



# ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES FOR LAND RECLAMATION AND DREDGING



**DEPARTMENT OF ENVIRONMENT**  
Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC)

**Department of Environment, Malaysia**

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## **ACKNOWLEDGEMENT**

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The Department is also grateful to all DOE staff for their efforts and passion in steering the development of this project into reality.

Finally, we wish to acknowledge all stakeholders for their great contribution in the development of this Guidelines.

## PREFACE

This **Environmental Impact Assessment Guidelines for Land Reclamation and Dredging** is prepared following the latest requirements in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015, of the Environmental Quality Act (EQA) 1974 (Act 127).

The guidelines shall be read and referred together with the **Environmental Impact Assessment Guideline in Malaysia (EGIM) (DOE, 2016)**. Compliance with the requirements set out in this Guidelines and the EGIM will fulfil the obligations of the Project Proponent as stated under section 34A (2C) of the EQA 1974.

The Department of Environment (DOE) has rationalised the EIA process to make it more reflective of the scope, functions and visions of the Department in line with its Environment Strategic Plan, with a focus on Environmental Mainstreaming Tools (EMT) to achieve Self-Regulation.

The guidelines are specifically prepared to guide the Project Proponent and EIA Consultant to prepare an Environmental Impact Assessment (EIA) for land reclamation and dredging activities that is subjected to the following prescribed activities listed in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015.

Land Reclamation and Dredging activities are normally carried out on waterbodies such as the coast and river. Marine ecology and coastal areas comprise of diverse habitats (including mangrove ecosystem), therefore any disturbance to them could lead to environmental deterioration. Coastal areas are very dynamic systems, influenced by hydrodynamic marine processes such as waves, currents, tides, wind, coastal drifts, erosion and accretion process. These may be affected when land reclamation and dredging works are carried out at the project site, where in certain cases piles, breakwater, jetties and other structures are constructed as part of the land reclamation and dredging works. Therefore any development which involves land reclamation and dredging must be properly planned and proper mitigating measures shall be put in place to minimise any adverse impacts on the environment.

This Guidelines is intended to be a reference tool and shall assist the Project Proponent and EIA Consultant to identify appropriate stakeholders and Government Agencies to be engaged prior to carrying out any land reclamation and dredging activities. Adherence to Jabatan Pengairan dan Saliran (JPS) as well as PLANMalaysia existing guidelines and any other government agencies requirements and to this EIA Guidelines on Land Reclamation and Dredging will ensure that impacting activities can be properly planned and implemented with minimal adverse impacts.

Stakeholders' engagement shall be an avenue to gauge their concerns, identify the main issues and to propose applicable effective mitigating measures. The EIA process will provide adequate mechanisms to enable the general public access to contribute their views and comments. Their recommendations will be taken into account in the EIA and by the EIA Technical Review Committee (EIATRC) to ensure sustainable development is carried out.

The Guidelines shall only be used within the framework of the EQA 1974 including its future updates, and its subsidiary regulations. It will be further updated as and when deemed necessary by the Director General of Environmental Quality.

The DOE wishes to express its appreciation to all users for using the Guideline in the spirit of protecting our marine coastal resources.



**(DATO' DR. AHMAD KAMARULNAJUIB BIN CHE IBRAHIM)**  
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**Malaysia**

# ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES FOR LAND RECLAMATION AND DREDGING

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## ABBREVIATIONS

AI	Appointed Individuals
AN	Ammoniacal Nitrogen
APCS	Air Pollution Control Systems
BAT	Best Available Technologies
BATNEEC	Best Available Technology Not Entailing Excessive Costs
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BQ	Bill of Quantities
C&D	Construction and demolition
CAR	Corrective Action Report
CESA	Coastal Environmentally Sensitive Area
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CM	Compliance Monitoring
COA	Conditions of Approval
DG	Director General
DID	Department of Irrigation and Drainage/ <i>Jabatan Pengairan dan Saliran</i>
DO	Dissolved Oxygen/Development Order
DOE	Department of Environment/ <i>Jabatan Alam Sekitar</i>
DOF	Department of Fisheries/ <i>Jabatan Perikanan</i>
DOSH	Department of Occupational Safety and Health/ <i>Jabatan Keselamatan dan Kesihatan Pekerja</i>
EB	Environmental Budget
EC	Environmental Competency
EF	Environmental Facility
e.g.	Example
EGIM	Environmental Impact Assessment Guideline in Malaysia
EIA	Environmental Impact Assessment
EIATRC	Environmental Impact Assessment Technical Review Committee
EM	Environmental Mainstreaming
EMC	Environmental Monitoring Committee
EMCR	Environmental Monitoring Compliance Report
EMP	Environmental Management Plan
EMR	Environmental Monitoring Report
EMT	Environmental Mainstreaming Tools
EO	Environmental Officer
EP	Environmental Policy
EPD	Environmental Protection Department
EPMC	Environmental Performance Monitoring Committee
EQA	Environmental Quality Act
EQR	Environmental Quality Report
ERCMC	Environmental Regulatory Compliance Monitoring Committee
ERP	Emergency Response Plan

ESA	Environmentally Sensitive Areas
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
ESI	Environmental Scoping Information
ESM	Environmental Scoping Matrix
ET	Environmental Transparency
etc.	<i>Et cetera</i>
FGD	Focal Group Discussions
FIA	Fisheries Impact Assessment
GAs	Government Agencies
GIS	Geographic Information System
GTM	Geological Terrain Mapping
HIA	Health Impact Assessment
HQ	Headquarters
HRA	Health Risk Assessment
i.e.	<i>id est</i>
IETS	Industrial Effluent Treatment Systems
ILO	International Labour Organisation
IM	Impact Monitoring
ISMP	Integrated Shoreline Management Plan
IWK	Indah Water Konsortium
JAKOA	Jabatan Kemajuan Orang Asli Malaysia
JKPTG	Department of Director General of Lands and Mines/ <i>Jabatan Ketua Pengarah Tanah dan Galian</i>
JKR	Public Works Department/ <i>Jabatan Kerja Raya</i>
JMG	Minerals and Geoscience Department Malaysia/ <i>Jabatan Mineral dan Geosains</i>
JPBD/ PLANMalaysia	Department of Town and Country Planning/ <i>Jabatan Perancangan Bandar dan Desa</i>
JPSM	Forestry Department of Peninsular Malaysia/ <i>Jabatan Perhutanan Semenanjung Malaysia</i>
JPSPN	National Solid Waste Management Department/ <i>Jabatan Pengurusan Sisa Pepejal Negara</i>
KD	<i>Kemampuan Spatial dan Daya Tahan Terhadap Perubahan Iklim</i>
KPKT	Ministry of Urban Wellbeing, Housing and Local Government/ <i>Kementerian Kesejahteraan Bandar, Perumahan dan Kerajaan Tempatan</i>
KSAS	<i>Kawasan Sensitif Alam Sekitar</i>
L <sub>10</sub>	Ten percentile level
L <sub>50</sub>	Fifty percentile level
L <sub>90</sub>	Ninety percentile level
LAC	Limit of Acceptable Change
L <sub>Aeq</sub>	Equivalent A-Weighted Continuous Sound Level
LCP	Laporan Cadangan Pemaju
LD-P2M2	Land Disturbing Pollution Prevention and Mitigation Measures
L <sub>MAX</sub>	Maximum A-Weighted Continuous Sound Level

L <sub>MIN</sub>	Minimum A-Weighted Continuous Sound Level
LOS	Level of Service
MAAQS	Malaysian Ambient Air Quality Standards
MARPOL	The International Convention for the Prevention of Pollution from Ships
MESTECC	Ministry of Energy, Science, Technology, Environment & Climate Change
METMalaysia	Malaysian Meteorological Department/ <i>Jabatan Meteorologi Malaysia</i>
MMWQCS	Malaysia Marine Water Quality Criteria and Standard
MOH	Ministry of Health/ <i>Kementerian Kesihatan</i>
MOM	Minutes of Meeting
MPFN	National Physical Planning Council/ <i>Majlis Perancang Fizikal Negara</i>
MSL	Mean Sea Level
MSMA-2	<i>Manual Saliran Mesra Alam Edisi-2</i>
MUSLE	Modified Universal Soil Loss Equation
MWQI	Marine Water Quality Index
NGO	Non-governmental Organisations
NLC	National Land Code
NPCZP	National Physical Coastal Zone Plan
NPP-CZ	National Physical Plan-Coastal Zone
NPP-2	National Physical Plan-2
NPP-3	National Physical Plan-3
NRE	Ministry of Natural Resources and Environment/ <i>Kementerian Sumber Asli dan Alam Sekitar</i>
NREB	National Resources and Environment Board
NTU	Nephelometric Turbidity Units
NWQS	National Water Quality Standards of Malaysia
O&G	Oil and Grease
OSC	One-Stop Centre
PE	Population Equivalent
P2M2	Pollution Prevention and Mitigation Measures
PBT	Local Authorities/ <i>Pihak Berkuasa Tempatan</i>
PD	<i>Pertumbuhan Dinamik Bandar dan Luar Bandar</i>
PERHILITAN	Department of Wildlife and National Parks Peninsular Malaysia/ <i>Jabatan Hidupan Liar dan Taman Negara Semenanjung Malaysia</i>
PM	Performance Monitoring
PM <sub>10</sub>	Particulate Matter 10 micrometres or less in diameter
PM <sub>2.5</sub>	Particulate Matter 2.5 micrometres or less in diameter
PTD	Land and District Office/ <i>Pejabat Tanah dan Daerah</i>
PTG	Land and Minerals Office/ <i>Pejabat Tanah dan Galian</i>
PVD	Prefabricated Vertical Drain System
Q&A	Questions and Answers
RAC	Report Adequacy Check
RFZPPN	<i>Rancangan Fizikal Zon Persisiran Pantai Negara</i>
ROD	River Oxygen Demand
ROW	Right of Way
RQSAT	Report Quality Self-Assessment Tool
RUSLE	Revised Universal Soil Loss Equation

SAMM	<i>Skim Akreditasi Makmal Malaysia</i>
SAP	Special Area Plans
SI	Soil Investigation
SIA	Social Impact Assessment
SIDRA	Signalised and Unsignalised Intersection Design and Research Aid
SMA	Special Management Areas
SPAN	National Water Commission of Malaysia/ <i>Suruhanjaya Perkhidmatan Air Negara</i>
SPC	State Planning Committee
SR	Self-Regulation
SS	Suspended Solids
SSA	Site Sustainability Assessment
STP	Sewage Treatment Plant
STS	Sewage Treatment Systems
SWMM	Storm Water Management Model
TCPA	Town and Country Planning Act
TIA	Traffic Impact Assessment
TNB	Tenaga Nasional Berhad
TOC	Table of Contents
TOR	Terms of Reference
TORAC	Terms of Reference Adequacy Check
TRC	Technical Review Committee
TSHD	Trailing Suction Hopper Dredger
TSS	Total Suspended Solids
UNEP	United Nations Environment Programme
UPEN	State Economic Planning Unit/ <i>Unit Perancang Ekonomi Negeri</i>
WIPs	Water Intake Points
WQI	Water Quality Index
WTP	Water Treatment Plants
WWF	World Wildlife Fund for Nature
ZOI	Zone of Impact
ZOS	Zone of Study

## CHAPTER 1 INTRODUCTION

### 1.1 INTRODUCTION

The guidelines shall be entitled '**Environmental Impact Assessment (EIA) Guidelines for Land Reclamation and Dredging**' (hereinafter referred to as the 'Guidelines') is prepared to take into account the latest requirements in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015, of the Environmental Quality Act (EQA) 1974 (Act 127).

The Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015 came into force on 28 August 2015, which is now divided into the **First Schedule** (21 Prescribed Activities) and **Second Schedule** (17 Prescribed Activities).

The Department of Environment (DOE) has rationalised the EIA process to make it more reflective of the scope, functions and visions of the Department in line with its Environment Strategic Plan, with a focus on **Environmental Mainstreaming Tools (EMT) to achieve Self-Regulation (SR)**.

Guidelines for Land Reclamation and Dredging shall be read and referred to together with the **Environmental Impact Assessment Guideline in Malaysia (EGIM) (DOE, 2016)**. Compliance with the requirements set out in this Guidelines and the EGIM will fulfil the obligations of the Project Proponent as stated under Section 34A (2C) of the EQA 1974.

The EIA Guidelines for Land Reclamation and Dredging shall cover the following prescribed activities:

First Schedule	Second Schedule
<b>7. LAND RECLAMATION</b>	<b>7. LAND RECLAMATION</b>
<i>Coastal reclamation or land reclamation along river banks involving an area of less than 50 hectares<sup>1</sup>.</i>	<p>(a) <i>Coastal reclamation or land reclamation along river banks involving an area of 50 hectares or more<sup>1</sup>.</i></p> <p>(b) <i>Coastal reclamation or land reclamation along river banks within or adjacent or near to environmentally sensitive areas<sup>2</sup>.</i></p> <p>(c) <i>Reclamation for man-made</i></p>

	<i>island</i> <sup>3</sup> .
<b>First Schedule Activity 7(a) and Second Schedule 2 Activity 7(a)</b>	
Note <sup>1</sup> -indicates that coastal protection, coastal defence and beach nourishment works are <b>excluded</b> from First Schedule Activity 7 and Second Schedule Activity 7 due to its nature of activity which is as mitigation against adverse impacts.	

<b>Second Schedule Activity 7(b)</b>	
Note <sup>2</sup> -indicates that for coastal reclamation or land reclamation along river banks within or adjacent or near to environmentally sensitive areas need to include the buffer distance showed in any State Structure Plan and District Local Plan.	
<p>National Physical Plan -3 2010 defines Environmentally Sensitive Areas (ESA) in reference to a particular area that is sensitive to any forms of alteration to its ecosystem due to natural processes or activities within or around it, either directly or indirectly. The level of ESA's sensitivity is determined based on integration of three features namely elements of disaster risk function, value of living support and value of the heritage and treasure of the area. *The category of ESA and its location needs to be referred to the National Physical Plan (NPP-3).</p> <p>Determination of the ESA shall be adopted from the definition set forth in the NPP-3 which has categorised the ESA into three (3) Ranks i.e. ESA Rank 1, ESA Rank 2 and ESA Rank 3.</p> <p>Based on Schedule 2, item 7(b) Land Reclamation – <i>Coastal reclamation or land reclamation along river banks within or adjacent or near environmentally sensitive areas</i>, the following quantum can be applied to ascertain the definition of adjacent or near. However thorough modelling and impact assessment should also be carried out to ensure that the land reclamation and dredging activities shall not cause adverse impacts to the nearest receptors.</p> <p>Definition of the following terms shall be applicable:</p> <p>(a) <b>Within</b> – inside of ESA of Ranks 1, 2 or Rank 3.</p> <p>(b) <b>Near</b> – sharing a common boundary with ESA of Rank 1, 2 or 3.</p> <p>(c) <b>Adjacent</b> – Project Site is within 500m radius of ESA of Rank 1, 2 or 3.</p>	

<b>Second Schedule Activity 7(c)</b>	
Note <sup>3</sup> –indicates that all reclamation activities that involve sand dredging on the coast and river shall adhere to the <i>Garis Panduan Perancangan Pemulihan dan Pembangunan Kawasan Sensitif Alam Sekitar Persisiran Pantai</i> .	

This Guidelines for Land Reclamation and Dredging shall also cover the following prescribed activities:

First Schedule	Second Schedule
15. DREDGING	15. DREDGING
(a) Capital Dredging <sup>4</sup> . (b) Disposal of waste dredged materials <sup>5</sup> .	None

**First Schedule Activity 15(a)**

Note<sup>4</sup> – indicates that Capital dredging can be treated as works carried out to create a new harbour, berth or waterway, or to deepen existing facilities in order to allow larger vessels to access. Capital works usually involves hard material or high volume works. The work is usually done using cutter suction dredge or large trailing suction hopper dredge or any other dredges; but for rock work, drilling and blasting along with mechanical excavation may be used. (Source: DOE 2018). Dredging works also refer to activities associated with reclamation, river bed deepening and dredging activities prior to any Prescribed Activity being implemented.

**First Schedule Activity 15(b)**

Note<sup>5</sup> – indicates that Dredged materials encompasses of sediments, soils and rocks excavated underwater for the purposes of providing or maintaining channels, ports and waterways or generated during the construction of port or waterway facilities (e.g. berthing facilities, turning basins) in support of maritime-borne commerce, fishing fleets and naval defence.

*Source: Davis, John D.; MacKnight, Scott; International Maritime Organization. 1990. Environmental considerations for port and harbor developments. World Bank technical paper ; no. WTP 126. Washington, D.C. : The World Bank.*

For a project that involves more than one prescribed activity, the EIA shall incorporate all key issues inherent in all relevant prescribed activities of the project. If one of them falls under the Second Schedule, then the project is to fall under the requirements of the Second Schedule.

**1.2 TERMS AND DEFINITIONS**

The proposed terms and definitions that will be adopted in the guideline is based on any interpretation and relevant documents published or to be published by DOE and other related government agencies, registered bodies and institutions. The legal definitions and interpretations shall be based on the Interpretation Acts 1948 and 1967 (Act 388).

The common terms and definition adopted for the EIA Guideline for Land Reclamation and Dredging is provided in the following subsections.

### 1.2.1 Definition of Land Reclamation

**Land reclamation** is the creation of artificial land within the coastal area. Coastal land reclamation or usually known as reclamation, and it is the process of creating a new vacant land from sea or riverbeds. The land reclamation provides a good solution and well managed in terms of physical, social and economic development in fulfilling human needs. Land reclamation provides an opportunity to expand the land for human benefits in a variety of purposes.

**Source : Coastal Land Reclamation: Implication towards development control system in West Malaysia Mohammad Yusup \*, Ahmad Fuzi Arshad, Yusfida Ayu Abdullah, Nor Syafa'ah Ishak Centre of Studies for Town and Regional Planning, Universiti Teknologi MARA.**

#### Purposes of Land Reclamation

- (a) To provide residential area and commercial or mix development, made to meet the demand for development and reduce population pressure.
- (b) Tools to attract foreign investment towards economic viability (e.g.: states like Melaka and Penang).
- (c) To lighten the burden of government providing public facilities and infrastructures to accommodate public needs through the privatisation process.
- (d) Providing new vacant land so development process is easy to deal with compared to development on the mainland.
- (e) To improve coastal stability by improving the hydraulic conditions and rearranging the coastline.
- (f) The purpose of the reclamation should also refer to the requirements of the Town and Country Planning Act (Amendment 2017).

### 1.2.2 Coastal Reclamation or Land Reclamation

According to the British Standard Institute (BS 6349-5-1991) land reclamation is defined as, the exclusion of the sea, or other mass of water, from areas that were previously submerged, or subjected to inundation, by rising of land levels primarily using materials recovered by dredging processes.

### 1.2.3 River

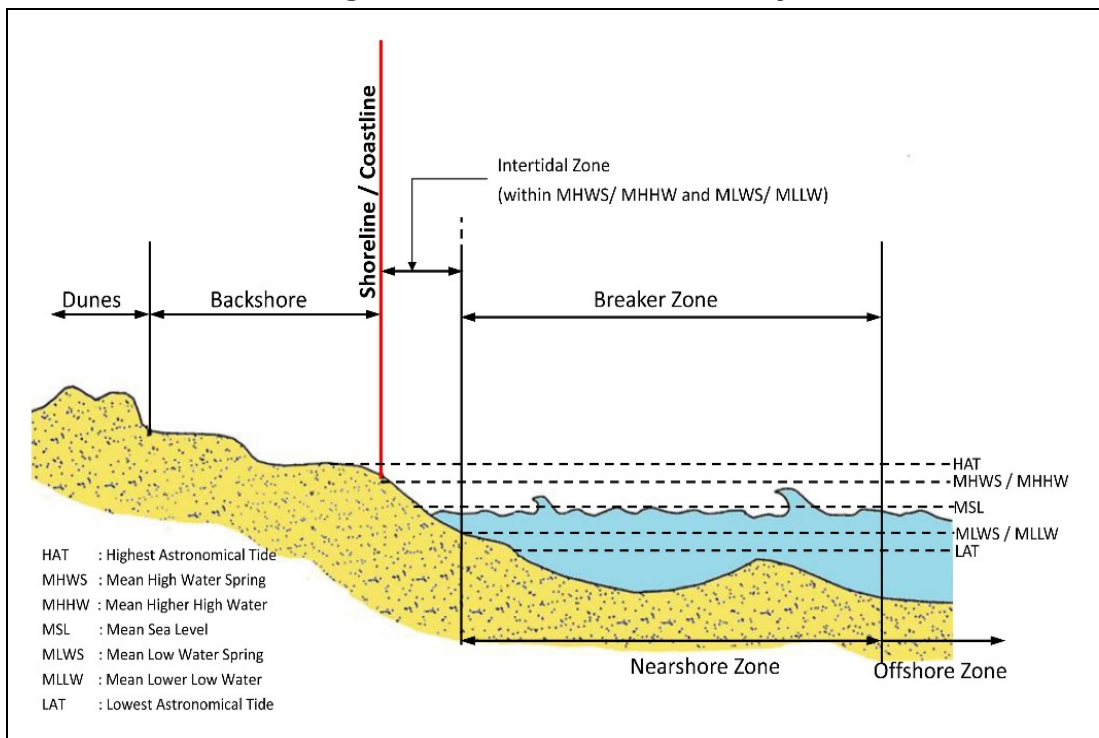
According to the Water Act 1920, river includes:

- (a) A tributary of a river and any other stream or natural water course.
- (b) Any canal declared by the State Authority of the State in which such canal is situated by notification in the Gazette to be subjected to this Act.

### 1.2.4 Shoreline

The line where shore and water meet. Although the terminology of coasts and shores is rather confusing, shoreline and coastline are generally used as synonymous. **Figure 1.2.1** shows the illustration of coastal boundaries.

**Figure 1.2.1: Coastal Boundary Limit**



Source: Adapted mainly from 'USACE, 2002'

## 1.3 COASTAL PROTECTION OR COASTAL DEFENCE

According to the *DID Manual Volume 3 – Coastal Management*, there are three different coastal protection or coastal defence definitions are used:

### 1.3.1 Coastal Erosion Control Measures

Measures aimed at protecting the coast against coastline retreat, thus protecting housing, infrastructure, the coast and the hinterland from erosion often at the expense of losing the beach and the dynamic coastal landscape. The measures often consist of hard structure such as revetments or groynes.

### 1.3.2 Tidal Wave Inundation Mitigation Measures

Measures aiming at protecting low-lying coast and coastal hinterland against flooding caused by the combined effect of storm surge and extreme astronomical tides. The measures often consist of dikes or seawalls of some kind, or in the form of artificial dunes.

### 1.3.3 Shore Restoration Measures

Measures aiming at protecting, preserving or restoring the shore and the dynamic coastal landscape and vegetation as well as protecting against coastline retreat to the extent possible.

## 1.4 EIA DEVELOPMENT

The EIA process entails studies to identify, predict, evaluate and quantify the impacts (both beneficial and adverse) on the environment of a proposed project or development and to communicate the said information to those concerned.

The benefit of having an EIA is to facilitate decision-making for both the DOE and the Project Proponent from an environmental perspective.

The EIA report shall assist the stakeholders in identifying the significant environmental impacts; appropriate abatement and mitigating measures; programmes for monitoring environmental compliance; within the development plan prior to and/or during project implementation.

## 1.5 GUIDELINES OBJECTIVES

The objectives of the Guidelines are to:

- (a) To provide an understanding of the EIA procedures, preparation, and submission of the EIA Report for review and approval.
- (b) To integrate and establish procedures to aid in evaluation for implementation of EIA studies involving land reclamation and dredging projects in Malaysia.
- (c) Provide clear and concise guidance on EIA project planning and preparation to the stakeholders, Project Proponents, Qualified Persons (i.e. DOE-registered Environmental Consultants), Government Agencies (GAs), Enforcement Officers and other EIA-related practitioners.
- (d) Provide compliance to mandatory requirements for environmentally acceptable land reclamation and dredging activity allowed by the authority within its jurisdiction;
- (e) Facilitate integration of the EIA into the overall project planning and development cycle in order to ensure compliance with and adherence to the legal environmental requirements and the framework on environmental sustainability.
- (f) Provide a detailed step-by-step guidance with explanation of the various EIA procedures and submissions, comprising:
  - (i) Environmental Scoping Information (ESI).
  - (ii) Terms of Reference (TOR).
  - (iii) EIA Reporting.
- (g) Clearly define the scope of the EIA with a focus on the significant environmental issues relevant to the DOE's three functional areas (water, air and wastes), whilst also taking into consideration the environmental requirements by other authorities or agencies, to facilitate overall decision-making and project approval.
- (h) Provide a clear framework for DOE to assess and approve the EIA reports.

## 1.6 APPLICABILITY OF THE GUIDELINES

The proposed guidelines are specifically prepared to guide the Qualified Person or Project Proponent to prepare an EIA and EIA reporting for land reclamation and dredging activities that subjected to the following prescribed activities listed in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015:

(i) **First Schedule Activity 7: Land Reclamation**

Coastal reclamation or land reclamation along river banks involving an area of less than 50 hectares.

(ii) **First Schedule Activity 15: Dredging**

- (a) Capital dredging.
- (b) Disposal of waste dredged materials.

(iii) **Second Schedule Activity 7: Land Reclamation**

- (a) Coastal reclamation or land reclamation along river banks involving an area of 50 hectares or more.
- (b) Coastal reclamation or land reclamation along river banks within or adjacent or near to environmentally sensitive areas.
- (c) Reclamation for man-made island.

The prescribed activities mentioned above shall not apply to the State of Sabah and Sarawak, where both states are subjected to separate state legislations and requirements.

## 1.7 OVERVIEW OF THE ENVIRONMENTAL ASSESSMENT PROCESS

The following presents the step-by-step guide of the environmental assessment:

**Step 1: Provide the Project Brief**

- (a) The Project Proponent must provide the basic information to enable the Qualified Person to understand and carry out an initial assessment.

- (b) This is to assist in determining which prescribed activity the project falls under (First or Second Schedule) based on the Environmental Quality (Prescribed Activity) (Environmental Impact Assessment) Order 2015.

### **Step 2: Identify the Legal Requirements**

During the Environmental Screening Process, the Qualified Person shall identify the legal requirements of the project based on the information provided by the Project Proponent.

### **Step 3: Check if the Project Aligns to Existing Policies and Guidelines**

The Project Proponent is required to clear all policy matters related to the project prior to submitting the EIA report.

### **Step 4: Carry out Preliminary Stakeholder Engagement**

- (a) Early on in the EIA process, the Project Proponent and the Qualified Person shall engage with the DOE (via the designated officer in charge) and the relevant GAs to determine the requirements to be included in the TOR.
- (b) The Qualified Person can also engage with other relevant stakeholders to obtain site information and data for the scoping.

### **Step 5: Preparation of the TOR and ESI**

- (a) Upon determining that the project requires either a First or Second Schedule EIA, the Environmental Scoping Information (ESI) and TOR must be prepared.
- (b) The Qualified Person shall obtain secondary data to assist in the Environmental Scoping. At this point of the study, qualitative data is sufficient for scoping of significant impacts for the TOR.
- (c) Relevant information required for the TOR that the Qualified Person is required to furnish includes:
  - (i) Site Suitability Assessment (SSA).
  - (ii) Determination of the study boundary.
  - (iii) Overview of baseline data.
  - (iv) Identification of key project activities.

- (v) Identification of significant impacts and priority setting.
- (vi) Selection of mitigation measures.

### **Step 6: Preparation and Submission of the TOR**

- (a) The Qualified Person shall review all data obtained during scoping to prepare the TOR report based on DOE requirements in the EGIM (DOE, 2016).
- (b) The report shall be submitted to DOE State/HQ for review and endorsement.

### **Step 7: Baseline Data Collection for EIA**

After the TOR endorsement, baseline data collection, either primary or secondary data, shall be carried out to obtain detailed information of the existing environment of the project site and its surroundings.

### **Step 8: Completion of EIA Report**

- (a) The major studies and components of the EIA report shall cover the following:
  - (i) Identify and predict the significant environmental issues and impacts.
  - (ii) Carry out the detailed environmental assessment on the most significant issues only.
  - (iii) Identify the suitable pollution prevention and mitigation measures (P2M2s) to minimise any negative impacts arising from the development of the projects.
  - (iv) Provide the Environmental Management Plan (EMP) framework in line with the SR concept.
- (b) Details can be referred to in **Chapters 5 – 7**.

**Step 9: Preparing EIA Report**

- (a) All assessments and findings must be included in the EIA report. Take note that the results of studies required by other GAs must be incorporated into the EIA report but not to append the individual reports. These reports must however be reviewed and approved by the respective GAs.
- (b) The format of the EIA report is detailed in **Chapter 8**.

**Step 10: Stakeholder Engagement**

- (a) During preparation of the EIA report, the Project Proponent and Qualified Person shall undertake an engagement with the relevant stakeholders (those who will be affected by the project, e.g. communities or institutions, businesses, etc.).
- (b) The objective is to brief these stakeholders about the project, what it entails, the potential environmental issues, and the proposed P2M2s, with the aim to seek their thoughts and feedback. All findings from the stakeholders' engagement shall be incorporated into the EIA report.

**Step 11: EIA Submission and Public Display**

- (a) The EIA report shall be submitted to DOE State/HQ for review.
- (b) The Qualified Person shall note the difference in requirements for a First Schedule and Second Schedule EIA and follow the required procedures.
- (c) The major difference to note is that the Second Schedule EIA shall require a public display of the EIA for the public to provide comments and feedback within the review period to DOE HQ.

## CHAPTER 2

### ENVIRONMENTAL PROJECT PLANNING

#### 2.1 EIA PROCESS

EIA is an integral part of the overall integrated project planning, which can provide benefits and value to any project. It is a tool to evaluate the potential impacts arising from a proposed project based on the physico-chemical, ecological and human components of the environment.

It identifies the key areas of environmental concerns for consideration during the project planning stage, and provides a means to decide on the types of mitigation measures to avert or minimise the adverse impacts at an early stage.

A summary of the EIA process is shown in EGIM 2016.

#### 2.2 ENVIRONMENTAL LEGISLATIVE REQUIREMENTS

The EQA 1974 (Act 127) is the main legislation governing environmental management in Malaysia.

Amendments to this main legislation and new subsidiary legislations or regulations may be enacted from time to time, pertinent and relevant to changing circumstances. The regulations made under any previous legislations thereof, will then need to be amended and/or updated; or new regulations may be proposed when new environmental policies are adopted by the DOE to protect the environment.

The DOE under the Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC) is the main agency tasked to implement the EQA 1974 (Act 127). It has overall functions and responsibilities on the environmental management and enforcement as prescribed under the said legislation and its subsidiary legislations and regulations.

## 2.3 POLICY AND GUIDELINES COMPLIANCE

### 2.3.1 Policy and legal requirement as listed in the EIA for Land Reclamation and Dredging Activities

Policy and legal requirement as listed in the EIA for Coastal and Reclamation Activities are:

- (a) National Physical Plan, 2016 (NPP-3)
- (b) Environmental Quality Order (Prescribed Activities) Environmental Impact Assessment) 2015
- (c) Environmental Quality (Scheduled Wastes) Regulations 2005
- (d) Environmental Quality (Clean Air) Regulations 2014
- (e) Environmental Quality (Sewage) Regulations 2009
- (f) Town and Country Planning Act (TCPA) 1976 (Act 172) and its Amendments

Other documents proposed to be guidance are the following Guidelines:

- (a) Environmental Impact Assessment Guidelines in Malaysia (EGIM), 2016
- (b) Environmental Impact Assessment Guidelines for Coastal and Land Reclamation Activities, 2017
- (c) Guidelines of Erosion Control for Development Projects in the Coastal Zone 1/97
- (d) Guidelines for Preparation of Coastal Engineering Hydraulic Study and Impact Evaluation (DID), December 2001
- (e) Garis Panduan dan Piawaian Perancangan Kawasan Pantai (JPBD 6/2000)
- (f) Rancangan Fizikal Zon Persisiran Pantai Negara (PLANMalaysia, 2012)
- (g) Draft Fisheries Impact Assessment (FIA) Guidance Document For Coastal Reclamation Activities Version 2 updated 29 March 2018
- (h) Draft Fisheries Impact Assessment (FIA) Guidance Document For Dredging Activities Version 2 updated 29 March 2018
- (i) State Structure and Local Plans

Existing legal provisions and policies on new guidelines are outlined as according to activities are as listed in **Table 2.3.1** and **Table 2.3.2**.

**Table 2.3.1: Acts, Policy Documents and Guidelines Related to Land Reclamation and Dredging Activities**

Acts, Policy Documents and Guidelines	Aspects of Control
<b>Legal Documents</b>	
National Land Code (NLC), 1965	<ul style="list-style-type: none"> <li>• Reclamation and dredging are both related activities either on land along river banks or coastal areas. Section 5 of the NLC states that <b>LAND</b> includes:               <ul style="list-style-type: none"> <li>• The surface of the earth and all substances forming that surface.</li> <li>• The earth below the surface and all substances therein.</li> <li>• All vegetation and other natural products, whether or not requiring the periodical application of labour to their production and whether on or below the surface.</li> <li>• All things attached to the earth or permanently fastened to anything attached to the earth, whether on or below the surface.</li> <li>• <b>Land covered by water.</b></li> </ul> </li> </ul>
Land Acquisition Act 1960 (Act 486)	<ul style="list-style-type: none"> <li>• Part II of the Act states that on acquisition of land (including reclamation land), The State Authority may acquire any land which is needed for any public purpose; by any person or corporation for any purpose which in the opinion of the State Authority is beneficial to the economic development of Malaysia and for the purpose of mining or for residential, agricultural, commercial, industrial or recreational purposes or any combination of such purposes.</li> <li>• The State Economic Planning Unit of the state shall consider the application either it is in the public interest.</li> <li>• In approving the acquisition of a reclaimed land, the land to be reclaimed has to be properly surveyed and demarcated (Section 5 Act 486).</li> <li>• The person/party that acquires the land is awarded land only as demarcated and can only develop within the demarcated boundary.</li> </ul>

Acts, Policy Documents and Guidelines	Aspects of Control
<b>Legal Documents</b>	
	<ul style="list-style-type: none"> <li>Any earthworks and development beyond the awarded piece boundary (including for buffer and structural measures) is considered as encroachment into/unlawful occupation of state/federal land and this is against Section 48 and 425 of the NLC.</li> </ul>
Waters Act P920 (Act 418)	<ul style="list-style-type: none"> <li>Prohibition 5(1) specifies that NO person shall in any manner obstruct or interfere with any river; build any bridge, jetty, or landing stage (other than a bath-house) over or beside any river at a point where the width of such river exceeds twenty feet and 5(2) states that licences to do the above may be issued by the District Officer.</li> <li>Reclamation activities at the river mouth or along the coast needs to adhere to this provision.</li> </ul>
Town and Country Planning Act (TCPA) 1976 (Act 172)	<ul style="list-style-type: none"> <li>“Development” in the Interpretation by the TCPA 1976 is “The carrying out of any building, engineering, mining, industrial or other similar operation in, <b>on, or under land</b>, the making of <b>any material change in the use of any land</b> or building or any part thereof, or the subdivision or amalgamation of lands: and “develop” shall be construed accordingly”.</li> <li>Reclamation and dredging activities also falls under “development” as according to the act as it is an activity that fulfils the definition of “the making of <b>any material change in the use of any land</b>”.</li> <li>In approving the acquisition of a reclaimed land, the land to be reclaimed has to be properly surveyed and demarcated (Section 5 Act 486).</li> <li>The person/party that is awarded land only as demarcated and can only develop within the demarcated boundary.</li> <li>Any earthworks and development beyond the awarded piece boundary (including for buffer and structural measures) is considered as encroachment into/unlawful occupation of state/federal land and this is against Section 48 and 425 of the NLC.</li> </ul>

Acts, Policy Documents and Guidelines	Aspects of Control
<b>Legal Documents</b>	
National Physical Planning Council (MPFN)	<ul style="list-style-type: none"> <li>• Matters referred by the State Government, including providing advice to the State Planning Committee on applications for planning permission under Section 22 (A), Act 172, namely to: <ul style="list-style-type: none"> <li>• Development of a new township whose population exceeds 10,000 or areas exceeding 100 hectares, or both;</li> <li>• <b>Development for the construction of any infrastructure / key facilities; and</b></li> <li>• Development involves the peak/hill in the area designated as environmentally sensitive areas.</li> </ul> </li> <li>• Any coastal reclamation planned has to be referred to the MPFN for advice.</li> </ul>
Planning Control-Planning Permission	<ul style="list-style-type: none"> <li>• In the TCPA 1976 (Act 172), the development control system is provided under Part IV of Act 172 which includes the Planning Permission.</li> </ul> <p>Part IV Section 19 on Planning Control; Prohibition of development without planning permission specifies that No person, other than a local authority, shall commence, undertake, or carry out any development unless planning permission in respect of the development has been granted. Any coastal reclamation done without planning permission are considered as against the legal provision of the act.</p>
<b>Planning Policy Documents</b>	
National Physical Plan (NPP) 2 (not applicable to Sabah and Sarawak)	<ul style="list-style-type: none"> <li>• The NPP-2 sets out the national long-term strategic spatial planning policies and measures needed to implement them in respect to the general direction and broad pattern of the land uses, biodiversity conservation and physical development in Peninsular Malaysia (NPP-2).</li> <li>• To ensure the consistency with the overall spatial planning of the country, reclamation planning within the Peninsular Malaysia, Sabah and Sarawak needs to make reference to the document.</li> </ul>

Acts, Policy Documents and Guidelines	Aspects of Control
<b>Planning Policy Documents</b>	
	<ul style="list-style-type: none"> <li>• National Physical Plan 2: Policy NPP24 states that: “Sensitive coastal and marine ecosystems shall be protected and managed in a sustainable manner”.</li> <li>• Indicative Plan (IP) 17 of the policy state the following measures: “Coastal reclamation shall not be encouraged except for the development of ports of strategic national importance. <b>Coastal reclamation</b> shall not be permitted in or <b>adjacent to sensitive ecosystems</b> such as marine parks, mangroves, mudflats, coral reefs, seagrass beds, turtle landing sites and major tourism beaches”.</li> <li>• All proposals involving coastal reclamation shall be referred to the MPFN.</li> </ul>
National Physical Plan 3 (NPP-3)	<ul style="list-style-type: none"> <li>• NPP-3 specifies Core 1: Urban Dynamics and Rural Growth with <i>Pertubuhan Dinamik Bandar dan Luar Bandar</i> (PD)1: Balanced Urban Growth and PD1.5 Strengthening Entrance Ports and Logistics Industry as one of the measures. PD3: Improved Access and Access states the measures as in PD3.3 Enhancing Water Transport Services.</li> <li>• The plan clearly promotes strengthening of ports and water transport to serve as a catalyst for economic development and growth for a city. These facilities will promote agglomeration of nearby industrial and service activities and enables the growth of logistics and tourism industry. Therefore, dredging and reclamation, and development of ports need to be in sustainable manner so as to minimise adverse impacts on the environment.</li> </ul>

Acts, Policy Documents and Guidelines	Aspects of Control
<b>Planning Policy Documents</b>	
	<ul style="list-style-type: none"> <li>• NPP-3 Core 2: Spatial Sustainability and Resilience to Climate Change specifies <i>Kemampuan Spatial dan Daya Tahan Terhadap Perubahan Iklim (KD)1: Management Of Natural Resources, Food Sources And Heritage Resources</i> as the strategy. The measures include KD1.2 Managing and Controlling Development in ESA. This covers gazetted threatened habitats as a protected area including wetlands, sea grass plains, turtle landing sites and coral sites and to establish and strengthen the implementation of land and marine ecology corridors by Establishment of the Marine Protection Area Network.</li> <li>• Other related actions are: <ul style="list-style-type: none"> <li>• Action KD1.3A: Strengthen river basin management include management of river reserves and development along the river corridor.</li> <li>• Action KD1.4B: Develop sustainable mineral resource mining.</li> </ul> <p>According to the ESA guidelines, new mining and quarrying activities are not permitted except in the ESA Level 3 managed area according to the guidelines provided. However, for activities currently operating within the Level 1 and 2 ESA areas, mining practices using Best Available Technology Not Entailing Excessive Costs (BATNEEC) should be implemented by the developer.</p> </li> <li>• On KD2: Holistic Land Use Planning, a strategy KD2.2 Manage Natural Disaster Risk Area is outlined with the following actions: <ul style="list-style-type: none"> <li>• Action KD2.2B Conserve the coastal area.</li> <li>• Development Control in Coastal Areas.</li> <li>• Conservation of Coastal Areas In Critical Situations.</li> <li>• Controlling Reclamation and Reclamation Activities in Coastal Areas.</li> </ul> </li> </ul>

Acts, Policy Documents and Guidelines	Aspects of Control
<b>Planning Policy Documents</b>	
	<ul style="list-style-type: none"> <li>• The later strategies states that the coastal zones need to be preserved and conserved in order to avoid the loss and degradation of natural habitats and increase of soil erosion in coastal areas as a result of physical development activities including reclamation and reclamation activities. Hence, reclamation and land reclamation activities need to be well planned and controlled.</li> <li>• For those purposes, any reclamation and reclamation activities are not permitted, except where: <ul style="list-style-type: none"> <li>• The needs and benefits of such activities can be clearly demonstrated in contributing significant socioeconomic contributions at state and country level (such as infrastructure development); and</li> <li>• Does not affect the environment significantly.</li> </ul> </li> <li>• However, reclamation and land reclamation are not permitted in the following areas: <ul style="list-style-type: none"> <li>• Mangrove forest areas and wetlands that have been gazetted as protected areas.</li> <li>• Environmental sensitive areas according to the Planning Guidelines (refer to KD1.2).</li> <li>• Conservation and Development of Coastal ESAs.</li> <li>• Other recognized areas have high ecological, cultural and economic value.</li> <li>• Coastal Protection Zone that has been identified in the NPP-3.</li> </ul> </li> <li>• In addition to meeting the existing development requirements, any reclamation and land reclamation activities should conduct studies taking into account the following aspects: <ul style="list-style-type: none"> <li>• Impact on erosion and sedimentation along the shores of the coast, namely through hydrological and hydraulic engineering analysis of the coast.</li> </ul> </li> </ul>

Acts, Policy Documents and Guidelines	Aspects of Control
<b>Planning Policy Documents</b>	
	<ul style="list-style-type: none"> <li>• Impact on animal and plant population and natural habitats.</li> <li>• Impact of climate change, including sea level rise for a period of not less than 100 years.</li> <li>• The suitability of the design with the existing shoreline.</li> <li>• The use of unrefined reclamation material, which may negatively impact natural coastal and ocean habitats.</li> <li>• Availability of access to locals to coastal areas (except for prohibited areas).</li> </ul>
National Physical Plan Coastal Zone (NPP-CZ)	<ul style="list-style-type: none"> <li>• NPP-CZ outlined 10 Strategies under five Themes have been formulated to guide the sustainable planning, development and management of the coastal zone. Two themes related directly to reclamation and dredging i.e. Theme 3 and Theme 4 as follows:</li> <li>• Theme 3: Sustainable Coastal Development <ul style="list-style-type: none"> <li>• <i>Rancangan Fizikal Zon Persisiran Pantai Negara (RFZPPN) 4</i>: The development of coastal settlements shall be planned to maximize socio-economic benefits, in a form and scale that is appropriate to safeguard sensitive coastal resources and in is harmony with natural coastal processes.</li> <li>• RFZPPN 5: Infrastructure development along the coastline shall be planned and managed with strict adherence to the principles of public good, avoidance of harm to the natural environment and minimization of disruption to natural coastal processes.</li> </ul> </li> <li>• Theme 4 is on Wise Use Of Coastal Resources. Under this theme two strategies drawn related directly to dredging and reclamation i.e.: <ul style="list-style-type: none"> <li>• RFZPPN 6: Coastal reclamation shall only be undertaken when it is proven beyond reasonable doubt that the economic benefits significantly outweigh the environmental and social costs.</li> </ul> </li> </ul>

Acts, Policy Documents and Guidelines	Aspects of Control
<b>Planning Policy Documents</b>	
	<ul style="list-style-type: none"> <li>• RFZPPN 7: <i>Dredging and mining activities shall be carried out in a form and scale that does not harm natural ecosystems or interfere with natural coastal processes.</i></li> <li>• NPP under Section 6: Coastal Processes And Hazards highlighted that human activities have a great impact on the dynamics of the river mouth and adjacent coastlines.</li> <li>• Dredging has been identified as an activity that can impact directly on the coastal processes and morphology. Structures built with dredging activities pose similar impacts include: <ul style="list-style-type: none"> <li>• Ports and marinas.</li> <li>• Active coastal protection structures (groynes breakwaters, and all other structures occupying part of the foreshore and/or the shore face).</li> <li>• Passive coastal structures (revetments, seawalls and all other structures).</li> <li>• Reclamation works</li> <li>• Dikes Inlet jetties at tidal inlets.</li> <li>• Sea works at river mouths.</li> <li>• Embankment for bridges and runways.</li> <li>• Intake and outlet structures crossing the littoral zone.</li> <li>• Sewerage outfalls and pipelines.</li> </ul> </li> <li>• Soft intervention in the littoral zone: <ul style="list-style-type: none"> <li>• Backshore nourishment.</li> <li>• Beach nourishment.</li> <li>• Shore face nourishment.</li> <li>• Beach sand mining.</li> </ul> </li> <li>• Soft interventions offshore the littoral zone: <ul style="list-style-type: none"> <li>• Sand mining.</li> <li>• Dumping of dredging material.</li> </ul> </li> </ul>

Acts, Policy Documents and Guidelines	Aspects of Control
<b>Planning Policy Documents</b>	
	<ul style="list-style-type: none"> <li>• Interventions in rivers and in upstream areas: <ul style="list-style-type: none"> <li>• Sand mining.</li> <li>• Deepening of river areas for navigation purposes.</li> <li>• Construction of dams.</li> <li>• Drainage and irrigation schemes.</li> <li>• Construction of river dikes.</li> <li>• Spill of sediments from sand and gravel mining.</li> </ul> </li>   <li>• NPP-CZ highlighted that coastal developments along the coastline such as coastal reclamations and dredging have been identified as the potential threat to marine ecosystem including river terrapins from sand mining activities along sandy riverbanks.</li>   <li>• Management Criteria related to coastal reclamation as according to NPP are: <p><i>“No new development, expansion of existing development or resource extraction (all forms of mining) shall be permitted in the Coastal ESA (CESA) Rank 1 areas, which includes the existing permitted areas, proposed protected areas of NPP-CZ and marine park islands.”</i></p> <p><i>“No new development, expansion of existing development or resource extraction (all forms of mining) shall be permitted in the CESA Rank 2 areas, which includes all other natural habitats outside of CESA 1”.</i></p> </li>   <li>• For CESA 3; all other areas outside of CESA Rank 1 and Rank 2, within 1 km inland from the Mean High Water Level (but further inland at river mouths, depending on local flood regimes) the management criteria are: <ul style="list-style-type: none"> <li>• Land use zoning shall take into consideration the severity of coastal hazards and the impact of the development on coastal habitats and coastal morphology.</li> </ul> </li> </ul>

Acts, Policy Documents and Guidelines	Aspects of Control
<b>Planning Policy Documents</b>	
	<ul style="list-style-type: none"> <li>• Land use zoning and coastal management options recommended are tabulated in the Coastal Hazard Guidance and Land Use Zoning Guidance of NPP-CZ.</li> <li>• Reclamation in lower river systems will reduce the size of the river channel along with the amount of water flowing in and out the system, therefore reducing the self-cleansing flushing capacity of the system.</li> <li>• Land reclamation and construction of structures such as piers directly on top of coral reefs result in landscape alteration and destruction of coral reefs.</li> </ul>

**Table 2.3.2: ESA Framework for Peninsular Malaysia (Coastal Areas)**

<b>ESA Level 3</b>	
<b>Environmental Sensitive Areas</b>	<b>Management Criteria</b>
<b>Buffer zone 500m around Level 2 ESA</b>	Controlled development where the type and intensity of development should be subject to limitations. The limitation features include coastal zone erosion and areas exposed to flood threats.
<b>Water catchment area and groundwater recharge zones</b>	Water catchment areas and recycling zones should be identified at the level of the State Structure Plan and Local Plan.
<b>Islands and Marine Parks</b>	All development on islands and marine parks must comply with existing and future guidelines.
<b>Coastal area</b>	All coastal development needs to comply with RFZPPN, Integrated Shoreline Management Plan (ISMP) state, existing and future guidelines

Source: National Physical Plan 3

### 2.3.2 Integration of Environmental Compliance into Project Planning

A typical project cycle involves many phases and requires inputs from various technical specialists and consultants to provide for submissions and applications to the various approving authorities, e.g. local authority. Throughout, the environmental assessment can be incorporated as follows:

#### (a) **Planning Phase**

The Project Proponent will develop a conceptual proposal and identify suitable sites for feasibility assessment.

At this phase, The Project Proponent is also required to ensure that all national and state policies related to the project are addressed with the relevant authorities before carrying out the EIA.

Environmental Screening and Scoping: The Project Proponent shall carry out initial screening to determine if the Project falls under any prescribed activity based on the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015.

If it does, then a scoping exercise will be undertaken to assess the environmental aspects of the site. This will ensure that the significant environmental issues are scoped early and identification of possible P2M2s can be incorporated into the project design early on. Findings shall be presented in the TOR report for the DOE endorsement.

#### (b) **Feasibility and Project Design Phase**

The Project Proponent will conduct the technical studies and project design for submission to the approving authorities represented by various government technical agencies, which will review the application and provide the approvals if all submissions are in order.

EIA: If a project is a prescribed activity under the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015, an EIA is required to be prepared and approved by the DOE before a project can be submitted for development order (DO) approval by the local authorities. The Project Proponent and Qualified Person(s) shall carry out the studies identified in the TOR during the screening and scoping stage, and develop P2M2 for the project.

(c) **Construction and Operations Phase**

Upon obtaining the project approval, e.g. DO or Planning Permission by the Local Authorities, the project shall proceed with construction and later on, operations. Typical activities include site access establishment, mobilisation of machineries and equipment, setting up base camp, land clearing and structural works.

Post-EIA: Environmental controls and management will be through the Environmental Management Plan (EMP) which will be utilised by the Project Proponent and contractors to implement the P2M2s and environmental monitoring and auditing, throughout the construction phase and if necessary, into the operational phase.

### **2.3.3 Project Brief**

At the start of a project, the Project Proponent shall provide a project brief, containing basic information of the project, as an overview to the Qualified Person. This will facilitate identification of the scope and requirements of the environmental compliance for that project.

The Qualified Person (Environmental Consultant) shall then assess if the project falls within a prescribed activity based on the Environmental Quality (Prescribed Activity) (Environmental Impact Assessment) Order 2015 (see next section for more on the legislative requirements).

All the information shall then form part of the TOR but may be subjected to changes as the project ensues. Information provided shall be ensured adequate to provide a basis for the environmental screening and scoping, which can be detailed or revised later in the EIA.

## **2.4 STAKEHOLDER ENGAGEMENT**

The EIA process has provided adequate mechanisms to enable the general public access to contribute their views and comments. Their recommendations will be taken into account in the EIA and by the EIA Technical Review Committee (EIATRC).

The mechanisms for stakeholders' participation in the EIA process can be direct, indirect and formal or informal. The EGIM (DOE, 2016) has highlighted this as follows:

*...“EIA is a multi-disciplinary study on the environmental components such as water quality, air quality, waste management, environmentally sensitive areas and natural resources. It involves the participation of government agencies, non-governmental agencies (NGOs), academicians, experts and environmental practitioners including qualified and competent persons, industries and public at large. Hence, the EIA process should provide adequate opportunities to all stakeholders including the affected public to express their concerns and provide inputs for decision making process by relevant approving authority.”*

#### 2.4.1 Identification of Stakeholders

The selection of stakeholders can be generally grouped into three main groups from:

- (a) GAs which have the powers and legal rights to administer, enforce and approve the project.
- (b) General public, organisations, properties and land owners who may be directly or indirectly be affected by the project.
- (c) Special interest groups or organisations representing their interests, e.g. NGOs related to environmental conservation.

**Table 2.4.1** below provides list of possible stakeholders to be considered for stakeholder engagement process related to dredging and land reclamation project. Please note that the list provided below is an indicative, but non-exhaustive where the relevant stakeholders may vary depends on the project nature. The qualified person may identify any relevant stakeholders to be engaged for the project.

**Table 2.4.1: List of Possible Stakeholders**

Stakeholder	Roles and Responsibility
DOE	<ul style="list-style-type: none"> <li>• Administration of the EIA process under EQA 1974.</li> <li>• Responsible for the issuance of the COA for the EIA.</li> <li>• Post EIA approvals, monitoring and enforcement.</li> </ul>
Project Proponent	<ul style="list-style-type: none"> <li>• The party to carry out the development and responsible for obtaining all necessary approvals for the site.</li> <li>• Involved in the management of the project at all stages of development.</li> </ul>

Stakeholder	Roles and Responsibility
Gas:	<ul style="list-style-type: none"> <li>• GAs which have roles and functions in the project and are responsible for the issuance of approvals for studies, technical reports and plans for the project.</li> <li>• Engagements shall assist in determining GA requirements for the project that needs to be addressed by the Project Proponent, and also to assist in obtaining information under their respective agencies jurisdiction.</li> <li>• The possible GAs to be considered for engagements are follows: <ul style="list-style-type: none"> <li>• State Economic Planning Unit</li> <li>• Department of Mineral and Geoscience (JMG)</li> <li>• Public Works Department (JKR)</li> <li>• Local Authorities</li> <li>• Department of Drainage and Irrigation (DID)</li> <li>• Fisheries Department</li> <li>• Marine Department</li> <li>• Port Commission/Port Authority</li> <li>• Forestry Department Peninsular Malaysia</li> <li>• Department of Marine Parks Malaysia</li> <li>• Federal Department of Town and Country Planning (PLANMalaysia)</li> </ul> </li> </ul>
Affected Public and Local Population	<ul style="list-style-type: none"> <li>• The public or local population that may be directly or indirectly affected by the project and whose concerns and interests need to be addressed as part of the EIA.</li> <li>• Preliminary engagement may include identifying public concerns for the project that needs to be addressed and feedback on mitigation measures.</li> <li>• These may include: <ul style="list-style-type: none"> <li>• Local residents/community.</li> <li>• Fishermen.</li> <li>• Tourists.</li> <li>• Land owner.</li> <li>• Ports/Marina Operators.</li> <li>• Recreation/water sport's activity operator.</li> </ul> </li> </ul>
NGOs	<ul style="list-style-type: none"> <li>• Provide input and feedback on issues of special interest. These may include: <ul style="list-style-type: none"> <li>• NGO's related to environment.</li> <li>• Sailing institutions.</li> <li>• Other related NGOs.</li> </ul> </li> </ul>

### **2.4.2 Methods in Engagement**

The Project Proponent and Qualified Persons shall carry out preliminary engagements to achieve the following:

- (a) Identify areas of policy and regulatory compliance from the relevant GAs.
- (b) Obtain initial data and views from the GAs and stakeholders (communities, local leaders, etc.) to assist in preparation of the TOR.
- (c) Obtain stakeholder feedback in identifying areas of improvement to the initial design and concept.

### **2.4.3 Documentation and Reporting**

- (a) Findings from the stakeholder engagement shall be incorporated into the TOR, especially in regards to policy compliance.
- (b) Proof of engagement can be in the form of written reports, official response letters from the GAs, minutes of meeting (MOM), photos, etc.

## CHAPTER 3 APPROACH AND METHODOLOGY

### 3.1 INTRODUCTION

TOR is the first major milestone in the overall EIA procedure process.

The Project Proponent and Qualified Person are required to carry out the environmental screening and scoping, with the findings incorporated into the TOR.

This Chapter shall detail the steps in the preparation and submission of the TOR for the endorsement of DOE.

### 3.2 ENVIRONMENTAL SCREENING PROCEDURES

Environmental Screening is carried out to determine whether a proposed project is a prescribed activity under the Environmental Quality (Prescribed Activity) (Environmental Impact Assessment) Order 2015.

Screening is important as there are a large number of projects and activities that are potentially subjected to an EIA. It also important that any project shall be screened to have complied with all Federal and/or state policy matters before proceeding with an EIA.

If the proposed project has components falling within both First and Second Schedule prescribed activities, the Second Schedule EIA shall prevail and shall encompass all EIA requirements required of those activities. In which case, all other relevant EIA Guidelines must be referred to.

### 3.3 ENVIRONMENTAL SCOPING

The main objective of environmental scoping is to identify the environmental attributes and issues to determine the focus, depth, and spatial and temporal boundaries of the EIA that are deemed significant and requiring assessment in detail as part of the EIA process.

Scoping shall be carried out at an early stage of the project cycle. It enables the EIA to focus on the significant issues, impacts and sensitive receptors.

Scoping shall encompass all environmental aspects (physico-chemical, biological and socio-economic) to enable an overall evaluation of the significant impacts. At the start of the scoping exercise, no attempt should be made to exclude or pre-judge any issues of concern.

The scoping exercise comprises the following steps:

- (a) Site Suitability Assessment (SSA): Based on the site constraints and technical studies, the Project Proponent shall consider all alternatives or options to refine and improve upon the original concept design.
- (b) Determination of Study Boundary: The Qualified Person shall determine the extent of the Zone of Study (ZOS) and Zone of Impact (ZOI) based on site conditions and environmental sensitivity.
- (c) Baseline Data Review: The Qualified Person shall carry out qualitative assessment based on desktop study and literature review. These may be supplemented by initial site investigations and public engagements.
- (d) Determination of Key Project Activities: The Project Proponent shall outline the key project activities that will be carried out during the various phases of the project (pre-construction, construction and operations including abandonment at all phases).
- (e) Identification of Significant Impacts and Priority Setting: This step will involve preliminary identification of significant issues for further detailed assessment in the EIA. Less significant issues shall also be addressed accordingly in the EIA study but through general/qualitative impact prediction and evaluation.
- (f) Selection of Mitigation Measures: Based on the magnitude of the identified significant impacts, the Qualified Person shall determine the potential mitigation measures that need to be provided in detail in the EIA.
- (g) Preparation and Submission of ESI and TOR: Findings from the scoping shall be compiled, collated, analysed and reported for DOE's endorsement.

### 3.4 SITE SUSTAINABILITY ASSESSMENT

During project planning, the Project Proponent shall consider alternatives and options to the proposed site, concept, layout, design and methodologies based on the findings in the feasibility reports and from the scoping exercise. This will form part of the SSA detailed in the EGIM (DOE, 2016) and required for the EIA.

This step may involve a re-evaluation of the project site, concept, layout, design and methodologies to take into account the new selected options. At this juncture, the P2M2s and BMPs can still be incorporated into the project design for the final option. The final selected option shall be environmentally feasible and pragmatic.

A 'No Project' option shall also be assessed and its implications discussed comparatively with the 'With Project' option.

### 3.5 STUDY BOUNDARY

The scoping exercise shall also determine the study boundaries to gather information for the baseline for the TOR/ESI.

The Qualified Person shall obtain the necessary relevant information on the projects and the surrounding ZOS and the ZOI, either available from secondary sources and through preliminary data gathering at the site.

In terms of criteria, the ZOS is the study area generally encompasses a 5-km radial zone from the project boundary. However, the potential impacts from the Project may extend beyond the ZOS and hence, that impact area is termed the ZOI.

For linear component of the project such as access roads, the ZOS shall cover a 1-km corridor [500 m on either side of the Right of Way (ROW)] while the ZOI may extend further, based on the EIA assessment.

The level of detail for the environmental studies shall be based on factors such as project area size, type, activities and potential impacts to surrounding areas, which shall be determined by the Qualified Person in carrying out the EIA.

### 3.6 BASELINE DATA REVIEW

**Table 3.6.1** lists the indicative requirements for baseline description in the environmental scoping exercise. Baseline information shall be qualitative but adequate to assess the potential impacts resulting from the project on the sensitive receptors and vice-versa. However, if there is available supporting information available, these can be included as well.

If any of the items in the table are unavailable at the time of scoping, but is important to the EIA, it must be recorded as items to be addressed at the EIA stage. Items irrelevant or insignificant to the project can and shall be omitted during scoping. Any relevant items shall be prioritised based on the levels of significance.

**Table 3.6.1: Baseline Requirements for Environmental Scoping**

Baseline	Requirements	Data Source
<b>Physico-chemical</b>		
Landuse	<ul style="list-style-type: none"> <li>• Landuse maps and photos</li> <li>• Description of existing and future landuse (5-km ZOS)</li> <li>• Identification of ESAs.</li> </ul>	<ul style="list-style-type: none"> <li>• Topography maps.</li> <li>• Aerial or satellite imagery.</li> <li>• Structure and local plans (PLANMalaysia).</li> <li>• Site investigations.</li> </ul>
Geology/ Hydrogeology	<ul style="list-style-type: none"> <li>• Description of local and regional geology.</li> <li>• Locations of aquifer and groundwater abstraction wells.</li> </ul>	<ul style="list-style-type: none"> <li>• Geological and hydrogeological maps by JMG.</li> <li>• Geological Terrain Mapping (GTM) report.</li> </ul>
Soil and Terrain	<ul style="list-style-type: none"> <li>• Topography and slopes.</li> <li>• Soil investigation (SI).</li> <li>• Construction suitability map.</li> </ul>	<ul style="list-style-type: none"> <li>• Site survey.</li> <li>• Soil map by Department of Agriculture (DOA).</li> <li>• SI report.</li> <li>• GTM report.</li> </ul>
Climate	<ul style="list-style-type: none"> <li>• Climate data (min 5 years).</li> </ul>	<ul style="list-style-type: none"> <li>• Malaysian Meteorological Department (METMalaysia).</li> </ul>
Hydrology	<ul style="list-style-type: none"> <li>• River systems and catchment areas.</li> <li>• Flood prone areas.</li> <li>• Downstream receptors.</li> </ul>	<ul style="list-style-type: none"> <li>• Topography maps.</li> <li>• Department of Irrigation and Drainage (DID) flood maps.</li> <li>• Site observations.</li> </ul>

Baseline	Requirements	Data Source
Water Quality	<ul style="list-style-type: none"> <li>• Water quality data (if any).</li> <li>• Locations of water pollution sources.</li> <li>• Locations of water intake points (WIPs) and water treatment plants (WTPs).</li> </ul>	<ul style="list-style-type: none"> <li>• State water resources departments.</li> <li>• Published reports by water agencies and DOE.</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>• Air quality data (if any).</li> <li>• Locations of air polluting sources.</li> </ul>	<ul style="list-style-type: none"> <li>• DOE published data.</li> <li>• Site observations.</li> </ul>
Noise and Vibration Level	<ul style="list-style-type: none"> <li>• Locations of high noise and vibration generators.</li> </ul>	<ul style="list-style-type: none"> <li>• Site observations.</li> </ul>
<b>Biological</b>		
Ecosystem	<ul style="list-style-type: none"> <li>• Description of existing ecology and habitats.</li> <li>• Identification of ESAs (forest reserve, wildlife reserves and sanctuaries, wetlands, mangroves, fisheries, etc.)</li> <li>• Presence of endemic, rare, threatened, endangered and near extinct flora and fauna.</li> </ul>	<ul style="list-style-type: none"> <li>• Secondary information.</li> <li>• Data from various relevant departments such as the Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN) and Forestry Department Peninsular Malaysia (JPSM).</li> <li>• <i>Buku Kawasan Sensitif Alam Sekitar</i> (DOE).</li> <li>• Site observations.</li> </ul>
<b>Social Aspects</b>		
Demography	<ul style="list-style-type: none"> <li>• Details of demographics.</li> <li>• Identification of social impact stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>• Population census from Department of Statistics.</li> <li>• Local plans from PLANMalaysia.</li> <li>• Interviews.</li> </ul>
Public Health	<ul style="list-style-type: none"> <li>• Description of public health status.</li> </ul>	<ul style="list-style-type: none"> <li>• Morbidity statistics and public health data from Ministry of Health (MOH).</li> </ul>
Heritage, Culture and Archaeology	<ul style="list-style-type: none"> <li>• Locations of historical and cultural sites.</li> <li>• Location of Orang Asli areas and settlements.</li> </ul>	<ul style="list-style-type: none"> <li>• Data from Department of Museums, National Heritage Department, Jabatan Kemajuan Orang Asli (JAKOA), etc.</li> </ul>

Baseline	Requirements	Data Source
Traffic	<ul style="list-style-type: none"> <li>• Access to project site.</li> <li>• Transport options.</li> </ul>	<ul style="list-style-type: none"> <li>• Road maps.</li> <li>• Site visit.</li> </ul>
Infrastructure, Utilities and Amenities	<ul style="list-style-type: none"> <li>• Water, electricity, sewerage, road, telecommunication and waste.</li> </ul>	<ul style="list-style-type: none"> <li>• Information from utility providers.</li> <li>• Local plans from PLANMalaysia.</li> </ul>

Note: The list is not exhaustive and not all the above may be relevant to the project. It is the responsibility of the Protect Proponent and Qualified Person to determine the relevant information required for environmental assessment and compliance.

### 3.7 DETERMINATION OF KEY PROJECT ACTIVITIES

Project activities are the basis for assessing the potential impacts for land reclamation and dredging projects. The key activities can be categorized based on the project phases that are pre-construction, construction and operations including abandonment at all phases. The pre-construction activities include pre-feasibility, feasibility and design stage of the project). The summary list of activities in a typical land reclamation and dredging project by phases as shown in **Tables 3.7.1 - 3.7.3**. The list is not exhaustive and the Qualified Person shall add or delete to the list, whenever and wherever necessary.

**Table 3.7.1: List of Typical Project Activities with Issues of Concern during Pre-Construction Phase**

Activities	Issues of Concern
<u>Site access</u> <ul style="list-style-type: none"> <li>• Vegetation and land clearing.</li> <li>• Establish temporary stream/river crossing.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion.</li> <li>• Loss of flora and fauna.</li> <li>• Water pollution (silt).</li> <li>• Air and noise pollution.</li> </ul>
<u>Site surveys</u> <ul style="list-style-type: none"> <li>• Commissioning of topography and bathymetry surveys.</li> <li>• Establishment of temporary camp sites.</li> <li>• Survey works.</li> </ul>	
<u>Soil investigation and data sampling</u> <ul style="list-style-type: none"> <li>• Commissioning of surveys.</li> <li>• Establishment of temporary camp sites including setting up floating pontoon or barge for soil investigation drilling rig.</li> <li>• Site measurement and survey works.</li> <li>• Obtain site samples.</li> <li>• Lab analysis of samples.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion.</li> <li>• Loss of flora and fauna.</li> <li>• Water pollution (silt).</li> <li>• Air and noise pollution.</li> <li>• Groundwater contamination.</li> </ul>

Activities	Issues of Concern
<u>Environmental assessment</u> <ul style="list-style-type: none"> <li>• Site assessment.</li> <li>• Collection of samples.</li> <li>• Analysis of samples.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion and surface runoff.</li> </ul>

Note: The list is not exhaustive and not all the above may be relevant to the project. It is the responsibility of the Protect Proponent and Qualified Person to determine the relevant information required for environmental assessment and compliance.

**Table 3.7.2: List of Typical Project Activities with Issues of Concern during Construction Phase**

Activities	Issues of Concern
<u>Establish access road</u> <ul style="list-style-type: none"> <li>• Cut new path to project site and/or using existing roads on land in coastal areas.</li> <li>• Establish drainage and culverts.</li> <li>• Levelling and compacting of the road surface.</li> <li>• Laying of aggregates.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion</li> <li>• Loss of flora and fauna.</li> <li>• Water pollution (silt).</li> <li>• Air and noise pollution.</li> <li>• Groundwater contamination.</li> </ul>
<u>Site clearing and biomass removal</u> <ul style="list-style-type: none"> <li>• Cut, removal and disposal of vegetation including logging where applicable.</li> <li>• Demolition works of existing structures.</li> <li>• Establish temporary waste disposal site.</li> </ul>	<ul style="list-style-type: none"> <li>• Wastes management.</li> <li>• Soil erosion.</li> <li>• Air and noise pollution.</li> <li>• Loss of biodiversity.</li> </ul>
<u>Base camp and site facilities establishment</u> <ul style="list-style-type: none"> <li>• Construct site office, worker quarters, canteen, toilets and bathing areas, stockpile areas, storage facilities and workshops.</li> <li>• Establish utilities and infrastructure: power supply, water, telecommunications, etc.</li> <li>• Provide appropriate treatment systems, e.g. for toilets, waste collection areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Water pollution (sewage and sullage).</li> <li>• Drainage (runoff from site).</li> <li>• Air and noise pollution.</li> <li>• Wastes (municipal wastes).</li> <li>• Safety and health (vector-borne disease).</li> </ul>
<u>Establish vessel facilities</u> <ul style="list-style-type: none"> <li>• Construct temporary landing points such as jetty and vessel anchorage areas.</li> <li>• Establish fuel storage and refuelling areas.</li> <li>• Establish vessel management plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Marine pollution.</li> <li>• Scheduled wastes management.</li> </ul>

Activities	Issues of Concern
<p><u>Worker recruitment, mobilisation of equipment and materials</u></p> <ul style="list-style-type: none"> <li>• Employ workers to carry out construction work.</li> <li>• Transport equipment and materials required for construction to the storage areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Socio-economy (employment, social conflicts – from SIA).</li> <li>• Safety and health (communicable disease, sanitary conditions, accidents and injury).</li> <li>• Air and noise pollution,</li> <li>• Wastes (municipal and construction wastes).</li> <li>• Traffic (congestion from heavy vehicle transportation).</li> </ul>
<p><u>Earthworks for land-based and water-based activities (land reclamation and dredging)</u></p> <ul style="list-style-type: none"> <li>• Construction of erosion and sedimentation control measures such as BMPs.</li> <li>• Dredging and filling works.</li> <li>• Import of fill material from approved source.</li> <li>• Disposal of unsuitable dredged material to approved disposal area.</li> <li>• Platform formation for the above water filling works.</li> <li>• Ground treatment works.</li> <li>• Compaction and exaction or trimming to the required handover levels.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion/slope failure.</li> <li>• Hydrology and drainage (Increased runoff, impacts to marine environment).</li> <li>• Water pollution (silt and debris).</li> <li>• Air (dust) and noise pollution.</li> <li>• Wastes (spoil disposal)</li> <li>• Visual/aesthetics.</li> </ul>
<p><u>Infrastructure works</u></p> <ul style="list-style-type: none"> <li>• Diversion of streams and existing drainage,</li> <li>• Relocation of existing pipelines, outlets, drains, or telecommunication and power supply cables.</li> <li>• Construction of permanent drainage system, utility pipelines, power supply, telecommunication, outfall and waste treatment system.</li> </ul>	<ul style="list-style-type: none"> <li>• Water pollution (silt and debris).</li> <li>• Wastes management.</li> </ul>

Activities	Issues of Concern
<p><u>Structural works (onshore and offshore / land-based and water-based) and facilities establishment</u></p> <ul style="list-style-type: none"> <li>• Construction of shoreline protection structure.</li> <li>• Formworks and concreting works for structures.</li> <li>• Construction of retaining wall and steel structures.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion/slope failure.</li> <li>• Hydrology and drainage (Increased runoff, impacts to downstream users).</li> <li>• Water pollution (silt and debris).</li> <li>• Air (dust) and noise pollution.</li> <li>• Wastes (spoil disposal)</li> <li>• Visual/aesthetics.</li> </ul>
<p><u>Waste disposal</u></p> <ul style="list-style-type: none"> <li>• Provision of temporary waste or spoils collection to approved disposal sites.</li> <li>• Collection of accumulated wastes or spoils to approved disposal sites.</li> <li>• Sewage treatment and management.</li> </ul>	<ul style="list-style-type: none"> <li>• Wastes (spoil, municipal, scheduled wastes)</li> <li>• Air pollution (odour).</li> <li>• Health impact (disease, vectors, accidents).</li> <li>• Water pollution (floatables, sewage, leachate).</li> </ul>
<p><u>Establishment of permanent access</u></p> <ul style="list-style-type: none"> <li>• Construction of permanent access road.</li> <li>• Closure of temporary access. Removal of temporary structures as per abandonment plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion.</li> <li>• Slope stability/failure.</li> <li>• Water pollution (silt).</li> </ul>
<p><u>Final finishing and landscaping</u></p> <ul style="list-style-type: none"> <li>• Field testing and post land reclamation soil investigation.</li> <li>• Handover survey for the final platform level.</li> <li>• Surface covers or revegetation and landscaping.</li> </ul>	<ul style="list-style-type: none"> <li>• Visual/aesthetics.</li> </ul>

Note: The list is not exhaustive and not all the above may be relevant to the project. It is the responsibility of the Protect Proponent and Qualified Person to determine the relevant information required for environmental assessment and compliance.

**Table 3.7.3: List of Typical Project Activities with Issues of Concern during Operational and Closure/Exit Phases**

Activities	Issues of Concern
<u>Occupation and operations of project</u> <ul style="list-style-type: none"> <li>• Management of impacts from human activities in the project area.</li> <li>• Traffic management.</li> <li>• Solid waste management.</li> <li>• Explosion incident during cargo handling or transport.</li> <li>• Spillage of cargo or spillage of waste from vessel during anchorage or transport.</li> <li>• Vessels collision.</li> </ul>	<ul style="list-style-type: none"> <li>• Air and noise pollution (traffic, human activities).</li> <li>• Traffic (congestion).</li> <li>• Wastes (municipal wastes).</li> <li>• Socio-economy (employment, economic growth).</li> <li>• Marine pollution.</li> </ul>
<u>Vessel maintenance facilities</u> <ul style="list-style-type: none"> <li>• Marine traffic management.</li> <li>• Vessel facilities maintenance.</li> <li>• Waste management.</li> </ul>	<ul style="list-style-type: none"> <li>• Marine pollution.</li> <li>• Scheduled wastes management.</li> </ul>
<u>Infrastructure, utility and amenities maintenance</u> <ul style="list-style-type: none"> <li>• Maintenance of sewage treatment</li> <li>• Monitoring of effluent quality</li> <li>• Conduct repairs as necessary</li> <li>• Maintenance of wharf, operation building and structures</li> <li>• Maintenance of infrastructure: roads, drainage, power supply, telecommunications, etc.</li> <li>• Maintenance of landscaping.</li> </ul>	<ul style="list-style-type: none"> <li>• Water pollution (sewage and sullage).</li> <li>• Air and noise pollution.</li> <li>• Safety and health.</li> <li>• Wastes (municipal wastes).</li> <li>• Visual/aesthetics.</li> </ul>
<u>Site decommissioning</u> <ul style="list-style-type: none"> <li>• Demolition of unwanted structures and buildings.</li> <li>• Removal of machinery, materials and workers from the project area.</li> <li>• Fill in depressions and holes.</li> <li>• Removal of wastes.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion.</li> <li>• Water pollution (silt).</li> <li>• Air and noise pollution.</li> <li>• Safety and health.</li> <li>• Wastes (demolition wastes).</li> </ul>

Activities	Issues of Concern
<u>Rehabilitation works</u> <ul style="list-style-type: none"> <li>• Erect hoarding</li> <li>• Establish protection measures for slopes and exposed areas (compaction, turfing and structural measures)</li> <li>• Provide coastal protection measures.</li> <li>• Revegetation or landscaping,</li> <li>• Coral rehabilitation and regeneration.</li> <li>• Provide signage and warning to alert public and adjacent community.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion.</li> <li>• Water pollution (silt).</li> <li>• Air and noise pollution.</li> <li>• Safety and health.</li> <li>• Wastes (demolition wastes).</li> <li>• Aesthetic (visual impacts).</li> </ul>

Note: The list is not exhaustive and not all the above may be relevant to the project. It is the responsibility of the Protect Proponent and Qualified Person to determine the relevant information required for environmental assessment and compliance.

### 3.8 IDENTIFICATION OF SIGNIFICANT IMPACTS AND PRIORITY SETTING

#### 3.8.1 Selection of Method

There are many methods and tools to conduct the scoping exercise. These include checklists, matrices, or any other accepted methods, to assist in systematically organising, collating and analysing the data for the project. At the TOR stage, qualitative assessment is adequate but quantitative data can be provided to support the assessment.

A useful tool is the Environmental Scoping Matrix (ESM) to amalgamate the scores from a series of criteria; ranging from major to minor negative and positive magnitudes of environmental impacts. The Scoping Matrix is appended as **Appendix 5**.

The Qualified Person and the Project Proponent's input is vital at this stage as their knowledge and experience would ensure appropriate weightage is given to the issues under assessment.

From the scoping outputs, a priority list of environmental impacts shall be determined for in-depth studies and assessments in the EIA.

### 3.8.2 Key Issues Related to Land Reclamation and Dredging Projects

Some of the key environmental impacts that should be highlighted in the TOR and EIA are:

- (a) Marine ecology and coastal areas: Marine ecology and coastal areas comprised diverse habitats of mangrove forests, mudflats, coral reefs, sandy beaches, dunes, estuaries and coastal forests. Any disturbance to them could lead to environmental deterioration Marine Park Department, Department of Wildlife and National Parks of Peninsular Malaysia (PERHILITAN) and in the case of terrestrial forests, Department of Forestry Peninsular Malaysia have to be engaged to discuss measures to safeguard these sensitive marine ecology and coastal areas.
- (b) Changes to the coastal processes: Coastal areas are very dynamic systems, influenced by marine processes such as waves, currents, tide, wind, coastal drift, erosion and accretion. These may be affected when land reclamation and dredging works are carried out at the project site, where in certain cases piles, jetties and other structures are constructed as part of the land reclamation and dredging works. The change in coastal morphology will increase or decrease the rate of erosion and accretion along the coastline. Disturbance to the seabed also results in a sediment plume, which can spread by the currents to a wide area, if not properly mitigated. The impact during construction phase will also be studied to determine the temporary and permanent impacts of the relevant project key activities.
- (c) Site access (land and water): When constructing in water, access from land and water may be required. Two considerations must be taken into account; the management of vessels in terms of passageways and secondly the anchorage areas, harbourage, refuelling and waste management and locations for stockpiling materials brought via the sea. Vessel activity close to sensitive areas may result in deterioration of the marine ecology, water pollution and disrupt existing marine traffic.

Impacts from land access may not be severe if roads and tracks are already available. However, if new access is built, this will involve land clearing and construction works, which leads to erosion and sedimentation and loss of flora and fauna.

- (d) Hazards: Over time, coastal erosion may undermine the foundation of structures built too close to the coast. Development in the coastline is also prone to natural risks and disasters such as floods, sea level rise and tsunamis. Adequate setbacks and adaptive measures are needed in the development design.
- (e) Carrying capacity: For land reclamation and dredging works at coastal areas, the carrying capacity of the area should be considered to avoid detrimental effects such as overcrowding, causing discomfort to the locals, stress on utilities, amenities and infrastructure (waste, water supply, electricity, sewerage treatment, etc.) on the environment.
- (f) Conflicts due to shared usage: The coastal areas have a variety of highly valuable resources. Developing such areas may lead to depletion of these resources such as mangroves, fisheries and coral reefs. These systems are important to sustain ecosystem services and also produce economic resources. Adverse impacts to protected, historical and heritage sites should be taken into consideration.
- (g) Visual effects: Any deterioration of the coastal areas will affect the aesthetics and scenic quality of these areas. Similarly, man-made structures may not be compatible with the natural environment that results in lowering the aesthetic value for tourism.

### 3.8.3 Determining EIA Study Requirements

The preceding sections have identified the key environmental impacts. **Table 3.8.1** provides a list of the studies for the EIA study. The list is indicative and non-exhaustive and the Qualified Person's judgement is needed since all projects in coastal areas and/or marine parks are very different from one another.

The table also provides a List of Indicative studies that may or may not be required by other GAs related to the project in coastal and marine parks. Again, the list is not exhaustive and depends on the requirements of the respective GAs.

**Table 3.8.1: Study Areas for the EIA**

Study Reference	Prescribed Activity				
	First Schedule Activity 7		First Schedule Activity 15	Second Schedule Activity 7	
	Land-based	Water-based	Water-based	Land-based	Water-based
Slope Analysis (Landward) Terrain and slope classification	√	-	√	√	-
Soil Erosion Analysis (Landward) Soil loss and sediment yield (pre-construction and construction)	√	-	-	√	-
Land Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2)	√	-	-	√	-
P2M2	√	√	√	√	√
Baseline sampling (water, air, noise, vibration)* <sup>1</sup>	√	√	√	√	√
Topographic Survey	√	-	-	√	-
Bathymetry Survey* <sup>2</sup>	-	√	√	-	√
Hydraulic Study* <sup>2</sup>	-	√	√	-	√
Shoreline Assessment* <sup>3</sup>	-	√	√	-	√
Ecological Habitat Mapping* <sup>4</sup>	-	√	√	√	√
Carrying Capacity Study* <sup>5</sup>	-	-	√	√	√
Stakeholder Consultation	√	√	√	√	√
Post-EIA Monitoring Programme	√	√	√	√	√
Erosion and Sediment Control Plan (ESCP)	√	√	√	√	√
Terrestrial, aquatic and marine flora and fauna assessment	√	√	√	√	√
Marine Baseline Traffic Assessment (Stage 1 Study)* <sup>6</sup>	-	√	√	-	√
Marine Risk Assessment (Stage 2 Study) * <sup>7</sup> to be prepared prior to work commencing on site	-	√	√	-	√
Landuse compatibility	If required				
Social Impact Assessment (SIA)	If required				
Traffic Impact Assessment (TIA)	If required				
Health Impact Assessment (HIA)	If required				
Heritage Impact Assessment	If required				
Wastes (biomass, scheduled wastes: construction, municipal, etc)	If required				

## Notes:

- (i) First Schedule Activity 7: Coastal reclamation or land reclamation along river banks involving an area of less than 50 hectares.
- (ii) First Schedule Activity 15: (a) Capital dredging (b) Disposal of waste dredged materials
- (iii) Second Schedule Activity 7: (a) Coastal reclamation or land reclamation along river banks involving an area of 50 hectares or more (b) Coastal reclamation or land reclamation along river banks within or adjacent or near to environmentally sensitive areas (c) Reclamation for man-made island
- (iv) <sup>\*1</sup> Based on site conditions and project activities.
- (v) <sup>\*2</sup> Requirements based on the Guidelines for Preparation of Coastal Engineering Hydraulic Study and Impact Evaluation [Department of Irrigation and Drainage (DID), 2001].
- (vi) <sup>\*3</sup> Requirements based on DID Manual Volume 2 - Coastal Management (DID, 2009)
- (vii) <sup>\*4</sup> If adjacent to ESAs Rank I, II and III as defined by PLANMalaysia.
- (viii) <sup>\*5</sup> Carrying capacity shall be based on PLANMalaysia criteria and requirements (physical; infrastructure and utilities; and beach area) as defined in the Laporan *Tahap Tampungan dan Garis Panduan Pembangunan Pulau (JPBD, 2006)*.
- (ix) <sup>\*6</sup> Indicates that the scope of Marine Baseline Traffic Assessment (Stage 1 Study) is described in detailed Table 4.1
- (x) <sup>\*7</sup> Marine Risk Assessment (Stage 2) study scope shall be determined and approved by Marine Department of Peninsular Malaysia.
- (xi) The list is not exhaustive and not all the above may be relevant to the project. It is the responsibility of the Project Proponent and Qualified Person to determine the relevant information required for environmental assessment and compliance.

### 3.9 SELECTION OF MITIGATION MEASURES

- (a) Based on the significant impact, the Qualified Person shall assess the best available technologies (BATs) and options for P2M2 to address the identified key environmental issues.
- (b) At this point in the TOR/ESI, the identified measures shall be descriptive to be further detailed in the EIA stage.

### 3.10 PREPARATION AND SUBMISSION OF TOR/ESI

- (a) Findings from the scoping exercise shall be incorporated into the ESI as information to develop the TOR.
- (b) The TOR shall be submitted to DOE for review and endorsement before proceeding to the EIA stage.

#### 3.10.1 TOR Table of Content (TOC)

- (a) The TOR and ESI are required for prescribed activities, which fall within either the First or Second Schedules.
- (b) The report(s) shall be prepared in accordance with the format detailed under the Guidance Document for Preparing TOR under Appendix 8 of the EGIM (DOE, 2016).

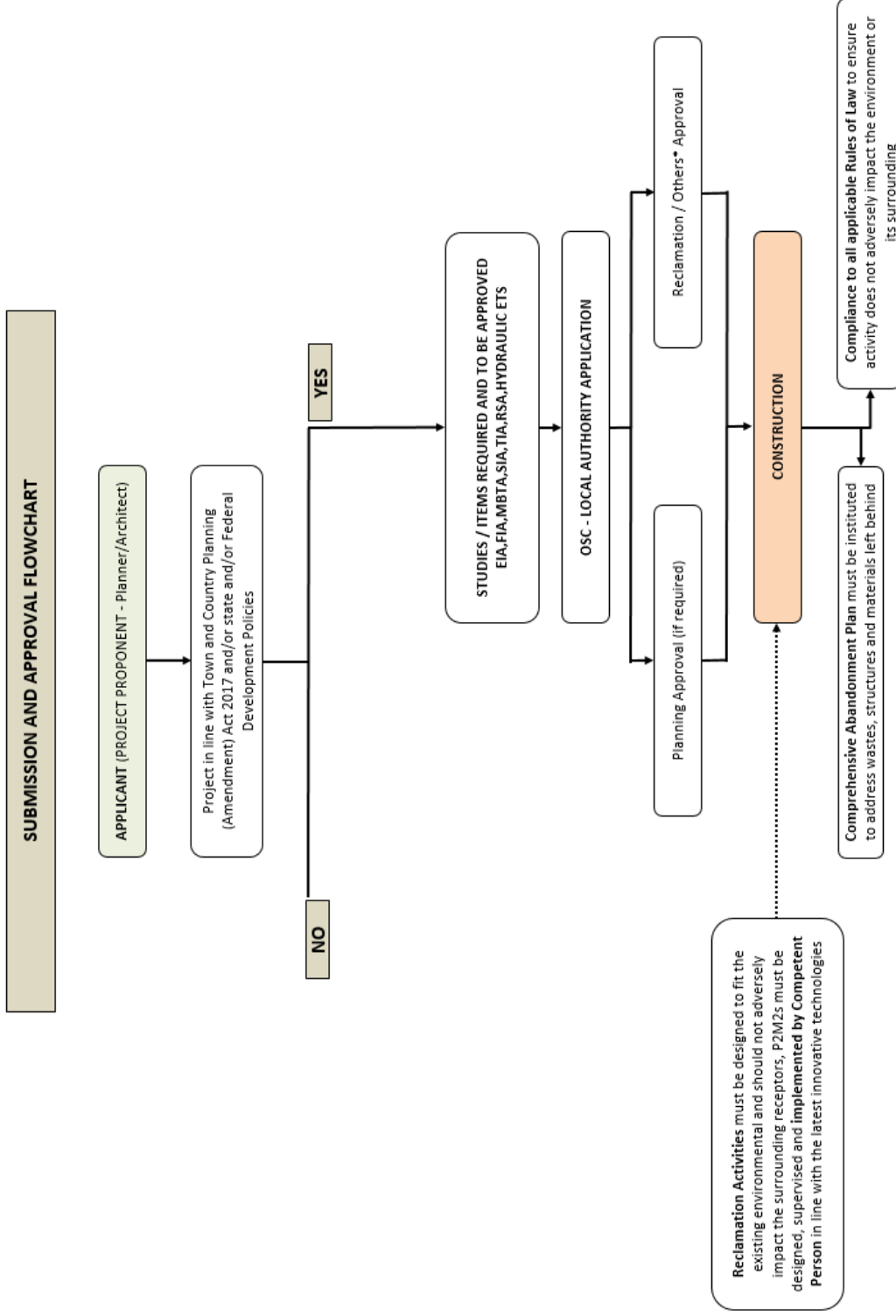
### 3.10.2 TOR Adequacy Check (TORAC) Process

- (a) The output from scoping is documented as the ESI. The ESI shall provide the basic information of the current environment issues with identified key impacts that need to be assessed in detail. All these will then be incorporated as the scope of work in the TOR.
- (b) A review shall be carried out by the EIATRC comprising DOE officers and GAs and/or Appointed Individuals (AIs).
- (c) The adequacy of the scoping exercise and TOR shall be decided in a TORAC meeting (if required), chaired by the DOE Headquarters (HQ)/DOE State Director.
- (d) When the TOR is endorsed, the Project Proponent shall proceed to the EIA study.

### 3.11 TYPICAL FLOWCHARTS OF PROJECT ACTIVITIES

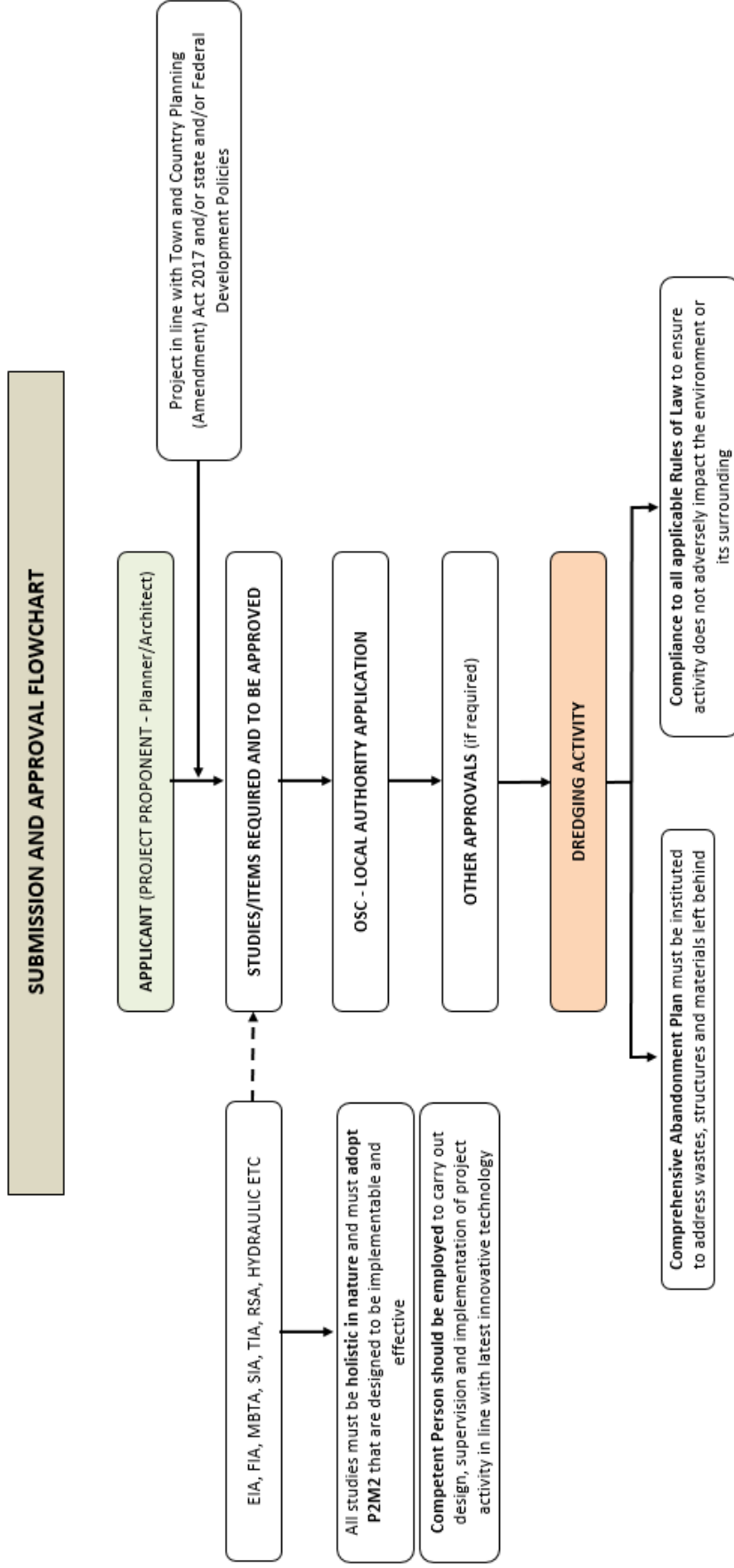
**Figure 3.11.1** and **Figure 3.11.2** are typical flowcharts of project activities with relevant approvals and studies needed.

Figure 3.11.1: Reclamation Activities Process Flowchart



Source : Enviro Enhance Sdn. Bhd. (2018)

Figure 3.11.2: Dredging Activities Process Flowchart



Source: Enviro Enhance Sdn. Bhd. (2018)

## CHAPTER 4 BASELINE DATA

### 4.1 INTRODUCTION

After endorsement is given by the DOE for TOR or the Revised TOR, the Project Proponent and Qualified Person shall then proceed with the EIA study.

Compared to the TOR stage, the EIA stage requires detailed information to be incorporated into the Report. At this stage of work, the preliminaries for the project would have been completed and the overall project planning has moved on to the detailed design stage alongside with the essential technical assessments and studies.

The following Chapters shall detail the requirements for baseline data collection as part of the EIA.

### 4.2 BASELINE DATA COLLECTION AND ANALYSIS

Preliminary data, mostly based on secondary data and initial site assessment, would have been collected during the environmental screening and TOR stage to provide an overview of the existing environment.

Based on those data, the methodology and approach in obtaining detailed data and technical studies would have been identified and approved by EIATRC and incorporated into the TOR.

During the EIA stage, in-depth information and more data shall be collected and collated to describe the existing environment.

The scope shall cover the three major environmental components:

- (a) Physico-chemical environment.
- (b) Biological environment.
- (c) Socio-economic environment.

In line with the DOE environmental mainstreaming, the study shall focus on the core aspects of water, air and waste.

The collected environmental baseline must be appropriate to provide sufficient grounds to draw up the potential impacts for which mitigation measures will be planned for any negative impacts.

Supporting information and relevant studies required by other approving agencies shall also be incorporated into the EIA to provide an overall comprehensive assessment. Supporting information, studies or reports shall be endorsed by the respective GAs which has authority to do so.

**Tables 4.2.1** provides the major environmental components for the EIA.

**Table 4.2.1: Environmental Baseline Scope and Requirements**

Aspect	Scope and Requirement	Relevant Agencies for Reference
Terrain	<ul style="list-style-type: none"> <li>• Description of existing topography and bathymetry based on land and hydrographic surveys.</li> <li>• Geological Terrain Mapping (GTM) of the project site and surrounding areas.</li> <li>• Geotechnical report.</li> </ul>	<ul style="list-style-type: none"> <li>• DOE</li> <li>• JMG</li> </ul>
Geology and Soil	<ul style="list-style-type: none"> <li>• Description of local and regional soil and geology.</li> <li>• Analysis of soil profile obtained from soil investigations.</li> <li>• Estimates of soil loss and sediment yield of the project site.</li> </ul>	<ul style="list-style-type: none"> <li>• DOE</li> <li>• JMG</li> </ul>
Hydrogeology	<ul style="list-style-type: none"> <li>• Hydrogeological assessment.</li> <li>• Seismicity assessment.</li> </ul>	<ul style="list-style-type: none"> <li>• JMG</li> <li>• JKR</li> </ul>
Hydrology and Hydraulics	<ul style="list-style-type: none"> <li>• Within and surrounding the project site (rivers, streams and drainage).</li> <li>• Identification of downstream receptors such as water intake points (WIPs) and water treatment plants (WTPs).</li> <li>• Flood risk analysis, if required.</li> <li>• Descriptions of the existing bathymetry, wave, tidal and wind condition at the project area.</li> </ul>	<ul style="list-style-type: none"> <li>• DOE</li> <li>• DID</li> </ul>

Aspect	Scope and Requirement	Relevant Agencies for Reference
	<ul style="list-style-type: none"> <li>• Identification and assessment of potential impacts of the proposed land reclamation and dredging to the coastal area and propose possible mitigation measures to overcome or minimize the impacts.</li> </ul>	
Water Quality	<ul style="list-style-type: none"> <li>• Sampling and analysis of water quality of waterways and water bodies within the ZOI.</li> </ul>	<ul style="list-style-type: none"> <li>• DOE</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>• Sampling and analysis of ambient air quality of the project site and nearby sensitive receptors.</li> </ul>	<ul style="list-style-type: none"> <li>• DOE</li> </ul>
Noise Level and Vibration	<ul style="list-style-type: none"> <li>• Measurement and analysis of ambient noise and vibration levels of the project site and nearby sensitive receptors.</li> </ul>	<ul style="list-style-type: none"> <li>• DOE</li> </ul>
Waste	<ul style="list-style-type: none"> <li>• Estimation of the amount of biomass waste generated from site clearing.</li> <li>• Estimation of the amount of solid waste generated from the project site.</li> <li>• Identification of potential scheduled wastes generated from the project site.</li> <li>• Identification of future spoil disposal areas.</li> </ul>	<ul style="list-style-type: none"> <li>• DOE</li> <li>• Local Authority</li> <li>• National Solid Waste Management Department (JPSPN)</li> <li>• Marine Department</li> </ul>
Landuse	<ul style="list-style-type: none"> <li>• Description of existing and future landuse (map and description) within the ZOI.</li> <li>• Identification of ESAs and impact receptors.</li> <li>• Landuse compatibility assessment.</li> </ul>	<ul style="list-style-type: none"> <li>• Federal Town and Country Planning Department (PLANMalaysia)</li> </ul>
Climate	<ul style="list-style-type: none"> <li>• Obtain long-term (minimum 5-year) climate data to define the weather patterns for the project site.</li> </ul>	<ul style="list-style-type: none"> <li>• Malaysian Meteorological Department (METMalaysia)</li> </ul>

Aspect	Scope and Requirement	Relevant Agencies for Reference
Ecology	<ul style="list-style-type: none"> <li>• Habitat mapping of ESAs (terrestrial and aquatic).</li> <li>• Provide an inventory, and assess the terrestrial and aquatic biodiversity within the Project site.</li> <li>• Identify any endemic, rare, endangered, threatened and near extinct species within the project site and surrounding ZOI.</li> </ul>	<ul style="list-style-type: none"> <li>• Forest Department of Peninsular Malaysia (JPSM)</li> <li>• PERHILITAN</li> <li>• Department of Fisheries (DOF)</li> </ul>
Socio-economy	<ul style="list-style-type: none"> <li>• Data on demography, and socio-economic profiles of stakeholders within the ZOI.</li> <li>• This shall be based on the findings of the SIA, if carried out separately.</li> </ul>	<ul style="list-style-type: none"> <li>• Federal Town and Country Planning Department (PLANMalaysia)</li> <li>• Department of Statistics Malaysia.</li> </ul>
History, Culture and Archaeology	<ul style="list-style-type: none"> <li>• Identify locations of significant historical, cultural, heritage and archaeological value (graves, ritual areas, heritage buildings, artefacts, pre-human habitation, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>• National Heritage Department.</li> <li>• Department of Museum.</li> </ul>
Land Traffic	<ul style="list-style-type: none"> <li>• Existing traffic within and surrounding the project site.</li> <li>• This shall be based on the findings of the TIA, if any.</li> </ul>	<ul style="list-style-type: none"> <li>• JKR</li> </ul>
Marine Traffic	<ul style="list-style-type: none"> <li>• This shall be based on the findings of Marine Baseline Traffic Assessment.</li> </ul>	<ul style="list-style-type: none"> <li>• Marine Department Malaysia.</li> </ul>

Aspect	Scope and Requirement	Relevant Agencies for Reference
Infrastructure, Utilities and Amenities	<ul style="list-style-type: none"> <li>• Availability of existing and future utilities (water, electricity, sewerage, waste management, road networks, telecommunication, etc.).</li> <li>• Discharge points of sewage and effluent.</li> <li>• This shall be based on the findings of the <i>Laporan Cadangan Pemaju</i> (LCP), if any, or obtained from the Project Proponent.</li> </ul>	<ul style="list-style-type: none"> <li>• Water Supply Authority/ Providers.</li> <li>• Indah Water Konsortium (IWK).</li> <li>• Tenaga Nasional Berhad (TNB).</li> <li>• JKR</li> <li>• Local Authorities (PBT).</li> </ul>

Note: The above represents a full list of potential baseline studies, the Qualified Person shall be responsible in determining the relevant baseline requirements based on the project needs.

### 4.3 PRIMARY DATA COLLECTION

Primary data collection is necessary to fill in the gaps in information identified during the TOR/ESI stage. Common methodologies include on-the-ground surveys and sampling programmes at-site. The sampling/study boundary shall be within the project's ZOI.

Samples collected must be analysed by a *Skim Akreditasi Makmal Malaysia* (SAMM) Accredited Laboratory. Details of sampling (person in charge, time, date and location of sampling) must be clearly stated. All certificated and data shall be included.

The scope and requirement for such studies are to be determined by the respective GAs and reports are to be approved by the said GAs before incorporation as part of the EIA.

### 4.4 SECONDARY DATA COLLECTION

Secondary data can be referred from other official sources to support the EIA to identify non-critical issues.

Sources of information must be clearly stated along with the date of publication in the EIA.

## CHAPTER 5

### EVALUATION OF IMPACTS

#### 5.1 INTRODUCTION

There are many methods to evaluate the impacts. Generally, all methods of impact evaluation seek to compare the existing environment against a predicted future environment caused by various project activities in all phases of project development.

Predictions and assessments are made through qualitative or quantitative approaches and methods that form the basis of evaluation.

While there is no one method that fits all requirements, the predictive and assessment method chosen must have at least the following attributes:

- (a) Established and proven models or methods.
- (b) Adequate, accurate and up-to-date data for assessment.
- (c) Results can be replicated and is reproducible by independent evaluators.
- (d) Cost-effective and for any software, it can be purchased (proprietary software and tools can also be used). If possible, use of widely accepted freeware is encouraged.

It is up to the Qualified Person to select the best method to conduct investigations and generate reliable scenarios and datasets to ascertain the magnitude, extent and significance of any impacts from the project.

#### 5.2 PREDICTION AND EVALUATION OF IMPACTS

The Scoping Exercise would have determined the types of studies that need to be carried out during the EIA stage (refer Section 3.8). Hence, the endorsed TOR need to be referred in order to ensure the EIA is focused.

The level of details in the impact identification shall commensurate with the following factors:

- (a) Scale of the project (land area, total disturbed areas, etc.).
- (b) Intensity of development (total land clearing, phasing of land clearing).
- (c) Potential pollution sources from the project.
- (d) Magnitude and complexity of impacts.
- (e) Area of impacts (localised versus transboundary).
- (f) Probability of cumulative impacts (effects of project on adjacent land areas and *vice versa*).
- (g) Sensitivity of nearby receptors, e.g. ESAs.

## 5.2.1 Impacts of Reclamation and Dredging Activities

### 5.2.1.1 Potential Impacts during Investigation Stage

The typical issues and impacts associated during investigation stage are as listed in **Table 5.2.1**.

**Table 5.2.1: Typical Issues and Impacts during Investigation Stage**

Activities	Issues	Impacts
Site surveys including topography and bathymetry survey	Ecology	<ul style="list-style-type: none"> <li>• Disturbance of coastal and marine habitats.</li> <li>• Water pollution and effects on marine areas.</li> <li>• Boat strike on marine organisms.</li> <li>• Threat to wildlife (hunting/poaching).</li> </ul>
	Water Quality	<ul style="list-style-type: none"> <li>• Vessel discharge in coastal waters.</li> </ul>
	Air Quality	<ul style="list-style-type: none"> <li>• Open burning by workers.</li> </ul>
	Socio-economy	<ul style="list-style-type: none"> <li>• Conflicts due to presence of foreign workers.</li> <li>• Pollution may affect fishery resources and aquaculture farms.</li> </ul>
	Wastes	<ul style="list-style-type: none"> <li>• Biomass wastes from land clearing and trimming works.</li> </ul>
	Traffic	<ul style="list-style-type: none"> <li>• Spillage onto roads.</li> <li>• Damage to roads.</li> </ul>
	Marine Traffic	<ul style="list-style-type: none"> <li>• Safety and risk of collision.</li> <li>• Oil spills and wastewater discharge from vessels.</li> <li>• Boat strike on marine organisms.</li> </ul>
	Safety and Health	<ul style="list-style-type: none"> <li>• Work-related injuries.</li> <li>• Accidents.</li> </ul>

Activities	Issues	Impacts
Soil Investigation (SI)	Ecology	<ul style="list-style-type: none"> <li>• Disturbance of coastal and marine habitats.</li> <li>• Boat strike on marine organisms.</li> <li>• Threat to wildlife (hunting/poaching).</li> </ul>
	Water Quality	<ul style="list-style-type: none"> <li>• Vessel discharge in coastal waters.</li> </ul>
	Air Quality	<ul style="list-style-type: none"> <li>• Open burning by workers.</li> </ul>
	Wastes	<ul style="list-style-type: none"> <li>• Biomass wastes from land clearing and trimming works.</li> <li>• Solid wastes from work camps.</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• Noise due to drilling for SI works on marine and terrestrial fauna.</li> </ul>
	Traffic	<ul style="list-style-type: none"> <li>• Spillage onto roads.</li> <li>• Traffic congestion.</li> <li>• Damage to roads.</li> </ul>
	Marine Traffic	<ul style="list-style-type: none"> <li>• Safety and risk of collision.</li> <li>• Oil spills and wastewater discharge from vessels.</li> <li>• Boat strike on marine organisms.</li> </ul>
	Safety and Health	<ul style="list-style-type: none"> <li>• Work-related injuries.</li> <li>• Improper waste management attracts pests and scavengers.</li> </ul>
Land Acquisition (if any) under SIA and local authorities' scope	Socio-economy	<ul style="list-style-type: none"> <li>• Loss of income and job opportunities</li> <li>• Loss of tourism.</li> </ul>
	Community	<ul style="list-style-type: none"> <li>• Homeless.</li> <li>• Increase demand for new settlement or residential areas</li> <li>• Increased demand for facilities, utilities and amenities.</li> </ul>

Note.: The list is not exhaustive and not all the above may be relevant to the project, It is the responsibility of the Project Proponent and Qualified Person to determine the relevant information required for environmental assessment and compliance.

### 5.2.1.2 Potential Impacts during Initial Site Preparation and Development Stage

Typical issues and impacts during initial site preparation and development stage for land reclamation and dredging activities are as listed in **Table 5.2.2**.

**Table 5.2.2: Typical Issues and Impacts during Site Preparation and Development Stage**

Activities	Issues	Impacts
Establish access road	Ecology	<ul style="list-style-type: none"> <li>Disturbance and possibly loss of coastal and marine habitats.</li> </ul>
	Wastes	<ul style="list-style-type: none"> <li>Biomass wastes from land clearing and trimming works.</li> </ul>
	Safety and Health	<ul style="list-style-type: none"> <li>Work-related injuries.</li> <li>Accidents.</li> </ul>
Site clearing	Ecology	<ul style="list-style-type: none"> <li>Disturbance of coastal and marine habitats.</li> <li>Threat to wildlife (hunting/poaching).</li> </ul>
	Water Quality	<ul style="list-style-type: none"> <li>Increase runoff and turbidity into nearby water courses.</li> </ul>
	Air Quality	<ul style="list-style-type: none"> <li>Open burning by workers.</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>High noise levels from demolition works, machineries and vessels.</li> </ul>
	Wastes	<ul style="list-style-type: none"> <li>Biomass wastes from land clearing and trimming works.</li> <li>Construction and demolition (C&amp;D) wastes.</li> </ul>
	Traffic	<ul style="list-style-type: none"> <li>Heavy vehicle access along public roads.</li> <li>Spillage onto roads.</li> </ul>
	Safety and Health	<ul style="list-style-type: none"> <li>Work-related injuries.</li> <li>Improper waste management attracts pests and scavengers.</li> <li>Accidents.</li> </ul>
Setting up site facilities and base camp	Air Quality	<ul style="list-style-type: none"> <li>Open burning by workers.</li> </ul>
	Wastes	<ul style="list-style-type: none"> <li>Solid wastes from work camps and top-side development.</li> <li>Scheduled wastes from workshops and refuelling stations can result in land and water contamination.</li> <li>Odour and unsightliness from improper waste management.</li> </ul>
	Safety and Health	<ul style="list-style-type: none"> <li>Improper waste management attracts pests and scavengers.</li> <li>Risk of communal disease spread.</li> </ul>

Activities	Issues	Impacts
Dredging and reclamation works (including infrastructure works)	Ecology	<ul style="list-style-type: none"> <li>• Disturbance and possibly loss of coastal and marine habitats.</li> <li>• Water pollution and effects on marine areas (red tide, sediment plume, oil spill, etc.).</li> <li>• Damage to corals and marine resources.</li> <li>• Loss of fishery resources.</li> <li>• Loss of benthic fauna and sessile organisms, unless translocated.</li> <li>• Boat strike on marine organisms.</li> </ul>
	Hydraulic and Hydrodynamics	<ul style="list-style-type: none"> <li>• Altered coastal watercourses.</li> <li>• Changes in wave climate; current speed and direction; tidal conditions; and pollutant dispersion patterns.</li> <li>• Impacts on aquatic habitats and coastal users.</li> </ul>
	Erosion and Sedimentation/ Coastal Erosion	<ul style="list-style-type: none"> <li>• Soil erosion and sedimentation.</li> <li>• Ecological damage.</li> <li>• Long-term accretion and/or erosion of coastal areas due to hydraulic changes.</li> <li>• Coastal protection requirements.</li> <li>• Affect aesthetic value of adjacent coastal area.</li> </ul>
	Water Quality	<ul style="list-style-type: none"> <li>• Soil contamination and water pollution due to leakage of oil and chemicals from equipment and machinery operations.</li> <li>• Impacts on coastal areas, e.g. recreational areas, aquaculture farms, etc.</li> <li>• Effects of spread of sediment plumes on water quality and offshore fishing sites.</li> <li>• Impacts of sewage and sullage discharged from work camps. Effects of scheduled waste contamination.</li> <li>• Vessel discharge in coastal waters.</li> <li>• Ecological degradation.</li> <li>• Spillage during transportation of fill or dredged material.</li> </ul>
	Air Quality	<ul style="list-style-type: none"> <li>• Emission from fuel burning equipment.</li> </ul>

Activities	Issues	Impacts
	Noise	<ul style="list-style-type: none"> <li>• High noise levels from piling, demolition works, construction, machineries and vessels.</li> <li>• Underwater noise impacts on marine fauna.</li> </ul>
	Communities	<ul style="list-style-type: none"> <li>• Nuisance and disturbance to nearby communities.</li> <li>• Affects access of the fishing community.</li> </ul>
	Socio-economy	<ul style="list-style-type: none"> <li>• Increase job opportunities, employment and business.</li> <li>• Conflicts due to presence of foreign workers.</li> <li>• Pollution may affect fishery resources and aquaculture farms.</li> <li>• Loss to tourism during construction period.</li> <li>• Increased demand for facilities, utilities and amenities.</li> </ul>
	Wastes	<ul style="list-style-type: none"> <li>• Scheduled wastes from workshops and refuelling stations can result in land and water contamination.</li> <li>• Odour and unsightliness from improper waste management.</li> </ul>
	Marine Traffic	<ul style="list-style-type: none"> <li>• Alteration of existing vessel traffic pattern</li> <li>• Safety and risk of collision.</li> <li>• Oil spills and wastewater discharge from vessels.</li> <li>• Boat strike on marine organisms.</li> </ul>
	Safety and Health	<ul style="list-style-type: none"> <li>• Work-related injuries.</li> <li>• Improper waste management attracts pests and scavengers.</li> <li>• Risk of communal disease spread.</li> <li>• Accidents.</li> </ul>
	Visual Impact	<ul style="list-style-type: none"> <li>• Loss of vista.</li> <li>• Reduced quality of life.</li> </ul>

Activities	Issues	Impacts
Structural works (onshore and offshore), coastal protection works	Ecology	<ul style="list-style-type: none"> <li>• Disturbance and possibly loss of coastal and marine habitats.</li> </ul>
	Hydraulic and Hydrodynamics	<ul style="list-style-type: none"> <li>• Altered coastal watercourses.</li> <li>• Flooding from higher storm flows or peak discharge.</li> <li>• Storm surges resulting in coastal flooding.</li> <li>• Changes in wave climate, current speed and direction, tidal conditions and pollutant dispersion patterns.</li> <li>• Impacts on aquatic habitats and coastal users.</li> </ul>
	Erosion and Sedimentation/ Coastal Erosion	<ul style="list-style-type: none"> <li>• Soil erosion and sedimentation.</li> <li>• Ecological damage.</li> <li>• Long-term accretion and erosion of coastal areas due to hydraulic changes.</li> <li>• Coastal protection requirements.</li> <li>• Affect aesthetic value of recreational beaches.</li> </ul>
	Water Quality	<ul style="list-style-type: none"> <li>• Soil contamination and water pollution due to leakage of oil and chemicals from equipment and machinery operations.</li> <li>• Effects of spread of sediment plumes on water quality and offshore fishing sites.</li> <li>• Effects of scheduled waste contamination.</li> <li>• Vessel discharge in coastal waters.</li> <li>• Ecological degradation.</li> </ul>
	Air Quality	<ul style="list-style-type: none"> <li>• Dust generation from earthworks and vehicular movement.</li> <li>• Emission from fuel burning equipment, vessels or machineries.</li> <li>• Open burning by workers.</li> <li>• Health problems of workers and nearby residents.</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• High noise levels from piling works, construction, machineries and vessels.</li> <li>• Underwater noise impacts on marine fauna.</li> </ul>
	Communities	<ul style="list-style-type: none"> <li>• Nuisance and disturbance to nearby communities.</li> <li>• Affects access of the fishing community.</li> </ul>

Activities	Issues	Impacts
	Socio-economy	<ul style="list-style-type: none"> <li>• Increase job opportunities, employment and business.</li> <li>• Conflicts due to presence of foreign workers.</li> <li>• Pollution may affect fishery resources and aquaculture farms.</li> <li>• Loss to tourism during construction period.</li> <li>• Increased demand for facilities, utilities and amenities.</li> </ul>
	Wastes	<ul style="list-style-type: none"> <li>• Biomass wastes from land clearing and trimming works.</li> <li>• C&amp;D wastes.</li> <li>• Odour and unsightliness from improper waste management.</li> <li>• Oil spills and wastewater discharge from vessels.</li> </ul>
	Traffic	<ul style="list-style-type: none"> <li>• Heavy vehicle access along public roads.</li> <li>• Spillage onto roads.</li> <li>• Traffic congestion.</li> <li>• Damage to roads.</li> <li>• Safety risk to road users and communities.</li> </ul>
	Marine Traffic	<ul style="list-style-type: none"> <li>• Vessel traffic increase.</li> <li>• Alteration to the existing navigation path.</li> <li>• Safety and risk of collision.</li> <li>• Increased boat strike on marine organisms.</li> </ul>
	Safety and Health	<ul style="list-style-type: none"> <li>• Work-related injuries.</li> <li>• Improper waste management attracts pests and scavengers.</li> <li>• Risk of communal disease spread.</li> <li>• Accidents.</li> </ul>
	Visual Impact	<ul style="list-style-type: none"> <li>• Loss of vista.</li> <li>• Reduced quality of life.</li> </ul>
Spoils disposal (onshore and/or offshore disposal site)	Ecology	<ul style="list-style-type: none"> <li>• Disturbance and possibly loss of flora and fauna at disposal site.</li> <li>• Damage to corals and marine resources.</li> </ul>
	Hydraulic and Hydrodynamics	<ul style="list-style-type: none"> <li>• Alteration of seabed/ground level at disposal area.</li> <li>• Changes in wave climate, current speed and direction, and tidal conditions.</li> </ul>

Activities	Issues	Impacts
	Water Quality	<ul style="list-style-type: none"> <li>• Changes in water quality due to erosion and sedimentation at onshore disposal site.</li> <li>• Effects of spread of sediment plumes on water quality and offshore fishing sites.</li> <li>• Dispersal of pollutants contained in spoils.</li> <li>• Ecological degradation.</li> <li>• Spillage during transportation of dredged materials or spoils.</li> </ul>
	Air Quality	<ul style="list-style-type: none"> <li>• Dust generation during transportation of spoils to disposal area.</li> </ul>
	Traffic	<ul style="list-style-type: none"> <li>• Heavy vehicle access along public roads.</li> <li>• Spillage onto roads.</li> </ul>
	Marine Traffic	<ul style="list-style-type: none"> <li>• Vessel traffic increase.</li> <li>• Safety and risk of collision.</li> </ul>
Establishment of permanent access, demobilisation of construction machineries and plants, final finishing and landscaping	Ecology	<ul style="list-style-type: none"> <li>• Disturbance and possibly loss of coastal and marine habitats.</li> </ul>
	Erosion and Sedimentation/ Coastal Erosion	<ul style="list-style-type: none"> <li>• Reduce soil erosion and sedimentation.</li> <li>• Increase aesthetic value of recreational beaches.</li> </ul>
	Water Quality	<ul style="list-style-type: none"> <li>• Impacts on coastal areas, e.g. recreational areas, aquaculture farms, etc.</li> <li>• Enhance water quality by proper drainage system and surface covers.</li> </ul>
	Air Quality	<ul style="list-style-type: none"> <li>• Enhance air quality by proper road pavement.</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• High noise levels from machineries and vessels.</li> <li>• Underwater noise impacts on marine fauna.</li> </ul>
	Communities	<ul style="list-style-type: none"> <li>• Nuisance and disturbance to nearby communities.</li> <li>• Affects access of the fishing community.</li> </ul>
	Wastes	<ul style="list-style-type: none"> <li>• Biomass wastes from landscaping and construction waste.</li> <li>• Odour and unsightliness from improper waste management.</li> </ul>
	Traffic	<ul style="list-style-type: none"> <li>• Reduce traffic congestion.</li> <li>• Reduce safety risk to road users and communities.</li> </ul>

Activities	Issues	Impacts
	Safety and Health	<ul style="list-style-type: none"> <li>• Work-related injuries.</li> <li>• Improper waste management attracts pests and scavengers.</li> <li>• Accidents.</li> </ul>
	Visual Impact	<ul style="list-style-type: none"> <li>• Increase of vista and aesthetics value.</li> <li>• Increase quality of life.</li> </ul>

Note.: The list is not exhaustive and not all the above may be relevant to the project, It is the responsibility of the Project Proponent and Qualified Person to determine the relevant information required for environmental assessment and compliance.

### 5.2.1.3 Potential Impacts during Operational Stage

Typical issues and impacts during operational stage for land reclamation and dredging activities are as listed in **Table 5.2.3**.

**Table 5.2.3: Typical Issues and Impacts during Operation Stage**

Activities	Issues	Impacts
Operation of navigation channel/ waterway/ waterway facilities	Ecology	<ul style="list-style-type: none"> <li>• Underwater noise from vessel's movement.</li> <li>• Boat strike on marine organisms.</li> </ul>
	Hydraulic and Hydrodynamics	<ul style="list-style-type: none"> <li>• Improve coastal watercourses flows.</li> <li>• Changes in wave climate, current speed and direction, tidal conditions.</li> </ul>
	Erosion and Sedimentation/ Coastal Erosion	<ul style="list-style-type: none"> <li>• Long term sedimentation in the dredged area.</li> </ul>
	Water Quality	<ul style="list-style-type: none"> <li>• Oil spills and tar balls.</li> </ul>
	Marine Traffic	<ul style="list-style-type: none"> <li>• Vessel traffic increase.</li> <li>• Safety and risk of collision.</li> <li>• Oil spills and wastewater discharge from vessels.</li> <li>• Alteration to existing traffic pattern.</li> <li>• Boat strike on marine organisms.</li> </ul>

Note.: The list is not exhaustive and not all the above may be relevant to the project, It is the responsibility of the Project Proponent and Qualified Person to determine the relevant information required for environmental assessment and compliance.

### 5.2.1.4 Potential Impacts during Rehabilitation and Abandonment Stage

Typical issues and impacts during rehabilitation and abandonment stage for land reclamation and dredging activities are as listed in **Table 5.2.4**.

**Table 5.2.4: Typical Issues and Impacts during and after Rehabilitation and Abandonment Stage**

Activities	Issues	Impacts
Abandonment during all stages of land reclamation and dredging works	Ecology	<ul style="list-style-type: none"> <li>• Disturbance and possibly loss of coastal and marine habitats.</li> <li>• Water pollution and effects on marine areas (red tide, sediment plume, oil spill, etc.).</li> <li>• Damage to corals and marine resources.</li> <li>• Loss of fishery resources.</li> <li>• Loss of benthic fauna and sessile organisms, unless translocated.</li> </ul>
	Hydraulic and Hydrodynamics	<ul style="list-style-type: none"> <li>• Altered coastal watercourses.</li> <li>• Changes in wave climate, current speed and direction, tidal conditions and pollutant dispersion patterns.</li> <li>• Impacts on aquatic habitats and coastal users.</li> </ul>
	Erosion and Sedimentation/ Coastal Erosion	<ul style="list-style-type: none"> <li>• Soil erosion and sedimentation.</li> <li>• Ecological damage.</li> <li>• Long-term accretion and/or erosion of coastal areas due to hydraulic changes.</li> <li>• Affect aesthetic value of recreational beaches.</li> </ul>
	Water Quality	<ul style="list-style-type: none"> <li>• Impacts on coastal areas, e.g. recreational areas, aquaculture farms, etc.</li> <li>• Effects of spread of sediment plumes on water quality and offshore fishing sites.</li> <li>• Ecological degradation.</li> </ul>
	Communities	<ul style="list-style-type: none"> <li>• Affects access of the fishing community.</li> <li>• Loss of beach and coastal access.</li> </ul>
	Socio-economy	<ul style="list-style-type: none"> <li>• Pollution may affect fishery resources and aquaculture farms.</li> </ul>
	Visual Impact	<ul style="list-style-type: none"> <li>• Loss of vista.</li> <li>• Reduced quality of life.</li> </ul>
Abandonment after reclamation works and dredging works	Hydraulic and Hydrodynamics	<ul style="list-style-type: none"> <li>• Altered coastal watercourses.</li> <li>• Storm surges resulting in coastal flooding.</li> <li>• Changes in wave climate, current speed and direction, tidal conditions, and pollutant dispersion patterns.</li> <li>• Impacts on aquatic habitats and coastal users.</li> </ul>

Activities	Issues	Impacts
	Erosion and Sedimentation/ Coastal	<ul style="list-style-type: none"> <li>• Soil erosion and sedimentation.</li> <li>• Long-term accretion and erosion of coastal areas due to hydraulic changes.</li> </ul>
	Erosion	<ul style="list-style-type: none"> <li>• Coastal protection requirements.</li> </ul>
	Communities	<ul style="list-style-type: none"> <li>• Affects access of the fishing community.</li> </ul>
	Visual Impact	<ul style="list-style-type: none"> <li>• Loss of vista.</li> <li>• Reduced quality of life.</li> </ul>

Note.: The list is not exhaustive and not all the above may be relevant to the project, It is the responsibility of the Project Proponent and Qualified Person to determine the relevant information required for environmental assessment and compliance.

### 5.3 TYPICAL LAND RECLAMATION AND DREDGING ACTIVITIES

A typical depiction of land reclamation and dredging is as shown in **Figure 5.3.1**.

### Figure 5.3.1: Examples of BMPs for Land Reclamation and Dredging Activities



Figure 5.3.1a: Reclamation and Ground Treatment Works at Penang Island



Figure 5.3.1c: Trimming Works for Temporary Slope at Penang Island



Figure 5.3.1b: Piling Works for Structural Works at Penang Island



Figure 5.3.1d: Slope Protection Works at Penang Island



Figure 5.3.1e: Double Layer Silt Curtain



Figure 5.3.1g: Sand Filling Works for Reclamation adjacent to Pulau Melaka

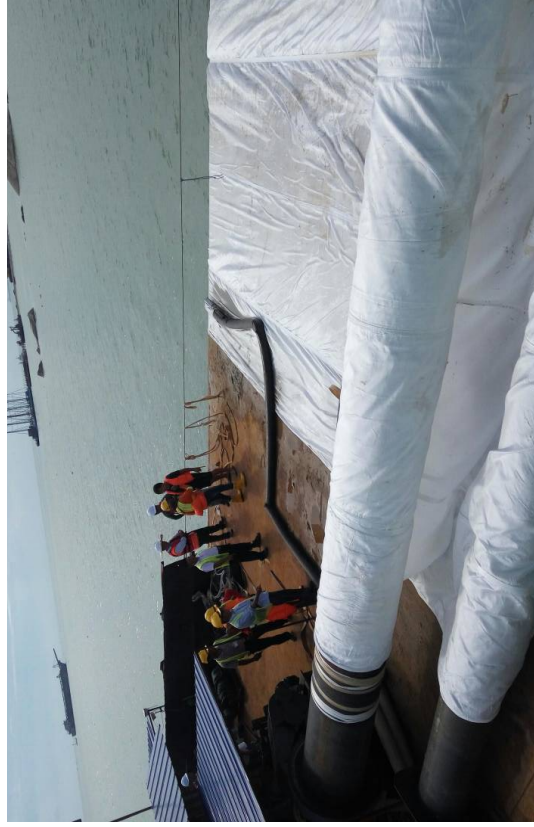


Figure 5.3.1f: Sand Quilt Laying Works adjacent to Pulau Melaka

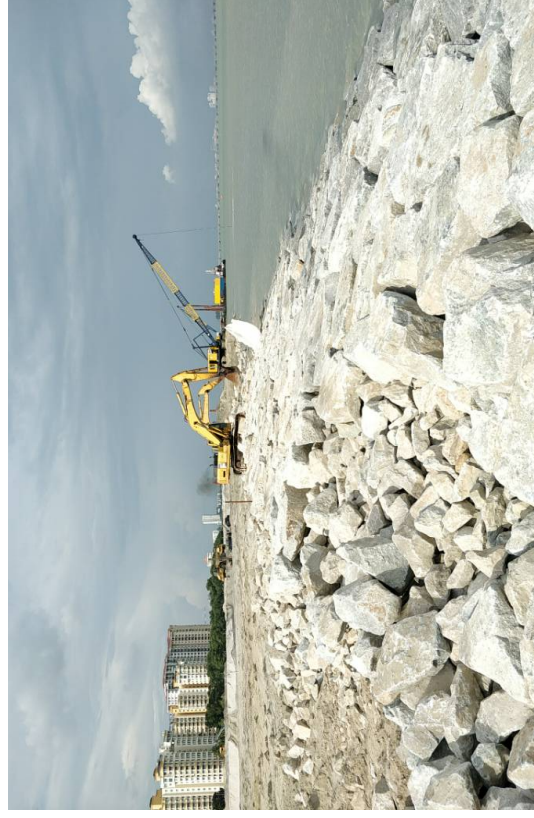


Figure 5.3.1h: Rock Revetment Works at Penang Island

## 5.4 PREDICTIVE METHODS AND TOOLS

- (a) Impact assessment can utilise a wide range of predictive tools and models. Among the accepted methods include:
- (i) Expert opinion.
  - (ii) Consultations and questionnaires.
  - (iii) Checklists.
  - (iv) Spatial analysis.
  - (v) Network and system analysis.
  - (vi) Matrices.
  - (vii) Carrying capacity analysis.
  - (viii) Mathematical and computer modelling.
  - (ix) Case studies.
- (b) Where possible, simple methodology is preferred, though this depends on the complexity of the impacts. Whichever method is chosen, it must be appropriate to address the problem, taking into consideration the localised conditions of the site.
- (c) For computer modelling, the following information is required:
- (i) Name and description of method/model.
  - (ii) Model set-up.
  - (iii) Data collection and analysis.
  - (iv) Calibration and validation.
  - (v) Detail of scenarios for modelling.
  - (vi) Presentation of results (raw data, table form, graphs).
  - (vii) Limitations in data collection or method chosen.
- (d) It has to be noted that all modelling exercises carried out shall capture the impacts under the various scenarios, either for short-, mid- to long-term. The modelling studies shall undergo verification, calibration and validation. The outputs of the modelling studies shall be presented in a concise manner and all uncertainties shall be discussed.
- (e) Technical reports, data analysis and tables and raw data, where necessary, shall be included as part of the appendix of the EIA to support the impact assessment methodology.

- (f) Ultimately, the main text for impact assessment in the EIA shall be the predictive results and outputs of studies, which have to be in sufficient technical details to support the assessment. It must also be written in a manner that is easily understood by decision makers and the public.
- (g) **Tables 5.4.5** summarises examples of the available and accepted prediction methods for impact assessment and expected outputs. The list is not exhaustive. The Qualified Person has to propose the best methods relevant to the project under study or to select one of the methods in the list.

**Table 5.4.5: Examples of Prediction Methods for Environmental Impacts**

Impacts	Prediction Methods	Output
Hydraulic and Hydrodynamics	<ul style="list-style-type: none"> <li>• Use of hydraulic and hydrodynamics models which meets the requirements of the DID.</li> <li>• 2D/3D modelling software e.g. Delft3D including D-Flow module to investigate hydrodynamics pattern, dispersion of sediment transport and coastal morphological processes.</li> </ul>	<ul style="list-style-type: none"> <li>• Sediment dispersion (concentration and extent) from land reclamation, dredging and other construction works.</li> <li>• Changes in the wave, water level and current condition at the project site during and after project implementation.</li> <li>• Sediment transport along the project site during pre- and post-construction phase.</li> </ul>
Erosion and Sedimentation	<ul style="list-style-type: none"> <li>• Revised Universal Soil Loss Equation (RUSLE).</li> <li>• Modified Universal Soil Loss Equation (MUSLE).</li> <li>• Computer models.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil loss rates and sediment yield.</li> <li>• Erosion risk and potential soil loss maps.</li> </ul>
Hydrology	<ul style="list-style-type: none"> <li>• Hydrological procedures (DID).</li> <li>• Computer models for estimating peak flood, runoff, watershed analysis, flood plain hydraulics, etc. Examples include HEC-HMS, HEC-RAS, FLO-2D, TUFLOW, EXTRAN and Storm Water Management Model (SWMM).</li> <li>• Hydrological analysis in accordance with <i>Manual Saliran Mesra Alam Edisi-2</i> (MSMA-2) and approved by DID.</li> </ul>	<ul style="list-style-type: none"> <li>• Estimation of pre-construction and post-construction runoff.</li> </ul>

Impacts	Prediction Methods	Output
Water Quality	<ul style="list-style-type: none"> <li>• Mathematical models (one, two or three-dimensional) analysis of pollution loads and dispersion in the waterways, such as QUAL2K, MIKE11, etc.</li> <li>• Simple mass balance models, e.g. Streeter-Phelps Model.</li> <li>• Operational sewage discharge modelled using Ouai2K or Delft, D or MIKE11.</li> </ul>	<ul style="list-style-type: none"> <li>• Estimation of Total Suspended Solids (TSS) (erosion) and River Oxygen Demand (ROD) and Ammoniacal Nitrogen (AN) (sewage) concentration affecting a stretch of river and downstream sensitive areas.</li> <li>• Estimation of pollution load and extent of effect on sensitive receptors.</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>• Gaussian plume dispersion model to assess dust generation and gas dispersion over an area under the worst case scenario.</li> </ul>	<ul style="list-style-type: none"> <li>• Dispersion contour map indicating levels at sensitive receptors.</li> <li>• Comparison of computed values with the Malaysian Ambient Air Quality Standards (MAAQS).</li> <li>• Determination of location of maximum air pollution concentration.</li> </ul>
Noise Level	<ul style="list-style-type: none"> <li>• Mathematical models to assess noise levels for point source or linear sources.</li> <li>• Noise modelling software such as SoundPlan: CadNa or Geographic Information System (GIS) acoustic models.</li> <li>• Traffic noise models.</li> </ul>	<ul style="list-style-type: none"> <li>• Quantitative values for noise level at sensitive receptors.</li> <li>• Noise contour map Indicating levels at sensitive areas.</li> <li>• Comparison of computed values to DOE's permissible noise limits.</li> </ul>
Biomass	<ul style="list-style-type: none"> <li>• Estimation on total biomass based on vegetation types and published studies values.</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted biomass waste generation.</li> </ul>
Scheduled Wastes	<ul style="list-style-type: none"> <li>• Identification of potential scheduled wastes generation during construction and operations based on project activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted scheduled waste generation.</li> </ul>

Impacts	Prediction Methods	Output
Ecology	<ul style="list-style-type: none"> <li>• Comparative assessment of conservation status and sensitivity of habitat, flora and fauna.</li> <li>• Ecological models for species diversity and population change.</li> <li>• Limit of Acceptable Change (LAC).</li> <li>• Spatial models such as GLOBIO3.</li> </ul>	<ul style="list-style-type: none"> <li>• Habitat map.</li> <li>• Species inventory, especially of rare, endangered, threatened and near extinct species that may require protection.</li> </ul>
Socio-economy	<ul style="list-style-type: none"> <li>• Social and economic surveys on affected population.</li> <li>• Perception survey to ascertain acceptance of project.</li> <li>• SIA.</li> </ul>	<ul style="list-style-type: none"> <li>• Socio-economic profiling.</li> <li>• Public opinion survey results.</li> <li>• Stakeholder feedback for EIA including possible mitigation measures.</li> </ul>
Landuse	<ul style="list-style-type: none"> <li>• Compatibility assessment based on structure plan, local plan and other guidelines.</li> <li>• Adherence to required setback based on national and state guidelines.</li> </ul>	<ul style="list-style-type: none"> <li>• Landuse compatibility and buffer requirements.</li> </ul>
Public Health	<ul style="list-style-type: none"> <li>• Qualitative/quantitative health risk assessment (HRA) encompassing hazard identification, exposure assessment and risk characterisation.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential health impacts to nearby population.</li> </ul>
Solid Wastes	<ul style="list-style-type: none"> <li>• Waste generation estimation based on population.</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted waste generation and disposal management.</li> </ul>
Traffic	<ul style="list-style-type: none"> <li>• Traffic impact assessment including simulation of peak traffic flows under various scenarios and junction analysis, e.g. Signalised and Unsignalised Intersection Design and Research Aid (SIDRA).</li> </ul>	<ul style="list-style-type: none"> <li>• Comparison of traffic scenarios pre- and post-project and need for road improvements.</li> </ul>

Impacts	Prediction Methods	Output
Infrastructure and Utilities	<ul style="list-style-type: none"> <li>• Existing demand estimation methods by regulators, e.g. population equivalent (PE) calculations [National Water Services Commission (SPAN)].</li> <li>• Comparison of existing supply to meet future demand to determine adequacy.</li> </ul>	<ul style="list-style-type: none"> <li>• Estimates of demand.</li> </ul>
Aesthetics	<ul style="list-style-type: none"> <li>• Visual assessment on scenic and aesthetic value of the area.</li> <li>• 2-D and 3-D Viewshed Analysis.</li> <li>• Economic valuation.</li> </ul>	<ul style="list-style-type: none"> <li>• Before and after scenario.</li> </ul>

Note: The list is not exhaustive and not all the above may be relevant to the project. It is the responsibility of the Project Proponent and Qualified Person to determine the relevant method required for environmental assessment and compliance.

## 5.5 OUTCOMES FROM ASSESSMENT

The method to determine the level of significant impact is to benchmark the results against the stipulated current criteria and standard limits imposed by DOE and various GAs.

In situations where there are no local standards or limits, regional and international examples of limits and adherence levels can be adopted based on expert opinion of the Qualified Person. However, the chosen criteria and standards must be suitable and relevant to local conditions.

**Table 5.5.1** provides a list of the evaluation criteria for various environmental components as a guide.

**Table 5.5.1: Criteria and Standards for Environmental Parameters**

Impacts	Evaluation Criteria
Erosion and Sedimentation	<p><u>Guidance Documents</u></p> <ul style="list-style-type: none"> <li>(a) Guidance Document for Addressing Soil Erosion and Sediment Control Aspects in the EIA Report (DOE).</li> <li>(b) Guidance Document for the Preparation of the Document on LD-P2M2 (DOE).</li> <li>(c) Guidelines on LD-P2M2 (DOE, 2017).</li> <li>(d) Guidelines for Erosion and Sediment Control in Malaysia (DID).</li> <li>(e) MSMA-2.</li> </ul> <p><u>Sediment basin/silt trap discharge</u></p> <ul style="list-style-type: none"> <li>(a) TSS: 50 mg/L, depending on locality.</li> <li>(b) Turbidity: 250 NTU.</li> </ul> <p><u>Silt curtain</u></p> <ul style="list-style-type: none"> <li>(a) TSS: Shall be based on the limit stated in Malaysia Marine Water Quality Criteria and Standards for Malaysia (MMWQCS).</li> <li>(b) Turbidity: 250 NTU.</li> </ul>
Water Quality and Pollution Control	<ul style="list-style-type: none"> <li>(a) Ambient water quality: National Water Quality Standards (NWQS).</li> <li>(b) Ambient marine water quality: MMWQCS.</li> <li>(c) Sewage discharge: Environmental Quality (Sewage) Regulations 2009.</li> <li>(d) Toilets and septic tanks: SPAN approved design and requirements.</li> <li>(e) Vessels: The International Convention for the Prevention of Pollution from Ships 1973/1978 (MARPOL 73/78) and Marine Department of Peninsular Malaysia requirements - oil, sewage, bilge, ballast water, solid and scheduled wastes (Annex I, IV and IV).</li> </ul>
Flood/Runoff Management	MSMA-2 requirements.
Air Quality	<ul style="list-style-type: none"> <li>(a) Environmental Quality (Clean Air) Regulations 2014.</li> <li>(b) MAAQS.</li> <li>(c) MARPOL Annex VI on ship emissions.</li> </ul>

Impacts	Evaluation Criteria
Noise Level	(a) The Planning Guidelines for Environmental Noise Limits and Control (DOE). (b) Factories and Machinery (Noise Exposure) Regulations 1989. (c) UNEP/CBD/SBSTTA/20/INF/8: Scientific Synthesis of the Impact of Underwater Noise on Marine and Coastal Biodiversity and Habitats (UNEP, 2016).
Vibration	The Planning Guidelines for Environmental Vibration Limits and Control (DOE).
Ecology	(a) International Union on the Conservation of Nature (IUCN) and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) listing. (b) Fisheries Act 1985. (c) Wildlife Conservation Act 2010. (d) Feedback from Department of Marine Park Malaysia, DOF, PERHILITAN and JPSM.
Landuse	(a) Structure Plans, Local Plans, Special Area Plans (SAP). (b) ESA Listing under the NPP-3. (c) Marine Park Management Plan. (d) Requirements in the National Physical Coastal Zone Plan (NPCZP). (e) Local authority requirements.
Land Traffic	(a) Acceptable level of service (LOS) for traffic flows. (b) Local authority requirement.
Safety and Health	(a) Occupational Safety and Health Act 1994. (b) Factory and Machinery Act 1967. (c) Department of Safety and Health (DOSH) requirements. (d) International Labour Organisation (ILO) and other guidelines. (e) Guidance Document on HIA in EIA (DOE). (f) EIA Guidelines for Risk Assessment (DOE).

Impacts	Evaluation Criteria
Wastes	<p><u>Scheduled wastes</u> Environmental Quality (Scheduled Wastes) Regulations 2005.</p> <p><u>Other wastes</u> (a) Solid Waste and Public Cleansing Management Act 2007. (b) Local authority requirements.</p> <p><u>Vessels</u> The International Convention for the Prevention of Pollution from Ships 1973/1978 (MARPOL 73/78) and Marine Department of Peninsular Malaysia requirements - solid and scheduled wastes.</p>
Socio-economy	<p>(a) Public perception on acceptability. (b) National Heritage Register (National Heritage Department). (c) Preservation of cultural, heritage, historical, and archaeological items and sites of significance. (d) SIA requirements in the context of the TCPA (Amendment) 2017 (Act A1522) for three categories:</p> <p><u>SIA Category 1:</u> Development projects under subsection 20B(1) and (2) of Act A1522 for coastal reclamation projects and major national infrastructure.</p> <p><u>SIA Category 2:</u> Development projects under subsection 22(2A) Act 172 for new township development for population over 10,000 people or covering area over 100 ha or both, major national infrastructure.</p> <p><u>SIA Category 3:</u> Any other development projects with significant social impacts as ordered by the MPFN from time to time.</p>
Treatment Systems	<p>(a) Technical Guidance Document on the Design and Operation of Industrial Effluent Treatment Systems (DOE, 2015). (b) Technical Guidance Document on Performance Monitoring of Industrial Effluent Treatment Systems (DOE, 2015). (c) Technical Guidance Document on Performance Monitoring of Air Pollution Control Systems (DOE, 2006).</p>
Visual Aesthetics	Public perception on acceptability.

Notes: The list is not exhaustive and not all the above may be relevant to the project. The Project Proponent and Qualified Person shall make reference to the latest standards and requirements by the authorities.

## CHAPTER 6

### MITIGATION MEASURES

#### 6.1 INTRODUCTION

This Chapter shall focus on P2M2s that serve to address the significant adverse environmental impacts identified during the scoping exercise and impact assessment phases of the EIA. The mitigation measures provided in this Chapter shall serve as a guide only.

The implementation of P2M2 is intended to achieve the following:

- (a) Avoidance of negative impacts through selection of alternatives to implement the preventive measures.
- (b) When an impact cannot be avoided, to adopt relevant mitigation measures to minimise the impacts.
- (c) Enhance and amplify the beneficial impacts.
- (d) Ensure that residual impacts are kept within acceptable levels.

#### 6.2 PRINCIPLES OF ADOPTION OF P2M2

The basic principles of P2M2s implementation include:

- (a) The need and extent of P2M2s required shall correspond to the significance of the predicted impact. Once an issue is identified as significant, P2M2s must be identified and elaborated in detail in the EIA (e.g. for and from engineering design and calculations for slope reinforcement works on cut slopes). For minor issues, management actions and simple measures need only be highlighted (e.g. need for water browsing for dust control at site).
- (b) Priority shall be on control at source (e.g. use of erosion control covers on slopes and platforms to reduce erosion) and rectifying the effects (e.g. maintenance on silt traps and removal of accumulated silt from drainage).

- (c) Solutions shall be project-specific and designed for the site conditions instead of using generic solution proposals. The P2M2s need not be complex and costly, but shall instead be practical, easy to implement and effective.
- (d) The EIA shall include adequate explanation on the design and function of a P2M2, supported by diagrams, illustrations, photos and maps. The technical reports and specifications shall be included in the appendix of the EIA.
- (e) The use of new technology is encouraged if it can be proved to be effective in mitigating the impacts. The Project Proponent or the Qualified Person is responsible to provide proof and supporting evidence that the proposed technology is tried and tested and able to address the impacts.
- (f) P2M2s require regular inspection, maintenance and rehabilitation and these shall be incorporated as part of the management requirements of the project, including the allocation of adequate budgets for such purposes.
- (g) Effectiveness of P2M2s shall be documented and this is through implementation of a monitoring programme.

The Qualified Person shall also propose Best Management Practices (BMPs) based on the findings of the EIA for the project site.

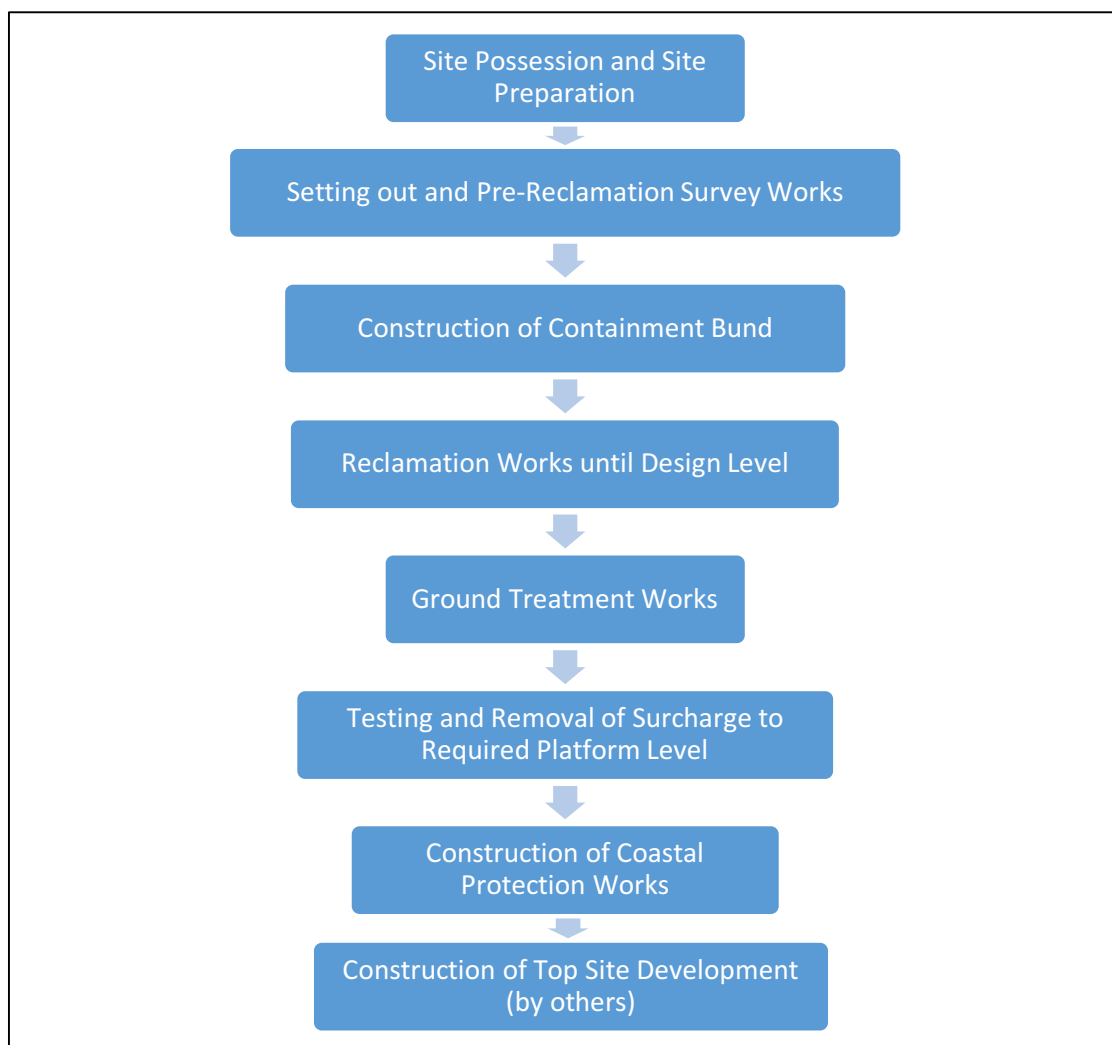
The P2M2s and BMPs shall be incorporated into the overall design of the project. The submission of the EIA and the pledge given by the Project Proponent shall reflect the agreement and commitment towards ensuring implementation of the mitigation measures on-site during all stages of work.

## 6.3 BMPs ON TYPICAL CONSTRUCTION SEQUENCE FOR LAND RECLAMATION WORKS

### 6.3.1 Detailed Construction Sequence

#### 6.3.1.1 Site Possession and Site Preparation

Site possession is defined as occupation of land, particularly by Contractor to carry out the works. The Contractor will mobilize all machineries, plants and equipment required for reclamation and other associated works after obtaining the Site Possession from Client or Project Proponent. Temporary structures and/or facilities such as laydown area, site office, fabrication yard, base camp, and temporary jetty will be constructed after the site clearing. Temporary hoarding along the landside of project boundary and signboard will be erected and site access will be established to control access to and from the project site.



**Figure 6.3.1: Typical Construction Sequence for Land Reclamation Works**



**Figure 6.3.2: Example of Site Access and Hoarding**



**Figure 6.3.3: Example of Temporary Jetty for Land Reclamation Works**



**Figure 6.3.4: Example of Site Office and Workers Base Camp**



**Figure 6.3.5: Example of Skid Tank with Containment Tray**

### 6.3.1.2 Setting out and Pre-Land Reclamation Survey

A licensed surveyor appointed by the Contractor will conduct a setting out and pre-land reclamation survey to confirm the extent of the project boundary and to determine the current seabed and topography level within the project boundary. Temporary bench marks will be established at or near to the project site for reference during interim and handover survey works. The boundary of the project site shall be demarcated using timber or steel pipe pegs and these pegs shall not be disturbed during the construction works.



**Figure 6.3.6: Example of Temporary Bench Mark**

### 6.3.1.3 Land Reclamation Works and Ground Treatment Works

Land Reclamation works will be undertaken by first constructing perimeter bunds before offloading fill material. Given that the land reclamation area is usually a large area, it is considered that, practically, the land reclamation will need to be carried out progressively in phases of reclamation areas.

The sequence of land reclamation is described as below and:

- (i) Install silt curtain along the perimeter of proposed land reclamation boundary based on the specification by Consultant.



**Figure 6.3.7: Example of Installed Silt Curtain prior to Land Reclamation Works**

- (ii) Construct a temporary containment bund using sand or rock material. The typical construction method of sand containment bund and rock bund are as follows:
  - (i) The construction of sand containment bund is carried out by pumping sand from the Trailing Suction Hopper Dredger (TSHD) to the land reclamation area via conveyor belt, pipeline or excavator positioned in the flat top barge. The bund will be shaped by a long reach excavator operating from a barge. Example of containment bund construction is shown below:

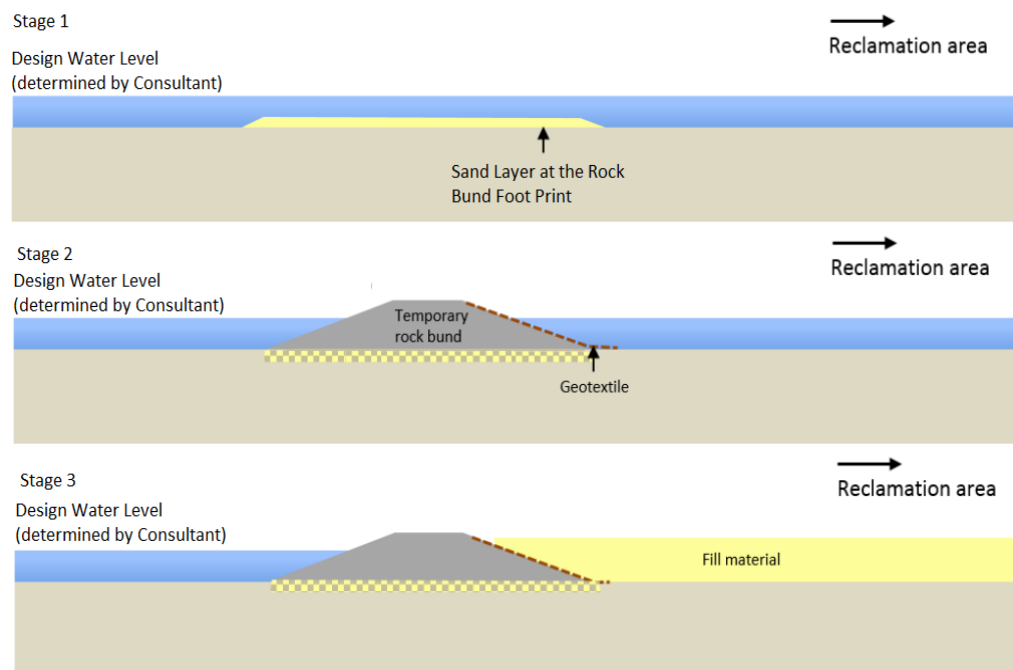


**Figure 6.3.8: Sand Filling Works using Conveyor Belt from TSHD**



**Figure 6.3.9: Construction of Sand Containment Bund using Flat Top Barge and Excavator**

- (ii) Typically, the construction of rock containment bund is done by placing a layer of sand over the footprint of the proposed rock bund alignment. The rock material for the bund will be delivered by barges and placed by a long reach excavator operating from a barge.



**Figure 6.3.10: Typical Construction Sequence of Rock Containment Bund**

- (iii) Once the land reclamation area is surrounded by the containment bunds, fill material is pumped to the land reclamation area at the back of temporary containment bunds to the design level determined by the Consultant.
- (iv) Ground treatment works such as Prefabricated Vertical Drain System (PVD) and surcharge will be carried out to accelerate the ground consolidation and settlement. **Figures 6.3.11 – 6.3.12** below shows the typical process of ground treatment using PVD and surcharge.



**Figure 6.3.11: Ground Treatment Works using PVD System**



**Figure 6.3.12: Offshore PVD Works**

- (v) Install instrumentation to ensure that the performance criteria of the land reclamation are met (e.g. degree of consolidation and long term settlement). Besides, the monitoring results also give good indication on the stability of the reclaimed platform especially during the construction period.

#### 6.3.1.4 Testing and Removal of Surcharge to Required Levels

The surcharge material from ground treatment works will be trimmed after the required performance criteria are met by conducting field test and laboratory test. Handover survey shall be carried out by licensed surveyor to verify that the platform levels have achieved the required levels by the Project Proponent (refer **Figure 6.3.13**).



**Figure 6.3.13: Surcharge of Land Reclamation Area**

#### 6.3.1.5 Construction of Coastal Protection Structure

The coastal protection structure such as rock revetment or sea wall will be constructed after completion of land reclamation and ground treatment works (or otherwise depending on the Consultant's design). In example of coastal protection structure of rock revetment, the slope will be trimmed and a layer of geotextile will be placed on the trimmed surface, followed by placement of armour rocks by a long reach excavator/grab dredger operating from a barge or from the crest of the revetment (refer **Figure 6.3.14**).



**Figure 6.3.14: Example of Rock Revetment Construction Works**

These typical construction sequences may be repeated continuously for the next subsection of land reclamation until full phase of the land reclamation is completed depending on the size of the land reclamation project.

## **6.4 APPROACHES TOWARDS P2M2 ADOPTION**

### **6.4.1 General P2M2s and BMPs**

The Qualified Person shall identify and incorporate into the EIA, any additional P2M2 and BMPs required to mitigate significant impacts from the project site.

The Project Proponent and Qualified Person shall recommend alternative measures and/or introduce newer technology whenever these are proven more effective. At the EIA stage, the P2M2 shall be detailed out as best as possible and reported in the EIA Report.

The key P2M2 that are applicable:

- (a) Ecological Management
- (b) Erosion and Sediment Control Measures
- (c) Slope Failures
- (d) Drainage and Flooding
- (e) Water Pollution Control

Other mitigation measures that may be required include:

- (a) Air Pollution Control
- (b) Noise and Vibration Control
- (c) Waste Management
- (d) Safety and Health
- (e) Land and Marine Traffic Management

#### **6.4.2 LD-P2M2**

- (a) LD-P2M2 is a newly mandated requirement by DOE under the mainstreaming environmental agenda to effect a paradigm shift towards a culture of SR, placing the onus of environmental protection clearly on the Project Proponent to implement and comply.
- (b) The LD-P2M2 is required as long as there are any land disturbing activities, subject to Section 34A of the EQA 1974, carried out during project development.
- (c) The LD-P2M2 forms an integral part of the EIA process and must be taken into account during the project planning cycle to ensure that the recommendations in the document are incorporated into the project.
- (d) During project implementation, it shall act as a reference document for the Project Proponent, contractors and Environmental Officer (EO) in implementing P2M2s and BMPs on-site, and in facilitating monitoring, audit and enforcement.
- (e) The Guidance Document for the Preparation of the Document on LD-P2M2 in Appendix 4 of the EGIM (DOE, 2016) and “Guidelines on LD-P2M2 by DOE” (2017) shall be referred in the preparation of the LD-P2M2.

### 6.4.3 LD-P2M2 Principles

- (a) The LD-P2M2 is to be prepared and endorsed by a DOE registered consultant who holds a certification issued by DOE, as a professional for erosion and sediment control with a Professional CPESC™ Certification.
- (b) The basic principles to develop the LD-P2M2 shall include:
  - (i) Integration of project design with site constraints.
  - (ii) Preservation and stabilisation of drainage and waterways.
  - (iii) Minimise the extent and duration of disturbance.
  - (iv) Control of runoff flows into, through and from the site via stable drainage structures.
  - (v) Installation of perimeter controls.
  - (vi) Stabilisation of disturbed areas in a timely manner.
  - (vii) Protection of steep slopes.
  - (viii) Use of sediment controls to prevent off-site damage.
  - (ix) Protect inlets, storm drain outfalls and culverts.
  - (x) Provide access and general construction controls.
  - (xi) Inspect and maintain BMPs for control measures.
  - (xii) Employ experienced and qualified persons for monitoring and consistently conduct relevant training.

#### 6.4.4 Standard Requirements for Submission

- (a) The LD-P2M2 report shall include all required information as per the LD-P2M2 standard requirements for submission (refer to **Table 6.4.1**) and accompanied by relevant technical drawings and maps.
- (b) The Project Proponent is required to make a legal pledge to undertake efforts, measures, actions or due diligence in accomplishing the overarching goal of protecting the environment and in mitigating the adverse environmental impacts in the process of the proposed project development.

**Table 6.4.1: Standard Requirements for the LD-P2M2 Submission**

Requirement	Information to be Included
Project Activity and Implementation	<ul style="list-style-type: none"> <li>• Phasing plan.</li> <li>• Project implementation schedule.</li> <li>• Description of construction activities.</li> <li>• Construction schedule complete with timeline or charts for P2M2s installation.</li> <li>• Construction method statements.</li> </ul>

Requirement	Information to be Included
Information and Analysis on Project Development	<ul style="list-style-type: none"> <li>• Selected weather and rainfall data.</li> <li>• Site runoff velocity and flow rates (pre and post-development).</li> <li>• Description of site soil and geological characteristics (type, erodibility, hydrologic group, percentage dispersible material, excavation depth, etc.).</li> <li>• Description of adjacent areas that may be affected by land disturbance.</li> <li>• List of drainage, streams and river onsite as well as receiving streams and rivers.</li> <li>• List of P2M2s proposed.</li> <li>• Access roads and project components located outside of project boundary.</li> <li>• Earthworks cut and fill volume.</li> <li>• Availability of rocks materials.</li> <li>• Biomass management.</li> <li>• Solid (construction waste) and domestic waste management.</li> <li>• Spill prevention and control plan.</li> <li>• Hazardous waste management.</li> <li>• Soil loss prediction (pre, during and post-development) for with and without LD-P2M2 implementation scenarios.</li> <li>• Calculation for sediment traps/basins and projected runoff flows.</li> </ul>
Map of Site Plan with Existing Conditions	<ul style="list-style-type: none"> <li>• Topographic survey map.</li> <li>• Geological Terrain Map.</li> <li>• Erosion risk map.</li> <li>• Landuse map.</li> <li>• Site development plan map.</li> </ul>

Source: Guidance Document for the Preparation of the Document on LD-P2M2, DOE, 2016

## CHAPTER 7

# ENVIRONMENTAL MANAGEMENT PLAN

### 7.1 INTRODUCTION

The EMP is a legal document prepared by the Project Proponent, incorporating the LD-P2M2, other P2M2s and BMPs as recommended in the EIA), including the Conditions of Approval (COA) by the DOE.

The EMP shall function as a project implementation tool for the Environmental Management Team to carry out mitigation works on-site. The key contents of the EMP are required to be translated into a format for incorporation into the Bill of Materials (BOM) for the work scopes of the contractors during construction and operations.

Other than mitigation measures, the EMP shall include an environmental monitoring and audit programme to assess the effectiveness of the P2M2s implementation.

The EMP is a living document and has to be updated if there are major changes to the project design, layout or method statement that may result in impacts to the environment.

### 7.2 EMP FRAMEWORK

In the EIA phase, the project may not have sufficient detailed information on the project work plan to produce a comprehensive EMP. The EMP chapter in the EIA will only be an EMP framework for eventual morphing into a full EMP after the EIA approval stage.

The Project Proponent can decide to undertake the detailed EMP at the same time as the EIA Report and both can be submitted concurrently. The EMP can later be updated to incorporate the requirements of the COAs. The standard COAs to be included are:

- (a) Monthly monitoring of water quality of receiving water body by Accredited Laboratory or any other frequency as determined by DOE.
- (b) Monthly monitoring of TSS and Turbidity at inlets and outlets of sediment structures or any other frequency as determined by DOE.

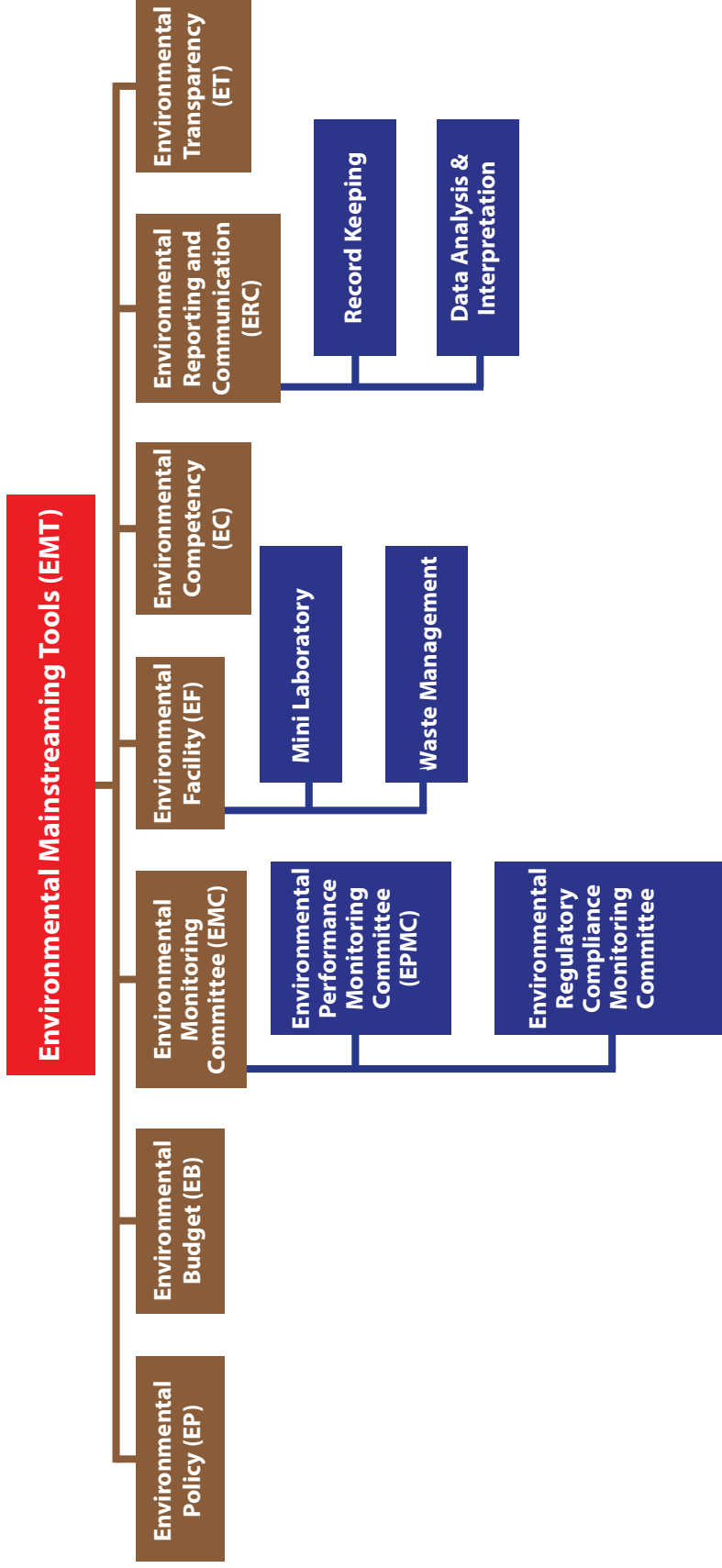
- (c) In-situ monitoring of TSS and Turbidity after rain event.
- (d) Monthly or Quarterly monitoring of air, noise and vibration qualities depending on sensitivity of receptor.
- (e) Planning, construction and maintenance of LD-P2M2 on site.
- (f) P2M2 notification and implementation.
- (g) Identification of need of competent persons to undertake specific task on site.
- (h) Description and implementation details of EMT.
- (i) Clear documentation on any transfer of ownership or proponent of Approved EIA.
- (j) Allocation and reporting of sufficient resources to undertake the project activities on-site.
- (k) Temporary/permanent abandonment/project closure plan details for all phases.
- (l) Implementation of 5S concept in good housekeeping practices.
- (m) Any other green initiatives undertaken for site development activities

The EMP format, shall be based on the requirements stated within the EGIM (DOE, 2016), and shall contain details of the LD-P2M2 Document and proposed monitoring and audit programme.

### 7.3 SELF-REGULATION

Environmental Mainstreaming (EM) is a strategic tool that allows for the cultural evolution of embracing the environmental agenda at all levels of the organisational structure of the Project Proponent. With the understanding of EM, all key personnel in an Organisation can play a role in safe guarding our environment in an effective manner. As such, the elements as espoused in the EMT provide a Guide in achieving the ultimate Goal of Environmental Excellence in an Organisation. An overview of the EMT, as shown in **Figure 7.3.1**.

Figure 7.3.1: Environmental Mainstreaming Tools



Source : DOE, Malaysia (2018)

### **7.3.1 Environmental Policy (EP)**

A Policy is a commitment from the Project Proponent on their strong environmental accountability to ensure compliance is through the responsibility of all personnel.

### **7.3.2 Environmental Budgeting (EB)**

Sufficient budget shall be allocated for the implementation of the EM in the Organisation and shall be reviewed on a regular basis to ensure top priority is given to achieving environmental excellence in its perpetuity.

The budget list must be included as the following:

- (a) Environmental Training
- (b) LD-P2M2
- (c) Monitoring & Audit

### **7.3.3 Environmental Monitoring Committee (EMC)**

EMC shall play important role in identifying all future improvements needed to ensure the EM has achieved its goal. Implementation of future improvements must be scheduled and financial resources allocated to ensure that these improvements can be made without delay. The EMC shall comprise of the Environmental Performance Monitoring Committee (EPMC) members and the Environmental Regulatory Compliance Monitoring Committee (ERCMC) Members.

Lines of communication between the Project Proponent and EMC with the relevant stakeholders must be clearly spelled out, these is not only limited to project site management but also in engagements with affected communities and the general public.

#### **7.3.3.1 Environmental Performance Monitoring Committee (EPMC)**

EPMC is a committee set up at the operational level of the company to monitor the operations, maintenance and performance of all Pollution Prevention and Mitigation measures implemented to minimize any adverse impacts of the company's operations on the receiving environment. Members must be appointed by the Decision makers in the company and must meet monthly to monitor and report on Environmental Targets met.

The objectives of the EPMC are as follows:

- (a) Establish a Maintenance programme for pollution control structures, waste management, nuisance factors and all erosion and sedimentation control elements on a regular basis.
- (b) Devise training programmes for on-site workers to include awareness of the requirements pertaining to good environmental practices and consistent environmental compliance.
- (c) Allocate administrative responsibilities for planning and managing the environmental requirements as outlined in the EIA COA.
- (d) Ensure the implementation of P2M2.
- (e) Implement a monitoring programme (i.e., IM, CM and PM) to check the effectiveness of the mitigation measures provided.
- (f) Ensure that mitigation measures are incorporated in all relevant contracts and design of the site.

### **7.3.3.2 Environmental Regulatory Compliance Monitoring Committee (ERCMC)**

ERCMC is the Committee set by the Project Proponent to monitor the implementation of the EP and to review the Environmental Performance of the Project Proponent in terms of Regulatory compliance on a periodic basis. The ERCMC must be headed by the highest decision maker in any company and must meet regularly with proper records to show its findings.

The objectives of the ERCMC are as follows:

- (a) Implement the EP and make revisions as and when needed.
- (b) Study implications of new environmental Regulations on company's activities.
- (c) Provide financial resources for any environmental improvement projects.
- (d) Understand and take ownership of Company's performance in EM.
- (e) Address any non-compliance issues.

### 7.3.4 Environmental Facility (EF)

EF is incorporated in the Project Proponent's overall infrastructural planning to comply with the environmental regulatory requirements.

#### (a) Mini Laboratory

In order to get immediate results on the performance of the P2M2 on site, equipment needed to assist the Qualified Person in carrying out his duties. Project Proponent has to establish a mini laboratory in its site to fulfil this requirement. Equipment needed for the mini laboratory is pH meter, DO meter, TSS & Turbidity meter.

#### (b) Performance Monitoring

Discharges and monitoring is needed to show compliance to the relevant standards as stated in the Environmental Quality Act (Amendment) 2012 and its subsidiary Regulations.

In addition, the EIA terms of approval conditions that will be allude that all prevention and control measures; stated in the EIA study will need to be adhered to. The project proponent and the contractor shall be responsible in ensuring that all applicable laws, regulations and guidelines are complied with. TSS & Turbidity meter is one of the major equipment needed to carry out the performance monitoring at the sediment basin/silt trap discharge.

#### (c) Waste Management

Project Proponent has to establish efficient waste management system by ensuring proper waste collection/disposal to comply with the environmental regulatory requirements and prevent environmental pollution.

### 7.3.5 Environmental Competency (EC)

The need for competency has been established by DOE to play the bridge between the Project Proponent and DOE in ensuring the regulatory compliance is on a continuous basis.

The role of the Competent Person is as follows:

- (a) Ensures P2M2 is implemented on site.
- (b) Conducts and supervises in-situ sampling and testing.
- (c) Supervises environmental monitoring.
- (d) Ensures corrective actions are implemented.
- (e) Conducts daily inspection at site.
- (f) Reviews Environmental monitoring reports (EMRs) for compliance to COAs.
- (g) Ensure timely submission of the Environmental Monitoring Compliance Reports (EMCRs) and other reports to DOE.

### **7.3.6 Environmental Reporting and Communication (ERC)**

Reports as required by DOE should address all control and mitigation measures for the following:

- (a) Land clearing of site.
- (b) All activities during the Project Platform preparation stage.
- (c) All activities during the operational stage of the Project.

#### **(i) Record Keeping**

A documented procedure on record keeping for the activities, operations and maintenance of the P2M2 must be established to ensure all aspects of the compliance and performance of the Organisation in EM is properly and easily referred to. Records must be made available to DOE the Regulator whenever asked for.

#### **(ii) Data Analysis & Interpretation**

The Competent Person has to analyse and interpret the data from the IM, CM and PM in a suitable format for presentation the ERCMC and EPMC for any decision making purpose. Any upset conditions data must also be analysed so that records can be kept for continuous improvement purposes.

### 7.3.7 Environmental Transparency (ET)

The company status, environmental policy, compliance and achievement can be displayed on company website or billboard located at the Project Site boundary or entrance to the company's premise to improve public confidence.

An annual environmental Sustainability Report has to be prepared and submitted to DOE. A sample of the Sustainability Report is appended in **Appendix 6**.

## 7.4 MONITORING AND AUDIT PROGRAMME

The environmental monitoring and audit programme is an important component of the EMP. Monitoring and audit shall be implemented during the post-EIA stage.

### 7.4.1 Monitoring Category

Environmental monitoring can be categorised into three main types:

#### (a) Performance Monitoring (PM)

- (i) Relates to the monitoring of the performance treatment systems such as industrial effluent treatment systems (IETS), sewage treatment systems (STS) and air pollution control systems (APCS).
- (ii) This shall be undertaken by a Qualified Person with expertise in the related treatment system.

#### (b) Compliance Monitoring (CM)

- (i) Relates to the monitoring of P2M2s within the site and their performance. Measurements are usually taken either of the ambient parameters (water, air and noise) or of the discharge (sewage, sediment basin).
- (ii) This task shall be carried out by a Qualified Person such as the EO and/or the Environmental Consultant.

(c) **Impact Monitoring (IM)**

- (i) Impact monitoring may only be required in cases where there is a possibility that the impacts may still affect receptors outside of the project boundary despite implementation of P2M2s.
- (ii) This task must be carried out by a Qualified Person such as the Environmental Consultant.
- (iii) The monitoring locations and frequencies, parameters to monitor, recommended limits, instrumentation and personnel requirements shall need to be identified in the EMP framework.

#### 7.4.2 Monitoring Methodology

- (a) The extent of monitoring shall be determined by the scale of the project and of the predicted impacts. Monitoring covers both within the project site and outside of its boundary where impacts are perceived to affect sensitive receptors.
- (b) Details of the monitoring programme are to be decided upon by the Qualified Person or Environmental Consultants, and be included in the EIA to be approved by DOE before implementation.
- (c) For specific projects, the monitoring programme shall be required to be tailored to the site conditions and type of development. **Table 7.4.1** shows a typical monitoring programme for land reclamation and dredging activities.

#### 7.4.3 Environmental Audit

- (a) Environmental auditing is a post-EIA evaluation process to determine the effectiveness and performance of the LD-P2M2s in compliance to the COAs by the Project Proponent.
- (b) Audit requirements are guided by the requirements in the Environmental Audit Guidance Manual by DOE. The audit must be undertaken by an independent party as a DOE registered auditor.

- (c) The typical audit process involves:
- (i) Pre-audit: Preparation of a pre-audit checklist and information request to the auditee. Submission of a notification of audit to DOE.
  - (ii) On-site Audit: Briefing to the auditee by Lead Auditor. Audit shall include documentation review, site inspection, interviews with relevant personnel to obtain the necessary information to gauge compliance and site sampling (optional). Auditee will be briefed at the Closing Meeting with the on-site Audit Summary submitted to the state DOE.
  - (iii) Post-audit: Lead Auditor shall submit an Audit Report to the state DOE and the Project Proponent to respond with a Corrective Action Report (CAR) within two weeks from the audit date.

Table 7.4.1: Proposed Environmental Monitoring Parameters for Land Reclamation and Dredging

Aspect	Phase	Method	Parameters	Frequency
Water Quality	Construction	Grab sampling or other accepted standard methods (upstream and downstream of waterways)	<u>Ambient</u> NWQS.	Monthly
		In-situ sampling at final discharge point	<u>Sediment basin/silt trap discharge</u> TSS and Turbidity	After every heavy rain event (12.5 mm measured by rain gauge)
	Operational	Sampling at sewage treatment plant (STP) final discharge outlet	<u>Sewage</u> Environmental Quality (Sewage) Regulations 2009	Monthly
Air Quality	Construction	Measurement by approved air sampler (boundary and nearest receptors)	<u>Ambient</u> Relevant parameters of the MAAQS	Quarterly
Noise Level	Construction	Measurement by approved noise meter (boundary and nearest receptors)	<u>Ambient</u> The Planning Guidelines for Environmental Noise Limits and Control, 2 <sup>nd</sup> Edition (DOE, 2007)	Quarterly (ambient) and/or during blasting works
Vibration	Construction	Measurement by approved vibration meter	<u>Ambient</u> The Planning Guidelines for Vibration Limits and Control in the Environment, 2 <sup>nd</sup> Edition (DOE, 2007)	During piling and blasting works

Note: The list is not exhaustive and not all the above may be relevant to the port development project. It is the responsibility of the Project Proponent and Qualified Person to determine the relevant information required for environmental assessment and compliance.

## CHAPTER 8

### REPORTING AND REVIEW

#### 8.1 INTRODUCTION

This Chapter provides the required format for EIA report preparation for submission to the DOE for approval of projects.

##### 8.1.1 EIA Report

An EIA shall be written in a concise manner that is easy to understand and be able to convey the main message to the decision makers.

The **EGIM (DOE, 2016)** provides the specifications and format for EIA reporting.

##### 8.1.2 EIA Report Format

- (a) The EIA report shall typically include the following:
- (i) Declaration from the Project Proponent and Qualified Person(s) in the format detailed in Appendix 9 of EGIM (DOE, 2016).
  - (ii) Executive Summary of the EIA Report in Bahasa Malaysia and English.
  - (iii) Brief introduction to the project, Project Proponent (address, key person and contact information), Environmental Firm (address, key person and contact information) and EIA Team Members (name, academic qualifications, areas of study, signature).
  - (iv) Review of the policy, regulatory and legal requirements for the project.
  - (v) TOR for the EIA Study as endorsed by the DOE. Endorsement letter from DOE to be attached as appendix to the EIA report.
  - (vi) Statement of need for the project.
  - (vii) Deliberation on the alternatives and project options.

- (viii) Detailed description of the project including site information, concept and breakdown of major components, material and manpower requirements, project activities and time schedule (refer to **Table 8.1.1**). Mandatory to be addressed is rehabilitation of site if the project is abandoned at any stage of project activity.

**Table 8.1.1: Recommended Project Description in EIA Report**

<p><b><u>Project Details</u></b></p> <p>(a) Project title.</p> <p>(b) Name and contact details of the Project Proponent (contact person, address, telephone number, e-mail address).</p> <p>(c) Name of registered EIA Consulting Firm (EIA Team Leader, address, telephone number, e-mail address).</p> <p>(d) Location of project (coordinates, lot no, district, etc.).</p> <p>(e) Relevant map showing project location and accessibility.</p> <p><b><u>Location</u></b></p> <p>(a) General site plan including ZOS (5-km radius from project boundary and/or 1-km corridor (0.5 km on either side along the ROW for linear projects)).</p> <p>(b) Project boundary and layout including boundary coordinates.</p> <p>(c) Description of location in relation to identifiable landmarks (e.g. city centres, main roads, towns, etc.).</p> <p><b><u>Project Component and Design Details</u></b></p> <p>(a) Project details (land area, buffer requirements, lots and land status).</p> <p>(b) Project concept.</p> <p>(c) Project components.</p> <p>(d) Technology use.</p> <p>(e) Examples of similar project type and scale.</p> <p>Note: The above shall be supported with technical drawings, illustration and diagrams.</p> <p><b><u>Project Activities</u></b></p> <p>(a) Method statement to be provided for major project activities during pre-construction, construction and operational stages.</p> <p>(b) Manpower requirements.</p> <p>(c) Resource requirements (e.g. soil and aggregate sources, spoil disposal area, etc.).</p>
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**Infrastructure, Utilities and Amenities Requirement**

Details of the estimated demand for:

- (a) Water supply.
- (b) Electricity.
- (c) Sewerage.
- (d) Telecommunications.
- (e) Transport system.
- (f) Waste management.

Project abandonment Plan and Rehabilitation

- (a) Wastes.
- (b) Structure.
- (c) Site Stability.
- (d) Closing and Maintenance.

**Project Implementation Schedule**

- (a) The estimated timeline for various stages of project implementation from planning, to construction and operational stages.
- (b) Details of each stages of implementation.

- (ix) Description of the baseline conditions (physical, chemical, ecology and socio-economy) within the ZOS that may be impacted by the project.
- (x) Assessment of the significant impacts (positive and negative), prediction of the extent and effects on nearby sensitive receptors and proposal of P2M2s to minimise or enhance these impacts.
- (xi) Details of public consultation and engagement as part of EIA requirements.
- (xii) EMP incorporating the LD-P2M2, monitoring and audit programme.
- (xiii) Appendices containing technical studies, supporting documentation, results of analysis, list of references, etc.

- (b) An EIA Checklist shall be used as reference.

**8.1.3 Executive Summary**

The Executive Summary provides a concise brief of the findings and recommendations from the EIA for decision makers to review.

The Executive Summary shall be short and written in non-technical language, both in Bahasa Malaysia and English, presenting the following information:

- (a) Title of the project.
- (b) Name and contact details of the Project Proponent.
- (c) Name and contact details of EIA Team members.
- (d) Location of the project site.
- (e) Relevant maps showing project location and sensitive receptors and extent of the ZOS.
- (f) Alternatives considered.
- (g) A tabulation of significant impacts and proposed P2M2s (format as detailed in EGIM).
- (h) Description of monitoring and audit programme (PM, CM and/or IM).
- (i) Conclusion to the Study.

Soft copy of the Executive Summary (PDF format) shall be submitted to DOE along with soft copy of the full EIA report.

#### **8.1.4 Data Deliverables**

- (a) The Project Proponent shall make available all relevant data collected during the EIA study to be submitted (raw and processed format) along with the EIA report.
- (b) Examples of such data includes – sampling results (certificates and raw data), modelling databases, baseline data (surveys, hydrographic data and climate data), metadata files, etc.
- (c) This data shall be provided to the relevant government agencies upon request.

## **8.2 STAKEHOLDER ENGAGEMENT AND PUBLIC DISPLAY**

- (a) Public briefing: For EIAs under the Second Schedule, public engagement is mandatory. It can take many forms but the common one is through a public briefing with the stakeholders within the ZOI. In the briefing, the Project Proponent and EIA Team shall present the project brief followed by a questions and answers (Q&A) session. All discussions will be recorded and reported in the EIA.

- (b) Public display and review of EIA report: Likewise, after submission of the EIA, there is a one-month review period whereby the public will officially be requested to submit their responses and comments in writing to the DOE. Notification of the public display is published in two local newspapers consecutively, once every week for three weeks.
- (c) Display locations: The EIA will be displayed at selected locations (DOE office, public libraries and local authority offices) where the public can view the documents easily. The Project Proponent and Qualified Person can hold discussions with DOE to propose suitable locations for display.
- (d) Online display: For both First and Second Schedule activities, the EIA will be uploaded into the DOE website for the duration of the review period.
- (e) Additional engagements: While it is only mandatory for the Second Schedule EIA for official public engagement, all comments are useful in the EIA study. The Project Proponent is encouraged to carry out stakeholder engagements voluntarily even for the First Schedule EIA.
- (f) Documentation: The public participation process shall be properly documented and reported in the EIA. The report shall contain the following:
  - (i) Details of the programme (dates, venue, itinerary).
  - (ii) Attendance list of participants.
  - (iii) Copies of survey forms.
  - (iv) Brief summary of findings from the event e.g. reports, minutes of meeting, list of questions and responses, photograph of event.
  - (v) Video or voice recordings (optional and only as reference).
- (g) The report shall form part of the appendix in the EIA, and the issues brought up and responses from the Project Proponent, must be clearly stated and discussed in the EIA report.

### 8.3 EIA REPORT AND SUBMISSION AND REVIEW PROCESS

A comparison of the EIA submission and review process for First and Second Schedule EIA is presented in **Table 8.3.1**.

**Table 8.3.1: Comparison of Submission and Review Process for First and Second Schedule EIA**

Components	First Schedule Activities	Second Schedule Activities
<b>Report Submission</b>	Submission to DOE State Office	Submit to DOE HQ
<b>No. of Reports</b>	Minimum 12 hardcopies + 1 softcopy to State DOE 1 hardcopy + 1 soft copy to DOE HQ	Minimum 35 hard copies + 1 soft copy
<b>No. of Corrected EIA (if needed)</b>	5 hard copies + 1 soft copy	5 hard copies + 1 soft copy
<b>Review Timeline</b>	25 working days (5 weeks)	60 working days (12 weeks)
<b>Public Participation</b>	Required	Required
<b>Public Display</b>	Not required	Required
<b>Web Display</b>	Required Submit softcopy of the EIA Report to DOE State Office.	Required Submit softcopy of the EIA Report to DOE HQ.
<b>Advertisement</b>	Not required	Required. Advertise in two major newspapers.

Source: Adapted from EGIM, DOE, 2016

#### 8.4 EIA REPORT EVALUATION CRITERIA

- (a) The EGIM (DOE, 2016) provides a general guidance for the EIA Report Quality Self-Assessment Tool (RQSAT) as shown in **Table 8.4.1**.
- (b) This tool can be used by the Project Proponent and Qualified Person to assist in conducting self-check of the quality of the EIA prior to submission to the DOE, to avoid rejection.
- (c) An EIA Checklist shall be appended, which is required to be filled in by the EIA preparer and included in the EIA report.

**Table 8.4.1: Self-Assessment Tool for EIA Report Quality Control**

Assessment Criteria	Score	Expected Assessment Results
<ul style="list-style-type: none"> <li>• All important tasks (e.g. studies, public engagements, modelling, etc., wherever relevant) were performed.</li> <li>• All TOR components were covered.</li> <li>• EIA Report complies with the report standard format.</li> <li>• Data and information are factually correct, can be verified, and technically defensible.</li> <li>• EIA report is coherent, legible and balanced.</li> <li>• Proposed P2M2s are considered to be best available technologies (BATs) or best practices.</li> <li>• Project Proponent made pledge to implement EMP and P2M2s.</li> </ul>	A	The EIA report can be approved.
<ul style="list-style-type: none"> <li>• Most important tasks (e.g. studies, public engagements, modelling, etc., wherever relevant) were performed but minor ones were not performed.</li> <li>• All TOR components were covered.</li> <li>• EIA report complies with the report standard format.</li> <li>• Data and information are factually correct, can be verified, and technically defensible but some non-substantive facts cannot be verified.</li> <li>• EIA report is coherent, legible and balanced but some non-substantive information may not be presented clearly.</li> <li>• Some non-crucial content (e.g. maps) of EIA report are illegible or calculations not performed or incorrect.</li> <li>• Project Proponent made pledge to implement EMP and P2M2s.</li> </ul>	B	The EIA report can be approved.

Assessment Criteria	Score	Expected Assessment Results
<ul style="list-style-type: none"> <li>• Important tasks (e.g. studies, public engagements, modelling, etc., wherever relevant) were not performed.</li> <li>• Some TOR components were covered.</li> <li>• EIA report did not comply with the report standard format.</li> <li>• Important data and information are factually incorrect and are not technically defensible.</li> <li>• Important studies were not conducted, or inadequate, or technically flawed.</li> <li>• Some parts of EIA report are biased, incoherent and unreadable.</li> <li>• Proposed P2M2s are not considered to be BATs or best practices.</li> <li>• Project Proponent did not make pledge to implement EMP and P2M2s.</li> </ul>	F	The EIA report cannot be approved and will be rejected.

Source: Adapted from EGIM, DOE, 2016

The possible outcomes of the EIATRC meetings are:

- (a) **Approval of the EIA Report**, provided that the report meets with the requirements of Section 34A (3) of the EQA 1974.
- (b) **Rejection of the EIA Report**, where the report does not meet the requirements of Section 34A (3) of the EQA 1974.

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## GLOSSARY

Accretion	May be either natural or artificial. Natural accretion is the build-up of land, solely by the action of the forces of nature, on a beach by deposition of water-or airborne material. Artificial accretion is a similar build-up of land by reason of an act of man, such as the accretion formed by a GROIN, BREAKWATER, or beach fill deposited by mechanical means.
Air Pollution Control System (APCS)	Equipment or machinery used in the capture and treatment of emissions from fuel burning equipment, incinerators and other types of engines to ensure it meets with the standards of the Malaysian Ambient Air Quality Standards (MAAQS).
Analysis	An examination in order to understand.
Anchorage	An area off the coast which is suitable for a ship to anchor.
Appointed Individuals (AIs)	Persons appointed to be part of the TRC with expertise and specialist knowledge on specific fields/subjects to contribute to the technical review of a report.
Approving Authority/Agencies	Any government ministry, agencies or department with the authority to approved a project and/or activity under their jurisdiction by law.
Aquatic	Pertaining the ecosystem influenced by water and all its plants and animal that live within or nearby which has adapted to life in such environment.
Assessment	Examination in order to decide.
Astronomical Tide	The tidal levels and character which would result from gravitational effects, e.g. of the Earth, Sub and Moon, without any atmospheric influences.
Auditing	Evaluation process carried out by an independent auditor to determine effectiveness and performance of P2M2 and to ensure compliance of a project with Condition Of Approval (COA).
Backshore	That zone of the shore or beach lying between the foreshore and the coastline comprising the berm or berms and acted upon by waves only during severe storms, especially when combined with exceptionally high water.
Bank	(a) The rising ground bordering a lake, river, or sea; or of a river or channel, for which it is designated as right or left as the observer is facing downstream.

(b) An elevation of the sea floor or larger area, located on a continental (or island) shoals.

Baseline Data	Site specific data pertaining to the existing environment (physical, chemical, biological and human). It establishes the ambient situation, usually before some drastic change occurs, e.g. a major project.
Baseline Studies	Baseline studies are fundamental surveys of the physico-chemical, biological, and human environment. They may be specific to a particular project or they may have to be provide a data-base for future Environmental Assessment or Environmental Impact Assessment at other localities.
Basin	A depressed area with no surface outlet, such as a lake basin or an enclosed sea.
Bathymetry	The measurement of water depths in oceans, seas, and lakes; also information derived from such measurement.
Beach	On a shore, the area on which the wave break and over which shore debris, such as sand, shingle, pebbles accumulate. A beach includes backshore and foreshore.
Bed	The bottom of a watercourse, or any body of water.
Best Available Technology (BAT)	The most current and advanced technologies and methods available for pollution prevention and management.
Best Management Practices (BMPs)	Using the best controlling measures to prevent or mitigate pollution of other sources of environmental impact.
Bilge Water	Wastes from ship bottom usually containing considerable oils.
Bill of Quantities (BQ)	Itemised list of construction works and management requirements for a project issued to a contractor or specialist to quote.
Biological Diversity/ Biodiversity	The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.
Breakwater	A structure protecting a shore area, harbour, anchorage, or basin from waves.

Buffer Zone	An area designated around the boundary of a project and/or adjacent to environmentally sensitive areas where no or limited development is allowed for the purpose of mitigating against any environmental impact from the site to the surrounding areas or vice versa.
Carrying Capacity	(a) Maximum population size if the species that the environment can sustain indefinitely, given the food, habitat, water, and other necessities available in the environment.  (b) The ability of a built resource or natural resource to absorb population growth and related physical development without degradation.
Catchment	The area determined by landform within which falling rain will contribute to runoff at a particular point such as a stream or river. Often, it is used synonymously with basin or watershed.
Chart Datum	The plane or level to which soundings (or elevations) or tide heights are referenced (usually Low Water Datum).
Checklist	A list for verification purposes, a comprehensive list; an inventory.
Coastal Processes	Collective term covering the action of natural forces on the shoreline, and near shore seabed.
Coastal Profiling	Studies, measurements and observations done along the coastline to determine its physical parameters and conditions, i.e. contours, bathymetry, accreting and erosional areas, type of substrate, etc.
Coastal Protection	Any structural and non-structural works used in the reduction of erosion of the coastline.
Community	Any naturally occurring group of different organisms sharing a particular habitat.
Qualified Person	A person with the necessary skills and knowledge to carry out the specific technical task, usually gained through certification, work experience or training.
Compliance Monitoring (CM)	Monitoring of P2M2 installed within the project site to ensure they are functional and effective in treating pollutants.
Conditions of Approval (COA)	A set of legally binding instructions and requirements prepared by DOE after the end of EIA process for the Project Proponent to abide by for all phases of the development.

Coral Reefs	A coral-alga mound or ridge of in-place coral colonies and skeletal fragments, carbonate sand, and organically-secreted calcium carbonate. A coral reef is built up around wave-resistant framework, usually of older coral colonies.
Cumulative Impact	The total sum from combination of various activities or sources resulting in accumulation and aggregation of multiple impacts which would be significantly expanded as compared to a single event.
Cut and Fill	Procedure in which the elevation of a landform surface is modified by the removal or addition of surface material.
Data	A general term used to denote any kind or all facts in the form of numbers, letters, text or symbols. (Raw facts or statistics which alone have little or no meaning, but as a group allow some meaningful relationships to be drawn).
Development Order (DO)	A legal approval for a Project Proponent to proceed with the construction of a project once they have satisfied the requirements of the approving authority, i.e. One Stop Centre (OSC).
Digital Elevation Model (DEM)	Digital model or 3D representation of terrain's surface created from terrain elevation data.
Disaster Risk Factor	The level of risk and susceptibility of an area towards natural or man-made disasters, such as tsunamis, wildfires, landslides, flood, drought, etc.
Disposal Area	A designated or gazette area specifically for the storage of waste or excess materials generated from construction.
Drainage	Natural or artificial removal of surface and sub-surface water from an area.
Earthworks	Excavation and relocation of large quantities of soil and earth to form slopes, platforms, embankments, etc.
Ecology	The study of the habits and modes of life-living organisms (such as plants and animals), and their relationships to each other and their environment.
Ecosystem	A dynamic complex of plant, animal and microorganism communities and their non-living environment that interact as a function unit.
Emergency Response Plan (ERP)	A manual incorporating all measures, actions, roles and responsibilities for the project team to take action during emergencies and crisis, covers various scenarios that may occur during construction and operations.

Environment	The surrounding zone (the specific zone to be affected by the project), all natural resources (physical and biological and human resources people, economic development and quality of life values).
Environment Impact Assessment (EIA)	A study to identify, predict, evaluate and communicate information about the impacts (both beneficial and adverse) on the environment of a proposed development activity and to detail out the mitigating measures prior to project approval and implementation.
Environmental Management Plan (EMP)	A legally binding document which spells out in concise details the environmental requirements and P2M2 as detailed in the EIA and LD-P2M2 as well as other information, e.g. environmental budget, monitoring and audit programmes and roles and responsibilities of the Environmental Management Team (EMT).
Environmental Management Team (EMT)	Special team comprising of relevant personnel of a project with specific roles and responsibilities in the management of environmental matters at-site.
Environmental Manager (EM)	A person mandated to oversee all aspects of managing environmental compliance for a project, usually heads the EMT.
Environmental Monitoring	Observation of effects of development projects on environmental resources and values, including sampling, analysis, temporary monitoring during project construction stage and continuing periodic monitoring following commencement of project operations. Environmental monitoring allows the actual impacts of the project to be measured and improves the data-base for future impact prediction.
Environmental Officer	The site personnel directly in charge of supervising a site to ensure that all P2M2 are in place, maintained and repaired and that all requirements within the COA are adhered by the contractors. Other task includes training of staff, taking samples for reporting and attending site walkabouts and meetings.
Environmental Performance Monitoring Committee (EPMC)	Organisational setup within the Project Proponent which shall manage environmental compliance at the working group level during construction and operation phases of a project.
Environmental Pledge/Declaration	Statement by the Project Proponent and/or Qualified Person preparing the EIA that they have carried out the study in the proper manner and all facts and figures are to their knowledge true and correct and that they will carry out the recommendations and P2M2 for the project as described in the EIA.

Environmental Regulatory Compliance Monitoring Committee (RMCMC)	Organisational setup within the Project Proponent which shall management environmental compliance at the policy level during construction and operational phase of a project.
Environmental Scoping Information (ESI)	A report detailing the findings of the environmental scoping carried out for a site to allow for decision making through identification of significant impacts, proposals for mitigation measures and required studies.
Environmental Scoping Matrix	Technique to integrated large amounts of information for a rapid assessment in identifying significant impacts based on project activities and their impacts on different aspects of the environment.
Environmentally Sensitive Areas (ESA)	Areas of critical importance which has characteristics of significant biodiversity value; natural heritage; scenic beauty; provision of important ecosystem services; and/or is easily degraded due to natural and anthropogenic impacts, warranting its protection and conservation.
Erosion	The detachment or wearing away of the earth's surface, particularly soil or loose materials, by flowing water, wind or other geological agents.
Erosion and Sediment Control Plan (ESCP)	Document incorporating all erosion and sediment control measures as required by the Department of Irrigation and Drainage (DID) for a site. Usually prepared by a professional engineer (PE) to be endorsed by DID.
Eutrophication	The natural process of nutrient enrichment of water body which is enhanced by phosphate and nitrate waste from human activity. It can cause excessive organic growth and depletion of oxygen concentrations, resulting in death of aquatic animals and higher plants.
Geological Terrain Mapping (GTM)	Report prepared by a licensed Geologist required by the Minerals and Geoscience Department (JMG) to be submitted for DO approval, contains information on the terrain, geological makeup, soils and slope classification to allow for assessment of site suitability for construction.
Geology	The science which has for its object the investigation of the earth's crust, of the strata which enter into its composition with their mutual relations, and of the successive changes to which their present condition and position are due.
Government Agencies (GAs)	Personnel from government ministries, agencies and/or department with a role in specific committees, approving authorities or decision making bodies.

Self-Regulation (SR)	An initiative by DOE to cultivate environmental ownership and excellence in environmental commitment from the sectors regulated by DOE especially in regards to performance monitoring of pollution control measures, scheduled reporting, record keeping, qualified persons and involvement of environmental professionals with specific roles.
Habitat	The normal abode or locality of an animal or plant; the physical environment of a community; the place where a person or thing can usually be found.
Health Impact Assessment (HIA)	A report which assesses the health impacts of policies, plans and projects using qualitative, quantitative and participatory techniques for decision making. Usually required by the Ministry of Health (MOH) or Department of Health (DOH) for projects with health implications to nearby populations.
Highest Astronomical Tide (HAT)	The highest tidal level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions.
Hydraulic Report	A detailed technical report used in the assessment of impacts from a project/activity on the coastal and marine environment based on various scenarios and site conditions.
Hydrology	The study of the rainfall and runoff process and related to the derivation of hydrographs for given floods, droughts and seasonal pattern of inundation.
Impact Monitoring (IM)	Monitoring of impacts outside of the project site to ascertain its origin and magnitude.
Industrial Effluent Treatment System (IETS)	Systems used in the treatment of industrial effluent to ensure that the discharges meet the quality specified under Standard A/B of the Environmental Quality (Industrial Effluent) Regulations 2009.
Land Acquisition/ Alienation	The act of obtaining, either voluntarily or by law, the necessary land from existing landowners. May involve relocation of existing population on the said piece of land.
Land Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2)	Document incorporating construction methods, processes, materials and practices intended to prevent, reduce or eliminate the generation of pollutants at the source (development area) during any land-disturbing activity through the protection of natural resources through incorporation of BMPs.
Land-Disturbing Activities	Activities such as clearing of trees or vegetation, excavating, raising or sloping of ground, trenching, grading and blasting.

Lowest Astronomical Tide (LAT)	The lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions.
Mangroves	One of several genera of tropical trees or shrubs which produce many prop roots and grow along low-lying coasts into shallow water.
Marine Risk Assessment (MRA)	Technical document which studies the existing marine traffic of the area of proposed project, identifying constraints for navigation and risk of potential collision or mishaps during vessel operations.
Method Statement	A detailed scope and account of proposed construction techniques, equipment and machinery usage and structural and non-structural measures applied in carrying out construction, usually prepared by the Contractors.
Mitigation and Abatement Measures	These are measures adopted into the final project plan which either moderate or completely forestall potential environmental impact.
Modelling	To simulate a particular feature of the world using mathematical and computer aids to better understand, define, quantify and visualise the process.
Monitoring	To measure, systematically and repeatedly, the continuing conditions to track change(s).
Noise	A sound, especially one that is loud or unpleasant or that causes disturbance.
Offshore	Situated at sea some distance from the shore.
Oil spill	Release of a liquid petroleum hydrocarbon into the environment, especially marine areas, due to human activity and is a form of pollution.
Outfall	The place where a river, drain, or sewer empties into the sea, a river or a lake.
Performance Monitoring (PM)	Monitoring of performance system.
Pile	A long, heavy timber or section of concrete or metal that is driven or jettied into the earth or seabed to serve as a support or protection.
Piling	A group of piles.
Pollution Prevention and Mitigation Measures (P2M2)	The various methods (structural and non-structural) required to ensure that pollution does not occur or at least minimised as a result of a project.

Port	A place where vessels may discharge or receive cargo; it may be the entire harbour including its approaches and anchorages, or only the commercial part of a harbour where Quays, Wharves, facilities for transfer of cargo, docks, and repair shops are situated. Protection may be provided by natural or artificial features.
Prescribed Activity	Any activity specified by the Director General of Environment under the Environmental Quality (Prescribed Activity) (Environmental Impact Assessment) Order 2015, as requiring to undergo an EIA.
Project Activities	Specified tasks undertaken throughout the course of a project (earthworks, construction or operational) which serves to meet certain objectives.
Project Brief	Information pertaining to a project or development, including the details of the project, layout, method statement, location, etc. which can assist in assessment of the project.
Project Proponent	The main person, organisation or body which is proposing to undertake a project or activity.
Public Display	Mandatory viewing of Second Schedule EIA for fixed period of time whereby the public can forward recommendations and objections to the report for consideration by DOE in the EIA approval process.
Public Participation/ Engagement	The process whereby the public and related stakeholders are allowed the opportunity to participate in the planning, decision making, objection, idea sharing and/or approval of a project which may affect them. Can be mandated or voluntary.
Qualified Person	A person appointed by the Director General of Environment or is certified by/registered with DOE under Section 34A (2B) to carry out an EIA study.
Quay	A stretch of paved bank, or a solid artificial landing place parallel to the navigable waterway, for use in loading and unloading vessels.
Recreation	Activity of leisure, leisure being discretionary time.
Red tide	Discoloration of surface waters, mostly frequently in coastal zones, caused by large concentrations of microorganisms.
Residual Impacts	Impacts that still persist despite P2M2 and BMPs put in place.
Revised TOR	Final version of the TOR after incorporation of comments from the TRC and additional information.
Risk	A combination of the likelihood of an occurrence of a hazardous event with specified period or in specified circumstances.

Runoff	The portion of precipitation that runs off the surface as opposed to soaking in.
Sampling Station	Location identified and designated for collection of environmental data (air, water, noise, vibration, ecology, etc.).
Schedule	Categorisation of Prescribed Activities divided into the First Schedule (EIA without need for public display and will be processed by DOE State) and Second Schedule (EIA requiring public display and will be processed by DOE HQ).
Scheduled Wastes	Any form of toxic and hazardous wastes listed under the First Schedule of the Environmental Quality (Schedule Wastes) Regulations 2005 (Amendment 2007).
Scoping	Initial phase in an EIA to identify the key environmental issues and the study spatial and temporal boundaries.
Screening	Process by which a proposed development project is identified as being subjected to a regulatory provision requiring an EIA.
Sedimentation	The deposition of sediment from suspension in water.
Self-regulation	The adoption and implementation of measures and practices by a Project Proponent on their own initiative without requiring intervention of the authorities to safeguard the environment and meet all regulatory requirements of the country.
Setback	Distance which a building or other structure is set back from a street or road, a river, a shore or any other place which is deemed to need protection.
Sewage	<p>Any liquid waste or wastewater discharge containing human, animal, domestic or putrescible matter in suspension or solution, and includes liquids containing chemicals in solution either in the raw, treated or partially treated form.</p> <p>Any liquid discharges containing human excreta, animal or vegetable matters in suspension or solution derived from domestic activities and being generated from household, commercial, institutional and industrial premises including liquid discharges from water closets, basins, sinks, bathrooms and other sanitary appliances but excluding rain water and prohibited effluent.</p>

Sewage Treatment System (STS)/Plant (STP)	Any facility designed and constructed for the purpose of reducing potential of the sewage to cause pollution.
Siltation	The deposition or accumulation of silt that is suspended in a body of water.
Site Suitability Assessment (SSA)	A study on the suitability of various sites and the determination based on specific criteria on the best possible site for a project.
Social Impact Assessment (SIA)	A process to identify, predict, evaluate and communicate information about the social impacts of a proposed project, policy, programme or plan on a community and their activities, and to choose the best development option and subsequently propose mitigation measures.
Soil Investigation (SI)	Technical study on the soil and sub-surface strata of a project site to determine the sub-surface conditions and engineering requirements needed prior to a development
Spoil	Rock and debris produced by tunnelling, dredging and other excavations.
Statement of Need	A brief on the justifications for a project, including supporting arguments and evidence on the necessity of the project and benefits that will be generated.
Storm Surge	An abnormal rise of water generated by a storm, over and above the predicted astronomical tides. A rise above normal water level on the open coast due to the action of wind stress on the water surface. Storm surge resulting from a hurricane also includes that rise in level due to atmospheric pressure reduction as well as that due to wind stress.
Stormwater	Water that originates during precipitation events, e.g. rainfall.
Sullage	Wastewater that arise from domestic activities such as washing in bathrooms and kitchen, including water from food preparation and dishwashing, which does not contain human excreta.
Suspended Sediment	Sediment suspended in a fluid by its (fluid) turbulent flow.
Technical Review Committee (TRC)	A panel of decision makers comprising DOE officer, AIs and GAs that are selected to review the TOR and/or EIA to provide approval based on the reports submitted by the Project Proponent and Qualified Person(s).
Terms of Reference (TOR)	Product from scoping process which sets the objectives, defines the scope, and establishes the strategy and schedule for EIA process to address identified significant issues.

Terrain	Pertaining to the physical features of a land or area.
Tide	The periodic rising and falling of the water that result from gravitational attraction of the moon and sun and other astronomical bodies acting upon the rotating earth.
Topography	The configuration of the surface of the earth, including its relief, the position of its streams, roads, cities, etc. The earth's natural and physical features collectively.
TOR Adequacy Check (TORAC)	A review by a selected panel of DOE officers, AIs and/or GAs on whether a TOR has been prepared in accordance with DOE requirements and contains all necessary information for decision making to be made.
Traffic Impact Assessment (TIA)	A study/report on the condition of the roads and traffic in an area and if there is adequate capacity to meet the increasing demand from a project or to identify measures required to ensure that traffic will be smooth and uninterrupted.
Vessels	Any crafts travelling on water.
Visual/Aesthetics	Pleasing scenery, vistas and view to and view to an audience.
Wastes	Any substance which is discarded after primary use. Comprises of various types of wastes, such as municipal wastes, scheduled wastes, biomass wastes, etc.
Water quality	A term to describe the chemical, physical and biological characteristics of water.
Water Quality Index (WQI)	An index integrating six water quality parameters to provide a general categorisation to determine the condition of the water source.
Zone of Impact (ZOI)	The maximum area which will receive the impacts from the project.
Zone of Study (ZOS)	Boundary identified for the EIA Study which would be the main spatial area to carry out baseline data gathering, determine extent of modelling and assessment and other supporting studies.

## APPENDIX 1

## NATIONAL WATER QUALITY STANDARDS MALAYSIA

(SOURCE: DOE, MALAYSIA)

PARAMETER	UNIT	CLASS				
		I	IIA/IB	III*	IV	V
Al	mg/l	↑	-	(0,06)	0,5	↑
As	mg/l		0,05	0,4 (0,05)	0,1	
Ba	mg/l		1	-	-	
Cd	mg/l		0,01	0,01* (0,001)	0,01	
Cr (IV)	mg/l		0,05	1,4 (0,05)	0,1	
Cr (III)	mg/l		-	2,5	-	
Cu	mg/l		0,02	-	0,2	
Hardness	mg/l		250	-	-	
Ca	mg/l		-	-	-	
Mg	mg/l		-	-	-	
Na	mg/l		-	-	3 SAR	
K	mg/l		-	-	-	
Fe	mg/l		1	1	1 (Leaf) 5 (Others)	
Pb	mg/l		0,05	0,02* (0,01)	5	L
Mn	mg/l		0,1	0,1	0,2	E
Hg	mg/l	N	0,001	0,004 (0,0001)	0,002	V
Ni	mg/l	A	0,05	0,9*	0,2	E
Se	mg/l	T	0,01	0,25 (0,04)	0,02	L
Ag	mg/l	U	0,05	0,0002	-	S
Sn	mg/l	R	-	0,004	-	A
U	mg/l	A	-	-	-	B
Zn	mg/l	L	5	0,4*	2	O
B	mg/l	L	1	(3,4)	0,8	V
Cl	mg/l	E	200	-	80	E
Cl <sub>2</sub>	mg/l	V	-	(0,02)	-	
CN	mg/l	E	0,02	0,06 (0,02)	-	IV
F	mg/l	L	1,5	10	1	
NO <sub>2</sub>	mg/l	S	0,4	0,4 (0,03)	-	
NO <sub>3</sub>	mg/l		7	-	5	
P	mg/l	O	0,2	0,1	-	
Silica	mg/l	R	50	-	-	
SO <sub>4</sub>	mg/l	A	250	-	-	
S	mg/l	B	0,05	(0,001)	-	
CO <sub>2</sub>	mg/l	S	-	-	-	
Gross-α	Bq/l	E	0,1	-	-	
Gross-β	Bq/l	N	1	-	-	
Ra-226	Bq/l	T	< 0,1	-	-	
Sr-90	Bq/l		< 1	-	-	↓
CCE	μg/l		500	-	-	
MBAS/BAS	μg/l		500	5000 (200)	-	
O & G (Mineral)	μg/l		40; N	N	-	
O & G (Emulsified Edible)	μg/l		7000; N	N	-	
PCB	μg/l		0,1	6 (0,05)	-	
Phenol	μg/l		10	-	-	
Aldrin/Dieldrin	μg/l		0,02	0,2 (0,01)	-	
BHC	μg/l		2	9 (0,1)	-	
Chlordane	μg/l		0,08	2 (0,02)	-	
1-DDT	μg/l		0,1	(1)	-	
Endosulfan	μg/l		10	-	-	
Heptachlor/Epoxide	μg/l		0,05	0,9 (0,06)	-	
Lindane	μg/l		2	3 (0,4)	-	
2,4-D	μg/l		70	450	-	
2,4,5-T	μg/l		10	160	-	
2,4,5-TP	μg/l		4	850	-	
Paraquat	μg/l	↓	10	1800	-	

Notes :

\* = At hardness 50 mg/l CaCO<sub>3</sub>

† = Maximum (unbracketed) and 24-hour average (bracketed) concentrations

N = Free from visible film sheen, discoloration and deposits

PARAMETER	UNIT	CLASS					
		I	IIA	IIIB	IIIC	IV	V
Ammoniacal Nitrogen	mg/l	0,1	0,3	0,3	0,9	2,7	> 2,7
Biochemical Oxygen Demand	mg/l	1	3	3	6	12	> 12
Chemical Oxygen Demand	mg/l	10	25	25	50	100	> 100
Dissolved Oxygen	mg/l	7	5 - 7	5 - 7	3 - 5	< 3	< 1
pH	-	6,5 - 8,5	6 - 9	6 - 9	5 - 9	5 - 9	-
Colour	TCU	15	150	150	-	-	-
Electrical Conductivity*	µS/cm	1000	1000	-	-	6000	-
Floatables	-	N	N	N	-	-	-
Odour	-	N	N	N	-	-	-
Salinity	%	0,5	1	-	-	2	-
Taste	-	N	N	N	-	-	-
Total Dissolved Solid	mg/l	500	1000	-	-	4000	-
Total Suspended Solid	mg/l	25	50	50	150	300	300
Temperature	°C	-	Normal + 2 °C	-	Normal + 2 °C	-	-
Turbidity	NTU	5	50	50	-	-	-
Faecal Coliform**	count/100 ml	10	100	400	5000 (20000) <sup>a</sup>	5000 (20000) <sup>a</sup>	-
Total Coliform	count/100 ml	100	5000	5000	50000	50000	> 50000

Notes :

N : No visible floatable materials or debris, no objectional odour or no objectional taste

\* : Related parameters, only one recommended for use

\*\* : Geometric mean

a : Maximum not to be exceeded

DOE Water Quality Index Classification

PARAMETER	UNIT	CLASS				
		I	II	III	IV	V
Ammoniacal Nitrogen	mg/l	< 0,1	0,1 - 0,3	0,3 - 0,9	0,9 - 2,7	> 2,7
Biochemical Oxygen Demand	mg/l	< 1	1 - 3	3 - 6	6 - 12	> 12
Chemical Oxygen Demand	mg/l	< 10	10 - 25	25 - 50	50 - 100	> 100
Dissolved Oxygen	mg/l	> 7	5 - 7	3 - 5	1 - 3	< 1
pH	-	> 7	6 - 7	5 - 6	< 5	> 5
Total Suspended Solid	mg/l	< 25	25 - 50	50 - 150	150 - 300	> 300
Water Quality Index (WQI)		< 92,7	76,5 - 92,7	51,9 - 76,5	31,0 - 51,9	< 31,0

Water Classes And Uses

CLASS	USES
Class I	Conservation of natural environment. Water Supply I - Practically no treatment necessary. Fishery I - Very sensitive aquatic species.
Class IIA	Water Supply II - Conventional treatment required. Fishery II - Sensitive aquatic species.
Class IIB	Recreational use with body contact.
Class IIIC	Water Supply III - Extensive treatment required. Fishery III - Common, of economic value and tolerant species; livestock drinking.
Class IV	Irrigation
Class V	None of the above.

DOE Water Quality Classification Based On Water Quality Index

SUB INDEX & WATER QUALITY INDEX	INDEX RANGE		
	CLEAN	SLIGHTLY POLLUTED	POLLUTED
Biochemical Oxygen Demand (BOD)	91 - 100	80 - 90	0 - 79
Ammoniacal Nitrogen (NH <sub>3</sub> -N)	92 - 100	71 - 91	0 - 70
Suspended Solids (SS)	76 - 100	70 - 75	0 - 69
Water Quality Index (WQI)	81 - 100	60 - 80	0 - 59

## APPENDIX 2

### RECOMMENDED NOISE LIMITS

(SOURCE: DOE, MALAYSIA)

#### SCHEDULE 1

#### MAXIMUM PERMISSIBLE SOUND LEVEL ( $L_{Aeq}$ ) BY RECEIVING LAND USE FOR PLANNING AND NEW DEVELOPMENT

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Noise Sensitive Areas, Low Density Residential, Institutional (School, Hospital), Worship Areas.	50 dBA	40 dBA
Suburban Residential (Medium Density) Areas, Public Spaces, Parks, Recreational Areas.	55 dBA	45 dBA
Urban Residential (High Density) Areas, Designated Mixed Development Areas (Residential - Commercial).	60 dBA	50 dBA
Commercial Business Zones.	65 dBA	55 dBA
Designated Industrial Zones	70 dBA	60 dBA

**SCHEDULE 2****MAXIMUM PERMISSIBLE SOUND LEVEL ( $L_{Aeq}$ ) OF NEW DEVELOPMENT (ROADS, RAILS, INDUSTRIAL) IN AREAS OF EXISTING HIGH ENVIRONMENTAL NOISE CLIMATE**

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Noise Sensitive Areas, Low Density Residential	$L_{90} + 10$ dBA	$L_{90} + 5$ dBA
Suburban and Urban Residential Areas	$L_{90} + 10$ dBA	$L_{90} + 5$ dBA
Commercial, Business	$L_{90} + 10$ dBA	$L_{90} + 10$ dBA
Industrial	$L_{90} + 10$ dBA	$L_{90} + 10$ dBA

$L_{90}$  is the measured ninety percentile sound level for the respective time period of the existing areas of interest in the absence of the proposed new development.

**SCHEDULE 3****MAXIMUM PERMISSIBLE SOUND LEVEL ( $L_{Aeq}$ ) TO BE MAINTAINED AT THE EXISTING NOISE CLIMATE**

Existing Levels	New Desirable Levels	Maximum Permissible Levels
$L_{Aeq}$	$L_{Aeq}$	$L_{Aeq} + 3$ dBA

**SCHEDULE 4****LIMITING SOUND LEVEL ( $L_{Aeq}$ ) FROM ROAD TRAFFIC (FOR PROPOSED NEW ROADS AND/OR REDEVELOPMENT OF EXISTING ROADS)**

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Noise Sensitive Areas Low Density Residential Areas	55 dBA	50 dBA
Suburban Residential (Medium Density)	60 dBA	55 dBA
Urban Residential (High Density)	65 dBA	60 dBA
Commercial, Business	70 dBA	60 dBA
Industrial	75 dBA	65 dBA

**SCHEDULE 5****LIMITING SOUND LEVEL ( $L_{Aeq}$ ) FOR FROM RAILWAYS INCLUDING TRANSITS (FOR NEW DEVELOPMENT AND RE-ALIGNMENTS)**

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am	$L_{max}$ (Day & Night)
Noise Sensitive Areas, Low Density Residential Areas	60 dBA	50 dBA	75 dBA
Suburban and Urban Residential Areas	65 dBA	60 dBA	80 dBA
Commercial, Business	70 dBA	65 dBA	80 dBA
Industrial	75 dBA	65 dBA	NA

## SCHEDULE 6

**MAXIMUM PERMISSIBLE SOUND LEVELS (PERCENTILE  $L_N$  AND  $L_{MAX}$ ) OF CONSTRUCTION, MAINTENANCE AND DEMOLITION WORK BY RECEIVING LAND USE**

Receiving Land Use Category	Noise Parameter	Day Time	Evening	Night Time
		7.00 am - 7.00 pm	7.00 pm - 10.00 pm	10.00 pm - 7.00 am
Residential (Note 2 **)	$L_{90}$	60 dBA	55 dBA	* (Note 1)
	$L_{10}$	75 dBA	70 dBA	*
	$L_{max}$	90 dBA	85 dBA	*
Commercial (Note 2 **)	$L_{90}$	65 dBA	60 dBA	NA
	$L_{10}$	75 dBA	70 dBA	NA
Industrial	$L_{90}$	70 dBA	NA	NA
	$L_{10}$	80 dBA	NA	NA

## NOTES

- \*1. At these times the maximum permissible levels as stipulated in the Schedule 1 for the respective residential density type shall apply. This may mean that no noisy construction work can take place during these hours.
- \*\*2. A reduction of these levels in the vicinity of certain institutions such as schools, hospitals mosque and noise sensitive premises (apartments, residential dwellings, hotel) may be exercised by the local authority or Department of Environment.

Where the affected premises are noise sensitive, the limits of the Schedule 1 shall apply.

3. In the event that the existing ambient sound level ( $L_{90}$ ) without construction, maintenance and demolition works is higher than the  $L_{90}$  limit of the above Schedule, the higher measured ambient  $L_{90}$  sound level shall prevail. In this case, the maximum permissible  $L_{10}$  sound level shall not exceed the Ambient  $L_{90}$  level + 10 dBA, or the above Schedule  $L_{10}$  whichever is the higher.
4. NA = Not Applicable.

## APPENDIX 3

### RECOMMENDED VIBRATIONS LIMITS

#### SCHEDULE OF RECOMMENDED VIBRATION LIMITS

##### SCHEDULE 1

#### RECOMMENDED LIMITS FOR DAMAGE RISK IN BUILDINGS FROM STEADY STATE VIBRATION

Damage Description	Vertical Vibration Peak Velocity $v_{max}$ , mm/s (0 to Peak) (10 -100 Hz)
Safe	Less Than 3
Caution Level (Damage Not Necessary Inevitable)	3 to 5
Minor Damage	5 to 30
Major Damage	More Than 30

(Source: ISO DP 4688: 1975)

##### SCHEDULE 2

#### RECOMMENDED LIMITS FOR DAMAGE RISK IN BUILDINGS FROM SHORT TERM VIBRATION

Type of Structure	Vibration Velocity $v_i$ [mm/s] at foundation (as defined by the respective rating curves of Figure 1)	Vibration Velocity $v_i$ [mm/s] at plane of floor of uppermost full storey (all frequencies)
Industrial buildings and buildings of similar design	Curve C	40
Commercial building, dwelling and buildings of similar design and/or use	Curve B	15
Structures that, because of their particular sensitivity to vibration, do not correspond to those listed above, or of great intrinsic value (e.g. residential houses, or buildings that are under preservation order)	Curve A	8

(Source: DIN 4150/3)

## SCHEDULE 3

## RECOMMENDED LIMITS FOR DAMAGE RISK IN BUILDINGS FROM SINGLE EVENT IMPULSIVE EXCITATION \*

Type of Structure	Ground Vibration Peak Particle Velocity $v_{\max}$ [mm/s]	
	<i>At low frequency &lt; 40 Hz</i>	<i>At high frequency &gt;40 HZ</i>
Industrial buildings and buildings of similar design	40	50
Commercial building, dwelling and buildings of similar design and/or use	20	50
Structures that, because of their particular sensitivity to vibration, do not correspond to those listed above, or of great intrinsic value (e.g. residential buildings, or buildings that are under preservation order)	12	50

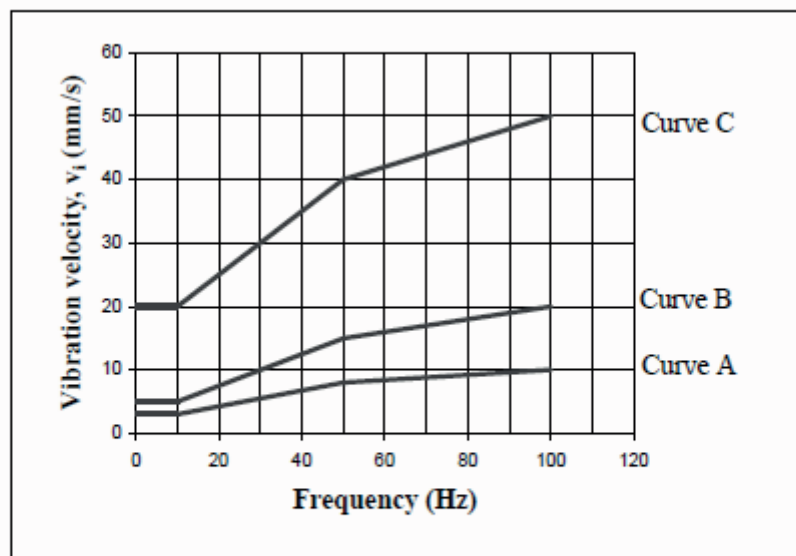
\* Single event impulsive excitation not exceeding 3 occurrences per day.

(Adapted from DIN 4150/3, and Swiss Standard for Vibration Damage to Buildings).

## SCHEDULE 4

## ACCEPTABLE ROAD TRAFFIC INDUCED VIBRATIONS IN BUILDINGS

Type of Building and Foundation	Recommended Vertical Velocity Limit, $v_{max}$ [mm/s]
- Especially sensitive buildings, and buildings of cultural and historical value	1
- Newly built buildings, and/or foundation of a foot plate (spread footings)	2
- Buildings on cohesion piles	3
- Building on bearing piles or friction piles	5



**FIGURE 1**  
Foundation Vibration Velocity Limiting Values for Vectorial Sum of Vibration Levels in Three Orthogonal Axes.

**SCHEDULE 5****RECOMMENDED LIMITS FOR HUMAN RESPONSE AND ANNOYANCE FROM STEADY STATE VIBRATIONS**

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Vibration Sensitive Areas	Curve 1	Curve 1
Residential	Curve 2 to Curve 4	Curve 2
Commercial, Business	Curve 4 to Curve 8	Curve 4
Industrial	Curve 8 to Curve 16	Curve 8 to Curve 16

**SCHEDULE 6****RECOMMENDED LIMITS FOR HUMAN RESPONSE AND ANNOYANCE FROM SHORT TERM VIBRATIONS**

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Vibration Sensitive Areas	Curve 1	Curve 1
Residential	Curve 8 to Curve 16	Curve 4
Commercial, Business	Curve 16 to Curve 20	Curve 16 to Curve 20
Industrial	Curve 32	Curve 32

The above stipulated curves are defined in Figure 2 and 3. The base Curve 1 is based on the vibration perception threshold for human response as defined by BS 6472:1992 and ISO 2631. The designated numbers of subsequent curves are multiplying factors of the base curve. (Source: ISO 2631 and BS 6472)

## APPENDIX 4

## MALAYSIAN AMBIENT AIR QUALITY STANDARDS (MAAQS)

(SOURCE: DOE, MALAYSIA)

Pollutants	Averaging Time	Ambient Air Quality Standard		
		IT-1 (2015)	IT-2 (2018)	Standard (2020)
		$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$
Particulate Matter with the size of less than 10 micron ( $\text{PM}_{10}$ )	1 Year	50	45	40
	24 Hour	150	120	100
Particulate Matter with the size of less than 2.5 micron ( $\text{PM}_{2.5}$ )	1 Year	35	25	15
	24 Hour	75	50	35
Sulfur Dioxide ( $\text{SO}_2$ )	1 Hour	350	300	250
	24 Hour	105	90	80
Nitrogen Dioxide ( $\text{NO}_2$ )	1 Hour	320	300	280
	24 Hour	75	75	70
Ground Level Ozone ( $\text{O}_3$ )	1 Hour	200	200	180
	8 Hour	120	120	100
*Carbon Monoxide ( $\text{CO}$ )	1 Hour	35	35	30
	8 Hour	10	10	10

\* $\text{mg}/\text{m}^3$

APPENDIX 5

EXAMPLE OF ENVIRONMENTAL SCOPING MATRIX

(SOURCE: EGIM, DOE MALAYSIA)

Environmental Component	Project Activity																				
	Pre-Construction				Construction										Operational		Closure/Exit				
	Site Access	Site Surveys	Soil Investigations	Environmental Assessment	Establish Access Road	Site Clearing and Biomass Removal	Base Camp and Site Facilities Establishment	Establish Vessel Facilities	Worker Recruitment, Mobilisation of Equipment & Materials	Earthworks for Land-based Activities (land reclamation & dredging)	Earthworks for Water-based Activities (land reclamation & dredging)	Structural works (Land-based & Water-based) and Facilities Establishment	Waste Disposal	Establishment of Permanent Access	Final Finishing and Landscaping	Occupation and Operations of Project	Vessel Maintenance Facilities	Infrastructure, Utility and Amenities Maintenance	Site Decommissioning	Rehabilitation Works	
Land																					
Landforms																					
Soil Profiles																					
Soil Composition																					
Slope Stability																					
Subsidence and Compaction																					
Seismicity																					
Flood Plains/Swamp																					
Landuse																					
Engineering and Mineral Resources																					
Buffer Zones																					

Note: (S) - Short term (L) - Long-term (+) - Beneficial (-) - Negative (1) - Little significance (2) - Significant (3) - Very significant  
 (N) - No Impact (X) - No mitigation measure needed (/) - Mitigation measure required

Environmental Component	Project Activity																				
	Pre-Construction				Construction								Operational		Closure/Exit						
	Site Access	Site Surveys	Soil Investigations	Environmental Assessment	Establish Access Road	Site Clearing and Biomass Removal	Establishment	Establish Vessel Facilities	Worker Recruitment, Mobilisation of Equipment & Materials	Earthworks for Land-based Activities (land reclamation & dredging)	Earthworks for Water-based Activities (land reclamation & dredging)	Structural works (Land-based & Water-based) and Facilities Establishment	Waste Disposal	Establishment of Permanent Access	Final Finishing and Landscaping	Occupation and Operations of Project	Vessel Maintenance Facilities	Infrastructure, Utility and Amenities Maintenance	Site Decommissioning	Rehabilitation Works	
<b>Surface Water</b>																					
Shoreline																					
Bottom Interface																					
Flow Variation																					
Water Quality																					
Drainage Pattern																					
Water Balance																					
Flooding																					
Existing Use																					
<b>Groundwater</b>																					
Water Table																					
Flow Regime																					
Water Quality																					
Recharge																					
Aquifer Characteristics																					
Existing Use																					

Note: (S) - Short term (L) - Long-term (-) - Negative (X) - No mitigation measure needed (1) - Little significance (2) - Significant (3) - Very significant (N) - No Impact (/) - Mitigation measure required

Environmental Component	Project Activity																			
	Pre-Construction				Construction								Operational		Closure/Exit					
	Site Access	Site Surveys	Soil Investigations	Environmental Assessment	Establish Access Road	Site Clearing and Biomass Removal	Base Camp and Site Facilities Establishment	Establish Vessel Facilities	Worker Recruitment, Mobilisation of Equipment & Materials	Earthworks for Land-based dredging)	Earthworks for Water-based dredging)	Water-based & Facilities Establishment	Waste Disposal	Establishment of Permanent Access	Final Finishing and Landscaping	Occupation and Operations of Project	Vessel Maintenance Facilities	Infrastructure, Utility and Amenities Maintenance	Site Decommissioning	Rehabilitation Works
<b>Atmosphere</b>																				
Air Quality																				
Air Flow																				
Climate Change																				
Visibility																				
<b>Noise</b>																				
Intensity																				
Duration																				
Frequency																				

Note: (S) - Short term  
 (N) - No Impact  
 (L) - Long-term  
 (+) - Beneficial  
 (-) - Negative  
 (X) - No mitigation measure needed  
 (/) - Mitigation measure required  
 (1) - Little significance (2) - Significant  
 (3) - Very significant

Environmental Component	Project Activity																				
	Pre-Construction				Construction										Operational			Closure/Exit			
	Site Access	Site Surveys	Soil Investigations	Environmental Assessment	Establish Access Road	Site Clearing and Biomass Removal	Establishment	Establish Vessel Facilities	Worker Recruitment, Mobilisation of Equipment & Materials	Earthworks for Land-based Activities (land reclamation & dredging)	Earthworks for Water-based Activities (land reclamation & dredging)	Structural works (Land-based & Water-based) and Facilities Establishment	Waste Disposal	Establishment of Permanent Access	Final Finishing and Landscaping	Occupation and Operations of Project	Vessel Maintenance Facilities	Infrastructure, Utility and Amenities Maintenance	Site Decommissioning	Rehabilitation Works	
<b>Biological Resources</b>																					
Terrestrial Vegetation																					
Terrestrial Wildlife																					
Other Terrestrial Fauna																					
Fish																					
Other Aquatic/Marine Flora																					
Terrestrial Habitats																					
Terrestrial Communities																					
Aquatic Habitats																					
Aquatic Communities																					
Estuarine Habitats																					
Estuarine Communities																					
Marine Habitats																					
Marine Communities																					
<b>Human Health and Safety</b>																					
Physical Safety																					
Physiological Wellbeing																					
Parasitic Disease																					
Communicable Disease																					
Physiological Disease																					

Note: (S) - Short term (L) - Long-term (+) - Beneficial (-) - Negative (1) - Little significance (2) - Significant (3) - Very significant  
 (N) - No impact (/) - Mitigation measure needed

Environmental Component	Project Activity																							
	Pre-Construction				Construction									Operational				Closure/Exit						
	Site Access	Site Surveys	Soil Investigations	Environmental Assessment	Establish Access Road	Site Clearing and Biomass Removal	Establishment	Base Camp and Site Facilities	Establish Vessel Facilities	Worker Recruitment, Mobilisation of Equipment & Materials	Earthworks for Land-based Activities (land reclamation & dredging)	Earthworks for Water-based Activities (land reclamation & dredging)	Structural works (Land-based & Water-based) and Facilities Establishment	Waste Disposal	Establishment of Permanent Access	Final Finishing and Landscaping	Occupation and Operations of Project	Vessel Maintenance Facilities	Operational	Infrastructures, Utility and Amenities Maintenance	Site Decommissioning	Rehabilitation Works		
<b>Social Economic</b>																								
Employment																								
Housing																								
Utilities																								
Amenities																								
Property and Settlement																								
Wilderness																								
Water Quality																								
Atmospheric Quality																								
Climate																								
Tranquillity																								
Sense of Community																								
Community Structure																								
Man-made Object																								
Historic Places or Structure																								
Religious Places or Structure																								
Landscape																								

Note: (S) - Short term (L) - Long-term (-) - Negative (X) - No mitigation measure needed (+) - Beneficial (/) - Mitigation measure required (1) - Little significance (2) - Significant (3) - Very significant (N) - No impact

## APPENDIX 6

# ENVIRONMENTAL SUSTAINABILITY REPORT IN PALM OIL INDUSTRY

### **Environmental Sustainability Report for Palm Oil Industries (Department of Environment (DOE) Perspective)**

#### **1.0 Introduction**

Palm oil industry is one of the main industries in Malaysia. Malaysia currently accounts for 39% of world palm oil production and 44% of world exports. In 2017, there were about 5.81 million hectares of palm oil plantations throughout Malaysia. Currently, there are 461 palm oil mills and 50 palm oil refineries in Malaysia. Figure 1 below shows the breakdown of the palm oil mills by states and the production capacity. Palm oil industry products are being used in various applications such as food and dairy products, skincare and haircare products as well as pharmaceuticals products.

Palm oil industry is also a highly regulated and well-managed industry in terms of environmental aspects with the objective of achieving sustainability of palm oil production and use in its entire supply chain. The Malaysian Sustainable Palm Oil (MSPO) Certification Scheme is the national scheme in Malaysia for oil palm plantations, independent and organised smallholdings, and palm oil processing facilities to be certified against the requirements of the MSPO Standards. The MSPO Standards have been developed by committees facilitated by the Malaysian Palm Oil Board (MPOB).

This environmental sustainability report for palm oil industries covers all of the legal requirement, programmes and initiatives under the Department of Environment (DOE) jurisdiction which envisions achieving the highest standards of sustainability of palm oil in Malaysia. This is essential in order to protect one of the most important national resources.

Under the DOE's jurisdiction, palm oil industry in Malaysia is subjected to the environmental compliance through Environmental Quality Act (EQA) 1974 except for Sabah and Sarawak where the environmental compliance for palm oil industry are governed by the the state agencies which are Sabah Environment Protection Department and Natural Resources and Environment Board (NREB) of Sarawak.

DOE had introduced the elements of competent person in handling the pollution control equipment in palm oil mills in order to uplift the technical capabilities of the operators as well as facilitating environmental compliance in palm oil industry.

Plus, DOE had been appointed by the Ministry as the coordinator for the prevention of peatfires to mitigate local haze to ensure the sustainability of palm oil industry which are the Fire Prevention and Peatland Management Programme and to coordinate in the preparation of the greenhouse gas (GHG) emissions report for waste sector. In addition, the development of waste to energy (WtE) facility in palm oil industry is subjected to the submission of Environmental Impact Assessment (EIA) to DOE.

Table 1: Breakdown of palm oil mills by states and the production capacity.

No.	States	No. of Palm Oil Mills	Production Capacity	
			< 40 MT FFB/hr	> 40 MT FFB/hr
1.	JOHOR	64	9	55
2.	KEDAH	6	1	5
3.	KELANTAN	11	3	8
4.	MELAKA	3	1	2
5.	NEGERI SEMBILAN	16	3	13
6.	PAHANG	71	15	56
7.	PULAU PINANG	2	1	1
8.	PERAK	48	13	35
9.	SELANGOR	17	8	9
10.	TERENGGANU	13	2	11
11.	SABAH	130	14	116
12.	SARAWAK	80	3	77
<b>Total</b>		<b>461</b>	<b>73</b>	<b>388</b>

## **2.0 Palm Oil Industries Environmental Compliance Requirement Under Environmental Quality Act (EQA) 1974**

There are several regulations under EQA 1974 in which related to palm oil industries. There are two types of palm oil industries, which are subjected to EQA 1974; the development requirement of palm oil plantations and the environmental compliance from palm oil mills. The regulations under the EQA 1974 which are related to palm oil industries are listed as below :-

1. Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015;
2. Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order 1977;
3. Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977;
4. Environmental Quality (Prescribed Activities) (Open Burning) Order 2003;
5. Environmental Quality (Scheduled Wastes) Regulations 2005; and
6. Environmental Quality (Clean Air) Regulations 2014

### **2.1 Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015**

The objective of this Order is to ensure that the land development options is under consideration environmentally sound and sustainable and that environmental consequences are recognized and taken into account early in the project design.

The Order depicts that any land development schemes of other agricultural states into palm oil plantation covering an area of 200 hectares and above are subjected to the submission of Preliminary Environmental Impact Assessment (EIA) Report under Schedule 1, Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987 to the DOE.

Plus, the development of waste to energy (WtE) facility in palm oil industry is also subjected to the submission of Environmental Impact Assessment (EIA) to DOE under the provision of this Order.

Penalty : Fine of maximum RM 500,000 or imprisonment not exceeding 5 years or both and additional fine of RM1,000 per day if the project development continues without the approval of EIA report.

From the year of 2015 until now, there are 5 approved EIA report on palm oil plantation development activity with area ranging from 350 to 950 hectares.

### 2.2 *Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order 1977*

The objective of this Order is to ensure that all palm oil mills are subjected to be licensed by DOE.

Penalty : Fine of maximum RM 25,000 or imprisonment not exceeding 2 years or both and additional fine of RM1,000 per day if that the offence is continued after a notice by the Director General had been issued.

Currently, there are 461 prescribed premises for palm oil mills in Malaysia.

### 2.3 *Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977*

The objective of this Regulation is to ensure that the palm oil mills effluent are in compliance with the specified limit values and standards. This Regulation is crucial in preventing environmental issues that arise from the quality of palm oil mill effluent.

The specified limits for palm oil mill effluent parameters are depicted as below :

i. Limits for palm oil mill effluent parameters to be discharged into a watercourse:

Parameters	Limit
BOD	100 mg/l
Suspended Solids	400 mg/l
Oil and Grease	50 mg/l
Ammoniacal Nitrogen	150 mg/l
Total Nitrogen	200 mg/l
pH	5.0 – 9.0
Temperature	45 °C

ii. Limits for palm oil mill effluent parameters to be discharged onto land :

Parameters	Limit
BOD	5,000 mg/l

Penalty : Fine of maximum RM 25,000 or imprisonment not exceeding 2 years or both and additional fine of RM1,000 per day if that the offence is continued after a notice by the Director General had been issued (non-compliance with license condition).

Currently, DOE had taken the initiative in reviewing the standard and limit values of the palm oil mill effluent in order to suit current technologies and practices to further protect the sustainability of the industry.

#### **2.4 Environmental Quality (Prescribed Activities) (Open Burning) Order 2003**

The objective of this Order is to ban any open burning to be done on peatsoil. This is crucial in order to prevent the occurrence of local haze due to peatland fire.

Penalty : Compounded offences of maximum RM 2,000 per offence

#### **2.5 Environmental Quality (Scheduled Wastes) Regulations 2005**

The objective of this Regulation is to ensure that the scheduled waste management which include processing, storage and disposal of the scheduled wastes in palm oil mill is being done properly. It is crucial to prevent the environmental hazards that could arise from the scheduled wastes.

Penalty : Compounded offences of maximum RM 2,000 per offence

#### **2.6 Environmental Quality (Clean Air) Regulations 2014**

The objective of this Regulation is to ensure that the air emissions from the palm oil mills equipment are in compliance with the specified limit values and standards. This Regulation is crucial in ensuring that the air emission from those equipment does not pose any threat to the environment quality.

There are several specified limit values and technical standards for palm oil mills equipment which are depicted as below :-

- i. Opacity limit :
  - Not darker than shade No. 1 Ringelmann Chart
  - Not greater than 20% opacity (transmissometer)
  - Premise emitting more than 2.5kg/hour dust or potentially emitting smoke darker than No. 2 Ringelmann Chart shall install and operate transmissometer (averaging time : 1 minute)
- ii. Control of fuel quality for fuel burning equipment and incinerators

Fuel type	Fuel	Fuel quality parameter
Liquid	All	Sulphur content < 500 ppm (per weight)
Solid	Coal	Sulphur content < 1% (per weight)
	Biomass	Wood, agricultural waste, etc.: air dry and in its natural composition (e.g. wood without coating, paint or other treatment) Residues from wood-based industries: without wood preservatives

iii. Combustion emissions from fuel burning equipment and incinerators

Fuel type	Pollutant	Limit value	Monitoring
Liquid	Total particulate matter (PM) Where dust load emitted : a) > 0.33 < 1.0 kg/h b) ≥ 1.0 kg/h	50 mg/m <sup>3</sup>	Once/year 2 times/year
Solid	Total particulate matter (PM) Where dust load emitted : a) > 0.44 < 1.0 kg/h b) ≥ 1.0 < 1.5 kg/h c) ≥ 1.5 < 2.0 kg/h d) ≥ 2.0 < 2.5 kg/h e) ≥ 2.5 kg/h	150 mg/m <sup>3</sup>	Once/year 2 times/year 3 times/year 4 times/year Continuous*
	Carbon monoxide (CO)	1000 mg/m <sup>3</sup>	Periodic

iv. Heat and power generation : A1. Boilers

*O<sub>2</sub> reference content 6% solid and 3% for others*

Fuel Type	Pollutant	Capacity	Limit Value	Monitoring
Gaseous Fuels	Sum of NO and NO <sub>2</sub> expressed as NO <sub>2</sub>	> 10 MW	350 mg/m <sup>3</sup>	Continuous
	Carbon Monoxide (CO)	> 10 MW	50 mg/m <sup>3</sup>	Continuous
	Total PM	> 10 MW	5 mg/m <sup>3</sup>	Periodic

## v. A2. Combustion Turbines

*O<sub>2</sub> reference content 15%*

Fuel Type	Pollutant	Capacity	Limit Value	Monitoring
Gaseous Fuels	Sum of NO and NO <sub>2</sub> expressed as NO <sub>2</sub>	> 10 MW	150 mg/m <sup>3</sup>	Continuous
	Carbon Monoxide (CO)	> 10 MW	100 mg/m <sup>3</sup>	Continuous

## vi. A3. Generator Sets for Combined Heat &amp; Power Production with a Total Thermal Output ≥ 3 MW

*O<sub>2</sub> reference content 5%*

Fuel Type	Pollutant	Capacity	Limit Value	Monitoring
Liquid or Gaseous Fuels	Sum of NO and NO <sub>2</sub> expressed as NO <sub>2</sub>	≥ 3 MW	600 mg/m <sup>3</sup>	Periodic
	Carbon Monoxide (CO)	≥ 3 MW	650 mg/m <sup>3</sup>	Periodic
	Total PM	≥ 3 MW	80 mg/m <sup>3</sup>	Periodic

## K. Waste Incinerator in all sizes

*O<sub>2</sub> reference content 11%*

Pollutant	Limit value	Monitoring
Total PM	100 mg/m <sup>3</sup>	Continuous*
NM VOC as total organic carbon	10 mg/m <sup>3</sup>	Continuous*
Hydrogen chloride (HCl)	40 mg/m <sup>3</sup>	Continuous*
Hydrogen fluoride (HF)	1 mg/m <sup>3</sup>	Continuous*
Sum of SO <sub>2</sub> and SO <sub>3</sub> , expressed as SO <sub>2</sub>	50 mg/m <sup>3</sup>	Continuous*
Sum of NO and NO <sub>2</sub> expressed as NO <sub>2</sub>	200 mg/m <sup>3</sup>	Continuous*
Carbon monoxide (CO)	50 mg/m <sup>3</sup>	Continuous*
Cadmium and its compounds, expressed as cadmium (Cd)	Total	Periodic
Thallium and its compounds, expressed as thallium (Tl)	0.05 mg/m <sup>3</sup>	Periodic
Mercury and its compounds, expressed as mercury (Hg)	0.05 mg/m <sup>3</sup>	Periodic
Antimony (Sb), Arsenic (As), Lead (Pb), Chromium (Cr), Cobalt (Co), Copper (Cu), Manganese (Mn), Nickel (Ni), Vanadium (V), and their compounds expressed as the element	Total 0.5 mg/m <sup>3</sup>	Periodic
PCDD/PCDF	0.1 ng TEQ/m <sup>3</sup>	Periodic

Penalty : Fine of maximum RM 100,000 or imprisonment not exceeding 2 years or both.

**DATA ON EQA 1974 COMPLIANCE STATUS FOR PALM OIL MILLS (EFFLUENT, CLEAN AIR, SCHEDULED WASTES) BY STATES (FROM 1<sup>st</sup> January – 31<sup>st</sup> May 2018)**

Table 1: EQA 1974 Compliance Status for palm oil mill effluent by States (From 1<sup>st</sup> January – 31<sup>st</sup> May 2018)

No.	State	No. of Palm Oil Mill	No. of Investigation	No. of Compliance	Non Compliance	Effluent Compliance (%)
1	JOHOR	64	211	186	24	89%
2	KEDAH	6	11	11	0	100%
3	KELANTAN	11	18	18	0	100%
4	MELAKA	3	4	4	0	100%
5	NEGERI SEMBILAN	16	26	25	1	96%
6	PAHANG	71	165	159	4	98%
7	PULAU PINANG	2	0	0	0	0%
8	PERAK	47	43	38	5	88%
9	PERLIS	0	0	0	0	0%
10	SELANGOR	17	6	6	0	100%
11	TERENGGANU	13	13	12	1	92%
12	SABAH	131	86	82	3	96%
13	SARAWAK	80	106	94	11	90%
14	WPKL	0	0	0	0	0%
15	W.P LABUAN	0	0	0	0	0%
16	W.P PUTRAJAYA	0	0	0	0	0%
<b>Total</b>		<b>461</b>	<b>689</b>	<b>635</b>	<b>49</b>	
<b>Average Compliance %</b>						<b>93%</b>

Table 2: EQA 1974 Compliance Status for clean air emission by States (From 1<sup>st</sup> January – 31<sup>st</sup> May 2018)

No.	State	No. of Palm Oil Mill	No. of Investigation	No. of Compliance	Non Compliance	Clean Air Compliance (%)
1	JOHOR	64	211	181	30	86%
2	KEDAH	6	11	11	0	100%
3	KELANTAN	11	18	18	0	100%
4	MELAKA	3	4	4	0	100%
5	NEGERI SEMBILAN	16	26	25	1	96%
6	PAHANG	71	165	152	12	93%
7	PULAU PINANG	2	0	0	0	0%
8	PERAK	47	43	38	5	88%
9	PERLIS	0	0	0	0	0%
10	SELANGOR	17	6	6	0	100%
11	TERENGGANU	13	13	13	0	100%
12	SABAH	131	86	83	3	97%
13	SARAWAK	80	106	95	11	90%
14	WPKL	0	0	0	0	0%
15	W.P LABUAN	0	0	0	0	0%
16	W.P PUTRAJAYA	0	0	0	0	0%
<b>Total</b>		<b>461</b>	<b>689</b>	<b>626</b>	<b>62</b>	
<b>Average Compliance %</b>						<b>91%</b>

Table 3: EQA 1974 Compliance Status for scheduled wastes management by States (From 1<sup>st</sup> January – 31<sup>st</sup> May 2018)

No.	State	No. of Palm Oil Mill	No. of Investigation	No. of Compliance	Non Compliance	Scheduled Wastes Management Compliance (%)
1	JOHOR	64	211	193	18	91%
2	KEDAH	6	11	11	0	100%
3	KELANTAN	11	18	18	0	100%
4	MELAKA	3	4	4	0	100%
5	NEGERI SEMBILAN	16	26	25	1	96%
6	PAHANG	71	165	161	4	98%
7	PULAU PINANG	2	0	0	0	0%
8	PERAK	47	43	42	1	98%
9	PERLIS	0	0	0	0	0%
10	SELANGOR	17	6	6	0	100%
11	TERENGGANU	13	13	13	0	100%
12	SABAH	131	86	84	2	98%
13	SARAWAK	80	106	95	11	90%
14	WPKL	0	0	0	0	0%
15	W.P LABUAN	0	0	0	0	0%
16	W.P PUTRAJAYA	0	0	0	0	0%
<b>Total</b>		<b>461</b>	<b>689</b>	<b>652</b>	<b>37</b>	
<b>Average Compliance %</b>						<b>95%</b>

### 3.0 Competent Person in Palm Oil Mills

Another requirement under the EQA 1974 for palm oil mill to operate is that there should be competent person handling the pollution control equipment to be on duty at all times. This requirement is essential in ensuring that the person handling the pollution control equipment has the technical capabilities and understanding in operating the equipment. This requirement would also helps to facilitate the industry in achieving full compliance to the DOE requirements.

The competency required by DOE from palm oil mill operators is the :-

- Certified Environmental Professional in the Treatment of Palm Oil Mill Effluent (CePPOME)
  - The main purpose of the training course is to introduce the participants with the concept and practice of performance monitoring as a means to monitor and control effluent treatment process efficiency and to ensure that the treatment system is operating optimally and in compliance with the environmental regulations
  - Currently, there are 713 people who attended the CePPOME course with 80 people acquired the full competency certification

The competent person also helps to ensure that the palm oil mills to implement the environmental mainstreaming tools (EMT) at the premises. The EMT covers 7 elements which involve environmental policy (EP), environmental budgeting (EB), environmental monitoring committee (EMC), environmental facility (EF), environmental competency (EC), environmental reporting and communication (ERC) and environmental transparency (ET). This would help to institutionalise the environmental aspects in the operations of the premises on daily basis. Currently, there are 129 palm oil mills that practice all of the seven (7) EMTs at their premises.



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