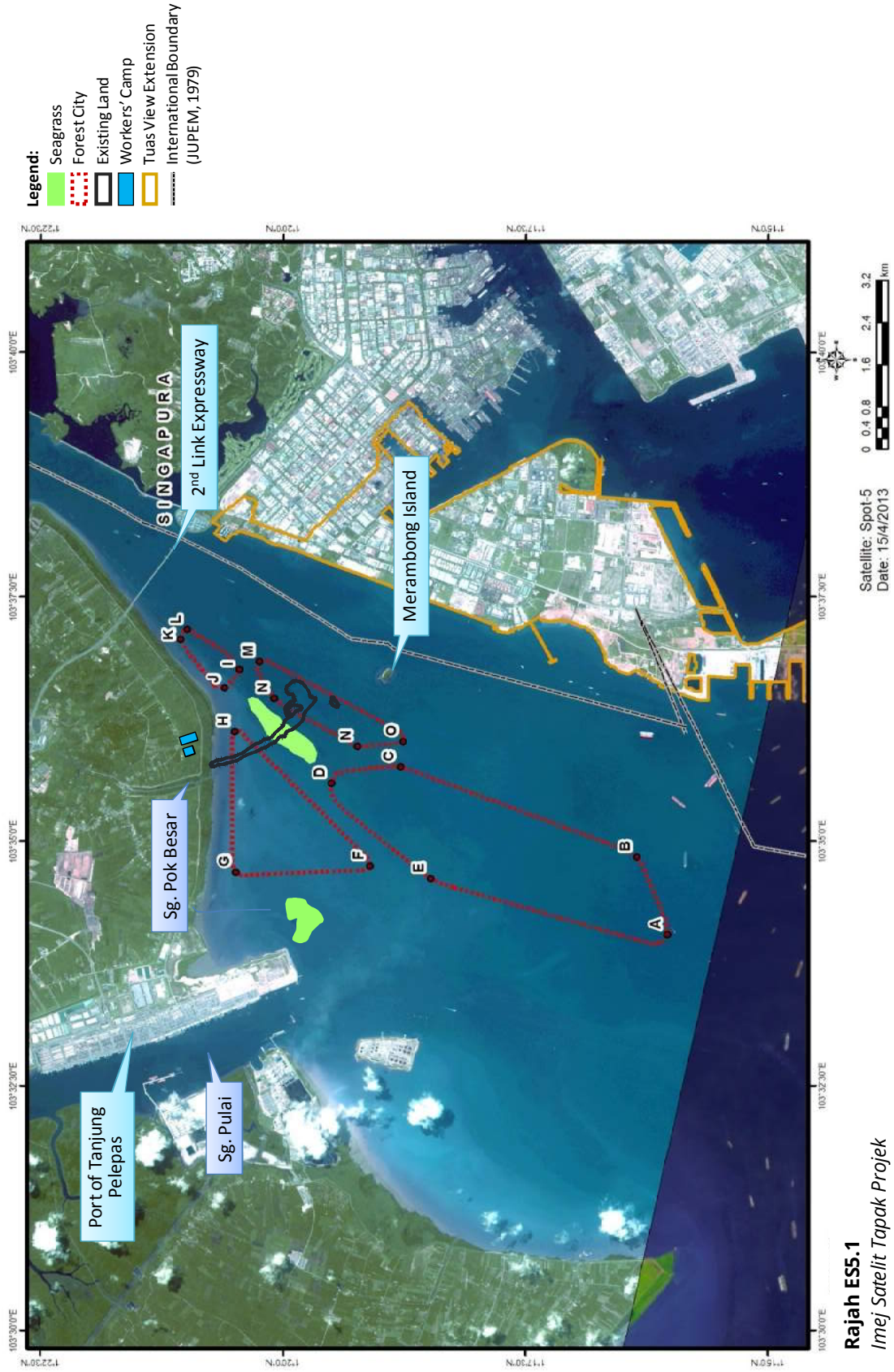
5.1 Lokasi Projek

Projek cadangan terletak di timur Pelabuhan Tanjung Pelepas dan selatan Tanjung Kupang dalam Selat Johor. Keluasan tambakan Projek di sepanjang persisiran pantai Tanjung Adang sehingga ke Sungai Pendas ialah 4,012.5 ekar. Kedudukan geografi lokasi dan koordinat cadangan penambakan ini disenaraikan dalam *Jadual RE5.1* dan dilakar pada *Rajah RE5.1*.

5.2 Perihal Umum Tapak Projek

Berikut disenaraikan ciri kawasan sedia ada yang terdapat dalam jarak lingkaran 5 km daripada tapak Projek:

a) Tapak Projek (Tanjung Pelepas - Sungai Pendas);
b) Sungai Pulai;
c) Persisiran Barat (Tanjung Bin – Tanjung Piai); dan
d) Persisiran Timur (Sungai Pendas - Kota Iskandar).



Rajah ES5.1
Imej Satelit Tapak Projek

Titik	Latitud	Longitud
A	103° 34' 2.777" E	1° 16' 2.466" N
B	103° 34' 50.433" E	1° 16' 21.46" N
C	103° 35' 45.719" E	1° 18' 47.609" N
D	103° 35' 35.677" E	1° 19' 30.236" N
E	103° 34' 37.214" E	1° 18' 28.915" N
F	103° 34' 45.033" E	1° 19' 6.23" N
G	103° 34' 40.871" E	1° 20' 29.865" N
H	103° 36' 7.224" E	1° 20' 29.865" N
I	103° 36' 45.284" E	1° 20' 26.967" N
J	103° 36' 33.991" E	1° 20' 36.092" N
K	103° 37' 3.774" E	1° 21' 3.649" N
L	103° 37' 9.965" E	1° 20' 59.267" N
M	103° 36' 50.149" E	1° 20' 14.589" N
N	103° 36' 27.675" E	1° 20' 5.581" N
O	103° 35' 58.152" E	1° 19' 14.092" N
P	103° 36' 1.24" E	1° 18' 45.972" N

Jadual ES5.1
Koordinat Tapak Projek

5.2.1 Tapak Projek

Pembukaan tanah telah dibuat di pintu masuk tapak Projek bagi pembinaan laluan masuk dan asrama pekerja. Tanah yang ditambak (sebahagian daripada penambakan Fasa 1 yang telah siap) melalui Beting Merambong menghubungkan laluan masuk ke tanah besar. Selain itu, terdapat mercu tanda dominan iaitu Pelabuhan Tanjung Pelepas yang terletak di tebing timur muara Sungai Pulai. Seterusnya, Link Kedua Malaysia-Singapura yang merentasi Selat Johor di antara Kampung Ladang di Gelang Patah, Johor dan Tuas di Singapura. Di Beting Merambong, terdapat hamparan rumput laut dalam kawasan Projek, manakala, Pulau Merambong bersebelahan dengan sempadan Projek.

5.2.2 Sungai Pulai

Sungai Pulai merupakan kawasan tadahan air dengan keluasan 345 km^2. Sungai ini didominasi hutan bakau yang dikenali sebagai Hutan Simpan Sungai Pulai. Hutan simpan ini merupakan hutan bakau terbesar di Johor dan kedua terbesar di Semenanjung Malaysia. Kawasan ini telah diisytiharkan sebagai tapak Ramsar pada 31 Januari 20013 (JNPC 2008). Terdapat lima sistem sungai dalam Sungai Pulai iaitu Sungai Karang, Sungai Redan, Sungai Jeram Choh, Sungai Ulu Pulai dan Sungai Jeram. Terdapat banyak sungai kecil yang mengalir ke Sungai Pulai iaitu Sungai Tiram Duku, Sungai Senapang, Sungai Dinar, Sungai Chengkeh dan Sungai Boh. Selain itu, terdapat beberapa akuakultur yang boleh ditemui di hulu Sungai Pulai seperti sangkar udang dan ikan.

Tambahan pula, terdapat empat jeti di tebing Sungai Pulai berdekatan PTP iaitu Jeti Jabatan Laut, Jeti Polis Marin, Jeti DynaMac Engineering Sdn. Bhd. dan Jeti Jabatan Kastam.

5.2.3 Persisiran Barat

Persisiran pantai barat bermula daripada Tanjung Bin sehingga ke Tanjung Piai. Tanjung Bin mempunyai mercu tanda industri iaitu Stesen Janakuasa Tanjung Bin, Terminal Minyak ATB dan Terminal Minyak APH. Persisiran Tanjung Bin sebaris dengan hutan bakau dan beberapa sistem sungai yang mengalir masuk ke Sungai Pulai ialah Sungai Sam, Sungai Chokoh Kecil, Sungai Nibong dan Sungai Chokoh Besar. Persisiran Tanjung Piai mempunyai hutan bakau dan dataran lumpur yang dirizabkan sebagai hutan simpan dan tapak Ramsar. Tanjung Piai juga terkenal dengan gelaran "Penghujung Benua Asia" dan merupakan kawasan tumpuan pelancong.

5.2.4 Persisiran Timur

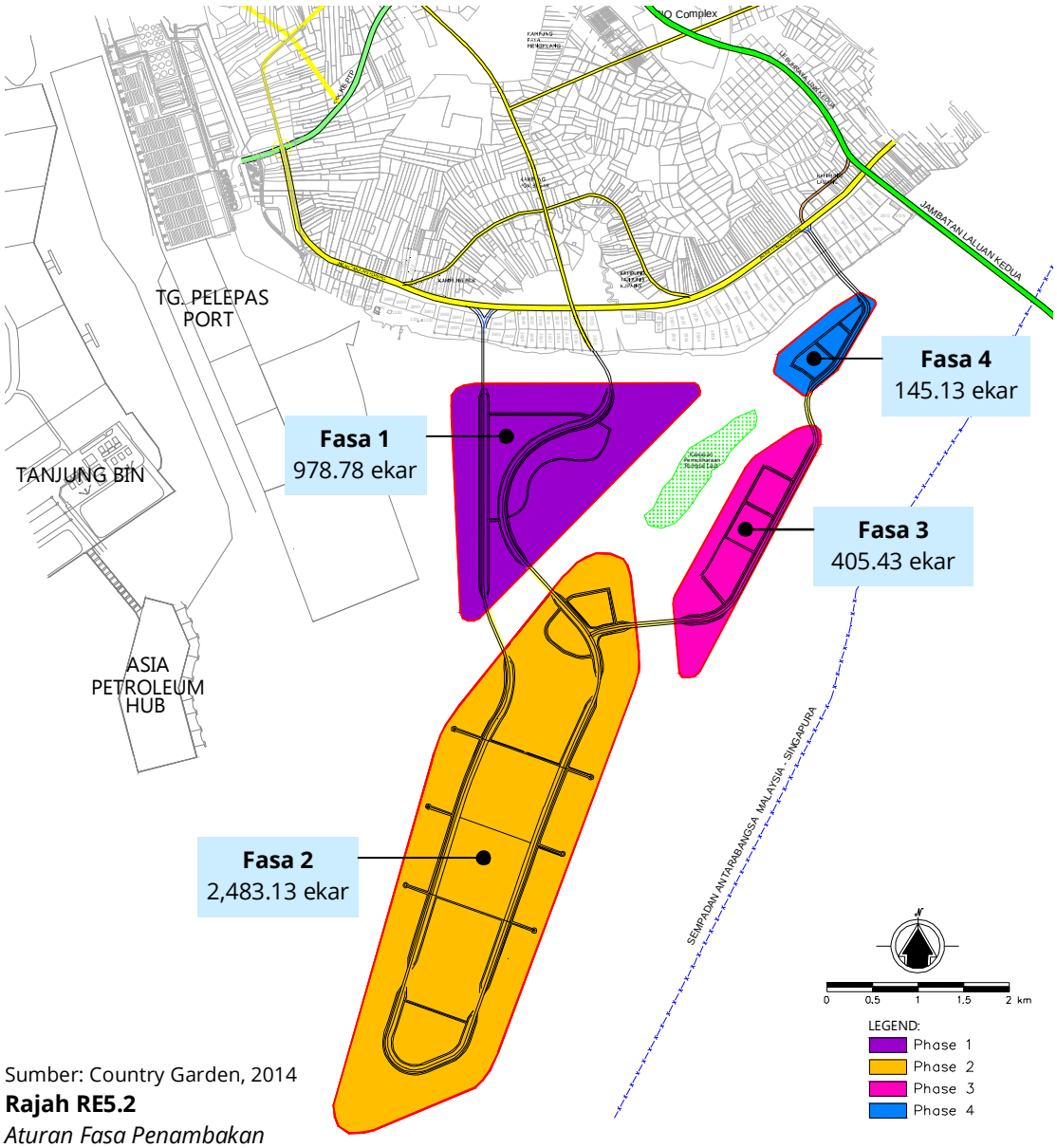
Persisiran pantai timur laut sehingga Kota Iskandar merupakan pusat pentadbiran utama bagi kerajaan negeri Johor. Pusat pentadbiran mempunyai bangunan-bangunan Dewan Negeri, Pejabat Ketua Menteri dan Sekretariat Negeri. Kota Iskandar terletak berdekatan dengan Puteri Harbour, sebuah pembangunan pinggir air berintegrasi dan marina dengan keluasan menjangkau 688 ekar. Terdapat juga terminal feri antarabangsa yang menghubungkan Puteri Harbour dan Tanjung Balai Indonesia. Terletak di antara Puteri Harbour dan tapak Projek adalah dua hutan simpan bakau yang dikenali Hutan Simpan Kemudi dan Hutan Simpan Sungai Bahan. Kedua-dua hutan simpan ini (yang terletak bersebelahan antara satu sama lain) merangkumi kawasan seluas 155.6 hektar dan dirizabkan sebagai hutan simpan pada tahun 1961.

5.3 Konsep dan Komponen Projek

Projek cadangan terdiri daripada empat pulau buatan manusia dengan keluasan 4,012.5 ekar (1,623.8 hektar). Jumlah kuantiti bahan isian yang diperlukan bagi tujuan penambakan ialah sebanyak 161,891,980 m^3. Komponen utama cadangan pembangunan terdiri daripada pangsapuri, pusat campuran komersil, rumah kelab, pusat kejiranan, pusat kesihatan, kemudahan pembelajaran, tapak perniagaan dan elemen air.

5.4 Fasa Projek

Projek cadangan terdiri daripada empat pulau berbeza di mana setiap pulau merujuk kepada satu fasa bagi pembangunan keseluruhan. Kedudukan fasa dilakarkan dalam *Rajah RE5.5.* Tempoh penambakan setiap fasa diterangkan dalam *Jadual RE5.3.*



Sumber: Country Garden, 2014

Rajah RE5.2

Aturan Fasa Penambakan

Jadual ES5.2

Fasa-fasa Projek

Pulau	Penambakan Bermula	Penambakan Tamat	Pembangunan Bahagian Atas Bermula	Pembangunan Bahagian Atas Tamat
Pulau 1	2015	2018	2015	2025
Pulau 2	2018	2028	2020	2045
Pulau 3	2028	2033	2030	2040
Pulau 4	2033	2038	2035	2045
Tempoh	23 tahun		30 tahun	

5.5 Aktiviti Projek

Perbincangan aktviti Projek dalam bahagian ini meliputi kerja penambakan tanah dan pengerukan, serta pembangunan atas tanah. Pemasangan tirai kelodak di kawasan yang telah ditetapkan dilakukan sebelum kerja pernambakan, pelupusan bahan pengerukan, pengangkutan bahan isian dan penempatan bahan isian di kawasan penambakan. Pembangunan atas tanah dibuat selepas penambakan.

5.5.1 Penambakan

5.5.1.1 Pemasangan Tirai Kelodak

Tirai kelodak dipasang di sekeliling kawasan penambakan bagi langkah kawalan untuk mengelak penyerakan sedimen. Dua lapisan tirai kelodak akan digunakan untuk Projek cadangan ini. Kaedah tertentu akan digunakan bagi pemasangan tirai kelodak di kawasan rumput laut seperti penggunaan paip GI dan pengecualian blok sinki biasa.

5.5.1.2 Peletakan Bahan Isian

Jumlah bahan isian yang diperlukan untuk melengkapkan penambakan keseluruhan ialah 161,891,980 m^3. Bagi peringkat pertama, peletakan bahan isian menggunakan kombinasi kapal korek CSD, tongkang pembawa dan saluran paip. Tongkang pembawa akan mengepam bahan isian ke CSD melalui saluran paip, manakala, CSD pula akan mengepam pasir ke kawasan pengisian. Sementara, bagi peringkat kedua, jentera darat akan digunakan untuk meratakan dan menyebarkan bahan isian di atas permukaan air. Mesin tolak tanah (jentolak, mesin pengorek dan lori pembuang) akan digunakan bagi mengurus bahan surcaj.

5.5.1.3 Pembinaan Ban Keliling

Ban keliling dibina untuk menahan serakan sedimen terampai yang terhasil daripada aktiviti penambakan. Ban keliling akan dibentuk sebelum peletakan bahan isian. Pembentukan ban keliling akan menggunakan 230 g/m^2 anyaman geotekstil. Ketinggian bagi ban adalah lebih tinggi daripada paras air pasang. Kecerunan ban dalam julat 1:8 hingga 1:11 untuk mengelak potensi gelinciran bulatan.

5.5.1.4 Rawatan Bahan Tambakan

Rawatan bahan tambakan akan dibuat di kawasan penambakan untuk mempercepatkan proses pemampatan. Sumbu salir (PVD) akan digunakan terlebih dahulu dan diikuti kaedah surcaj. Ujian pemampatan akan dibuat bagi menentukan kadar mampatan.

5.5.1.5 Kerja Instrumentasi dan Pemantauan

Instrumentasi akan dipasang untuk memantau pergerakan bawah tanah dan tekanan air tanah/liang pada sempadan pembinaan (cerun) dan struktur berdekatan lain. Ini membenarkan penilaian impak terhadap perubahan tanah ke atas kestabilan bahan tambakan dan struktur sisi sebelum, semasa dan selepas kerja penambakan.

5.5.1.6 Pembinaan Struktur Perlindungan Pantai

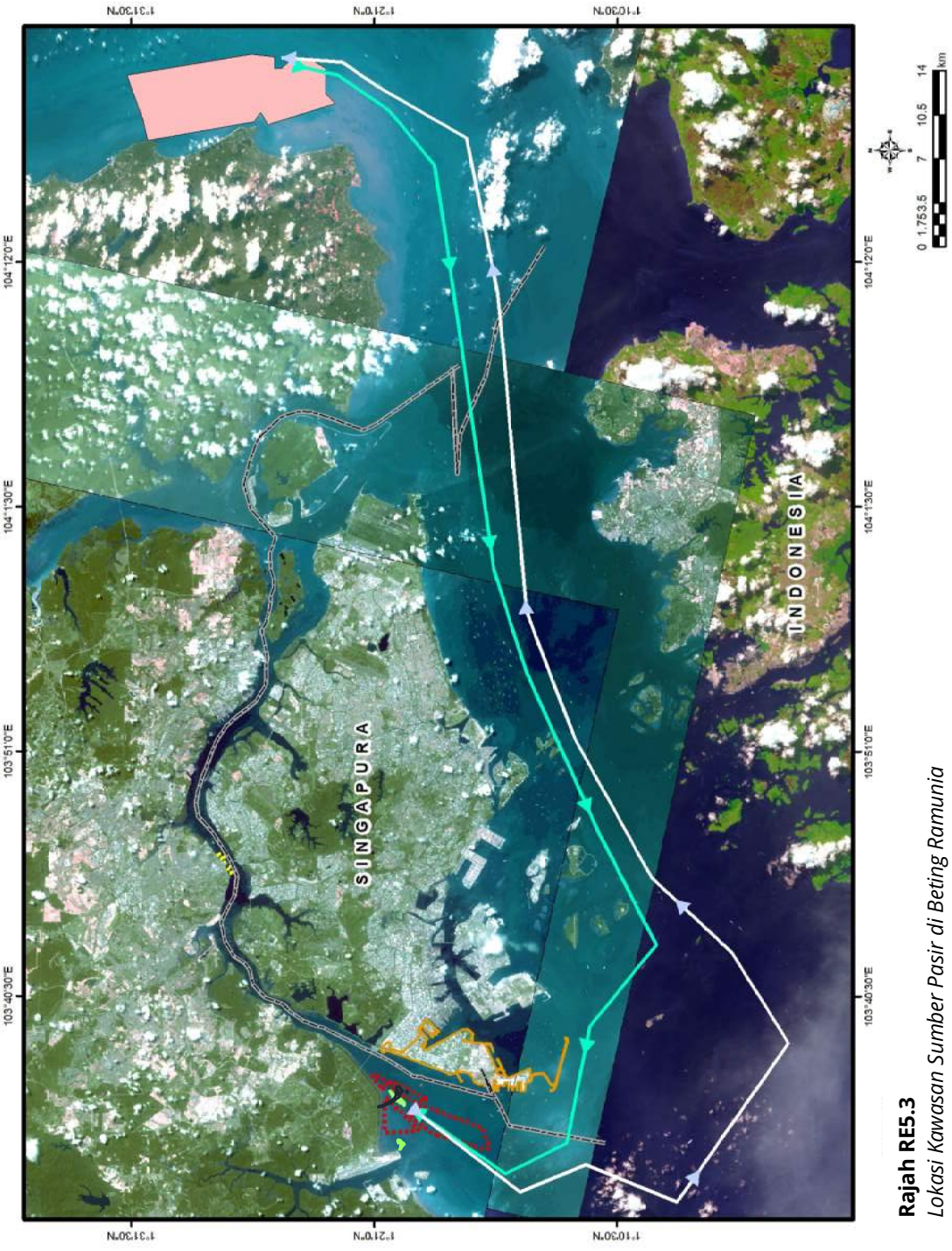
Kerja pembinaan struktur perlindungan pantai akan bermula sebaik sahaja penambakan pasir diisi penuh sehingga ke tahap yang diperlukan dan profil cerun diperolehi. Kerja meratakan dan pemampatan bagi profil cerun dilakukan selepas peletakan geotekstil. Fabrik geotekstil (dengan lebar 15 m dan panjang 40 m) akan diletakkan pada setiap panel menggunakan tongkang pemasangan. Bagi pembinaan perisai utama, tongkang rata atas akan digunakan untuk meletakkan batu yang akan bertindak sebagai bahan asas daripada dasar laut sehingga sampai ke paras air. Bagi perisai kedua, ban batu sementara akan dibina pada aras air sehingga selang 40 m. Kemudian, peletakan batu perisai akan dilakukan menggunakan pengorek lengan panjang daripada paras air sehingga paras platform atas.

5.5.2 Sumber dan Pengangkutan Bahan Tambakan

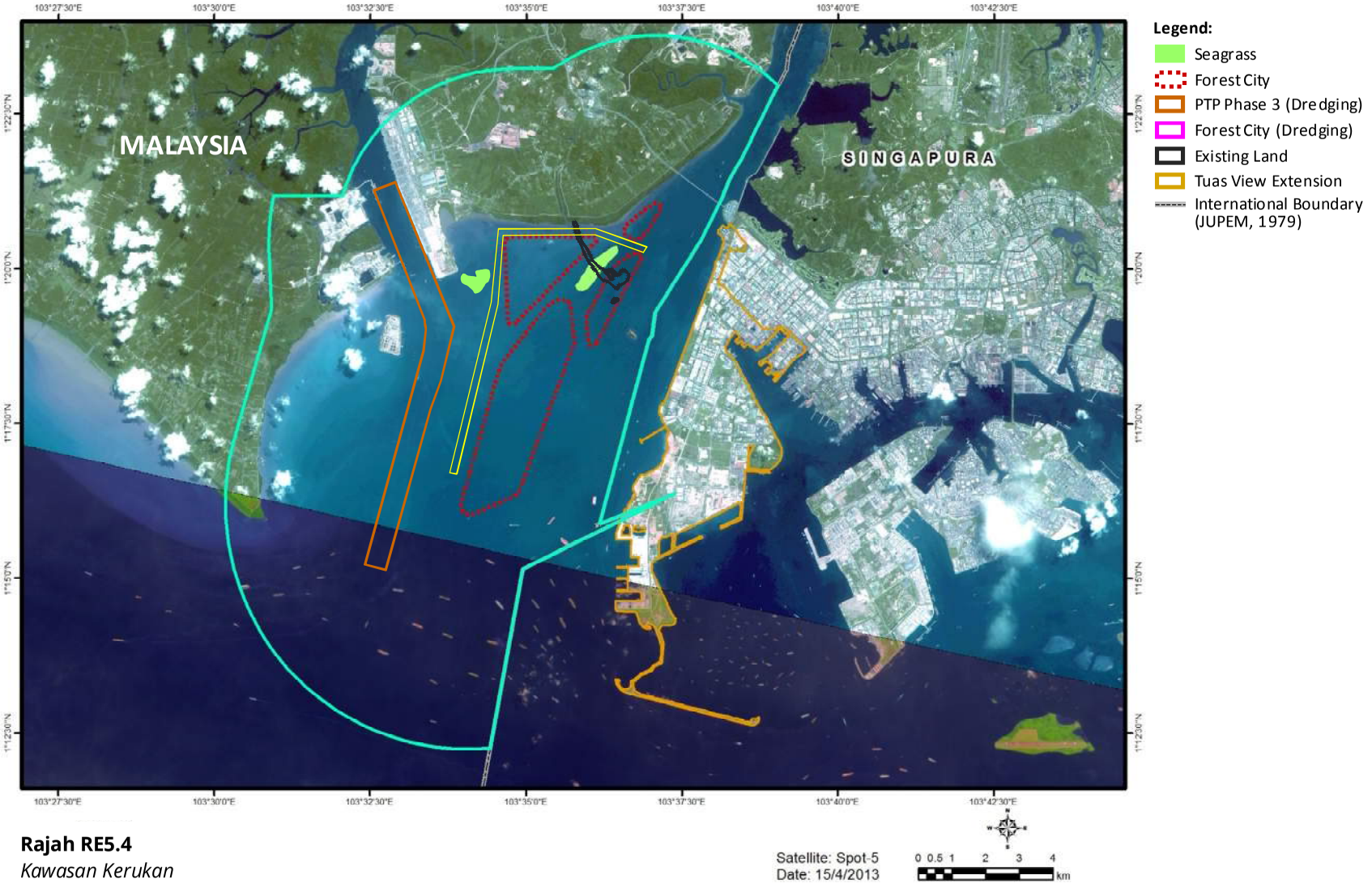
Fasa permulaan penambakan, bahan tambakan diambil daripada Beting Ramunia seperti *Rajah RE5.3*. Bahan isian akan diekstrak dari sumber tanah menggunakan kaedah pengerukan kering. Tiga tongkang pembawa akan digunakan bagi mengangkut pasir dari kawasan sumber pasir ke tapak penambakan.

5.5.3 Pengerukan

Kawasan antara Pulau 1 dan persisiran pantai Tanjung Kupang akan di dalamkan bagi mengawal kadar enapan. Kawasan pengerukan ditunjukkan dalam Rajah *RE5.4*, manakala, ringkasan reka bentuk bagi kerja pengerukan yang dicadangkan ditunjukkan dalam *Jadual RE5.3*. Berdasarkan tinjauan hidrografik, kebanyakan pengerukan akan dibuat di kawasan air cetek kurang daripada kedalaman 2 m semasa air surut. Oleh itu, pengerukan menggunakan kapal korek CSD dengan tongkang `Conveyor Barge' akan digunakan bagi kerja pengerukan. Saluran paip polietelina berkepadatan tinggi (HDPE) akan menghubungkan CSD dengan tongkang. Bahan yang dikeruk akan dipam melalui paip. Anggaran sasaran harian pengeluaran ialah 20,000 m^3.



Rajah RE5.3
Lokasi Kawasan Sumber Pasir di Beting Ramunia



Rajah RE5.4
Kawasan Kerukan

Rekabentuk	Ciri
Kedalaman	3.0 m bawah CD
Lebar	200 m
Panjang Alur	11,900 m
Anggaran Keluasan	2,594,200 m^2
Anggaran Isipadu	7,500,000 m^3
Kadar Pengerukan	3,000 m^3/hari
Cerun Sisi	1V: 3H
Bahan Kerukan	Campuran pasir, syal dan tanah liat

Jadual RE5.3
Ringkasan Rekabentuk Kerja Pengerukan

5.5.4 Pelupusan Bahan Kerukan

Kawasan pembuangan yang berpotensi berdekatan dengan Projek ialah Tanjung Balau dengan jarak 80 NM. Sejumlah 7,500,000 m^3 daripada bahan yang dikeruk akan dihantar ke tapak pembuangan menggunakan tongkang. Kaedah pembuangan melalui perut tongkang digunakan bagi operasi pembuangan.

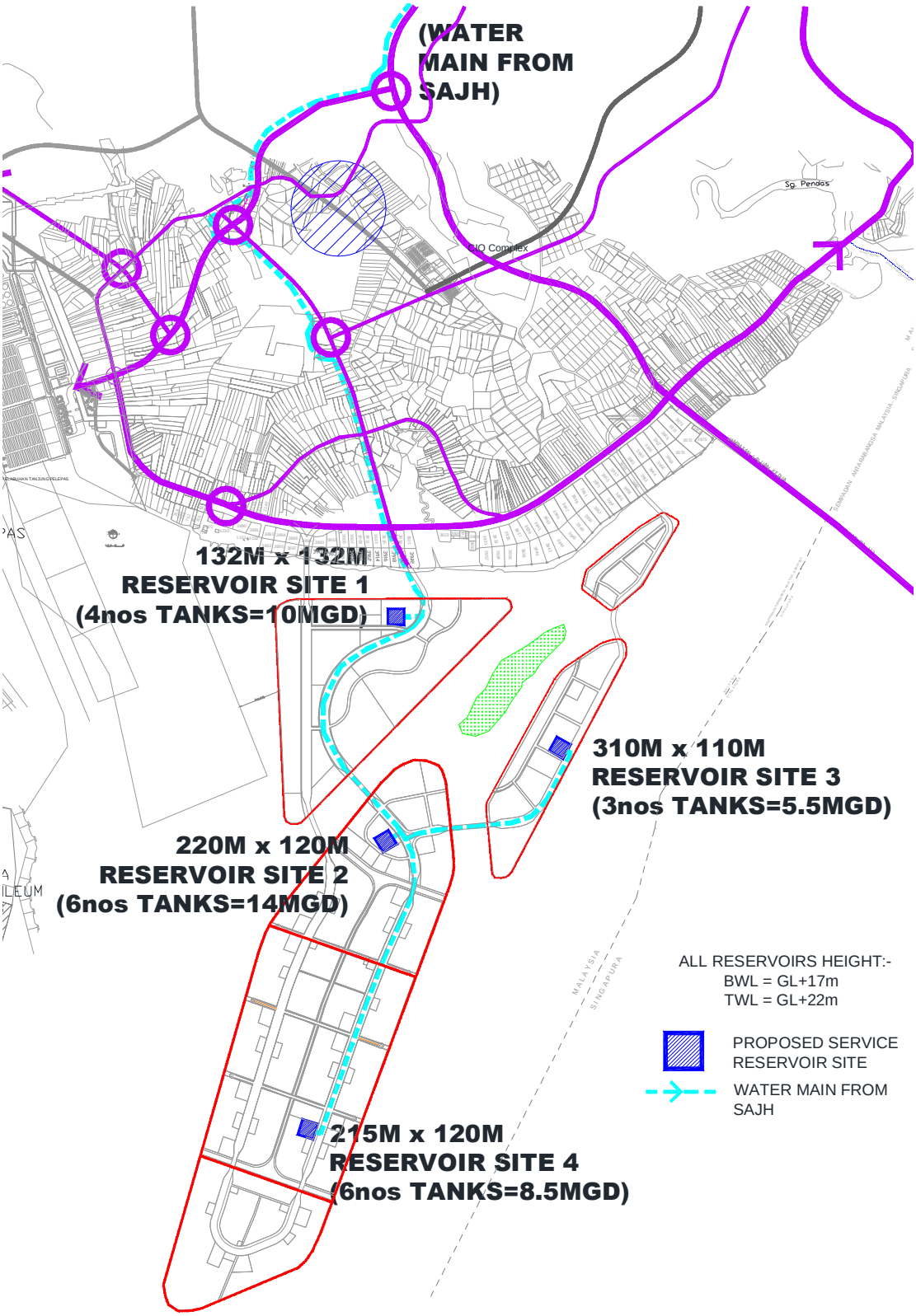
5.5.5 Pembangunan di Kawasan Tambakan Baru

5.5.5.1 Jalanraya dan Jambatan

Keempat-empat pulau akan dihubungkan dengan jambatan. Pembinaan jambatan akan melibatkan penuangan bahan asas ke dalam cerucuk gerek, pembinaan platform *bearing*, pembinaan tiang sambut, pembinaan rasuk penukup pra-tuang, pemasangan galang U pra-tuang, pemasangan galang T, jambatan geladak dan lain-lain. Sementara itu, pembinaan jalan akan memerlukan kerja subgred (pembersihan permukaan, subgred isian, perparitan, perlindungan cerun sisi, pembinaan paip pembetungan dan lain-lain). Kerja penurapan (termasuk gred asas dan permukaan konkrit asfalt) dan kemudahan trafik akan djalankan.

5.5.5.2 Bekalan Air

Sumber punca air bagi Projek cadangan akan diambil daripada punca bekalan air saliran atau takungan air sedia ada di mukim Tanjung Kupang, bergantung kepada kelulusan Syarikat Air Johor (SAJ). Apabila keseluruhan pembangunan siap, ia dijangka akan memenuhi permintaan bagi air sebanyak 40.63 MGD. Pelan perparitan air lokasi tapak takungan air ditunjukkan dalam *Rajah RE5.5*.



Rajah RE5.5
Lokasi Tapak Takungan Air

5.5.5.3 Pengurusan Kumbahan

Penggerak Projek mencadangkan dua pusat rawatan kumbahan (STP) dan dua stesen pam pengantaraan (IPS) dibina mengikut turutan pengendalian kumbahan yang terhasil daripada pembangunan cadangan. Cadangan STP yang dibina ialah Kelompok Reaktor Berturutan (SBR), pembentung bagi Fasa 1 akan discaj kepada 2 modul iaitu 200,000 PE STP1 sementara 4 modul 400,000 PE STP2 akan dibina bagi memenuhi pembangunan akan datang (Fasa 2 sehingga siap). Lokasi STP dan IPS ditunjukkan dalam *Rajah RE5.6*.

5.5.5.4 Pengurusan Sisa Pepejal

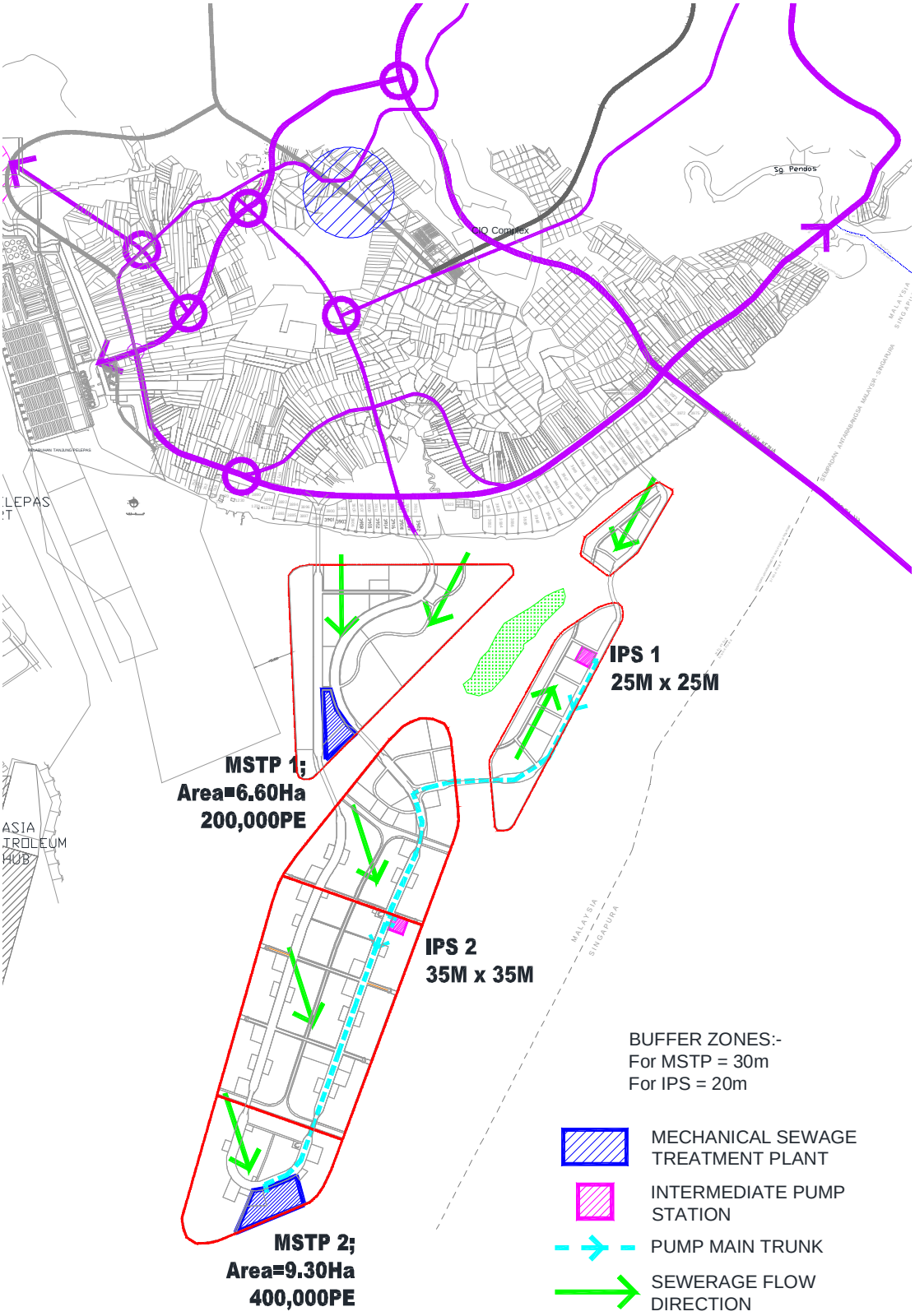
Semasa operasi penuh, jumlah sisa pepejal bandaran boleh mencapai 720 tan setiap hari. Sisa pepejal yang dihasilkan akan meningkat secara berperingkat sehingga mencapai 145 tan setiap hari menjelang 2020 apabila Pulau 1 siap sepenuhnya. Tapak pelupusan sedia ada di Seelong dan Tanjung Langsat mampu untuk menerima sisa daripada pembangunan ini.

5.5.5.5 Pengurusan Perparitan dan Air Ribut

Rekabentuk sistem perparitan berdasarkan Manual Pengurusan Tadahan Hujan Perbandaran (Manual Saliran Mesra Alam – MASMA II). Semua perparitan utama dalam kawasan pembangunan adalah saluran saliran dengan RC aliran air cuaca kering dan cerun benteng bertuf, direka berdasarkan 100 tahun ARI. Rekabentuk ini bagi menguruskan larian air permukaan di kawasan pembangunan dan discaj alur keluar dari tanah besar ke kawasan Projek. Terdapat dua jenis parit utama yang direka iaitu 20 hingga 60 m di kawasan simpanan. *Rajah RE5.7* menunjukkan keratan rentas parit utama. Parit utama akan merentasi kawasan pembangunan dan mengalir masuk ke Selat Johor melalui pintu kawalan pasang surut.

5.5.5.6 Sumber Elektrik

Jumlah jangkaan beban bagi seluruh pembangunan dianggarkan lebih kurang 1,000 MVA. Bagi memenuhi jangkaan permintaan, Pencawang Transmisi Utama (PMU 275 kV) TNB diperlukan untuk pembangunan ini. PMU 275kV ini akan dibina di tanah besar dan sumber bekalan kuasa adalah samada dari TNB PTP atau Stesen Janakuasa Tanjung Bin. Ini bergantung kepada semakan dan kelulusan TNB. PMU 275 kV iani akan mengagihkan kuasa kepada 12 PMU 132 kV yang terletak di seluruh kawasan pembangunan.



Rajah RE5.6
Lokasi STP dan IPS

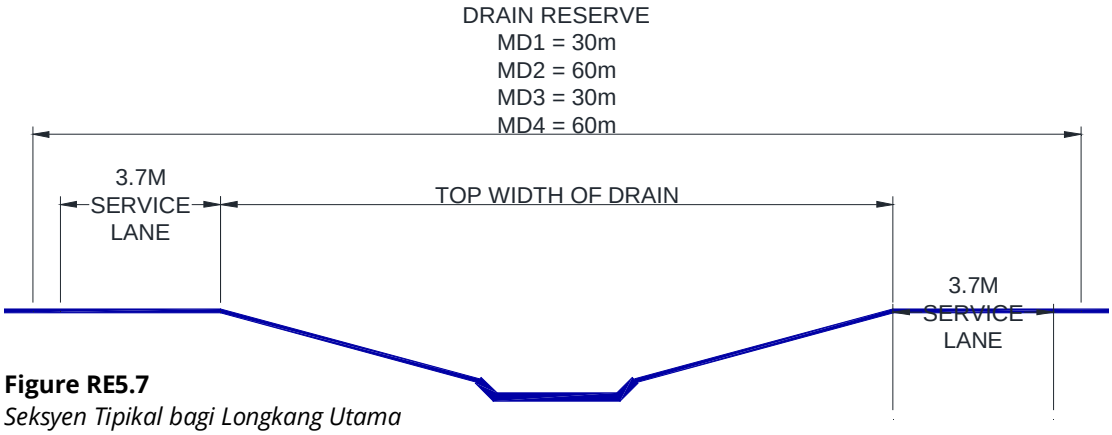
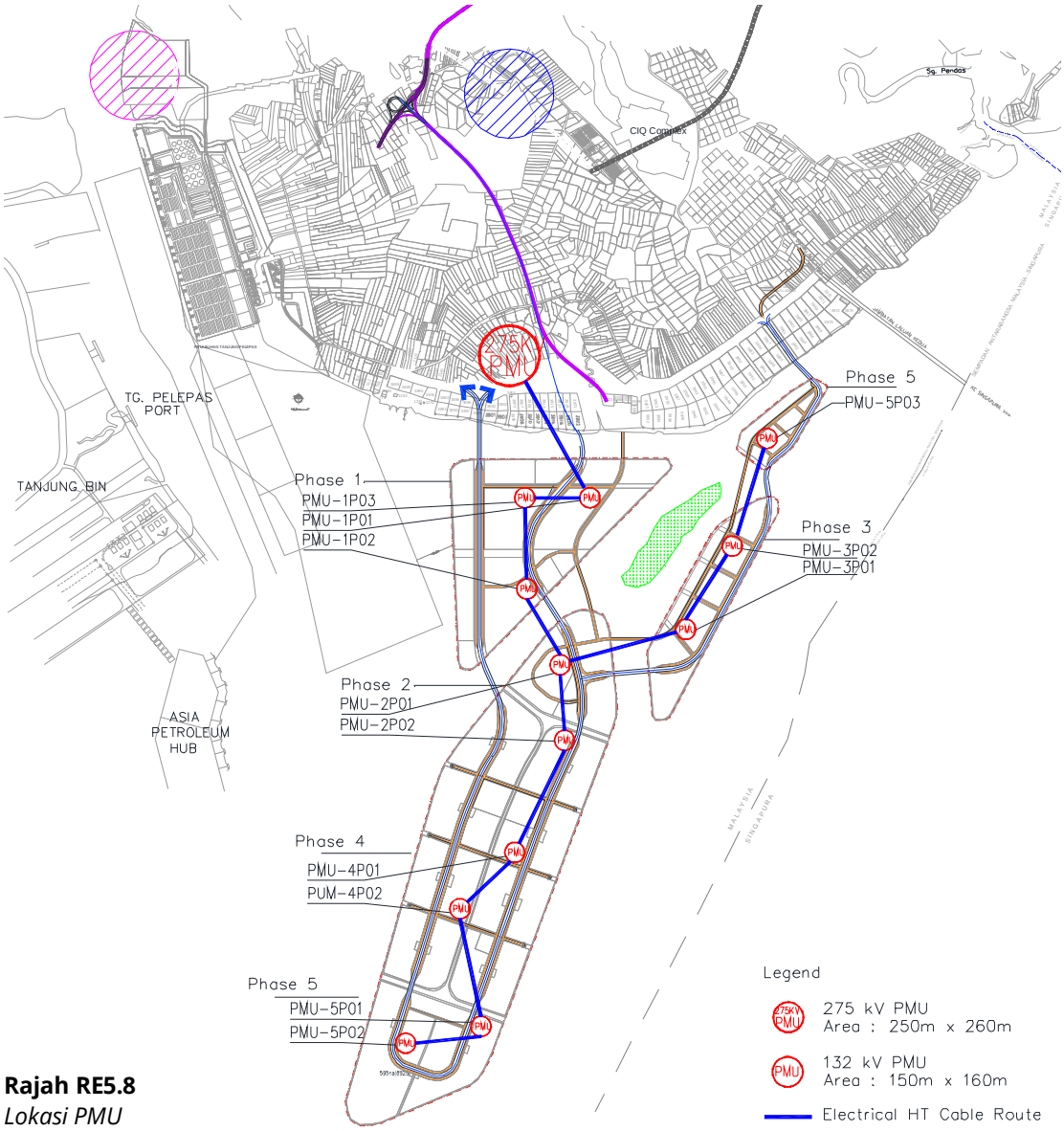


Figure RE5.7
Seksyen Tipikal bagi Longkang Utama



Rajah RE5.8
Lokasi PMU

5.5.5.7 Telekomunikasi

Bagi keseluruhan pembangunan, dianggarkan lebih kurang 147,580 talian telefon diperlukan. Cadangan punca adalah dari bekalan talian telefon di TM sedia ada (TMX F002) yang terdapat di tanah besar, JC9Cs di sepanjang jalan baru yang dicadangkan dan jambatan laluan utama ke kawasan pembangunan. Ini bergantung kepada kepada semakan dan kelulusan TM.

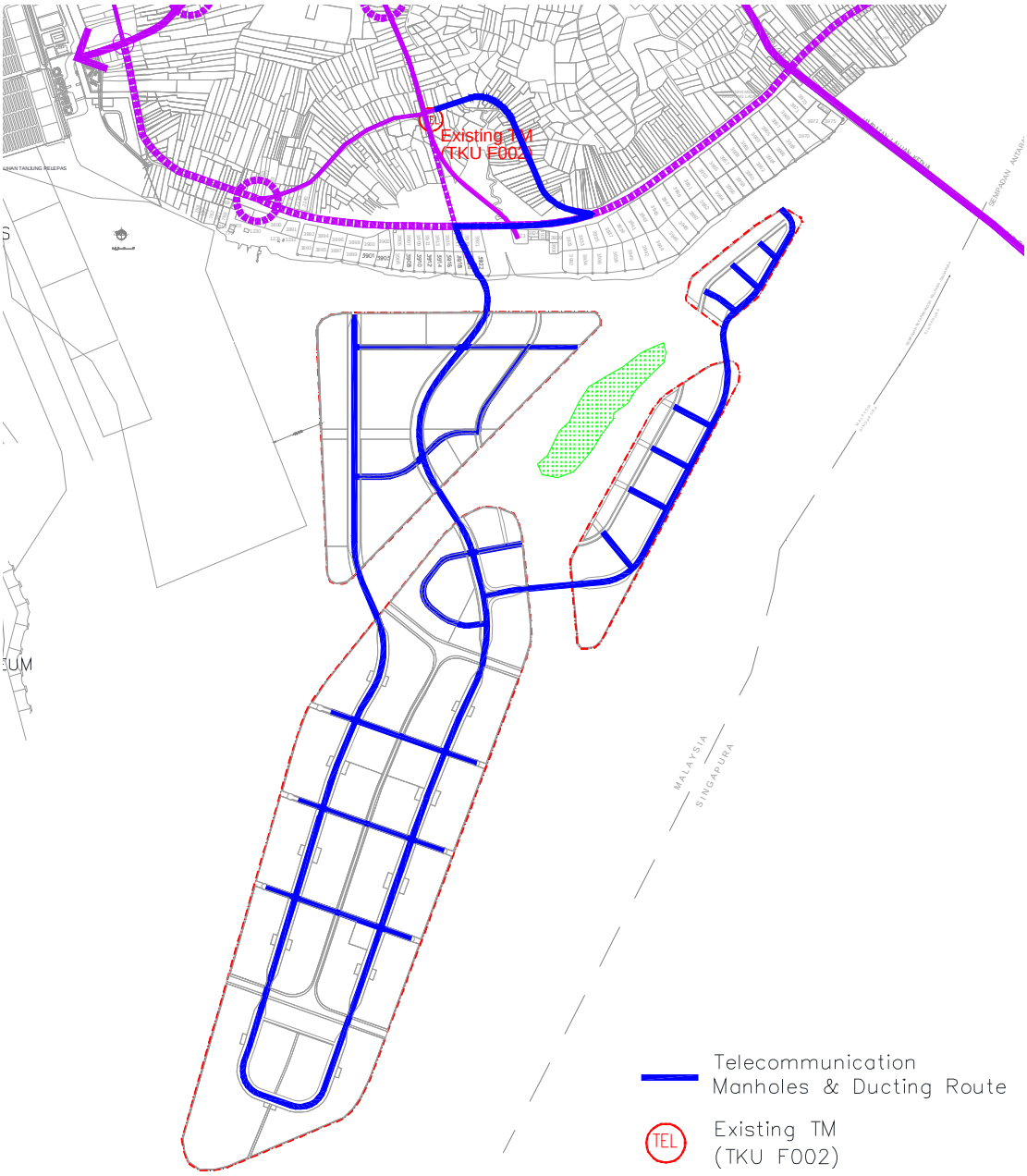


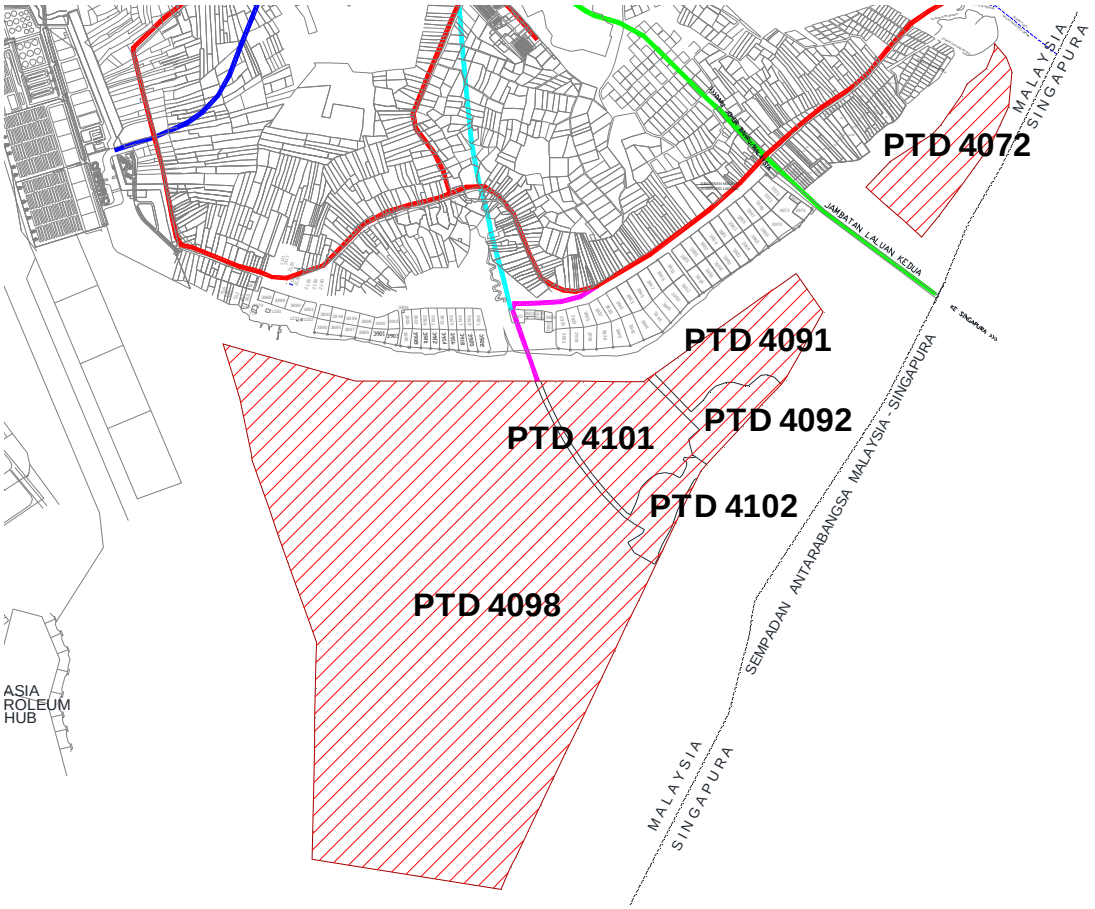
Figure RE5.9
Lokasi Sumber Bekalan Kuasa dan Jajaran Talian Telefon

6.0 Pilihan Projek

6.1 Konfigurasi Penambakan

Pelan perancangan awal tambakan pulau ini bertujuan untuk menggunakan keseluruhan kawasan berkeluasan 5,000 ekar berdasarkan pemilikan tanah yang diberikan kepada Penggerak Projek (*Rajah RE6.1*). Namun, setelah pemerhatian dan penilaian kepada pelbagai pertimbangan dan keperluan, bentuk kawasan tambakan yang terbaik telah ditentukan semula . Antara kriteria utama penentuan bentuk kawasan tambakan ini ialah:

a) Kawasan Sensitif Alam Sekitar (KSA) berhampiran;
b) Komponen hidraulik seperti ombak, arus, aliran, perubahan aras dasar dan lain-lain;
c) Persempadanan antarabangsa Malaysia-Singapura ;
d) Struktur berdekatan yang sedia ada ; dan
e) Pembangunan yang sedang dilaksanakan di sekitar kawasan Projek.



Rajah RE6.1
Pemilikan Tanah yang Diberikan kepada Country Garden Pacificview Sdn. Bhd.

Reka bentuk bagi Pilihan 4 dipilih bagi kawasan berkeluasan 4,012.5 ekar kerana bentuk kawasan tambakan telah mengikut keperluan-keperluan berikut :

a) Zon penampan 200 hingga 500 m bagi KSA sekitar iaitu Beting Merambong;
b) 600 m daripada kawasan sensitif alam sekitar Pulau Merambong;
c) Pengorekan semula tambak sedia ada (Tambak CG) yang merupakan laluan sementara sepanjang 1.5 km dan 50 m lebar. Kawasan Tambak CG telah memisahkan hamparan rumput laut Merambong kepada dua bahagian. Sehubungan dengan itu, pemindahan tambak adalah pelan tindakan segera untuk memulihara dan melindungi rumput laut daripada terus termusnah;
d) Kawasan penampan sejauh 1 km daripada cadangan kerja pembesaran Fasa 3 Pelabuhan Tanjung Pelepas;
e) Jarak 200 hingga 300 m daripada tanah besar (Tanjung Kupang) untuk memberi laluan kepada bot-bot kecil (nelayan tempatan);
f) Jarak sekurang-kurangnya 1 km daripada Laluan Kedua;
g) Jarak sekurang-kurangnya 1 km dari Sempadan Antarabangsa Malaysia-Singapura;
h) ±10% perubahan maksimum halaju arus yang dibenarkan dalam perairan Singapura; dan
i) ±10% perubahan maksimum halaju arus yang dibenarkan dalam perairan Malaysia (sekiranya tidak dikawal).

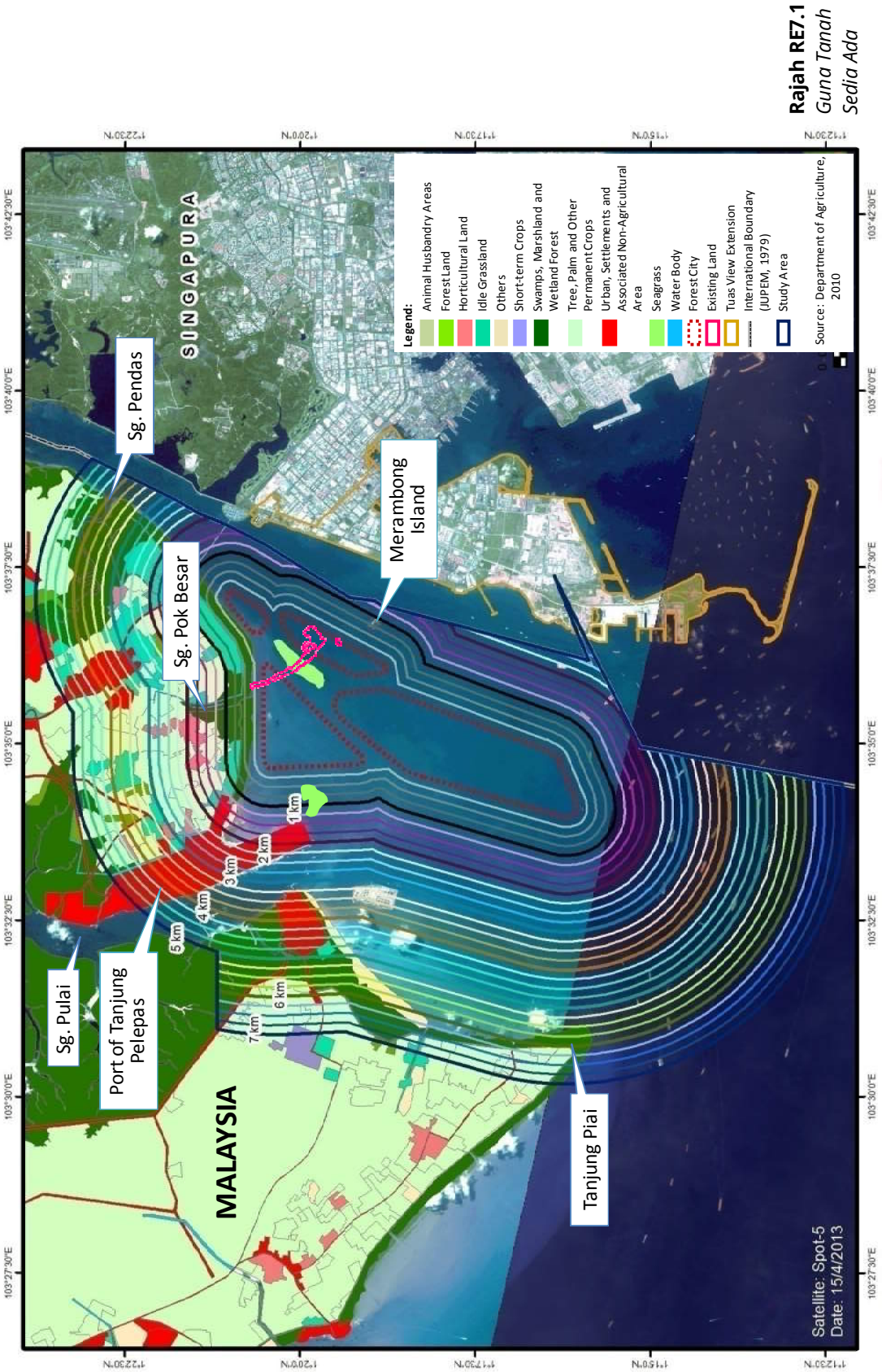
6.2 Pilihan "Tiada Pembinaan"

Persisiran pantai Tanjung Kupang dan perairan sekitar Pulau Merambong akan kekal seperti asal. Walaubagaimanapun, kerajaan akan kehilangan sumber pendapatan melalui pelaburan asing, premium, cukai tanah, yuran penilaian, yuran penyerahan, dan yuran pelesenan. Kerja membaikpulih infrastruktur berjumlah RM 700 juta tidak akan terlaksana. Tambahan lagi, hampir 62,200 peluang pekerjaan baru dan pelbagai perniagaan baru juga tidak akan tersedia.

7.0 Persekitaran Fizikal Sedia Ada

7.1 Guna Tanah

Kawasan guna tanah yang dikaji merujuk kepada kawasan lingkungan 5 km daripada tapak cadangan (*Rajah RE7.1*). Secara umumnya, kebanyakan corak guna tanah ini adalah kawasan perumahan, rizab hutan bakau, hutan paya, Stesen Janakuasa Tanjung Bin dan kelompok industri yang tertumpu di kawasan pertemuan Sungai Pulai dan Selat Johor serta sepanjang pantai utara-barat Selat Johor.


Rajah RE7.1
Guna Tanah
Sedia Ada
Legend:
Animal Husbandry Areas
Forest Land
Horticultural Land
Idle Grassland
Others
Short-term Crops
Swamps, Marshland and Wetland Forest
Tree, Palm and Other Permanent Crops
Urban, Settlements and Associated Non-Agricultural Area
Seagrass
Water Body
Forest City
Existing Land
Tuas View Extension
International Boundary (JUPEM, 1979)
Study Area
Source: Department of Agriculture, 2010
SINGAPURA
MALAYSIA
Sg. Pendas
Sg. Pok Besar
Merambong Island
Sg. Pulai
Port of Tanjung Pelepas
Tanjung Piai
1 km
2 km
3 km
4 km
5 km
6 km
7 km
Satellite: Spot-5
Date: 15/4/2013

Kawasan cadangan ini terletak dalam dua kawasan berbeza di bawah Perancangan Tempatan iaitu Perancangan Tempatan Daerah Johor Bahru (Pindaan) 2020 dan Peracangan Tempatan Daerah Pontian (Pindaan) 2020. Kawasan ini juga termasuk dalam Pelan Iskandar Malaysia (Guna Tanah Berintegrasi). Kawasan cadangan Projek ini terletak di bawah bidang kuasa Majlis Perbandaran Johor Bahru Tengah (MPJBT) dan Majlis Daerah Pontian (MDP).

Jasad air adalah komponen utama guna tanah yang merangkumi 37.40% dalam blok sub -perancangan. Kebanyakan jasad air merangkumi Sungai Pulai dan cabangannya dalam blok perancangan Tanjung Pelepas dan juga air daripada Selat Johor.

Kawasan hutan bakau merangkumi 23.14% dalam blok perancangan Tanjung Pelepas. Hutan bakau ini meliputi Kawasan Ramsar Sungai Pulai (jumlah keluasan 9,126 hektar) yang telah diiktiraf oleh Sekretariat Ramsar sebagai *"Internationally Important and Significant",* serta hutan paya asli di sekitar Kawasan Ramsar Sungai Pulai.

Berpandukan kepada Guna Tanah Berintegrasi dalam Pelan Iskandar Malaysia, Projek ini terletak berhampiran dengan Flagship B: Nusajaya dan Flagship C: Tanjung Pelepas—Tanjung Piai. Majoriti guna tanah bagi Iskandar Malaysia diperuntukkan untuk perbandaran (sedia ada dan masa akan datang) yang merangkumi 42.95% bagi keseluruhan kawasan. Guna tanah kedua tertinggi ialah tanah pertanian (27.35%) dan menjadi fokus pembangunan Iskandar Malaysia. Manakala, kawasan perbandaran sedia ada merangkumi kawasan pembinaan dan kawasan perkhidmatan, infrastruktur dan utiliti bandar.

Tanjung Bin adalah kawasan pengurusan khas dan kawasan persendirian terbesar dalam Peringkat 1 Kawasan Pemuliharaan Utama. Ia terletak di kuala Sungai Pulai yang merupakan kawasan ekologi di Iskandar Malaysia. Terdapat dua aktiviti utama di Tanjung Bin iaitu Stesen Janakuasa Tanjung Bin dan Pelabuhan Tanjung Pelepas. Selain itu, aktiviti utama lain ialah pelancongan, penyelidikan dan pendidikan. Kawasan Ramsar, hutan bakau, rizab hutan dan rumput laut adalah kawasan berkepentingan tinggi kepada Iskandar Malaysia.

7.2 Pembangunan Komited

Terdapat 4 pembangunan komited utama yang berhampiran Projek cadangan seperti Kota Pinggiran Air Tanjung Piai, Pelabuhan Tanjung Pelepas (PTP), Hub Integrasi Petroleum dan Kawasan Perindustrian Maritim serta Sunway Iskandar. Pantai Tanjung Piai telah lama mengalami hakisan pantai. Namun, langkah telah diambil oleh Jabatan Perparitan dan Saliran (JPS) bagi mengurangkan masalah hakisan dengan menjaga kepentingan pantai Tanjung Piai sebagai rumah kepada kawasan Ramsar Tanjung Piai.

PTP berhasrat untuk menjalankan pembangunan Fasa 3 mengikut perancangan pelan induk yang akan melibatkan kerja pengerukan dan penambakan tanah. Dermaga sedia ada akan dipanjangkan pada awal 2015 bagi pembinaan dermaga baru dan pengerukan alur pelayaran.

Hub Integrasi Petroleum dan Kawasan Perindustrian Maritim terletak di Tanjung Piai dalam mukim Serkat di Pontian. Pembangunan ini akan melibatkan penambakan berkeluasan 3,485 ekar.

Sunway Iskandar ialah cadangan pembangunan campuran dalam "Zon Flagship B" Iskandar Malaysia. Projek tersebut akan dibangunkan perumahan berkepadatan rendah dan hartanah perdagangan di tanah sekitar Sungai Pendas yang berkeluasan 1,800 ekar. Terdapat juga kawasan sungai merentasi Sungai Pendas.

7.3 Komponen Hidraulik

Arus Selat Melaka dan Selat Singapura mengalir masuk ke barat Selat Johor semasa air pasang. Air mengalir keluar daripada barat Selat Johor semasa air surut. Semasa tempoh air surut, dataran lumpur dan kawasan hutan bakau dalam kawasan projek akan terdedah. Kelajuan arus adalah berbeza-beza di kawasan Projek.

Orientasi pantai di sekitar tapak Projek dan kawasan penambakan di Singapura dan juga dataran lumpur memberikan pelbagai darjah perlindungan kepada garis pantai bergantung kepada arah perambatan ombak.

Pemerhatian perubahan dasar laut sedia ada pada keadaan bermusim menunjukkan terdapat sedikit perubahan pada corak hakisan dan enapan di dalam dan di sekitar tapak Projek semasa Monsun Timur Laut dan Monsun Barat Daya.

7.4 Geologi dan Geoteknik

Kajian geologi dan geoteknik telah dijalankan bagi menilai keadaan batu/tanah di sub-permukaan pada tapak Projek. Penilaian ini merangkumi profil tanah dan parameter reka bentuk bagi isu kekunci geoteknik seperti kestabilan tanah yang ditambak dan struktur perlindungan pantai.

Stratigrafi tanah bagi tapak Projek mengandungi komposit tanah seperti berikut:

a) Lapisan 1: Tanah liat marin yang lembut;
b) Lapisan 2: Tanah aluvium yang terdiri daripada mendapan kelodak atau kelikir; dan
c) Lapisan 3: Tongkolan yang terdiri daripada granit/syal/kuarzit.

7.5 Hidrologi dan Perparitan

Projek yang dicadangkan akan dibina pada tanah yang ditambak dalam Selat Johor. Oleh itu, tiada sebarang gangguan kepada kawasan tadahan air bagi sistem sungai sedia ada. Namun, kebanyakan sistem sungai yang mengalir ke perairan di tapak Projek akan dipengaruhi oleh kehadiran jisim tanah baru. Tadahan sungai utama ialah Sungai Pulai, Sungai Pok Besar, Sungai Pok Kecil dan Sungai Pendas.

7.6 Kualiti Air

Lima belas stesen persampelan yang dijalankan dalam tapak kajian dinyatakan dalam jadual di bawah.

Jadual RE7.1
Stesen Persampelan Kualiti Air

Stesen	Koordinat	Jenis Air	Penerangan
W1	1° 22′ 32.33″ N, 103° 38′ 22.26″ E	Payau	Muara Sungai Pendas
W2	1° 22′ 35.94″ N, 103° 38′ 45.84″ E	Masin	4 km berhampiran timur laut kawasan Projek
W3	1° 21′ 52.71″ N, 103° 38′ 19.33″ E	Masin	Bersebelahan sempadan antarabangsa Malaysia-Singapura
W4	1° 20′ 56.59″ N, 103° 37′ 51.56″ E	Masin	Berdekatan Tuas Checkpoint
W5	1° 18′ 59.93″ N, 103° 36′ 26.09″ E	Masin	Pulau Merambong
W6	1° 16′ 41.00″ N, 103° 35′ 41.00″ E	Masin	1 km berhampiran selatan kawasan Projek
W7	1° 17′ 14.83″ N, 103° 33′ 52.48″ E	Masin	Berdekatan tempat kapal berlabuh
W8	1° 19′ 47.72″ N, 103° 33′ 57.00″ E	Masin	Beting Tanjung Adang
W9	1° 19′ 40.56″ N, 103° 35′ 49.38″ E	Masin	Beting Merambong (Selatan)
W10	1° 20′ 21.96″ N, 103° 36′ 18.06″ E	Masin	Beting Merambong (Utara)
W11	1° 20′ 43.87″ N, 103° 35′ 33.34″ E	Payau	Muara Sungai Pok
W12	1° 19′ 59.18″ N, 103° 37′ 21.95″ E	Masin	Berdekatan sempadan antarabangsa
W13	1° 17′ 48.53″ N, 103° 36′ 34.10″ E	Masin	Berdekatan sempadan antarabangsa
W14	1° 21′ 53.74″ N, 103° 32′ 25.72″ E	Payau	Muara Sungai Pulai
W15	1° 17′ 53.31″ N, 103° 31′ 28.18″ E	Masin	Berhadapan Sungai Nibong

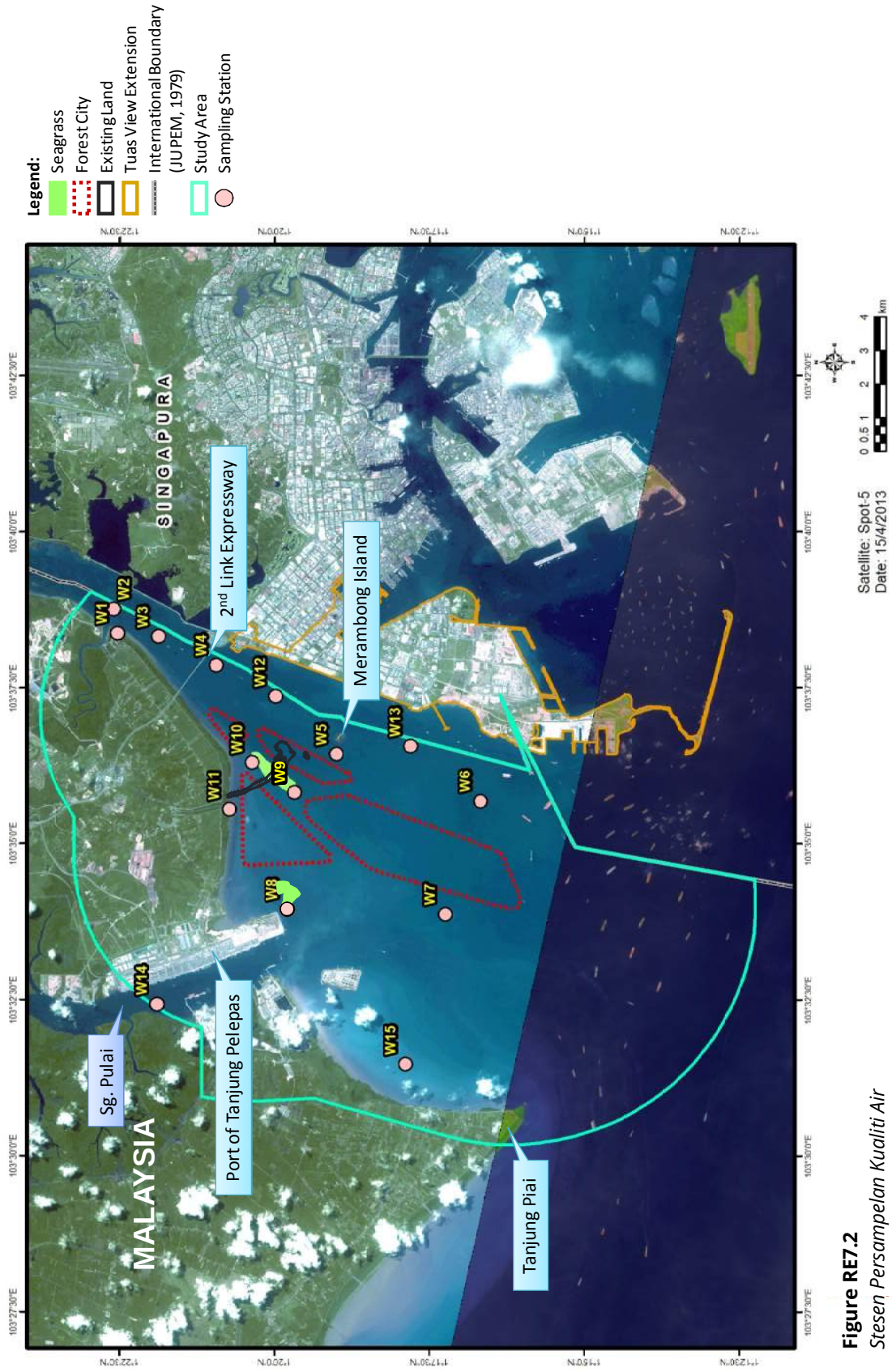


Figure RE7.2
Stesen Persampelan Kualiti Air

Pengukuran *in-situ* bagi parameter fizikal dan persampelan air telah dilakukan pada 26 Jun 2014. Keterangan persampelan kualiti air adalah seperti disenaraikan di bawah. Persampelan air yang diambil di kawasan kajian telah dianalisa oleh makmal berakreditasi dan analisis *in-situ* menggunakan meter analitik mudah alih yang mengikut kaedah piawai yang telah ditetapkan US EPA.

a) **Oksigen Terlarut (DO)** - Aras DO sedia ada rendah iaitu sekitar 3 hingga 4 mg/L (3.08 hingga 4.75 mg/L) meskipun di air masin. Nilai DO biasanya rendah di kawasan hutan dan bakau kerana kehadiran tanin dan asid humik. Stratifikasi bagi nilai DO adalah tidak signifikan di antara tiga lapisan turus air dan ini menunjukkan air tercampur baik.

b) **Kekeruhan dan Pepejal Terampai** - Nilai kekeruhan yang diukur secara *in-situ* menunjukkan nilai rendah bagi semua stesen iaitu semua nilai di bawah 5 NTU (air sangat jernih). Berdasarkan Piawaian MWQSC, nilai pepejal terampai (SS) pada aras 50 mg/L menunjukkan kualiti air marin adalah sangat baik.

c) **Minyak dan Gris (O&G)** - Dalam kajian ini, didapati aras O&G berada di bawah 10 mg/L pada semua stesen dan kedalaman dengan data yang direkodkan menunjukkan julat antara tidak dikesan (ND) sehingga 3 mg/L. Nilai 1 hingga 3 mg/L adalah biasa kerana kapal dan bot sering melalui kawasan ini.

d) **Kandungan Organik** - Nilai COD berada dalam julat sangat rendah (3 mg/L) sehingga tinggi (127 mg/L). Nilai COD meningkat (sekitar 100 mg/L) disebabkan kewujudan kawasan organik bakau. Nilai COD dan BOD ini menunjukkan air di kawasan tapak Projek telah tercemar dengan organik terlarut.

e) **Ammoniakal Notrogen** - Julat aras ammoniakal nitrogen di dalam sampel air laut adalah sederhana (1.06 mg/L) hingga sangat tinggi (5.71 mg/L). Ini disebabkan oleh pencemaran dari sisa kumbahan dan dapat dibuktikan melalui nilai BOD seperti dinyatakan sebelum ini.

f) **Koliform** - Koliform najis tidak dapat dikesan dengan kurang daripada 2 MPN/100 mL di semua stesen.

g) **Logam Berat** - Semua logam berat di tapak Projek di perairan selat tidak dapat dikesan kecuali bagi Kromium dan Ferum. Kromium masih di bawah piawai MWQSC iaitu 0.01 mg/L., namun tiada had piawai yang ditetapkan bagi Besi.

Jadual RE7.2
Butiran Persampelan Kualiti Air

Perkara	Marin
Fizikal	Suhu, kemasinan, pH, konduktiviti, kekeruhan, oksigen terlarut (DO), jumlah pepejal terampai (TSS)
Anion	Nitrogen ammonia, fosfat, nitrat, sulfida
Cation/Sisa Pepejal	Cr, Cd, Cu, Ni, Fe, Pb, Mn, As, Hg
Organik	BOD, jumlah karbon organik (TOC), minyak & gris
Mikrobial	Koliform najis, *E.coli*, *Enterococci*
Jumlah Stesen	Lima belas (15)
Kedalaman	Tiga kedalaman (permukaan, pertengahan dan bawah)
Pasang-surut	Air pasang

7.7 Kualiti Sedimen

Sebanyak tiga stesen persampelan kualiti sedimen dijalankan di tapak kajian. Sampel sedimen diambil menggunakan Van Veer Grab. Analisis kimia telah dilakukan dengan mengikut piawai yang telah ditetapkan. Kualiti sedimen asas dinyatakan dalam jadual di bawah. Jadual menunjukkan semua parameter dikategorikan sebagai "Tidak Tercemar (NP)" berdasarkan Piawaian US EPA. Secara umumnya, kualiti sedimen di sekitar tapak Projek boleh dikelaskan dalam keadaan baik.

Jadual RE7.3
Analisis Kualiti Sedimen

Parameter	Unit	Piawaian US EPA			Hasil		
		NP	MP	HP	S1	S2	S3
Zink sebagai Zn	mg/kg	<90	90-200	>200	51.500	22.530	40.769
Nikel sebagai Ni	mg/kg	<20	20-50	>50	5.625	0.602	8.284
Kuprum sebagai Cu	mg/kg	<25	25-50	>50	13.125	0.904	3.846
Kromium sebagai Cr	mg/kg	<25	25-75	>75	11.500	2.952	19.763
Plumbum sebagai Pb	mg/kg	<40	40-60	>60	15.813	5.000	22.071
Arsenik sebagai As	mg/kg	<3	3 – 8	>8	<0.001	<0.001	<0.001
Kadmium sebagai Cd	mg/kg	-	-	>6	0.875	0.361	0.473

7.8 Kualiti Udara

Persampelan kualiti udara telah dilakukan pada 17 sehingga 19 Julai 2014. Parameter yang diperhatikan ialah jumlah bahan terampai (TSP), Sulfur dioksida (SO_2), Karbon monoksida (CO) dan Nitrogen dioksida (NO_2). Sebanyak tujuh stesen telah dipilih.

Jadual RE7.4
Stesen Kualiti Udara

Stesen	Koordinat	Lokasi	Garispanduan *Malaysian Recommended Environmental Air Quality*
A1	1° 21' 35.44" N, 103° 36' 45.25" E	Kampung Ladang	TSP :260 µg/m^3 SO_2 :105 µg/m^3 NO_2 :320 µg/m^3 CO :35 µg/m^3
A2	1° 21' 03.34" N, 103° 35' 57.26" E	Kampung Tanjung Kupang	
A3	1° 21' 18.38" N, 103° 33' 50.00" E	Kampung Tanjung Adang	
A4	1° 19' 50.04" N, 103° 36' 35.74" E	Kawasan yang ditambak (Pulau 3)	
A5	1° 18' 53.09" N, 103° 36' 46.21" E	Pulau Merambong (menghadap Singapura)	
A6	1° 19' 07.95" N, 103° 35' 30.47" E	Kawasan cadangan Pulau 2	
A7	1° 19' 40.20" N, 103° 31' 20.43" E	Kampung Sungai Dinar	

Table RE7.5
Analisis Persampelan Kualiti Udara Asas

Parameter		**Bahan Terampai (TSP)**		
Tarikh Persampelan		17—18/07/2014	17—18/07/2014	18—19/07/2014
Waktu Persampelan	**Mula**	8.45 pg	8.30 pg	8.00 pg
	Tamat	8.45 pg	8.30 pg	8.00 pg
Tempoh Persampelan (min)		1,440	1,440	1,440
Isipadu Sampel Udara (m^3)		1,627	1,627	1,627
Berat Bahan Terampai Dikumpul (µg)		60,190	40,670	43,920
Kepekatan TSP (µg/m^3)		37	25	27
Parameter		**Sulfur Dioksida (SO_2)**		
Tarikh Persampelan		17—18/07/2014	17—18/07/2014	18—19/07/2014
Waktu Persampelan	**Mula**	8.45 pg	8.30 pg	8.00 pg
	Tamat	8.45 pg	8.30 pg	8.00 pg
Tempoh Persampelan (min)		1,440	1,440	1,440
Isipadu Sampel Udara (m^3)		2.909	2.880	2.880
Kepekatan SO_2 (ppm)		<0.001	<0.001	<0.001
Parameter		**Nitrogen Dioksida (NO_2)**		
Tarikh Persampelan		17/07/2014	17/07/2014	18/07/2014
Waktu Persampelan	**Mula**	8.45 pg	8.30 pg	8.00 pg
	Tamat	9.45 pg	9.30 pg	9.00 pg
Tempoh Persampelan (min)		60	60	60
Isipadu Sampel Udara (m^3)		0.122	0.121	0.121
Kepekatan of NO_2 (ppm)		<0.001	<0.001	<0.001
Parameter		**Carbon Monoksida (CO)**		
Tarikh Persampelan		17/07/2014	17/07/2014	18/07/2014
Waktu Persampelan	**Mula**	8.45 pg	8.30 pg	8.00 pg
	Tamat	9.45 pg	9.30 pg	9.00 pg
Tempoh Persampelan (min)		60	60	60
Isipadu Sampel Udara (m^3)		2.82	0.122	0.121
Kepekatan of CO (ppm)		<5	<5	

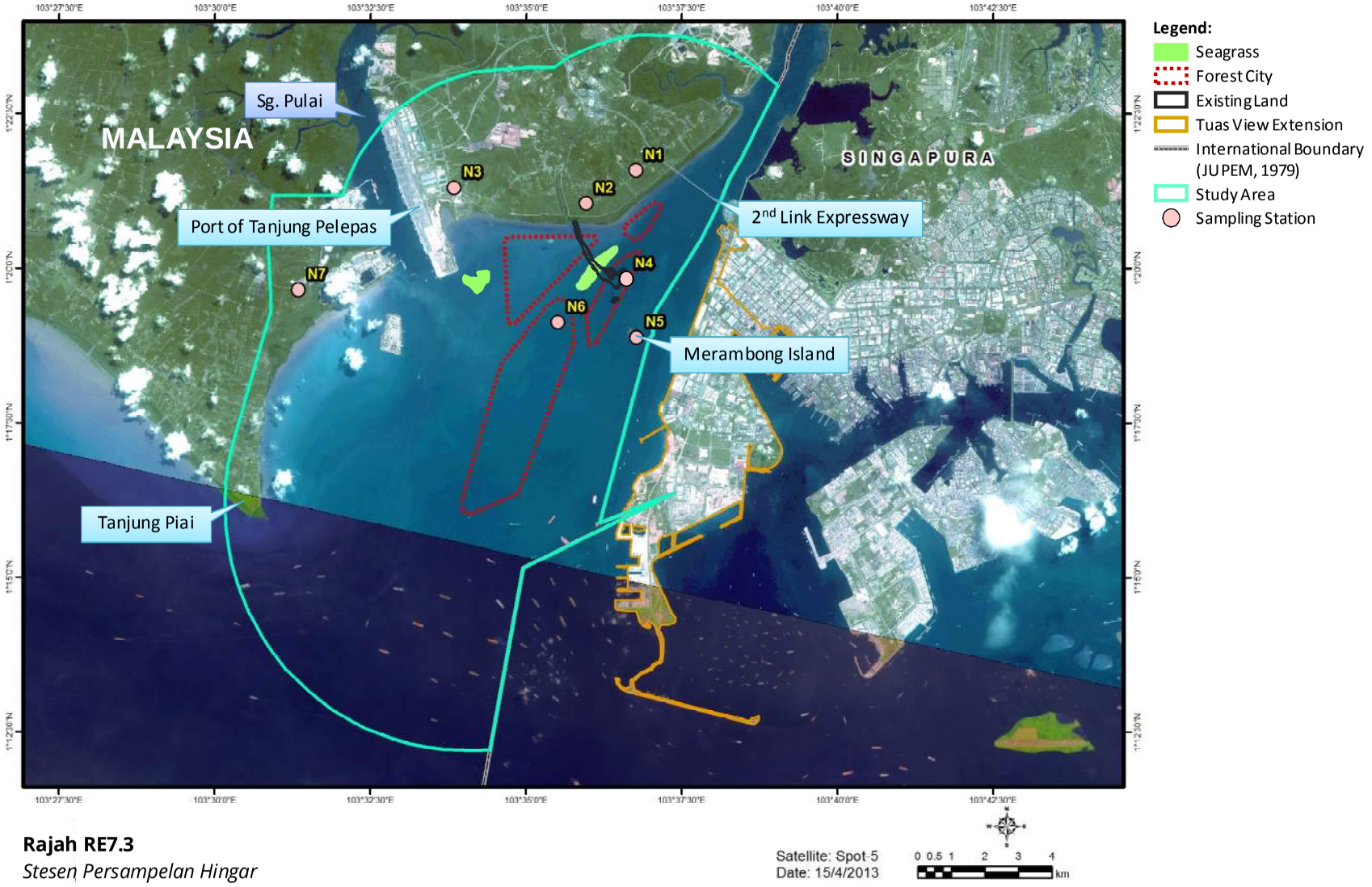
Nota: Garis Panduan *Malaysian Recommended Environmental Air Quality* = 260 µg/m^3

7.9 Hingar

Pengukuran hingar bertujuan untuk mengukur dan mendapatkan tahap bunyi sedia ada di persekitaran Projek cadangan termasuk kawasan perumahan dan kawasan sensitif yang terlibat. Tahap pengukuran hingar berdasarkan spesifikasi Suruhanjaya Elektro-teknikal Antarabangsa (IEC). Deskriptor hingar ialah Leq, L10, dan L90. Tahap hingar akan dipantau serentak sekurang-kurangnya lima belas minit dalam unit dBA. Selain itu, tahap minimum dan maksimum hingar, L_{min} dan L_{max} akan menentukan julat data tahap hingar semasa pengukuran dibuat, unit yang digunakan dalam dBA. Tujuh lokasi dipilih sebagai stesen persampelan hingar.

Jadual RE7.6
Stesen Persampelan Hingar

Stesen	Koordinat	Lokasi	Parameter Diukur
N1	1° 21′ 35.44″ N, 103° 36′ 45.25″ E	Kampung Ladang	L_{min}, L_{max}, L_{10}, L_{50}, L_{90}, L_{eq} (profil 24 jam)
N2	1° 21′ 03.34″ N, 103° 35′ 57.26″ E	Kampung Tanjung Kupang	
N3	1° 21′ 18.38″ N, 103° 33′ 50.00″ E	Kampung Tanjung Adang	
N4	1° 19′ 50.04″ N, 103° 36′ 35.74″ E	Kawasan yang ditambak (Pulau 3)	
N5	1° 18′ 53.09″ N, 103° 36′ 46.21″ E	Pulau Merambong (menghadap Singapura)	
N6	1° 19′ 07.95″ N, 103° 35′ 30.47″ E	Kawasan cadangan Pulau 2	
N7	1° 19′ 40.20″ N, 103° 31′ 20.43″ E	Kampung Sungai Dinar	



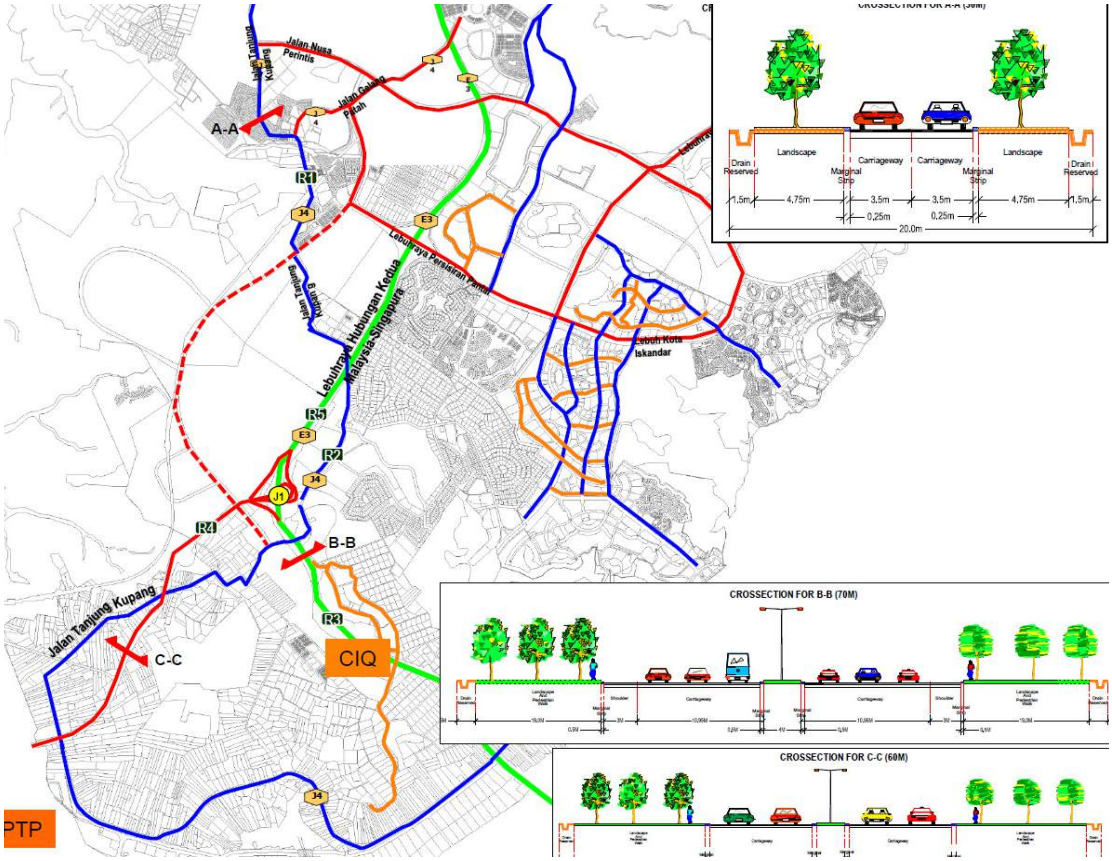
Rajah RE7.3

Stesen Persampelan Hingar

7.10 Trafik Darat Sedia Ada

Tapak cadangan pembangunan terletak di bahagian barat Nusajaya, dengan laluan ke tapak boleh diakses daripada Lebuhraya Tanjung Pelepas dan Lebuhraya Link Kedua. Laluan utama bagi jaringan ini adalah Jalan Pendas Laut dan Jalan Tanjung Kupang yang membentuk jalan negeri J4. Jaringan jalan sedia ada di sekitar tapak Projek ditunjukkan dalam *Rajah RE7.44*.

Tinjauan trafik bagi jalan raya dan persimpangan telah dijalankan pada 6 Februari 2014. Tinjauan ini melibatkan tinjauan pengiraan tepi jalan, tinjauan lapangan, tinjauan inventori jalan. Data bagi pergerakan kenderaan bermotor, komposisi, kepadatan membelok (*turning volume*), inventori jalan dan persimpangan turut dicatatkan. Pengiraan pengkelasan secara manual bagi pergerakan membelok di laluan jalan dan persimpangan telah dijalankan mengikut piawaian "Arahan Teknik (Jalan) JKR 8/86" bagi merangka kepadatan sebenar sepanjang jalanraya dan persimpangan terpilih. Jadual di bawah menunjukkan suasana operasi jalan raya sedia ada dan tahap perkhidmatan (LOS) masing-masing.



Rajah RE7.4
Rangkaian Jalan Raya Sedia Ada

Jadual RE7.7
Tahap Operasi Rangkaian Jalanraya Sedia Ada

Stesen	Jenis Lorong	Arah Aliran	Trafik Waktu Puncak Sedia Ada (pcu)	Kadar Pergerakan Waktu Puncak (pc/h)	Tahap Perkhidmatan (LOS)
R1 – Jalan Pendas Laut	S1	Arah Utara	585	1,328	C
	S1	Arah Selatan	677		
R2 – Jalan Tanjung Kupang	S1	Arah Utara	505	1,090	C
	S1	Arah Selatan	529		
R3 – Second Link Expressway (Berdekatan CIQ)	D3	Arah Utara	461	169	A
	D3	Arah Selatan	3,871	1,419	D
R4 – Tanjung Pelepas Highway	D2	Arah Utara	473	260	A
	D2	Arah Selatan	1,666	916	D
R5 - 2nd Link Expressway (berdekatan Leisure Farm)	D3	Arah Utara	864	317	A
	D3	Arah Selatan	5,468	2,005	D

8.0 Kawasan Sensitif Alam Sekitar

Terdapat beberapa Kawasan Sensitif Alam Sekitar (KSAS) berdekatan tapak Projek. NPP2 menyatakan secara jelas, bahawa sebarang pembangunan yang dijalankan perlu menjaga kepentingan dan melindungi kawasan sensitif alam sekitar. Beberapa KSAS di dalam dan berdekatan dengan tapak Projek yang mempunyai nilai yang berharga kepada ekosistem tempatan dandikelaskan sebagai KSAS Tahap 1. Lokasi dan jarak KSAS dengan tapak Projek dinyatakan dalam *Jadual RE8.1* di bawah.

8.1 Hamparan Rumput Laut (Beting Tanjong Adang dan Merambong)

Hamparan rumput laut di Beting Merambong dan Beting Tanjung Adang telah dikelaskan sebagai kawasan berkepentingan tinggi di Semenanjung Malaysia. Hamparan rumput laut ini menyokong kepelbagaian hidupan yang terdiri daripada spesis-spesis terancam seperti kuda laut, dugong dan spesis komersil yang penting seperti ikan, ketam, udang. Invertebrata lain turut dijumpai di kawasan ini seperti tapak sulaiman, timun laut dan anemon.

Jadual RE8.1
Senarai ESA yang Berdekatan dengan Tapak Projek

Peringkat ESA	ESA	Lokasi	Jarak Terdekat dari Kawasan Projek (km)
Peringkat 1	Rumput Laut	▪ Tanjung Adang Shoal ▪ Merambong Shoal	0.69 0.28
	Pulau	Merambong Island	0.80
	Batu Karang	Merambong Island	0.80
	Hutan Paya Bakau	▪ Coastline of Tanjung Piai ▪ Coastline of Tanjung Kupang ▪ Sungai Pulai Estuary	5.63 0.43 5.45
	Kawasan Ramsar	▪ Tanjung Piai ▪ Sungai Pulai	5.67 5.63
	Tarikan Pelancong/ Mercu tanda	The Southernmost Tip of Mainland Asia	5.93
Peringkat 2	Kawasan Penduduk (dalam lingkungan kawasan kajian)	▪ Kampung Tanjung Adang ▪ Kampung Tanjung Kupang ▪ Kampung Pekajang Lurus ▪ Kampung Pekajang Bengkok ▪ Kampung Tiram Duku ▪ Kampung Pok Besar ▪ Kampung Pok Kechil ▪ Kampung Ladang ▪ Kampung Paya Mengkuang ▪ Pendas ▪ Kampung Pendas Laut ▪ Kampung Bukit Kuching ▪ Kampung Sungai Sam ▪ Kampung Sungai Dinar ▪ Kampung Sungai Chengkeh Besar ▪ Kampung Chengkeh	1.34 1.03 3.12 4.06 4.54 2.60 2.00 1.32 3.57 1.32 4.06 5.12 6.01 5.63 6.70 6.55
	Dataran Lumpur	▪ Northern Shoreline (Tanjung Kupang - Pendas) ▪ Western Shoreline (Tanjung Bin - Tanjung Piai)	5.67 5.63
Lain-lain	Akuakultur	Berdekatan Sungai Pendas	4.00
	Sempadan Antarabangsa	Sempadan Antarabangsa Malaysia—Singapura	1.59
	Hakisan pantai	Tanjung Piai	6.33

Pembangunan yang dicadangkan dijangka akan memberi kesan yang besar kepada hamparan rumput laut ini. Jarak di antara hamparan rumput laut dan tapak Projek terlalu hampir dan kawasan penampan sangat kecil. Ini mungkin akan menyebabkan langkah kawalan menjadi kurang berkesan. Dalam usaha melindungi hamparan rumput laut ini, cadangan langkah kawalan hendaklah dilaksanakan dengan penuh teliti, tiada kesilapan dan diselenggara dengan baik.

8.2 Pulau Merambong

Pulau Merambung berkeluasan 2.75 hektar dan ditumbuhi vegetasi bakau dan *shrub* serta sebagai tanda sempadan Malaysia-Singapura. Daripada tinjauan lapangan bagi Projek ini, terdapat 59 takson dalam 53 genus daripada 35 famili. Flora pulau ini bukan sahaja melibatkan pokok tetapi tumbuhan palma, *shrub*, herba, paku-pakis dan pemanjat.

Terdapat juga tompokan rumpai laut serta karang lembut dan kasar di sekitar perairan pulau ini. Pulau ini juga terkenal sebagai habitat kuda laut (*Hippocampus kuda*), *pipefish* dan *sea hares.* Selain itu, pulau ini sangat penting sebagai kawasan penyelidikan bagi universiti-universiti tempatan menjalankan penyelidikan organisma marin kerana pulau ini mempunyai kekayaan ekosistem marin dan habitat yang sesuai bagi pelbagai hidupan marin.

8.3 Tapak Ramsar (Sungai Pulai dan Tanjung Piai)

Hutan Simpan Sungai Pulai ialah hutan simpan bakau terbesar di Johor. Ia merangkumi kawasan yang luas (keluasan 8,353.23 hektar) dan kawasan sungai bakau yang baik dan terbesar di Malaysia. Ia telah diiktiraf sebagi tapak Ramsar pada 31 Januari 2003. Kepelbagaiannya yang diurus dengan baik menjadikan habitat bakau di Sungai Pulai mempunyai 24 spesis tumbuhan bakau dan 21 spesis asosiasi, yang merangkumi 84% spesis bakau Malaysia, 79% spesis bakau ekslusif Malaysia dan 37% spesis bakau dunia.

Hutan bakau Tanjung Piai mempunyai pantai bakau sepanjang 8 km dan dataran lumpur air pasang-surut seluas 400 hektar. Habitat bakau ini telah dua kali diwartakan. Kebanyakan persisiran pantai merupakan kawasan yang terdedah. Persisiran pantai kerap kali mengalami hakisan primer. Dataran lumpur adalah luas dan memanjang. Dari segi kepelbagaian ia mempunyai 59 spesis flora bakau, 36 spesis bakau ekslusif (94.8% di Malaysia), 19 bukan ekslusif dan 4 asosiasi.

8.4 Dataran Lumpur

Dataran lumpur terdapat dari Tanjung Piai ke Tanjung Bin menjangkau 11.1 km serta terdapat di sepanjang pantai Tanjung Kupang. Keluasan dataran lumpur menjangkau

sehingga 2 km bersebelahan dengan dermaga PTP dan sehingga 100 m di bahagian barat kuala Sungai Pulai.

8.5 Akuakultur

Terdapat aktiviti akuakultur berdekatan dengan tapak Projek. Aktiviti akuakultur ini seperti kultur sangkar ikan boleh dijumpai di sepanjang kuala Sungai Pendas. Sistem utama yang diamalkan ialah kultur sangkar air payau dan kanvas. Kebanyakan nelayan bergantung penuh kepada aktiviti perikanan ini kerana mereka tidak mempunyai sumber pendapatan lain dan kebanyakan isteri para nelayan merupakan suri rumah. Para nelayan akan kehilangan sumber pendapatan sekiranya berlaku penurunan kepada kualiti air dan gangguan kepada hidupan marin.

8.6 Kawasan Penempatan

Penduduk tempatan berdekatan dengan tapak Projek, kebanyakannya adalah nelayan kampung dan telah menetap di sini lebih daripada 30 tahun. Impak kepada pelaksanaan pembangunan ini bukan sahaja melibatkan alam sekitar tetapi dijangka akan melibatkan penduduk tempatan berdekatan. Keadaan bagi persekitaran manusia sedia ada akan diterangkan secara terperinci dalam *Bab 11 – Persekitaran Manusia Sedia Ada*.

8.7 Keadaan Persisiran Pantai

Persisiran pantai adalah stabil di sekitar Stesen Janakuasa Tanjung Bin yang terletak di muara sungai Pulai, namun, persisiran pantai antara Fasa 2 PTP dan Tanjung Kupang adalah bertambah (*accreting*). Kestabilan persisiran pantai ini bergantung kepada perlindungan persisiran yang telah disediakan oleh Stesen Janakuasa Tanjung Bin. Ini berdasarkan Pelan Pengurusan Persisiran Pantai bagi Iskandar Malaysia (SMP) menyatakan bahawa tapak Projek adalah terlindung daripada ombak dari arah laut. Guna tanah sedia ada dan guna tanah akan datang bagi unit pengurusan ini adalah industri berasaskan pelabuhan.

Tumpahan minyak di laut akan memberi impak kepada bakau di persisiran pantai seperti mati atau berkurangan daripada persisiran pantai. Bakau di sepanjang persisiran pantai telah merosot akibat Projek pertanian dan akuakultur; sekaligus, akan menyebabkan tekanan kepada bakau lantaran menyumbang kepada hakisan.

9.0 Persekitaran Biologi Sedia Ada

Komponen biologi utama yang diperhatikan dalam kajian ini ialah flora daratl (bakau), mamalia, burung, reptilia, amfibia, ikan dan makro-invertebrata akuatik. Keterangan bagi

setiap komponen adalah berdasarkan tinjauan lapangan dan data tambahan yang sudah terbit dan belum diterbitkan oleh pelbagai institusi dan agensi kerajaan.

9.1 Flora Darat (Bakau)

Tinjauan flora bakau dilakukan melalui dua cara. Pertama, tinjauan umum dengan 11 transek sepanjang persisiran pantai/sungai, untuk mendokumenkan semua spesis tumbuhan di pantai/sungai dan bakau. Kedua, 14 plot kajian berukuran 50 m x 20 m (0.1 hektar) dilaksanakan bagi mendapatkan maklumat komposisi spesis, kepelbagaian spesis dan anggaran biomas atas tanah. Semua pokok dengan diameter ≥ 5 cm paras dada direkodkan. Spesies bakau yang menjadi perhatian untuk pemuliharaan atau jarang ditemui akan dinyatakan berpandukan Senarai Kategori dan Kriteria Merah IUCN. Walau bagaimanapun bagi status data, tinjauan flora merupakan data sekunder dan bagi kajian plot, hasil kajian 11 daripada 14 plot merupakan data primer. Lokasi bagi tinjauan flora dan plot kajian disenaraikan di bawah:

Jadual RE9.1
Lokasi Plot Kajian Flora

Tapak	Jenis	Lokasi	Koordinat GPS	Status Data
A	Tinjauan Flora	Tanjung Adang—Tanjung Kupang—Sungai Pendas	01° 21' 8" N 103°36'48.822"E	Sekunder
B	Tinjauan Flora	Sungai Pok	01° 21′ 02″ N 103° 35′ 28″ E	Sekunder
C	Kajian Plot	Sungai Pendas	01° 24′ 39″ N 103° 38′ 44″ E	Sekunder
D	Tinjauan Flora	Kampung Tanjung Adang/PTP	01° 20′ 51″ N 103° 33′ 42″ E	Sekunder
E	Kajian Plot	Sungai Redan I	01° 25′ 30″ N 103° 28′ 42″ E	Primer
F	Kajian Plot	Sungai Redan II	01° 25′ 22″ N 103° 28′ 46″ E	Primer
G	Kajian Plot	Sungai Karang I	01° 22′ 36″ N 103° 30′ 04″ E	Primer
H	Kajian Plot	Sungai Karang II	01° 22′ 47″ N 103° 29′ 45″ E	Primer
I	Kajian Plot	Sungai Karang III	01° 23′ 15″ N 103° 20′ 49″ E	Primer
J	Kajian Plot	Sungai Karang IV	01° 23′ 04″ N 103° 30′ 58″ E	Primer
K	Tinjauan Flora	Sungai Dinar	01° 20′ 26″ N 103° 32′ 00″ E	Sekunder

Jadual RE9.1 *(samb')*

Tapak	Jenis	Lokasi	Koordinat GPS	Status Data
L	Tinjauan Flora	Sungai Chengkih Besar	01° 20′ 55″ N 103° 31′ 22″ E	Sekunder
M	Tinjauan Flora	Sungai Chengkih Kecil	01° 21′ 30″ N 103° 31′ 57″ E	Sekunder
N	Tinjauan Flora	Sungai Chokoh to Fish Farm	01° 18′ 27″ N 103° 30′ 16″ E	Sekunder
O	Tinjauan Flora	Sungai Chokoh to Kampung Perepat Timbul and Tanjung Piai Resort	01° 17′ 42″ N 103° 30′ 40″ E	Sekunder
P	Kajian Plot dan Tinjauan Flora	Taman Negara Tanjung Piai to border of Ramsar Site	01° 16′ 18″ N 103° 30′ 14″ E	Sekunder
Q	Kajian Plot dan Tinjauan Flora	Menara Pemerhati Satu	01° 16′ 04″ N 103° 30′ 24″ E	Sekunder
R	Kajian Plot	Tanjung Piai National Park 1 (TPNP1)	01° 16′ 07″ N 103° 30′ 35″ E	Primer
S	Kajian Plot	Tanjung Piai National Park 2 (TPNP2)	01° 16′ 06″ N 103° 30′ 38″ E	Primer
T	Kajian Plot	Tanjung Piai National Park 3 (TPNP3)	01° 16′ 01″ N 103° 30′ 41″ E	Primer
U	Kajian Plot	Tanjung Piai National Park 4 (TPNP4)	01° 15′ 59″ N 103° 30′ 42″ E	Primer
V	Tinjauan Flora	Merambong Island	1°18'55.632"N 103°36'41.676"E	Sekunder
W	Kajian Plot	Sungai Kemudi—Sungai Bahan	01° 24′ 39″ N 103° 38′ 44″ E	Sekunder

Daripada 23 tapak kajian, terdapat 144 spesis tumbuhan yang terdiri daripada pokok, *shrub*, palma, herba, paku-pakis, rumput, rusiga dan pemanjat telah direkodkan. Kebanyakan spesis yang dijumpai ialah spesis biasa kecuali 3 spesis pokok yang jarang ditemui. Merujuk kepada Kriteria IUCN, *Bruguiera hainesii* merupakan "*Critically Endangered*", *Avicennia rumphiana* merupakan "*Vulnerable*" serta *Brownlowia tersa*, *Ceriops zippeliana* dan *Sonneratia ovata* merupakan "*Nearly Threatened*".

9.2 Fauna Darat

Objektif bagi penilaian fauna dalam Projek cadangan adalah:

a) mencari maklumat asas bagi "*Volant*" darat dan mamalia "*non-Volant*" serta burung di kawasan Projek cadangan (dalam lingkungan 5 km); dan

b) mengenalpasti kehadiran spesies yang dilindungi atau jarang ditemui.

Lokasi bagi tinjauan lapangan dan tapak perangkap disenaraikan di jadual di bawah. Data sekunder diperolehi daripada gabungan laporan Pelan Pengurusan Pantai Iskandar Malaysia (2010) dan DEIA bagi Fasa 3 Pengerukan dan Penambakan PTP (2014).

Jadual RE9.2
Lokasi Tapak Kajian dan Kawasan Perangkap

Tapak	Lokasi	Burung	Herpeto-fauna	Mamalia	Koordinat GPS
1	Sungai Pendas (Kampung Pendas Jaya)	/		/	01°22.502'N, 103°38.391'E
2	Sungai Simpang Arang	/		/	
3	Sungai Tiram Duku	/		/	
4	Taman Negara Tanjung Piai	/	/	/	01° 15' 59" N, 103° 30' 42" E
5	Tapak Ramsar Sungai Pulai	/	/	/	01° 20' 51" N, 103° 33' 42" E

a) **Mamalia:** Tinjauan mamalia besar dilakukan sekurang-kurangnya 3 hari di setiap tapak kajian di sepanjang hutan bakau. Setiap tapak kajian, tinjauan dibuat sekurang-kurangnya dalam transek 1 km. Tinjauan terhadap mamalia diperhatikan melalui kesan tapak kaki dan jejak tinggalan. Laporan daripada temubual dengan penduduk tempatan dan agensi sekitar juga dimasukkan ke dalam senarai spesis mamalia.

b) Maklumat berhubung spesis mamalia daripada data primer menyatakan bahawa mamalia di sini tidak sama dengan spesis hutan dan umum kerana keunikan dalam beradaptasi dengan hidup di kawasan persisiran pantai yang mencabar. Meskipun bilangan spesis kurang, namun, terdapat pelbagai spesis mamalia hadir dalam ekosistem bakau, tetapi ekologi dan asosiasi dengan bakau kurang diketahui.

c) Kera paling kerap ditemui di kawasan kajian. Mamalia besar yang kerap ditemui di kawasan kajian ialah babi hutan (*Sus scrofa*). Babi hutan dan primat dilindungi di bawah Akta Pemuliharaan Hidupan Liar 2010.

d) **Burung**: Burung laut dan burung pantai sangat bergantung kepada dataran lumpur air pasang-surut, dataran pasir dan kawasan bakau kerana habitat tanah bencah ini sangat penting bagi menyokong kekayaan fauna bentik. Dataran lumpur menyediakan sumber makanan bagi burung berhijrah dan burung residen.

Secara keseluruhan, tiada rekod bagi spesis terancam kerana waktu persampelan yang pendek. Jumlah bilangan spesis burung yang diperolehi tidak memberi gambaran sebenar kepelbagaian burung di kawasan ini. Kajian yang lebih komprehensif diperlukan bagi musim penghijrahan burung.

9.3 Biologi Marin

9.3.1 Rumput Laut

Rumput laut ialah habitat ekologi penting yang membentuk keperluan bagi kebanyakan ekosistem marin kompleks. Rumput laut berperanan sebagai tempat perlindungan sumber makanan bagi kebanyakan hidupan laut serta membolehkan kawasan ini sesuai bagi pembiakan, nurseri dan perlindungan sementara bagi ikan dan krustasea.

Terdapat hamparan rumput laut yang terkenal di Beting Tanjung Adang, Beting Merambong dan tempat lain di sepanjang Sungai Pulai. Makrofit (rumput laut dan rumpai laut) yang hadir di pantai telah dinilai secara kualititatif dan kuantitatif.

Jadual RE9.3
Spesis Rumput Laut di Beting Tanjung Adang dan Beting Merambong

Beting Tanjung Adang	Beting Merambong
Enhalus accoroides *Halophila* spp. *Halophila spinulosa* *Syringodium isoetifolium*	*Enhalus accoroides* *Halophila ovalis* *Halophila spinulosa* *Thalassia hemprichii* *Cymodocea rotundata* *Halodule pinnifolia* *Halodule uninervis*

9.3.2 Ikan dan Perikanan

Selat Johor menyediakan kompleks makrokosm bagi komuniti ikan dalam ekosistem air tawar dan air laut. Tapak Ramsar Sungai Pulai menyediakan kawasan perlindungan yang baik bagi flora dan fauna darat serta organisma akuatik. Justeru, ekosistem ini menyedia dan memainkan peranan sebagai habitat utama/biotopik untuk spesis-spesis ikan dalam spektrum yang luas iaitu daripada komuniti ikan air tawar sehingga air masin.

Nelayan kecilan daripada persekitaran pantai menangkap sumber ikan di persekitaran dengan menggunakan alat tradisional seperti kelong, perangkap, mengheret, *long lining*, pukat tiga lapis dan pukat hanyut.

Tinjauan ikan marin dan penilaian telah dibuat berdasarkan kepada kehadiran spesis demersal dan pelagik semasa air pasang surut di kawasan kajian. Pukat hanyut dan pukat tiga lapis digunakan bagi menangkap spesis ikan demersal dan pelagik dan jaring diletakkan secara rawak di air pasang surut yang berbeza. Tambahan bagi tinjauan lapangan, data pendaratan ikan turut dikumpulkan daripada nelayan tempatan.

Kuda laut dan *pipefish* merupakan ikon spesis ikan di rumput laut di Beting Merambong. Hasil daripada tinjauan ini menyatakan bahawa spesis kriptik ini menggunakan hamparan rumput laut sebagai habitat primer dan gangguan yang besar ke atas

ekosistem akan menyebabkan spesis ini hilang dari kawasan ini.

Dugong merupakan salah satu daripada 12 mamalia marin yang menghuni perairan Malaysia. Di Malaysia, kurang kajian dilakukan kerana kekurangan individu terlatih dan kekurangan dana kajian terhadap dugong. Kehadiran dugong terutama tahun 1999 telah menarik perhatian masyarakat dan media. Dugong juga dikenali sebagai "lembu laut" kerana aktiviti pemakanan utama adalah meragut padang rumput laut di persisiran laut. Kehadiran rumput laut dugong seperti *Halophila* dan *Halodule* telah menyediakan habitat ragut utama bagi spesis dugong. Rekod dugong terdampar membuktikan kewujudan spesis mamalia ini dalam persekitaran kawasan kajian.

Jadual ES9.4
Rekod Dugong Terdampar di Kawasan Persekitaran

Bil. Kes	Tarikh	Bilangan	Gender	Lokasi
1	14.05.2003	1	Jantan	Tanjung Pelepas, Johor Bahru
2	23.07.2003	1	Betina	Pulau Merambong, Johor Bahru
3	18.10.2004	1	Tiada rekod	Pulau Merambong, Johor Bahru
4	14.01.2006	1	Tiada rekod	TLDM Pengerang, Kota Tinggi
5	11.04.2006	1	Tiada rekod	Simpang Arang, Gelang Patah, Johor Bahru
6	28.07.2006	1	Betina	Pengkalan Pendas Laut, Johor Bahru
7	2.09.2006	1	Betina	Pulau Kapas, Terengganu
8	23.01.2007	1	Betina	Pulau Tuba, Pulau Langkawi, Kedah
9	11.092007	1	Jantan	Sungai Pendas, Johor Bahru

10.0 Trafik Marin dan Pelayaran

Tujuan utama bagi kajian trafik marin dan pelayaran ialah bagi mencari isu alam sekitar yang berkaitan dengan cadangan pembangunan. Laporan telah dibuat berdasarkan maklumat yang diterima dan penyelidikan telah dijalankan berhubung faktor di bawah:

a) Kemudahan dan utiliti marin sedia ada;
b) Trafik marin dan alur pelayaran;
c) Statistik kemalangan trafik marin;
d) Keadaan iklim tempatan; dan
e) Peraturan keselamatan dan prosedur trafik marin sedia ada.

Penilaian telah dibuat menggunakan kaedah kualititatif dan kuantitatif termasuk maklumat tempatan, pengalaman, data yang diperolehi daripada Penggerak Projek, syarikat pengendali pelabuhan berdekatan, agensi dan pihak kerajaan, temubual dengan nelayan, masyarakat tempatan dan lain-lain.

10.1 Kemudahan Marin Sedia Ada

a) Kemudahan berdekatan dengan Projek cadangan ialah Pelabuhan Tanjung Pelepas, Pelabuhan Singapura, Terminal Minyak ATB, Stesen Janakuasa Tanjung Bin dan Terminal Minyak APH. Selain itu, terdapat juga STS yang mengendalikan peletakan kapal induk yang bersauh di tempat yang dikhususkan dan berfungsi sebagai unit penyimpanan apungan (FSU).

b) Bot Nelayan

Aktiviti menangkap ikan telah dilakukan secara tradisional di kuala Sungai Pulai yang kini menjadi lokasi bagi alur pelayaran PTP, Stesen Janakuasa Tanjung Bin, Terminal APH dan lembangan pusingan menghala ke Terminal Minyak ATT Tanjung Bin seiring dengan dermaga PTP.

Terdapat jeti kayu kecil yang terletak di sepanjang persisiran pantai ke timur PTP sehingga ke jambatan yang menghubungkan Malaysia dan Singapura (Laluan Kedua) dan selalunya bot kecil yang berkuasa enjin antara 15 hingga 60 hp. Bot terbuka ini diperbuat daripada kayu, bahan komposit, atau plastik kaca bertetulang (GRP). Jumlah bot nelayan yang berpengkalan di kuala Sungai Pulai ialah 200 buah. Ini termasuk keahlian menangkap ikan secara berlesen dan tidak berlesen.

c) Marina Sedia Ada

Terdapat dua marina yang terletak di sebelah barat Laluan Kedua iaitu Puteri Harbour dan Danga Bay. Marina Danga Bay telah ditutup dan tidak lagi berfungsi sebagai dermaga. Kawasan ini telah diganti selama 2 tahun lalu untuk pembangunan perumahan satelit yang besar.

10.2 Trafik Marin dan Alur Pelayaran Sedia Ada

PTP boleh didekati melalui alur pelayaran di pintu masuk selatan. Alur ini mempunyai lebar 420 m dan panjangnya 7,000 m. Kedalaman yang diisytihar ialah 16.0 m ACD pada alur pelayaran dan 17 m pada lembangan pusingan Fasa 2. Selain itu, di kawasan labuhan, terdapat beberapa pengendalian pemindahan *Ship-to-Ship* (STS) berlesen berdekatan dengan had selatan pelabuhan sehingga ke selatan Tanjung Piai.

Selain daripada alur pelayaran PTP, terdapat alur pelayaran lain di antara Pulau Merambong dan sempadan antarabangsa Malaysia-Singapura. Alur ini berukuran lebih kurang 7 km dari selatan ke Laluan Kedua dan terletak dalam had kawasan Pelabuhan Johor. Bot rekreasi dan perahu layar menggunakan alur ini untuk masuk atau keluar dari Johor Bahru.

10.3 Keadaan Iklim Tempatan

Kebolehlihatan kawasan ini secara umumnya baik meskipun terdapat hujan lebat yang akan mengurangkan kebolehlihatan sementara. Keadaan ini bertahan hanya beberapa jam dan dijangka tidak memberi impak signifikan kepada pergerakan kapal keluar atau masuk.

Kawasan ini menerima kesan "*the Sumatras*" yang merupakan siri ribut kilat yang biasanya melanda pada Mac sehingga November setiap tahun.

Pasang surut yang terjadi di kawasan ini merupakan pasang surut *co-oscillating* Lautan Pasifik dan Hindi. Kawasan ini mempunyai dua air surut dan dua air pasang setiap hari dengan julat pasang surut (perbezaan antara air tinggi dan rendah) serendah 0.86 m semasa air surut dan setinggi 3.34 m semasa pasang surut perbani.

Arus di sebelah selatan Selat Johor selalunya mengalir dari arah utara dan ke timur semasa air pasang. Arus surut cenderung untuk menjadi kuat dan mengalir dalam arah berbalik.

10.4 Trafik Marin Sedia ada dan Peraturan Keselamatan

Persatuan Antarabangsa Maritim (IMO) telah mengubahsuai STRAITREP – Sistem Pelaporan Mandatori Kapal di Selat Melaka dan Singapura seperti yang telah dicadangkan oleh Indonesia, Malaysia dan Singapura. Objektif bagi STRAITREP ialah (a) memantapkan keselamatan pelayaran; (b) melindungi persekitaran marin.

10.5 Pusat Kawalan Pelabuhan

Pusat Kawalan Pelabuhan PTP (PCC) memantau dan mangatur trafik marin di kawasan projek cadangan dan laluan pelayaran masing-masing dalam had pelabuhan. Pergerakan semua kapal di pelabuhan mesti mendapat kebenaran terdahulu dari PCC. Semua kapal yang beroperasi dalam had pelabuhan di bawah pengawasan Sistem Radar Pelabuhan (PRS). Pemaliman adalah wajib dalam had PTP.

11.0 Persekitaran Manusia Sedia Ada

11.1 Pengenalan

Bahagian ini akan membincangkan dan menggariskan profil sosio-ekonomi bagi penduduk tempatan yang menerima impak daripada Projek ini terutamanya nelayan serta mengukur pandangan dan tahap kesedaran mereka terhadap Projek yang dibina memandangkan tapak Projek adalah berhadapan dengan deretan kampung tradisional nelayan.

Kajian ini juga melihat tahap penerimaan sosial terhadap kawasan Projek cadangan. Penerimaan sosial ini kritikal bagi menentukan pelaksanaan cadangan pembangunan ini berjalan lancar. Bagi tujuan kajian ini, zon impak meliputi persisiran pantai dan penempatan dengan jarak lingkungan 5 km dari sempadan Projek yang banyak melibatkan kawasan kampung tradisional dan nelayan.

11.2 Kaedah

Data primer dan sekunder dikumpulkan bagi analisis sosio-ekonomi termasuk tinjauan isi rumah yang dilakukan dalam zon impak tapak Projek cadangan. Tinjauan ini dilakukan menggunakan enumerasi secara terus oleh empat pembanci. Selain tinjauan, data sekunder yang sudah terbit dan belum diterbitkan dari pelbagai jabatan dan agensi kerajaan seperti Jabatan Perikanan, Ketua kampung, Penghulu dan Ketua Unit Nelayan turut dijadikan rujukan.

Oleh kerana kawasan kajian secara relatif adalah spesifik, statistik persekitaran sosial sebenar tidak dapat diperoleh. Pemerolehan mikro data boleh diperoleh melalui tinjauan sosial di kalangan mereka. Selain daripada latar belakang penduduk bagi kawasan kajian diketahui, pandangan dan penilaian terhadap Projek cadangan juga boleh diperolehi.

Sampel seramai 180 responden (10%) yang merangkumi ketua keluarga dari kalangan penduduk tempatan sebanyak 143 orang (79.4 %) dan nelayan sebanyak 37 orang (20.6%) diambil menggunakan teknik persampelan rawak seperti *Jadual RE11.1*.

Satu Dialog Umum telah dilaksanakan pada 21 September 2014 di Dewan Raya Kampung Pok, Tanjung Kupang bagi memberi ruang kepada orang awam yang berminat untuk terlibat dalam sesi dialog ini. Orang awam diberi peluang untuk menyuarakan pandangan dan memohon penjelasan yang diragui atau isu yang menjadi kebimbangan mereka. Selain itu, dua Sesi Perbincangan Kumpulan Sasaran (FGD) telah diadakan sebelum Dialog Umum dengan penglibatan pemimpin tempatan dan pemaju berdekatan.

Jadual RE11.1
Agihan Responden Mengikut Komponen dan Kediaman di Sekitar Kawasan Projek

Kawasan Persampelan	Jangkaan Populasi*	Jangkaan Bilangan Keluarga	Saiz Sampel		
			Awam	Nelayan	Keseluruhan
Kampung Tiram Duku	1,100	220	8	2	10
Kampung Pekajang Bengkok	1,600	320	6	2	8
Kampung Pekajang Lurus	700	140	8	-	8
Kampung Pok Besar	1,200	240	14	1	15
Kampung Pok Kechil	600	120	15	-	15
Kampng Tanjung Kupang	400	80	16	6	22
Kampung Tanjung Adang	400	80	19	4	23
Kampung Ladang/Pendas	1,100	220	12	8	20
Kampung Pendas Baru	600	120	2	6	8
Kampung Paya Mengkuang	300	60	12	-	12
Kampung Bukit Kucing	400	80	14	-	14
Sub-Total	8,400	1,680	126	29	155
Kampung Sungai Dinar**	1,000	200	17	8	25
Total	**9,400**	**1,880**	**143**	**37**	**180**

*Sumber: Penghulu Gelang Patah/Tanjung Kupang
** Dalam kawasan mukim Serkat, Pontian

11.3 Penemuan

Profil responden atau komuniti sangat diperlukan bagi melihat jenis populasi lazim di kawasan kajian. Profil ini adalah pelengkap masyarakat bagi menentukan corak tindak balas, impak dan darjah penerimaan terhadap sesuatu projek. Analisis data daripada tinjauan soal selidik menunjukkan profil komuniti seperti demografi, ciri sosial dan ekonomi .

Tinjauan yang dijalankan telah berjaya mendapatkan 64.4% sasaran responden umum iaitu ketua keluarga dan selebihnya 35.6% daripada pasangan responden, anak atau kawan apabila ketua keluarga tiada di rumah. Namun bagi nelayan, 97.3% telah berjaya ditemubual dan baki 2.7% terdiri daripada anak pemilik. Kawasan kajian didominasi oleh orang Melayu, justeru kebanyakan responden ialah orang Melayu dan responden berbangsa Cina kurang daripada 1%.

Secara ekonomi, terdapat dua kategori pekerjaan iaitu pekerja sektor swasta dan usahawan merupakan pekerjaan utama bagi orang awam dengan pengecualian pekerjaan nelayan. Secara umum, latar belakang ekonomi responden seperti di dalam *Jadual RE11.2*.

Latar Belakang Ekonomi Responden	Awam	Nelayan	Keseluruhan
Pekerjaan:			
Nelayan	0.0	100.0	20.6
Pekerja sektor awam	6.3	0.0	5.0
Pekerja sektor swasta	37.8	0.0	30.0
Usahawan	14.0	0.0	12.2
Lain-lain	19.6	0.0	15.6
Tidak bekerja	21.0	0.0	16.6
Jumlah	**100.0**	**100.0**	**100.0**

Jadual RE11.2 *Profil Ekonomi Responden*

11.3.1 Pandangan Terhadap Projek Cadangan

Analisis responden menunjukkan kadar persetujuan di kalangan penduduk tempatan, orang awam dan nelayan bahawa Projek ini memberikan peningkatan kepada kemudahan asas, peningkatan nilai hartanah dan taraf hidup. Sementara itu, peningkatan peluang perniagaan agak signifikan kepada orang awam tetapi tidak kepada nelayan. Walau bagaimanapun, orang awam tidak bersetuju dengan peningkatan peluang pekerjaan kerana ia dilihat sebagai biasa datang bersama Projek baru. Para nelayan juga tidak melihat pembangunan akan meningkatkan peluang pemilikan hartanah buat mereka.

Pandangan	Awam	Nelayan	Keseluruhan
Kebaikan:			
Peluang pekerjaan kepada ahli keluarga	30.8	24.3	29.4
Peluang pekerjaan kepada penduduk tempatan	57.3	40.5	53.9
Peningkatan kemudahan asas	89.4	81.1	80.6
Peningkatan nilai tanah/hartanah	88.1	89.2	88.3
Peningkatan taraf hidup	81.1	83.8	81.7
Peningkatan peluang perniagaan	60.8	48.6	58.3
Peningkatan peluang pemilikan hartanah	30.8	21.6	28.9
Keburukan:			
Kehilangan pekerjaan	11.2	21.6	13.3
Kehilangan sumber pendapatan	10.5	43.2	17.2
Pengurangan kawasan mencari ikan	79.7	94.6	82.8
Berpindah	2.1	0.0	1.7
Kehilangan hartanah	9.8	18.9	11.7
Keterpinggiran penduduk sedia ada	48.3	75.7	53.9

Jadual RE11.3 *Tahap Persepsi Kebaikan dan Keburukan Sosio-ekonomi bagi Projek Cadangan (Peratus Mengatakan Ya)*

Daripada sudut yang positif, kebanyakan responden merasakan banyak peluang komersil dan penyewaan rumah akan terbuka bagi memenuhi keperluan pertumbuhan penduduk, untuk memulakan dan menyokong pembangunan ekonomi tempatan. Kawasan ini juga akan mengalami pembangunan pesat. Bagi pandangan yang tidak pasti, responden meragui kerana tidak mampu meramal apa yang akan berlaku kerana tiada pendedahan sebelum ini kepada mereka.

11.3.2 Penilaian Projek dan Penerimaan Setempat

Analisis data penilaian responden bagi Projek ini menunjukkan pandangan yang terpisah, kebanyakan beranggapan bahawa Projek memberi banyak kelebihan adalah di kalangan orang awam manakala anggapan Projek mendatangkan banyak keburukan datang daripada nelayan. Walau bagaimanapun, lebih daripada dua pertiga orang awam bersetuju dengan pelaksanaan Projek ini. Secara keseluruhan, lebih daripada separuh responden bersetuju untuk melaksanakan Projek manakala 35% tidak bersetuju dan selebihnya (6.7%) tidak pasti. Antara sebab-sebab responden bersetuju dan tidak bersetuju dengan projek cadangan dinyatakan dalam jadual berikut:

Jadual RE11.4
Sebab-Sebab Responden Bersetuju dengan Projek Cadangan

Pandangan	Awam	Nelayan
Sebab Bersetuju:	n=100	n=6
Menarik kehadiran orang luar dan meningkatkan nilai hartanah	29	16.7
Untuk perkembangan dan pembangunan	23	16.7
Peluang pekerjaan dan Infrastruktur yang lebih baik	17	0.0
Meningkatkan peluang perniagaan kepada penduduk setempat	13	50.0
Kebaikan buat generasi akan datang	7	16.6
Tiada pilihan, projek sedang dijalankan	11	0.0
Jumlah	**100.0**	**100.0**
Sebab Tidak Bersetuju:	n=35	n=28
Keterpinggiran penduduk tempatan dan kemasukan orang luar	14.3	0.0
Kebimbangan pencemaran air laut	42.9	14.3
Masalah alam sekitar dan kesan kepada bakau	11.4	10.7
Pendapatan dan kehidupan nelayan akan terjejas	5.7	32.1
Kawasan menangkap ikan akan mengecil	11.4	14.3
Gangguan kepada laluan penangkap ikan tempatan	14.3	28.6
Jumlah	**100.0**	**100.0**

Jadual RE11.4 *(samb.)*

Pandangan	Awam	Nelayan
Sebab Lain:	n=87	n=23
Pertambahan habuk di sepanjang laluan projek, perlukan pemantauan.	36.8	21.7
Ancaman keselamatan akibat pergerakan kenderaan berat pembinaan	18.5	13.0
Pendapatan nelayan terjejas, perlu bayaran pampasan	8.0	8.7
Rundingan tentang kawasan penambakan perlu dibuat kepada penduduk tempatan dan nelayan	8.0	8.7
Berdekatan dengan tempat penangkapan ikan	8.0	21.7
Bot tunda dan lain-lain mengancam keselamatan nelayan dan kerosakan kepada pengendali perikanan	12.7	8.7
Gangguan kepada musim mengawan hidupan laut	8.0	17.5
Jumlah	**100.0**	**100.0**

11.3.3 Pandangan daripada Dialog Umum

Dialog umum diadakan untuk menyediakan platform bagi individu yang tidak terlibat dalam tinjauan sosial untuk menyuarakan rungutan, pandangan dan cadangan terhadap Projek cadangan. Secara umum, didapati kehadiran peserta ke sesi Dialog Umum adalah bercampur dengan bukan penduduk tempatan di mana segelintir daripadanya datang dari Kuala Lumpur. Beberapa individu yang pernah hadir semasa sesi Dialog Umum KPTC di Pengerang 2013 dilihat hadir bagi sesi Dialog Umum ini. Penduduk tempatan melayu dilihat kurang menyerlah di khalayak ramai.

Perhatian utama yang diutarakan tentang Projek diringkaskan seperti berikut:

a) Aspek perancangan Projek,
b) Komponen pembangunan dan utiliti,
c) Kemasukan orang asing, dan
d) Manfaat yang diterima penduduk.

Walaubagaimanapun, terdapat beberapa isu yang disuarakan dan menyentuh kebimbangan masyarakat dalam dialog tersebut. Ringkasan isu yang disuarakan adalah seperti berikut:

a) Penduduk tempatan dipinggirkan dalam pembangunan serta kemasukan warga asing.
b) Terpaksa menerima hakikat kawasan penangkapan ikan ditambak menjadi pulau dan isu pampasan,.
c) Pemerolehan tanah untuk membuat laluan penghubung antara kawasan.

11.4 Kesihatan Orang Awam Sedia Ada

Kebanyakan isi rumah mendapat bekalan air minuman yang selamat. Johor mempunyai kebersihan tandas yang terbaik bagi kawasan luar bandar dan bandar. Data ini menunjukkan usaha kuat kerajaan dalam mengurangkan dan mengawal makanan dan sumber air daripada tercemar di dalam negeri.

Kawasan kajian adalah bebas daripada taun, difteria, leptospirosis, malaria, demam campak, *melioidosis*, influenza A, akut poliomyelitis, tifus and *viral encephalitis*. Justeru, penyakit seperti STD, demam denggi, penyakit tangan kaki dan mulut dan batuk kering merupakan penyakit komunikasi yang perlu diberi perhatian dan langkah kawalan yang sesuai.

11.5 Kesimpulan

Profil sosial bagi komuniti sedia ada di kawasan kajian boleh dikelaskan kepada populasi generasi muda yang mempunyai latar belakang pendidikan, kebanyakan pekerja bergaji, ahli perniagaan dan nelayan. Majoriti penduduk tepatan telah menetap di kawasan ini lebih daripada 30 tahun. Hanya 40% yang mengetahui tentang Projek ini tetapi melihat Projek ini tidak memberikan keuntungan ekonomi kepada mereka serta Projek ini boleh mencemarkan sumber air dan mengurangkan pendapatan akibat pengecilan kawasan penangkapan ikan. Kebergantungan kepada sumber perikanan sebagai sumber hidup, maka tidak mengejutkan apabila responden nelayan tidak bersetuju sebanyak 75.7% untuk Projek cadangan ini.

12.0 Kawalan Hakisan dan Enapan

Hakisan tanah dan enapan adalah perkara kritikal dalam impak alam sekitar yang timbul daripada Projek baru, terutama yang berdekatan dengan jasad air. Hakisan tanah adalah proses permukaan tanah yang semakin merosot disebabkan oleh air, angin atau graviti. Enapan pula merupakan pemendapan zarah-zarah partikel yang terhakis atau tertanggal daripada puncanya (permukaan tanah) dan dibawa mengikut aliran air (larian permukaan).

12.1 Pelan Kawalan Hakisan dan Enapan (ESCP)

Pelan Kawalan Hakisan dan Enapan (ESCP) dicadangkan dengan berpandukan kepada Manual Pengurusan Tadahan Hujan Bandaran (2000). ESCP ini akan dibaca bersama dengan pelan kejuruteraan atau panduan bertulis di tapak Projek.

12.2 Langkah Kawalan ESCP

Pagar halangan akan dipasang seperti yang ditunjukkan di dalam pelan mengikut budi bicara Jurutera Pemantau untuk memastikan kawalan trafik dan mengambil tindakan terhadap gangguan ke atas Projek.

Tanah akan dipindahkan dalam turutan yang sama seperti pemindahan daripada dasar. Ini penting bagi semua subtanah yang ditanam dan tanah atas kekal pada permukaan sejurus selepas Projek siap.

Semua kerja perataan tanah, termasuk laluan air, perparitan dan alur limpah akan dibina dengan stabil bagi menghadapi musim ribut petir. Semasa cuaca berangin, kawasan yang besar dan tidak dilindungi perlu kekal lembap (tidak basah) dengan menggunakan semburan air dan habuk dipastikan dibawah kawalan.

12.3 Rekabentuk Pagar Enapan

Pagar enapan akan dipasang bagi menahan sedimen kasar (termasuk sejumlah butiran halus) berdekatan dengan puncanya. Pagar di kawasan tadahan tidak melebihi 0.4 hektar, panjang tidak melebihi 30 m atau jumlah pengaliran keluar tidak melebihi 50L/s untuk setahun ARI. Pagar juga akan baki kedalaman (bagi zon penentuan dan zon tetap) sekurang-kurangnya 0.6 m dan dimensi dalaman menyediakan luas permukaan maksimum bagi membolehkan sedimen termendap.

12.4 Rekabentuk Besen Sedimen

Besen sedimen akan dibina berdasarkan panduan yang telah disediakan oleh Manual Pengurusan Tadahan Air Bandaran, rujukan kepada perkara rekabentuk 3 bulan ARI. Sedimen yang dikumpul akan dikelompokkan sebelum dibuang.

12.5 Pemeriksaan dan Penyelenggaraan Tapak

Program audit sendiri akan dilaksanakan untuk mengekalkan pengukuran di kawasan terlibat seperti yang diharapkan. Pemeriksaan tapak perlu dilakukan sekurang-kurangnya seminggu sekali sebelum tapak ditutup akibat hujan lebat.

12.6 Keseluruhan ESCP

Memandangkan kecerunan pada tapak sedia ada adalah lembut kerana baru ditambak, kuantiti kehilangan tanah akibat hakisan dan enapan sangat kecil dan boleh dikawal dengan pelaksanaan ESCP.

Tanah pada tapak sedia ada selalunya terdiri daripada pasir kasar (tanah yang ditambak) dengan kebolehtelapan air yang tinggi; oleh itu, hakisan tanah akan berkurang dengan banyak kerana sebahagian besar air hujan masuk ke dalam tanah berbanding yang mengalir pada permukaan tanah (punca utama hakisan)

13.0 Potensi Impak dan Langkah Kawalan bagi Persekitaran Fizikal dan Biologi

Ringkasan potensi impak dan langkah kawalan bagi persekitaran fizikal dan biologi ditunujukkan di dalam *Jadual 13.1*.

14.0 Potensi Impak dan Langkah Kawalan bagi Persekitaran Manusia

14.1 Projek Aktiviti

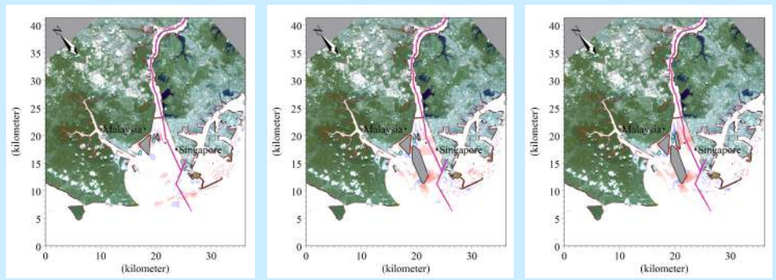
Aktiviti Projek dibincangan dalam bahagian ini meliputi pra-penambakan, pengerukan, kerja penambakan dan pembangunan atas tapak. Walaubagaimanapun, perbincangan impak dibuat daripada pelbagai sudut yang berkaitan dengan pembinaan iaitu sebelum pembinaan dan semasa pembinaan. Potensi impak sosio-ekonomi turut dinyatakan terutama terhadap nelayan dan kawasan penangkapan ikan, kontraktor Projek, tekanan buruh daripada sudut tuntutan ekonomi dan lain-lain serta impak sosio-budaya dan keselamatan.

14.2 Fasa Pra-Pembinaan

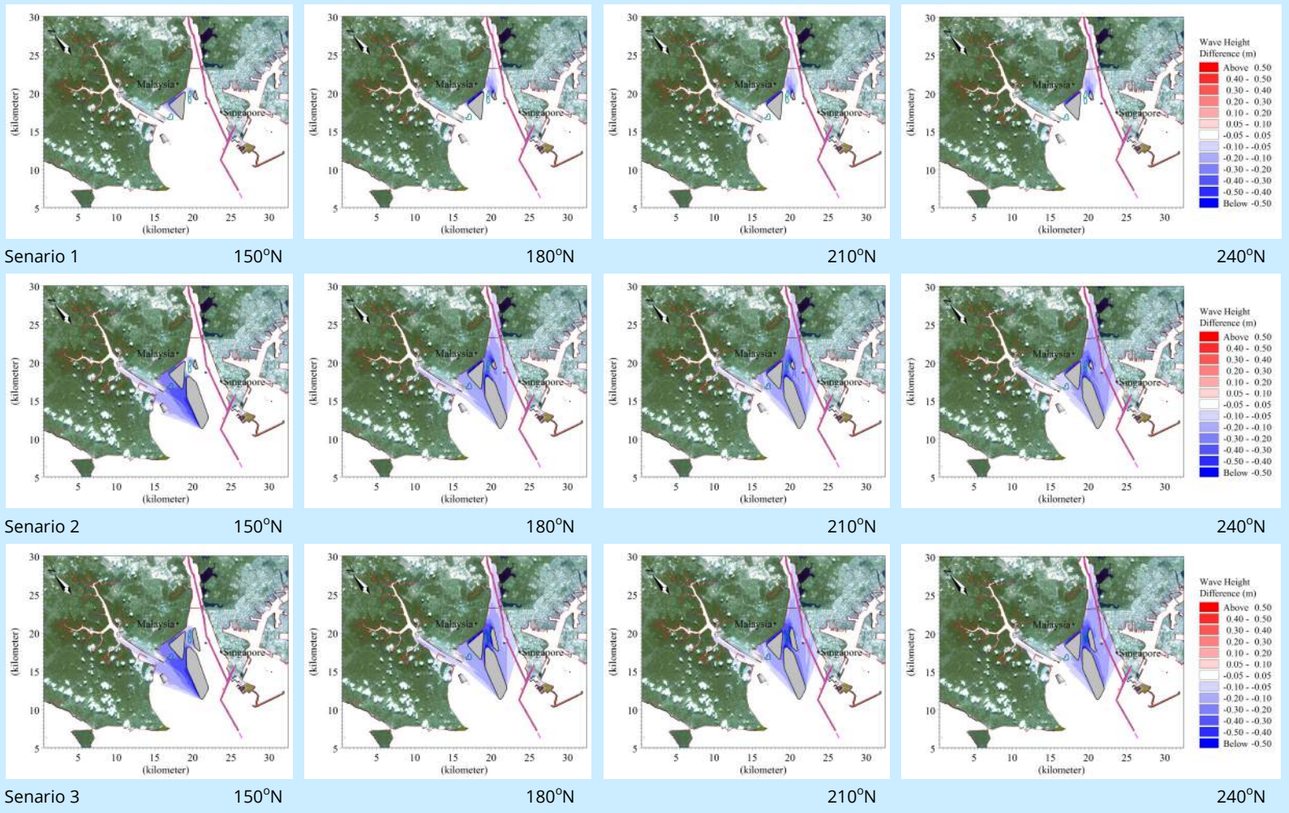
14.2.1 Potensi Impak di Lokasi Tapak

Sebahagian besar Projek cadangan akan dibangunkan dalam perairan di bawah Unit Pengurusan 3-9 (MU 3-9) dalam Pelan Pengurusan Persisiran Pantai bagi Iskandar Malaysia. Ia menyatakan bahawa Pulau Merambong dan hamparan rumput laut beting Merambong perlu dipelihara. Projek cadangan secara lumrah adalah pembangunan berimpak tinggi dengan kepadatan komponen komersil dan perumahan dalam pelan pembangunan. Meskipun pelbagai langkah kawalan boleh disediakan bagi mengurangkan kesan kemusnahannya, taraf kawasan perlindungan tersebut perlu dipinda.

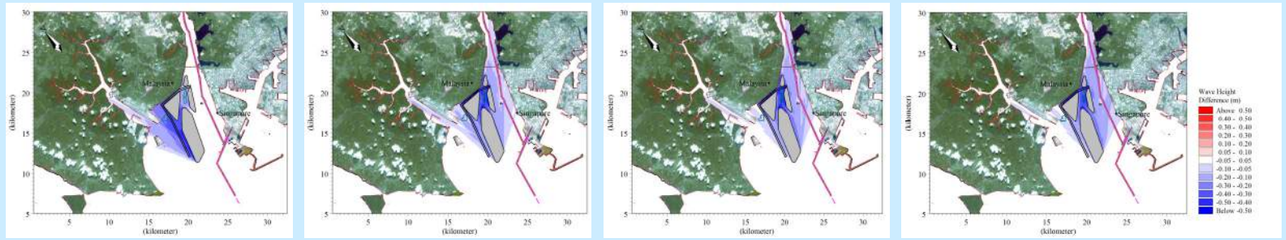
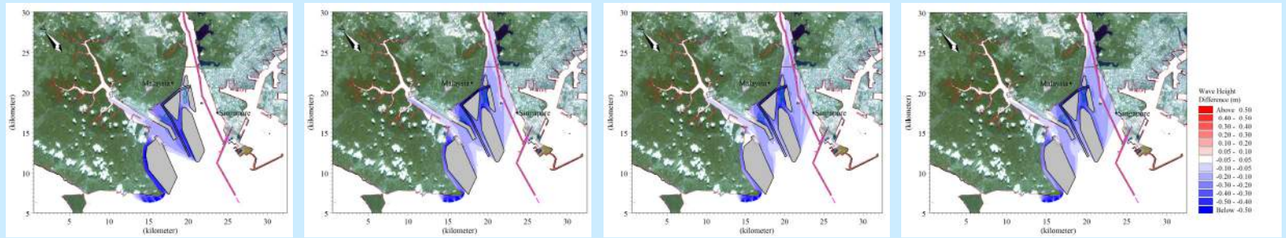
Jadual RE13.1
Ringkasan Impak Alam Sekitar berdasarkan Aktiviti Projek

Komponen Alam Sekitar	Aktiviti Projek	Potensi Impak	Langkah Kawalan
Hidraulik dan Hidrologi	**<u>Penambakan dan Pengerukan</u>** **Penambakan** Luas: 4,012.5 ekar Isipadu Bahan Isian: 161,891,980 m^3 Fasa: 4 Tempoh: 23 tahun **Pengerukan** Kedalaman: 3 m bawah CD Lebar: 200 m Panjang: 11,900 m Isipadu: 7,500,000 m^3 Kadar Kerukan: 16,000 m^3/hari Cerun: 1V:3H	**<u>Arus</u>** ▪ Pengurangan arus min dan maksimum sebanyak 12 dan 7% di Beting Merambong bagi keadaan siap penambakan berserta kehadiran pembangunan komited yang lain. ▪ Kelajuan arus min dan maksimum di Beting Tanjung Adang adalah 0.1 dan 0.3 m/s masing-masing. Perubahan kelajuan arus kurang daripada 5 dan 21% masing-masing bagi keadaan siap penambakan berserta kehadiran pembangunan komited yang lain. ▪ Kelajuan arus min dan maksimum di Pulau Merambong masing-masing kurang daripada 0.3 dan 0.8 m/s. Perubahan kelajuan arus masing-masing kurang daripada 7 dan 9% bagi keadaan siap penambakan berserta kehadiran pembangunan komited yang lain. Ini menunjukkan peningkatan aliran arus dengan adanya pembangunan komited yang lain. ▪ Kelajuan min dan maksimum masing-masing kurang daripada 5 dan 10% di Jambatan Link Kedua bagi keadaan siap penambakan berserta kehadiran pembangunan komited yang lain. ▪ Kelajuan arus min dan maksimum masing-masing adalah 0.2 dan 0.6 m/s di Tuas. Perubahan kelajuan arus bagi keadaan siap penambakan berserta kehadiran pembangunan komited yang lain adalah kurang daripada 3% untuk arus min dan kurang daripada 7% untuk arus maksimum. ▪ Kelajuan arus min dan maksimum masing-masing adalah 0.25 dan 0.6 m/s berdekatan dermaga-dermaga PTP. Perubahan kelajuan arus masing-masing adalah hampir 13% dan 68% dengan adanya Projek serta pembangunan komited yang lain. Perubahan Kelajuan Maksimum  Senario 1 Senario 2 Senario 3 Senario 4 Senario 5	Tiada langkah kawalan diperlukan.

Jadual RE13.1 *(samb.)*

Komponen Alam Sekitar	Aktiviti Projek	Potensi Impak	Langkah Kawalan
Hidraulik dan Hidrologi	**Penambakan dan Pengerukan**	**Ombak** ▪ Secara keseluruhan, ketinggian ombak berkurang dengan adanya pulau yang ditambak berdasarkan perambatan ombak yang berlaku terhadap air tenang di setiap darjah. ▪ Pesisiran pantai Tanjung Adang terlebih dahulu mengalami penurunan ketinggian ombak dengan adanya pulau buatan tersebut. ▪ Ketinggian ombak setempat berkurang kepada 0.6 m berlaku di sepanjang persisiran pantai berhampiran bahagian darat Pulau 1, 3 dan 4 serta Sungai Pok Besar pada perambatan ombak 180 dan 210°N. ▪ Tanjung Piai dan kawasan sensitif alam sekitar yang lain tidak dipengaruhi oleh perubahan ketinggian ombak pada keadaan penambakan penuh.  Senario 1 150°N 180°N 210°N 240°N Senario 2 150°N 180°N 210°N 240°N Senario 3 150°N 180°N 210°N 240°N	Tiada langkah kawalan diperlukan.

Jadual RE13.1 *(samb.)*

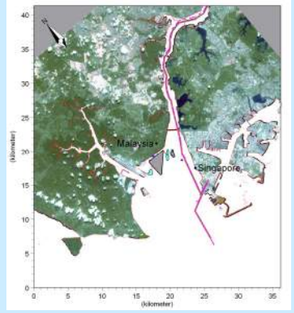
Komponen Alam Sekitar	Aktiviti Projek	Potensi Impak	Langkah Kawalan
Hidraulik dan Hidrologi	Penambakan dan Pengerukan	**<u>Ombak</u>** *(samb.)*  Senario 4 150°N 180°N 210°N 240°N  Senario 5 150°N 180°N 210°N 240°N	

Jadual RE13.1 *(samb.)*

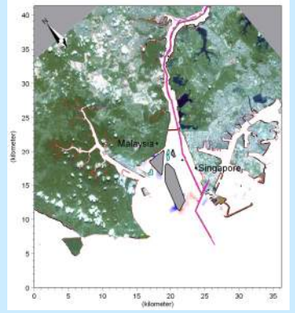
Komponen Alam Sekitar	Aktiviti Projek	Potensi Impak	Langkah Kawalan
Hidraulik dan Hidrologi	**Penambakan dan Pengerukan**	**Enapan dan Hakisan** Kadar Purata Enapan di ESA	**Hakisan:** ▪ Pihak Penggerak Projek mestilah mengawal hakisan pantai yang disebabkan oleh pembangunan tersebut. ▪ Rawatan perimeter di kawasan projek hendaklah direka sebaiknya dengan mengambil kira potensi hakisan. ▪ Jenis dan tahap perlindungan serta kesan kapal haruslah diambil kira semasa perekaan kejuruteraan, ▪ Pemantauan adalah digalakkan untuk memastikan kerja-kerja kawalan dilakukan dengan betul. ▪ Pendekatan kolektif disarankan untuk membahagikan kos kerja-kerja kawalan hakisan yang disebabkan oleh pembangunan ini dan juga pembangunan lain sepanjang Barat Selat Johor. **Pemendapan:** ▪ Pihak Penggerak Projek mestilah melaksanakan pengerukan penyelenggaraan secara berkala pada setiap 3 ke 5 tahun di kawasan perairan pembangunan yang mengalami pemendapan untuk memastikan pengaliran air yang baik. ▪ Pemantauan adalah digalakkan untuk memastikan kerja-kerja kawalan dilakukan dengan betul. ▪ Pendekatan kolektif disarankan untuk membahagikan kos kerja-kerja kawalan hakisan yang disebabkan oleh pembangunan ini dan juga pembangunan lain sepanjang Barat Selat Johor.

Titik	Lokasi	Kadar Enapan Purata (m/tahun)				
		Senario 1	Senario 2	Senario 3	Senario 4	Senario 5
SA	Bakau di Sungai Mandai Kechil	0	0	0	0	-0.1
SC	Sungei Buloh Wetland	0	0	0	0	0.1
SD	Akuakultur di Lim Chu Kang	0	0	0	0	0
ME	Akuakultur Sungai Melayu	0	0	0	0	0.3
MF	Bakau di Sungai Melayu	0	0	0	0	-0.4
MO	Bakau Tanjung Kupang	0	0	0	0.1	0.1
MR	Beting Tanjung Adang	0	0	0	0	0.2
MT	Habitat Burung Tanjung Piai	0	0	0	0	-1.3

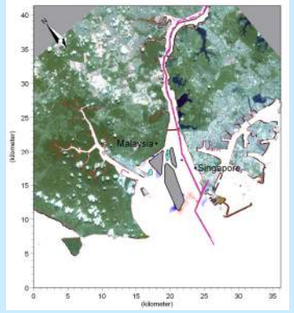
Jangkaan perubahan tahunan dasar laut



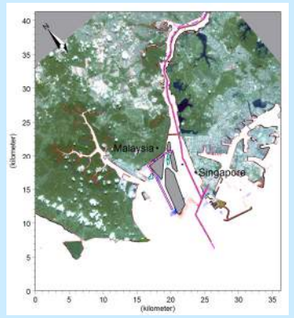
Senario 1



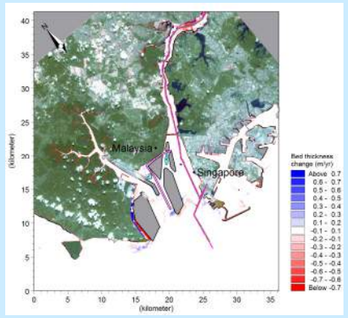
Senario 2



Senario 3

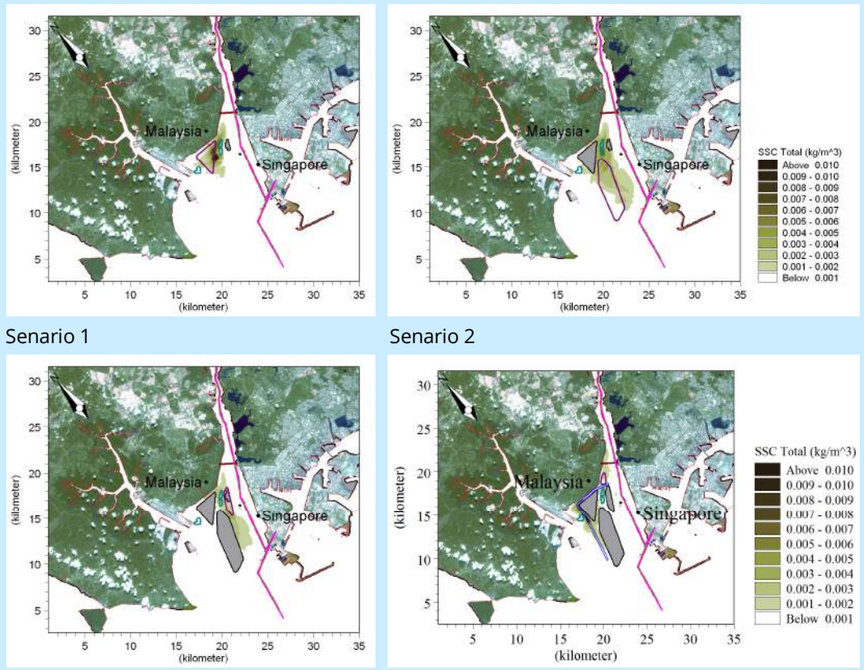
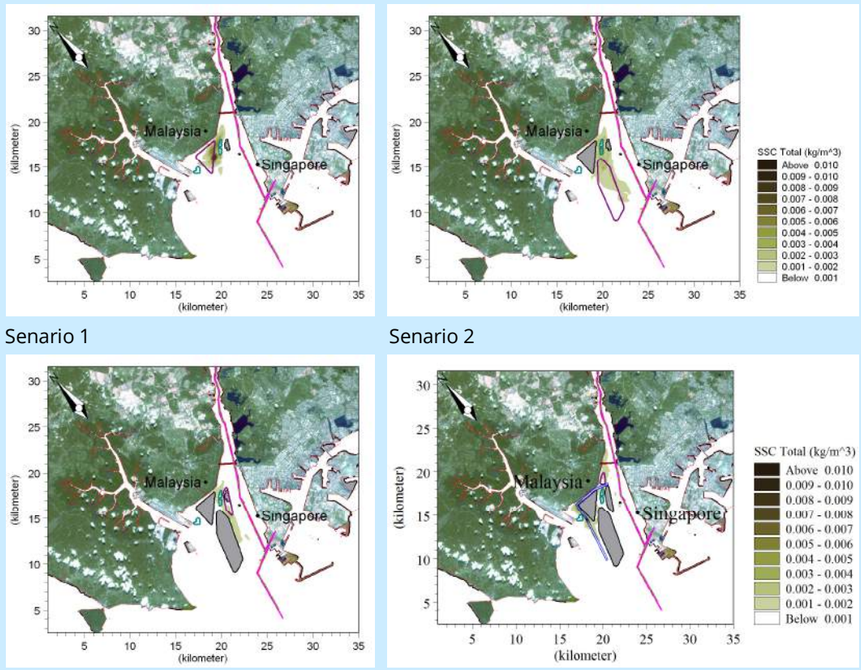


Senario 4



Senario 5

Jadual RE13.1 *(samb.)*

Komponen Alam Sekitar	Aktiviti Projek	Potensi Impak	Langkah Kawalan
Hidraulik dan Hidrologi	**Penambakan dan Pengerukan**	**Serakan Sedimen** ▪ Serakan sedimen terampai dalam air di sekitar kawasan Projek menyebabkan paras kekeruhan air dan kepekatan TSS menjadi tinggi. ▪ Dalam keadaan senario terburuk, kepekatan sedimen terampai melebihi 5 mg/L masing-masing diserakkan sehingga 6.0 km dan 1.8 km Kepekatan lebihan maksimum tanpa tirai kelodak  Senario 1 Senario 2 Senario 3 Senario 4	▪ Tirai kelodak haruslah digunakan untuk mengawal atau mengalihkan aliran sedimen terampai mendekati kawasan sensitif alam sekitar. ▪ Ia mestilah diletakkan pada jarak yang jauh untuk membolehkan pemendapan sedimen terampai berlaku. ▪ Penggunaan tirai kelodak mungkin tidak sesuai di kawasan aliran arus yang tinggi. Langkah kawalan yang boleh diambil adalah kerja-kerja pembinaan diberhentikan sementara waktu semasa aliran arus yang tinggi sewaktu air pasang perbani. Maximum excess concentration for contained condition (with silt curtain)  Senario 1 Senario 2 Senario 3 Senario 4
Aras Air dan Banjir	**Penambakan dan Pengerukan**	Paras ketinggian air tidak berubah selepas penambakan penuh. Oleh itu, tiada kesan aliran air paya di sungai-sungai berhampiran kawasan projek.	Tiada langkah kawalan.

Jadual RE13.1 *(samb.)*

Komponen Alam Sekitar	Aktiviti Projek	Potensi Impak	Langkah Kawalan
Kualiti Air	**Penambakan dan Pengerukan**	▪ Pengampaian bahan tercemar dapat dilihat dalam sedimen di turus air. ▪ Minyak dan gris dari kapal-kapal mungkin tertumpah ke dalam laut. ▪ Sisa dari kapal-kapal tidak dikendalikan dengan betul.	▪ Tongkang haruslah dikendalikan dengan cara yang betul untuk mengelakkan tumpahan pasir ke laut. ▪ Lebihan muatan adalah dilarang. ▪ Kapal-kapal yang digunakan semasa mengangkut pasir mestilah diselenggara dan berfungsi dengan baik.
	Pengangkutan Bahan Tambakan Sumber: Beting Ramunia Jenis: Pasir Isipadu: 161,891,980 m^3 Kapal: Tongkang Tali Sawat (3 unit) Masa berlayar: 10-15 jam	Tumpahan pasir ke laut sepanjang perjalanan ke tapak Projek.	
	Pengangkutan Bahan Kerukan Tapak pelupusan: Tanjung Balau Jenis: Campuran batu syal, pasir dan tanah liat Tanah liat: 7,500,000 m^3	Komuniti bentik akan dilitupi di tapak pelupusan.	▪ Pergerakan kapal korek ke tapak pelupusan mestilah dipantau sepanjang masa menggunakan DDMS dan VTMS. ▪ Garis panduan yang disarankan oleh JAS semasa di tapak pelupusan dan cara-cara pelupusan mestilah dipatuhi.
	Selepas Penambakan Pembinaan di atas kawasan tambakan	▪ Pengeluaran sisa dari kem pekerja. ▪ Sisa kumbahan dan *sullage* yang dihasilkan oleh pekerja binaan. ▪ Sisa pembinaan yang dihasilkan adalah sangat banyak.	▪ Menyediakan tandas bergerak yang mencukupi di kem pekerja. ▪ Semua tandas bergerak dan unit rawatan yang disediakan mestilah mematuhi spesifikasi yang ditetapkan oleh Kementerian Kesihatan dan SPAN. ▪ Sisa buangan yang dilepaskan ke alam sekitar mestilah memenuhi kriteria dari Environmental Quality (Sewage) Regulation 2009 (EQ(S)R, 2009). ▪ Tong sampah bertutup yang mencukupi hendaklah disediakan di tempat yang sesuai. ▪ Pembakaran sampah secara terbuka adalah dilarang.
	Operasi	**Permodelan Kualiti Air** ▪ Perubahan kualiti air adalah serupa untuk Senario 2 hingga 5 dan untuk Senario 6 dan 7. ▪ Senario 2 hingga 5 menunjukkan penurunan paras DO dan peningkatan paras BOD, nitrat, fosfat, kepekatan ammonia yang berlaku adalah setempat di sekitar kawasan Projek. ▪ Kepekatan koliform tinja adalah tinggi di muara sungai. ▪ Perubahan yang disebabkan oleh operasi loji kumbahan dan pelepasan air hujan peristiwa 10-tahun adalah kecil. Impaknya adalah setempat di kawasan alur limpah loji kumbahan. ▪ Impak bagi punca tidak setempat adalah tidak ketara kerana kepekatan DO dan BOD yang dilepaskan adalah pada tahap yang sama dengan keadaan perairan sekitar. Manakala kepekatan nitrat, ammonia dan fosfat telah dicairkan oleh perairan sekitar akibat percampuran dengan perairan yang dalam dan luas di kawasan masuk selat. ▪ Punca utama perubahan bagi setiap parameter adalah disebabkan pembangunan lain di kawasan barat Selat Johor.	▪ Satu peringkat penambahbaikan efluen hendaklah disediakan di loji kumbahan agar kualiti air di kawasan persekitaran Projek tidak tercemar biarpun efluen telah dirawat mengikut Standard A. Peringkat penambahbaikan menggunakan medium yang membiakkan penitrit dapat membantu mengurangkan kandungan fosfat kerana biofilem yang terbentuk akan mempunyai lapisan aerobik dan anoksia. ▪ Loji kumbahan perlu dipantau dengan kerap bagi memastikan ia berfungsi secara optimum dan dapat mengurangkan kos operasi. Pemantauan kepekatan MLSS perlu dilakukan setiap bulan bagi enam bulan pertama atau sehingga sistem telah stabil.

Jadual RE13.1 *(samb.)*

Komponen Alam Sekitar	Aktiviti Projek	Potensi Impak	Langkah Kawalan
Trafik Marin dan Keselamatan Pelayaran	**Penambakan dan Pengerukan**	▪ Kadar hakisan pada 0.3 m/tahun dijangka berlaku di alur pelayaran PTP. Ini membantu mendalamkan alur PTP seterusnya mengurangkan keperluan kerja pengerukan penyelenggaraan. would probably occur within the PTP navigation channel. ▪ Pulau 2 yang ditambak memasuki kawasan labuhan yang sibuk. Ini akan mengganggu pergerakan kapal-kapal lain. ▪ Penambakan dan pengerukan boleh mengganggu alatan bantu pelayaran sedia ada.	▪ Penggerak Projek perlu mengemukakan dokumen yang berkenaan serta Prosedur Operasi Piaiwai Projek kepada pihak berkuasa seperti Lembaga Pelabuhan Johor dan Jabatan Laut. Mesyuarat sebelum operasi perlu diadakan sekiranya berlaku kekangan/risiko navigasi. ▪ Kajian Penilaian Risiko Marin SImulasi Kapal perlu dijalankan untuk kelulusan pihak agensi berkaitan. ▪ Pematuhan kepada semua undang-undang, peraturan dan garis panduan yang telah dikeluarkan oleh pihak berkuasa marin iaitu Lembaga Pelabuhan Johor, Jabatan Laut Malaysia Wilayah Selatan. Harus dipastikan juga peraturan pelayaran antarabangsa dipatuhi ketika memasuki perairan antarabangsa. ▪ Alur pelayaran keluar dan masuk ke kawasan Projek haruslah ditanda dengan secukupnya menggunakan alat bantuan pelayaran yang bercahaya. ▪ Penggerak Projek hendaklah menyerahkan semua dokumen yang relevan berkenaan dengan SOP Projek cadangan kepada Lembaga Pelabuhan Johor dan Jabatan Laut. ▪ Semua struktur tetap ataupun mudah alih seperti saluran paip terapung dan tongkang hendaklah diterangi dengan sempurna supaya ianya mudah dilihat walaupun pada waktu siang. ▪ Sekiranya perlu, bantuan kepada pelayaran hendaklah disediakan.
	Pengangkutan Bahan Tambakan dan Bahan Kerukan	▪ Tongkang pengangkut bahan tambakan dan pengerukan akan menyebabkan pertambahan trafik marin di kawasan masuk PTP dan juga di kawasan berlabuh utama. ▪ Tahap penglihatan rendah ketika waktu malam atau cuaca buruk mampu meningkatkan risiko perlanggaran antara kapal. ▪	
	Selepas Penambakan	▪ Pulau-pulau yang baru ditambak telah mengambil ruang yang luas di kawasan barat Selat Johor. Ini menyebabkan ruang pergerakan kapal-kapal menjadi terhad. ▪ Bilangan kapal yang banyak berkongsi kawasan pelayaran yang terhad akan meningkatkan risiko berlakunya kemalangan.	
Kawasan Sensitif Alam Sekitar	**Penambakan dan Pengerukan**	**Rumput Laut** ▪ Peningkatan tahap TSS dan kekeruhan akan menganggu penembusan cahaya matahari yang kemudiannya akan menganggu proses fotosintesis. ▪ Sedimen terampai yang mendap akan mengambusi rumput laut. **Organisma Akuatik** ▪ Kawasan bertelur akan terkambus. **Bakau** ▪ Bakau adalah sensitif dengan tumpahan minyak. Minyak mampu menutupi rongga bakau dan mengakibatkan bakau kelemasan. ▪ Bakau juga sensitif terhadap elemen toksik.	▪ Pengawasan atas talian bagi kekeruhan dan kadar TSS. ▪ Pemantuan enapan di kawasan rumput laut (Beting Merambong) perlu dijalankan. ▪ Pemasangan tirai kelodak di kawasan kiritikal. ▪ Pergerakan kepulan sedimen perlu dikawal secara rapi. ▪ Program campur tangan hendaklah dilakukan dengan melibatkan Penggerak Projek, IRDA, NGO dan universiti tempatan. ▪ Pemindahan hidupan laut yang sensitif dari Beting Merambong ke hamparan rumput laut yang sesuai dan terletak berdekatan.
	Operasi	▪ Pelepasan efluen boleh menyebabkan kemasukan bahan pencemar seperti BOD dan nutrien. ▪ Nutrien berlebihan boleh menyebabkan eutrifikasi. ▪ Penurunan kualiti air akan menganggu produktiviti plankton.	▪ Pemantauan rapi ke atas prestasi loji kumbahan. Kesemua proses rawatan hendaklah dilakukan dengan efisyen supaya efluen yang dilepaskan berada di bawah had yang ditetapkan. ▪ Pembuang nutrien hendaklah dimasukkan ke dalam rekabentuk keseluruhan loji kumbahan. ▪ Air sisa daripada kawasan kediaman tidak boleh dilepaskan terus ke sistem perparitan. Sistem pengumpulan air sisa hendaklah disediakan. ▪ Penggunaan baja hendaklah dihadkan dan aktiviti pembajaan tidak boleh dilakukan ketika musim hujan. ▪ Program penyelenggaraan lanskap yang mapan dan mesra alam hendaklah disediakan.

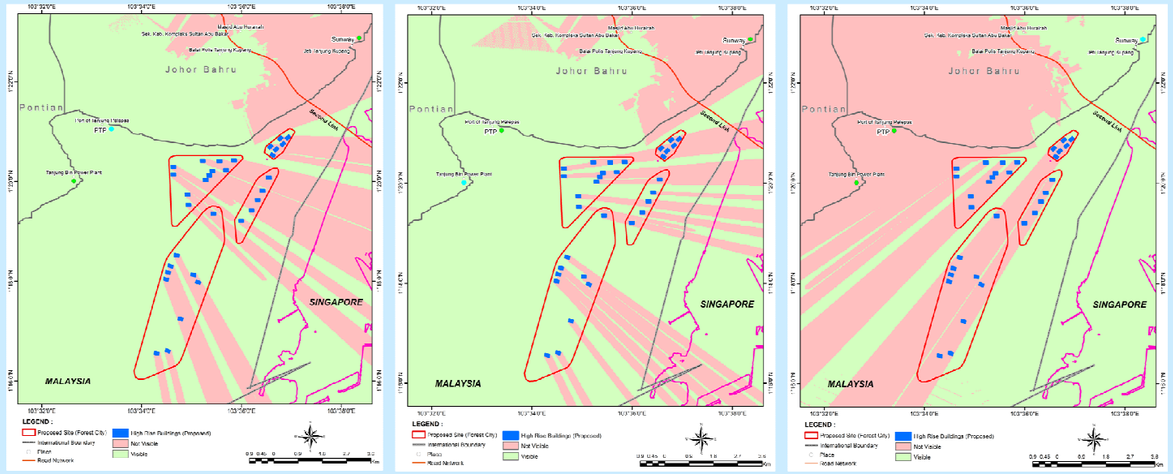
Jadual RE13.1 *(samb.)*

Komponen Alam Sekitar	Aktiviti Projek	Potensi Impak	Langkah Kawalan
Flora dan Fauna Akuatik	**<u>Penambakan dan Pengerukan</u>**	▪ Pengerukan dasar laut akan menyebabkan kehilangan kekal organisma bentik manakala penambakan akan menimbus dasar laut selama-lamanya. ▪ Tahap TSS dan kekeruhan yang tinggi akan menyebabkan hidupan laut menjadi tertekan. Cahaya matahari sukar untuk menembusi air laut yang keruh dan menyebabkan gangguan kepada kadar produktiviti primer. ▪ Suhu air yang tinggi dan pengurangan oksigen terlarut (DO) akibat tahap sedimen yang tinggi akan mengganggu kadar metabolisma kebanyakan hidupan bentik. ▪ Aktiviti pengerukan mampu menyebabkan bahan cemar dan nutrien yang terdapat di dalam sedimen tersebar.	▪ Sekiranya pencemaran air laut akibat sedimen terampai tidak dapat dielakkan, para nelayan perlulah diberitahu terlebih dahulu supaya kadar kerugian dapat dikurangkan. ▪ Kerisauan para nelayan tentang kehilangan mata pencarian perlu diambil berat. Sekiranya perlu, pampasan perlulah disediakan. Perbincangan hendaklah diadakan terlebih dahulu dengan pihak-pihak yang terlibat. ▪ Pampasan hendaklah disediakan berdasarkan keadaan-keadaan tertentu untuk menentukan bentuk dan jumlah pampasan yang selayaknya. Badan yang akan menguruskan hal pampasan seperti UPEN juga haruslah diambilkira.
	<u>Pengangkutan Bahan Tambakan dan Bahan Kerukan</u>	▪ Pelepasan atau kebocoran minyak daripada kapal mampu mencemarkan ekosistem pelagik dan bentik. ▪ Tumpahan bahan tambakan dan kerukan akan menyebabkan air laut menjadi keruh lalu mengakibatkan gangguan kepada hidupan laut.	
	<u>Operasi</u>	Pelepasan daripada kawasan pembangunan mungkin mengandungi kepekatan nutrien yang tinggi dan mampu menyebabkan eutrifikasi.	
Dataran Lumpur	**<u>Penambakan dan Pengerukan</u>** Kawasan kerukan = 259.42 ha	▪ Dataran lumpur menyokong pelbagai hidupan bentik sesil seperti polychaete dan gastropod, yang mana hidupan ini akan musnah sama sekali akibat aktiviti pengerukan. ▪ Bagaimanapun, keadaan ini adalah sementara. ▪ Dijangkakan selepas tempoh tertentu, kawasan dasar laut baru yang terdiri daripada substrat lembut akan terbentuk.	▪ Mengambil kira kesan kehilangan komuniti bentik ini adalah sementara, tiada langkah kawalan dicadangkan. Selepas satu tempoh tertentu, komuniti ini akan pulih seperti sedia kala. ▪ Kawalan kejadian ledakan alga perlu dilakukan dengan pengawasan rapi kandungan nutrien di dalam air. ▪ Pengawasan ledakan alga hendaklah dijalankan sebelum, ketika dan selepas pengerukan dijalankan. Program pemantauan juga hendaklah menggunakan pengimejan satelit yang diambil beberapa hari sebelum dan selepas kejadian. ▪ Amalan pengerukan yang baik hendaklah dijalankan di tapak Projek. ▪ Pampasan hendaklah diberikan kepada pengusaha akuakultur sekiranya aktiviti pengerukan didapati telah mengakibatkan kerugian. Walaubagaimanapun, kawasan akuakultur terletak agak jauh daripada kawasan yang bakal dikeruk. ▪ Kehilangan dataran lumpur sedia ada akibat pembangunan ini adalah kekal. Walaubagaimanapun, garis pantai baru akan terbina. Dalam tempoh masa tertentu, kehidupan marin akan bertapak semula dan burung-burung pantai dijangka akan kembali untuk mencari makanan di kawasan garis pantai yang baru terbina ini.
Fauna Darat		▪ Tiada impak yang ketara kepada fauna darat kerana Projek ini tidak meliputi kawasan hutan simpan yang telah dirizab. ▪ Burung berhijrah mungkin akan terganggu akibat kehilangan dataran lumpur.	▪ Tiada langkah kawalan yang dicadangkan bagi fauna darat kerana burung mampu untuk berpindah ke kawasan yang lebih kaya dengan hasil alam seperti Pulau Kukup.

Jadual RE13.1 *(samb.)*

Komponen Alam Sekitar	Aktiviti Projek	Potensi Impak	Langkah Kawalan
Tapak Perikanan	**Penambakan dan Pengerukan**	▪ Saiz kawasan tangkapan ikan akan berkurangan dan mengganggu aktiviti perikanan nelayan tempatan. ▪ Nelayan mengalami kerugian kerana terpaksa berpindah mencari kawasan tangkapan ikan yang lain. ▪ Peningkatan kos bahan api akan menjejaskan keuntungan daripada hasil tangkapan berkurangan.	▪ Sekiranya pencemaran air laut tidak dapat dielakkan, nelayan perlu dimaklumkan terlebih dahulu tentang apa yang berlaku bagi mnegelakkan kerugian atau kehilangan sumber pendapatan. ▪ Pihak nelayan risau keadaaan kehidupan mereka tidak dibela. Kaedah bayaran pampasan perlu diusahakan dengan pihak yang terbabit melalui wakil nelayan dan perlu dilaksanakan dengan baik. ▪ Pampasan perlu berdasarkan beberapa pertimbangan seperti tuntutan yang mutlak, jenis kepayahan yang dilalui serta tempoh gangguan. Perkara lain adalah samada pampasan dibuat secara tunai atau berupa barangan, frekuensi (sekali shaja atau secara berkala mengikut tempoh yang ditentukan), serta agensi yang akan membuat pembayaran pampasan misalnya UPEN.
Kualiti Udara	**Penambakan dan Pengerukan**	▪ Permukaan terdedah mudah dihakis pergerakan angin. ▪ Pergerakan lori dan jentera berat mampu menghasilkan masalah debu jika tidak dikawal.	▪ Tanah di kawasan yang telah dibuka hendaklah distabilkan. ▪ Dinding penghadang boleh dibina di jalan masuk yang berdekatan dengan penerima sensitif. ▪ Langkah kawalan debu seperti pancuran air mesti dilakukan dengan kerap di jalan masuk terutamanya ketika musim kering dan berangin. ▪ Palung cuci hendaklah dibina di jalan masuk. Tayar dan bahagian bawah kenderaan hendaklah selalu dibersihkan. ▪ Timbunan bahan hendaklah ditutup setiap masa.
	Selepas Penambakan	▪ Pergerakan lori dan jentera berat mampu menghasilkan masalah debu jika tidak dikawal. ▪ Timbunan bahan pembinaan seperti pasir dan simen boleh menjadi sumber pencemaran udara.	
	Operasi	Tiada impak berkenaan pencemaran udara bagi fasa ini.	
Trafik Darat		▪ Analisa menunjukkan Jalan Pendas Laut dan Jalan Tanjung Kupang mampu menampung trafik sehingga tahun 2025. ▪ Lebuhraya Tanjung Pelepas akan sampai ke tahap kapasiti pada tahun 2025. ▪ Lebuhraya Link Kedua akan sampai ke tahap kapasiti pada tahun 2045.	▪ Jalan masuk yang dicadangkan (Akses 1) akan memerlukan minimum jalan berkembar 3 lorong pada tahun 2025. ▪ Melainkan jalan masuk baru yang disambungkan terus dengan Lebuhraya Link Kedua dibina, Lebuhraya Tanjung Pelepas perlu ditambahbaik kepada tiga lorong pada tahun 2025, empat lorong pada tahun 2035 dan lima lorong pada tahun 2040. ▪ Lebuhraya Link Kedua perlu ditambahbaik menjadi empat lorong pada tahun 2045. ▪ Pelan pembangunan pengangkutan awam yang komprehensif.
Hingar	**Penambakan dan Pengerukan**	Aktiviti ini berlaku jauh daripada kawasan penduduk, jadi dijangkakan tiada impak ke atas tahap hingar.	▪ Operasi penuh kerja-kerja pembinaan hanya dibenarkan daripada 7.00 pagi ke 10.00 malam sahaja. Adalah dinasihatkan supaya hanya kerja-kerja minimal yang dijalankan ketika waktu malam dan cuti umum. ▪ Pergerakan kenderaan yang terlibat dengan kerja pembinaan hendaklah dihadkan ketika waktu malam. ▪ Generator, pam dan janakuasa hendaklah diletakkan dibelakang penghadang fizikal. ▪ Pemantauan tahap hingar hendaklah dilakukan untuk memastikan ianya tidak melebihi garis panduan yang ditetapkan oleh JAS iaitu tidak melebihi 65 dBA ketika siang dan 55 dBA ketika malam. ▪ Jentera, kelengkapan dan mesin yang digunakan hendaklah dipasang peredam bunyi yang efektif dan diselenggara dengan baik.
	Selepas Penambakan	▪ Penggunaan jentera dan mesin ketika kerja pembinaan mungkin menyebabkan pencemaran bunyi. ▪ Peningkatan trafik darat dan pergerakan kenderaan akan menjana bunyi yang menyumbang kepada peningkatan tahap hingar.	
	Operasian	Peningkatan trafik darat dan pergerakan kenderaan akan menjana bunyi yang menyumbang kepada peningkatan tahap hingar.	

Jadual RE13.1 *(samb.)*

Komponen Alam Sekitar	Aktiviti Projek	Potensi Impak	Langkah Kawalan
Pemandangan	**<u>Operasian</u>**	Kawasan yang menerima impak adalah Sunway Iskandar, PTP dan Tanjung Bin Power Plant. Pemandangan  Dari PTP Dari Tg. Bin Power Plant Dari Sunway Iskandar	

Langkah Kawalan

a) Proses bagi pindaan status zon perlindungan sepertimana Pelan Pengurusan Persisiran Pantai bagi Iskandar Malaysia di kawasan Projek cadangan perlu mendapat kebenaran pihak berkuasa bagi Iskandar Malaysia.

14.3 Fasa Pembinaan

14.3.1 Impak Potensi ke atas Buruh

Keperluan tenaga manusia adalah seramai 5,000 pekerja semasa waktu puncak aktiviti penambakan. Tenaga kerja akan merangkumi jurutera, pekerja mahir dan separa mahir. Keperluan hampir ratusan pekerja akan meningkatkan pasaran buruh tempatan atau pekerjaan. Ini akan meledakkan ekonomi tempatan dan meningkatkan kedudukan ekonomi penduduk yang rata-rata terdiri daripada golongan berpendapatan rendah.

Sekiranya, pengambilan pekerja asing secara pukal semasa fasa penambakan, maka ia akan menyebabkan hak masyarakat tempatan terancam. Namun, pertambahan peluang pekerjaan untuk penduduk tempatan, yang dianggap oleh hampir 17% penduduk tempatan, merupakan juga sebab mereka menyokong Projek ini.

Aktiviti ini juga memerlukan lantikan kontraktor dan pergerakan kenderaan dan peralatan. Ini sekali lagi menjana ekonomi dan penglibatan penduduk tempatan. Walaubagaimanapun, penduduk tempatan berdekatan perlu diberi keutamaan terlebih dahulu dalam peluang pekerjaan ini seperti yang dinyatakan dalam Dialog Umum dan Perbincangan Kumpulan Sasaran.

Langkah Kawalan

a) Peningkatan pengambilan pekerja tempatan akan menjadi efektif apabila terdapat peruntukan bagi buruh di kalangan penduduk tempatan.
b) Pengambilan buruh di kalangan penduduk tempatan yang tidak bekerja atau buruh baru ke pasaran buruh lebih menguntungkan daripada pengambilan orang yang mempunyai pekerjaan lain.
c) Proses pemilihan kontraktor dan sub-kontraktor juga perlu diberi keutamaan kepada penduduk tempatan.

14.3.2 Impak Potensi Sumber Pendapatan

Meskipun Projek ini menjamin pelbagai peluang ekonomi, namun, ia memberi ketidakselesaan kepada nelayan tempatan, terutama gangguan ke atas aktiviti seharian mereka, ancaman kepada kehidupan marin (meskipun sementara) dan merosakkan lokasi penangkapan ikan mereka. Pulau yang bakal terbentuk ini akan menyebabkan

kawasan penangkapan ikan semakin berkurang. Ini telah dinyatakan dalam hasil tinjauan terhadap golongan nelayan bahawa mereka akan kehilangan pekerjaan mereka dan sumber pendapatan turut terjejas berbanding keadaan sebelum ini.

Pengambilan 5,000 pekerja dijangka akan meningkatkan saiz populasi di kawasan kajian. Peningkatan ini akan menyebabkan pertambahan keperluan asas dan perkhidmatan.

Langkah Kawalan

a) Pemasangan tirai kelodak
b) Sempadan aktiviti penambakan dan laluan tongkang pasir perlu ditanda dengan boya.
c) Pembayaran pampasan perlu dibuat berdasarkan beberapa pertimbangan seperti kes sebenar bukan dibuat-buat, jenis ketidakielesaan dan tempoh terkesan dan lain-lain. Bagi kaedah pembayaran tuntutan, perlu mengambilkira cara bayaran (tunai atau kaedah lain), kekerapan (sekali bayar atau pada masa tertentu) dan agensi pembayaran seperti UPEN.
d) Usahasama perlu dibuat bersama penduduk tempatan.

14.3.3 Potensi Impak Keselamatan

Isu keselamatan adalah isu utama dalam setiap jenis pembinaan. Kemalangan industri boleh berlaku apabila pekerja tidak diurus dan diselia dengan baik. Keselamatan tidak tertumpu kepada kawasan pembinaan sahaja, namun di atas jalan juga. Pertambahan jumlah trafik daripada kenderaan berat dan bahan pembinaan akan menyebabkan tekanan dan berbahaya kepada trafik.

Langkah Kawalan

a) "Keselamatan Diutamakan" perlu ditekankan.
b) Pengendali kenderaan perlu bertimbangrasa dan mengamalkan pemanduan selamat sepanjang masa.
c) Tekanan kepada sistem jalanraya sedia ada boleh dikurangkan sekiranya cadangan menggunakan pengangkutan semasa sistem kelancaran trafik yang sesuai dicadangkan kepada kontraktor bagi memperkemas pergerakan.
d) Pengangkutan bahan keluar masuk daripada kawasan pembinaan perlu dibuat semasa masa bukan puncak.

14.3.4 Potensi Impak Ketenteraman dan Estetika

Panorama alam bagi pemandangan laut berhadapan dengan persisiran Tanjung Kupang akan lenyap. Namun, dalam jangka masa akan datang, pulau buatan akan menggantikan pemandangan ini. Nilai estetika dan keindahan di persisiran ini mungkin akan menarik mata yang memandang.

14.3.5 Impak Pembinaan dan Pengendalian Penempatan Pekerja

Penempatan pekerja merupakan sumber potensi kesihatan dan keselamatan serta tidak memberi kesan kepada sosiobudaya pekerja. Penginapan yang disediakan sepanjang tempoh pekerjaan akan menyebabkan kepadatan kepada penempatan bilik serta susunan keseluruhan blok penginapan yang sangat rapat.

Kemudahan penginapan dan penempatan pekerja asing daripada pelbagai negara untuk menetap di bawah bumbung yang sama atau dalam kawasan kompleks yang sama boleh mendatangkan kesan. Kehadiran ratusan pekerja asing ini dan kehadiran penduduk tempatan akan mengganggu budaya dan keseimbangan etnik di dalam kawasan tersebut, seterusnya mengubah keadaan sosial menjadi entiti kosmopolitan. Konflik fizikal akan terhasil disebabkan perbezaan budaya dan subbudaya, nilai, sikap dan tahap toleransi di kalangan etnik dan kaum yang berbeza.

Masalah lain yang timbul ialah isu sosial dan kesihatan yang disuarakan oleh satu perlima responden berhubung kemasukan pekerja asing ke kawasan mereka. Ada pandangan yang menyatakan bahawa akan berlaku peningkatan jenayah dan penyakit yang dibawa daripada negara asal seperti penyakit malaria dan batuk kering tanpa pengetahuan majikan.

Langkah Kawalan

a) Keadaan penempatan pekerja perlu sesuai dengan tahap kehidupan baik seperti ruang pengudaraan yang baik, kemudahan asas, kebersihan yang baik dan tidak terlalu padat.
b) Kesan kepada masalah sosial dan budaya boleh dikurangkan dengan memisahkan penempatan pekerja yang mempunyai latar belakang yang sama dan meletakkan mereka dalam kelompok yang berbeza latar belakang agar berlaku integrasi sosial.
c) Perkelahian etnik dan masalah sosial boleh dielakkan sekiranya kebajikan pekerja sentiasa diperhatikan, hubungan dua hala dijaga dan kefahaman budaya dan toleransi dititikberatkan.
d) Penularan wabak penyakit yang selalu berkait dengan pekerja asing boleh diatasi dengan prosedur pengambilan pekerja yang sesuai dan pemeriksaan kesihatan sebelum kebenaran kerja diberikan.

14.4 Pembangunan Tanah Tambakan Baru

14.4.1 Potensi Impak Pekerjaan

Semasa kemuncak pembangunan di tanah baru yang ditambak, tenaga buruh dijangka adalah seramai 5,000 orang. Manakala bagi fasa pengoperasian, terdapat 62,200 peluang pekerjaan akan ditawarkan. Kesan peluang pekerjaan ini kepada buruh luar mungkin berbeza mengikut jumlah yang berpindah atau tidak ke kawasan berhampiran dan bagi mereka yang membawa keluarga atau tidak.

Langkah Kawalan

Projek cadangan ini patut meletakkan nisbah penglibatan penduduk tempatan yang relevan di kawasan pembangunan ini.

14.4.2 Potensi Impak kepada Pendapatan dan Hasil

Pekerjaan yang menjamin pendapatan daripada gaji yang diperolehi memberikan ganjaran positif dan saluran sumbangan tambahan akan diberikan kepada mereka yang berbelanja di kawasan tempatan. Namun, tambahan sumbangan bergantung kepada jumlah perbelanjaan dalam negara yang dibelanjakan oleh pekerja luar sama ada keberadaan keluarga dalam negara atau tidak. Pelaburan berpusat dalam Projek cadangan signifikan kepada agensi berkaitan. Sekiranya peratusan penggunaan keperluan dan perkhidmatan (tidak termasuk buruh) dalam kawasan tempatan akan meningkatkan ekonomi tempatan. Terdapat juga yuran penilaian, cukai tanah, yuran dan royalti yang akan dibayarakan memberikan tukaran bersih bagi penguatkuasa tempatan dan memberi pulangan yang besar. Selain itu, pengendali utiliti dan kemudahan seperti bekalan air dan elektrik mendpaat manfaat daripada kadar kutipan ini.

14.4.3 Potensi Impak Kesan Penggandaan

Tenaga kerja yang sepadan (dengan bayaran setimpal) akan menggalakkan perbelanjaan barang runcit di kawasan tempatan bagi segala bentuk keperluan dan perkhidmatan. Ini boleh menjadi pelonjak ekonomi peruncitan tempatan. Projek cadangan ini perlu menyediakan komponen seperti firma kejuruteraan tempatan dan pengawasan kantin. Permintaan akan menjana pekerjaan, antara permintaan tambahan tenaga kerja yang boleh disediakan oleh Projek cadangan ialah kesihatan, pendidikan, perumahan yang akan menambah pembinaan tambahan. Impak ekonomi akan diperluas serta keuntungan akan dicapai dalam jangka masa panjang.

14.4.4 Potensi Impak Demografi, Perumahan dan Perkhidmatan Lain

Pengambilan pekerja daripada jarak pergerakan harian yang jauh dijangka akan berpindah ke kawasan pembangunan secara tetap semasa fasa pengoperasian. Sesetengah pekerja akan membawa keluarga ke dalam kawasan Projek. Pekerja asing dan keluarganya akan memberi kesan kepada persekitaran tempatan. Kehadiran mereka akan meningkatkan populasi penduduk dan mengubah struktur umur dan jantina bagi profil penduduk tempatan. Selain itu, permintaan terhadap tempat kediaman dan permintaan perkhidmatan tempatan seperti sekolah, kesihatan, kemudahan rekreasi, perkhidmatan polis dan kecemasan akan meningkat.

Langkah Kawalan

a) Sekiranya populasi meningkat, kawalan paling asas ialah menggalakkan penglibatan maksimum bagi pekerja yang menetap di luar tapak Projek. Ini akan mengurangkan bilangan pekerja dan keluarga dalam kawasan zon impak.
b) Impak kediaman penduduk boleh dikawal dengan menyediakan kediaman tambahan bagi tenaga kerja atau mengalakkan penggunaan kediaman tersedia dalam zon impak, bergantung kepada perumahan tempatan dan pasaran kediaman.

14.4.5 Potensi Impak Sosio-Kebudayaan

Saiz populasi yang dijangka dalam pulau buatan baru ialah sekitar 300,000 orang memberikan magnitud impak sosial yang sangat besar. Konflik sosial dan budaya serta pergeseran bakal berlaku sekirannya kehidupan yang harmoni diabaikan.

Langkah Kawalan

a) Integrasi masalah dan perbezaan gaya hidup boleh menyumbang kepada kegagalan dan kekecewaan. Ini boleh dielakkan sekiranya kawasan perumahan tidak tertutup dapat disediakan; peluang yang sama kepada semua yang terlibat sepanjang hari di kawasan tempatan dan zon impak.
b) Peranan pihak berkuasa dan badan pengurusan sangat penting dalam memastikan kemudahan disediakan. Perasaan kekitaan perlu dipupuk bagi menzahirkan hubungan kebersamaan.
c) Berhubung isu peminggiran kelompok tempatan, ia boleh dikawal dengan mengenalpasti golongan tempatan yang boleh diambil dan diasah bakat dan kemahiran bagi pembangunan di kawasan ini.
d) Pengasingan juga boleh diatasi dengan memastikan integrasi populasi persekitaran dengan pembangunan baru melalui pemantauan laluan yang baik, infrastruktur dan tahap perhubungan yang baik masuk atau keluar kawasan.

15.0 Impak Sisa

15.1 Pengenalan

Bahagian iani akan memperincikan tentang impak-impak sisa bagi Projek cadangan. Impak-impak sisa ialah kesan yang mungkin terhasil selepas langkah kawasan diambilkira. Ini termasuklah:

a) Penurunan kualiti air marin;
b) Gangguan kepada ekosistem sensitif;

c) Enapan dan hakisan;
d) Pertambahan trafik darat;
e) Pertambahan trafik marin;
f) Kehilangan tempat penangkapan ikan;
g) Kemasukan warga asing;
h) Impak sosio-ekonomi; dan
i) Perubahan pemandangan.

15.2 Penurunan Kualiti Air Marin

Memandangkan pembangunan cadangan dikelilingi oleh laut, pencemaran air marin boleh berlaku akibat daripada sisa pepejal, sisa kumbahan dan air sisa yang tak diurus dengan baik. Meskipun sisa kumbahan dirawat pada tahap Piawaian A, namun discas ke luar kawasan memberi kesan kepada persekitaran yang mempunyai ekosistem sensitif seperti rumput laut, karang dan bakau.

15.3 Gangguan Ekosistem Sensitif

Pembentukan empat pulau ini akan memisahkan kesalinghubungan antara rumput laut, bakau dan karang. Gangguan kepada ekosistem sensitif ini akan terganggu sekiranya terdapat pengurangan kualiti air.

15.4 Enapan dan Hakisan

Pembangunan akan memberi kesan kepada kawasan persekitaran Projek. Impak yang signifikan daripada pembangunan ini adalah perubahan aras dasar pada kawasan KSAS. Selain itu, enapan juga dijangka berlaku kepada tanah bencah Sungei Buloh dan hakisan di kawasan bakau di Sungai Melayu dengan kehadiran pemaju komited yang lain. Enapan sebanyak 0.1 m/tahun dikesan di perairan Singapura berhadapan dengan Pantai Lido (Senario 4). Namun, hakisan sehingga 0.6 m/tahun dialami oleh perairan Singapura berhadapan penambakan Lido Boulevard dengan kehadiran pembangunan komited lain (Senario 5).

15.5 Peningkatan Trafik Darat

Jumlah trafik darat akan bertambah di kawasan persekitaran berikutan pertambahan aktiviti komersil dan populasi yang menetap dalam pulau yang ditambak. Cadangan penambahbaikan jalan utama dan persimpanagan yang menghubungkan tapak Projek boleh dibuat dan ini akan mengurangkan gangguan kelancaran trafik.

15.6 Gangguan kepada Trafik Marin

Lokasi Projek pada asalnya sibuk dengan pelbagai trafik marin seperti feri, tongkang, yacht dan bot nelayan. Gangguan akan berlaku dengan pertambahan kapal yang menggunakan laluan yang sama.

15.7 Hilang Kawasan Penangkapan Ikan

Penambakan pulau boleh menyebabkan kehilangan kawasan penangkapan ikan kepada nelayan tempatan. Kawasan Projek pada asalnya adalah kawasan tradisional penangkapan ikan. Pembangunan projek ini juga dijangka akan menyebabkan impak kepada kawasan KSAS seperti padang rumput laut dan bakau yang menjadi habitat penting ikan dan hidupan laut.

15.8 Kemasukan Warga Asing

Magnitud impak sosial semakin besar dengan pertambahan orang luar. Impak akan menjadi lebih buruk sekiranya populasi orang asing bertambah. Pertambahan penduduk yang berbeza latar belakang sosial, ekonomi dan budaya akan menyebabkan konflik dan pergeseran sosial dan budaya.

15.9 Impak Sosio-ekonomi

Peluang pekerjaan yang signifikan boleh mendatangkan keuntungan kepada masyarakat tempatan sekiranya mereka diberi keutamaan berkerja. Pengambilan bekerja secara terus akan memberikan pendapatan yang diperolehi dan sekaligus meningkatkan ekonomi penduduk. Perbelanjaan keperluan runcitan dalam kawasan tempatan akan melonjakkan ekonomi peruncitan setempat. Namun, terdapat kemungkinan penduduk tempatan merasa terpinggir. Ini mungkin menjadi lebih memudaratkan sekiranya orang luar mempunyai kedudukan ekonomi yang lebih stabil berbanding penduduk tempatan di sana.

15.10 Perubahan Pemandangan

Suasana laut yang menghadap pulau tambakan akan berubah. Pemandangan di pulau tersebut ialah isu subjektif, namun dengan pembangunan yang terancang, pulau tersebut akan menawarkan panorama baru yang menarik dan pelengkap kepada pemandangan sedia ada.

16.0 Penilaian Impak Ekonomi Alam Sekitar

16.1 Penilaian Kos dan Faedah

Daripada enam komponen yang disenaraikan di dalam *Jadual RE16.1*, terdapat tiga komponen penting yang dipertimbangkan untuk penilaian. Impak yang dijangkakan boleh mengurangkan kualiti persekitaran adalah kehilangan dataran lumpur akibat penambakan, kehilangan dataran lumpur akibat pengerukan, kerosakan hamparan rumput laut, dan kehilangan kawasan tangkapan ikan. Projek ini dijangkakan akan mengurangkan kadar servis alam sekitar yang boleh diperolehi daripada kawasan yang terjejas.

16.2 Penilaian Keseluruhan

Jika didiskaun pada kadar 8%, kerugian nilai sedia ada adalah sebanyak RM116.0 juta bagi tempoh 50 tahun. Pada kadar 6%, jumlahnya adalah sebanyak RM145.6 juta manakala RM193.2 juta bagi kadar diskaun 4%. Kajian ini menjelaskan bahawa Nilai Sedia Ada tidak boleh dikira sebagai penunjuk kepada kebolehlaksanaan Projek ini. Sebaliknya, ia memberi petunjuk dalam istilah kewangan sebagai pengurangan servis alam sekitar yang berlaku akibat daripada perlaksanaan Projek cadangan.

17.0 Pelan Pengurusan Alam Sekitar

Ringkasan program pemantauan yang dicadangkan adalah seperti dalam *Jadual RE17.1*.

18.0 Kesimpulan

Secara amnya, dapat disimpulkan bahawa pembangunan ini dijangka akan memberi pelbagai kesan negatif dan positif kepada alam sekitar, keadaan sosial dan juga dari segi guna tanah. Komitmen yang besar diperlukan daripada pihak Penggerak Projek dalam melaksanakan semua langkah kawalan yang disyorkan supaya pembangunan ini bukan sahaja dapat menguntungkan pihak Penggerak Projek tetapi penduduk setempat dan negeri Johor.

Jadual RE17.1
Cadangan Program Pemantauan

Perkara	Parameter	Stesyen Pemantauan	Kekerapan Persampelan	Kriteria Kualiti Alam Sekitar	Keperluan Laporan
Kualiti Air	Suhu, kemasinan, pH, konduktiviti, kekeruhan, oksigen terlarut (DO), jumlah pepejal terampai (TSS), BOD, jumlah karbon organik (TOC), minyak & gris, Koliform najis, *E.coli, Enterococci*	Seperti *Jadual 7.11, Bab 7—Persekitaran Fizikal Sedia Ada*	Setiap bulan	Keputusan akan dibandingkan dengan paras sedia ada dan *Malaysia Marine Water Quality Criteria and Standard* (MWQCS) dan Protokol *Malaysia-Singapore Joint Committee on the Environment* (MSJCE).	Laporan hendaklah dikemukakan kepada JAS setiap bulan dan setiap 3 bulan sekali.
	TSS dan Kekeruhan	Beting Merambong dan Pulau Merambong	Setiap Hari	Keputusan akan dibandingkan dengan paras sedia ada dan *Malaysia Marine Water Quality Criteria and Standard* (MWQCS).	-
Kualiti Sedimen	Nitrogen, Fosforus, Arsenik, Kadmium, Kromium, Kuprum, Plumbum, Zink, Merkuri dan Nikel	Seperti *Jadual 7.15, Bab 7—Persekitaran Fizikal Sedia Ada*	Setiap bulan sepanjang tempoh pengerukan	Keputusan akan dibandingkan dengan paras sedia ada dan Standard US EPA.	Laporan hendaklah dikemukakan kepada JAS setiap bulan ketika tempoh pengerukan.
Kualiti Udara	TSP, NO_2, SO_2 dan CO	Seperti *Jadual 7.19, Bab 7—Persekitaran Fizikal Sedia Ada*	3 bulan sekali	Keputusan akan dibandingkan dengan paras sedia ada dan *Recommended Malaysian Air Quality Guidelines* (RMAQG).	Laporan hendaklah dikemukakan kepada JAS setiap 3 bulan.
Hingar	(L_{Aeq}, L_{A5}, L_{A10}, L_{A50}, L_{A90} and L_{A95}); dan (L_{Amax})	Seperti *Jadual 7.22, Bab 7—Persekitaran Fizikal Sedia Ada*	3 bulan sekali	Keputusan akan dibandingkan dengan paras sedia ada dan Garispanduan Interim JAS untuk paras bunyi maksimum bagi reseptor di sekitar (Jadual 1 dan 2)	Laporan hendaklah dikemukakan kepada JAS setiap 3 bulan.

Jadual RE17.1 *(samb.)*

Perkara	Parameter	Stesen Pemantauan	Kekerapan Persampelan	Kriteria Kualiti Alam Sekitar	Reporting Requirement
Kajian Batimetri	Perubahan pesisiran pantai dan dasar laut	Seperti *Rajah 17.2*	Setiap 3 bulan (ketika fasa penambakan) Setiap 6 bulan (selepas penambakan)	Keputusan akan dibandingkan dengan keadaan sedia ada.	Laporan perlu dikemukakan kepada JPS tidak lebih daripada 3 bulan selepas kajian selesai.
Pemantauan Enapan	Sedimen terendap	Beting Merambong dan Pulau Merambong	Setiap 2 minggu	Keputusan akan dibandingkan dengan *Impact Severity Matrix*.	Laporan hendaklah dikemukakan kepada JAS setiap bulan.
Ekologikal	Keadaan dan kesihatan ESA	Hamparan Rumput Laut di Beting Tanjung Adang dan Merambong	Setiap 3 bulan	Keadaan ESA hendaklah dibandingkan dengan tapak kawalan dan/atau keadaan sebelum bermulanya kerja pengerukan dan penambakan.	Laporan hendaklah dikemukakan kepada JAS setiap 3 bulan
Audit Alam Sekitar	Untuk mengaudit agar mematuhi syarat kelulusan EIA dan peraturan dan garis panduan alam sekitar yang berkaitan.	Sepanjang tempoh pelaksanaan keseluruhan Projek dan aktiviti Projek	Setiap bulan	Audit Alam Sekitar perlu dijalankan oleh pihak ketiga Juruaudit Alam Sekitar (yang berdaftar dengan JAS)	Laporan hendaklah dikemukakan kepada JAS setiap bulan