



ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES FOR QUARRY AND MINING



Department of Environment, Malaysia

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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 Quarry and Mining** 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 Quarry and Mining activities that is subjected to the following prescribed activities listed in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015.

In Malaysia, quarry and mining projects are threatening forests as well as livelihoods of people dependent on forest-based economies, and creating conflict between wild animals and local inhabitants due to loss of forest cover. Therefore, assessing the impacts on water, air and noise qualities are an integral part of the Environmental Assessment process. The impacts of a mining or quarrying project may be severe, in the event that it is within adjacent or near an environmentally sensitive area (ESA). Therefore any quarry and mining projects should adhere to various requirements by the Jabatan Mineral and Geosains and Department of Environment and other government Agency requirements in order to ensure that these projects do not adversely affect the ecology or surrounding human environment. Proper and practical mitigating measures shall be put in place to minimise any adverse impacts on the environment.

Quarry and Mining activities can cause significant impacts on the social, biological and physical environments of its site and surrounding areas which need extensive and effective mitigation measures. Adherence to Jabatan Mineral and Geosains Guidelines and to this EIA Guidelines on Quarry and Mining will ensure that impacting activities can be properly planned and implemented.

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 quarry and mining activities. 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).

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 natural resources.



(DATO' DR. AHMAD KAMARULNAJIB BIN CHE IBRAHIM)
Director General of Environmental Quality
Malaysia

ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES FOR QUARRY AND MINING

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ABBREVIATIONS

Als	Appointed Individuals
AMD	Acid Mine Drainage
AN	Ammoniacal Nitrogen
APCS	Air Pollution Control Systems
BAT	Best Available Technologies
BATNEEC	Best Available Technology Not Entailing Excessive Costs
BMPs	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>
FGDs	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 ₁₀	Ten percentile level
L ₅₀	Fifty percentile level
L ₉₀	Ninety percentile level
LAC	Limit of Acceptable Change
L _{Aeq}	Equivalent A-Weighted Continuous Sound Level
LCP	Laporan Cadangan Pemaju
LD-P2M2	Land Disturbing Pollution Prevention and Mitigation Measures
L _{MAX}	Maximum A-Weighted Continuous Sound Level

L _{MIN}	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
MDA	Mineral Development Act
MESTECC	Ministry of Energy, Science, Technology, Environment & Climate Change
METMalaysia	Malaysian Meteorological Department/ <i>Jabatan Meteorologi Malaysia</i>
ML	Mining Lease
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
NGOs	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
PML	Proprietary Mining License
PM ₁₀	Particulate Matter 10 micrometres or less in diameter
PM _{2.5}	Particulate Matter 2.5 micrometres or less in diameter
PPV	Peak Particle Velocity
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
OML	Operational Mining Scheme
OQS	Operational Quarry Scheme
RAC	Report Adequacy Check

RFZPPN	<i>Rancangan Fizikal Zon Persisiran Pantai Negara</i>
ROM	Run-Of-Mine
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
SME	State Mineral Enactments
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
TSF	Tailing Storage Facility
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>
USEPA	United States Environmental Protection Agency
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 Quarry and Mining**' (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.

1.2 LEGAL DEFINITIONS: ACTIVITY 8

The EIA Guidelines for Quarry and Mining shall cover the following prescribed activities:

First Schedule	Second Schedule
8. MINING	8. MINING
(a) <i>Ore Processing outside mineral tenement area, including concentrating of aluminium, copper, gold, iron, tantalum or rare earth element¹.</i>	(a) <i>Mining of Minerals in new areas involving large scale operation³.</i>

First Schedule	Second Schedule
8. MINING	8. MINING
(b) Sand mining on land or river or in coastal area on in territorial waters not exceeding 3 nautical miles measured from the low-water line, involving an area of 20 hectares or more.	(b) Mining of Minerals within or adjacent or near to environmentally sensitive area ⁴ .
(c) Sand mining in Continental Shelf ² .	

Note¹ - Definition of the terminologies used in EIA Order 2015, Schedule 1: Activity 8(a)

- (a) **Ore Processing** – Second stage of mining operation. Mineral Development Act 1994 defines mineral (ore) processing as any activity whereby minerals or mineral ores are treated for the beneficiation thereof but excludes smelting and refining.
- (b) **Mineral tenement** – As defined in the Mineral Development Act 1994, a fossicking licence, *dulang* licence, individual mining licence, prospecting licence, exploration licence, proprietary mining licence, mining lease, or any of them for the purpose of exploration or mining of minerals or mineral ores, as the case may be, issued under any Federal or State law regulating mineral tenements.
- (c) **Mining Operation** generally consists of 2 major stages of activity: (1) Excavation of mineral bearing materials at the mine pit and (2) Mineral processing for the beneficiation of the targeted minerals. From the technical and legal points of view, these 2 activities must be carried out within an approved mineral tenement for the following reasons:
- (i) **Mining Excavation** involves bulk material handling where transportation is a critical issue of concerned. Thus it is necessary for the processing plant to be located as close as possible to the mine pit.
 - (ii) It is a legal requirement for a mining operation to be carried out within an approved **Mining Lease (ML)** or **Proprietary Mining License (PML)** as stated in the Mineral Enactment of various states.

Note¹ - Definition of the terminologies used in EIA Order 2015, Schedule 1: Activity 8(a)

- (iii) Mining operation may only be permitted to commence upon the approval of an **Operational Mining Scheme (OMS)** as stated in the Mineral Development Act 1994 (Section 10).
- (d) **Concentrating of Aluminium** as the wording states is a smelting activity. The ore for aluminium is bauxite.
- (e) **Concentrating of Copper, Gold, Iron, Tantalum or Rare Earth Element** as the wordings states may be interpreted either as mineral processing or smelting.
- (f) Mine – when used as a noun, means any place, excavation or working wherein, whereon or whereby any operation connected with mining is carried on together with all buildings, premises, erections, water reservoirs, tailing ponds, waste, other dumps and appliances belonging or appertaining thereto above or below the ground or in or below the sea for the purpose of winning, obtaining or extracting any mineral by any mode or method or for the purpose of dressing, treating or preparing mineral ores.
- (g) **Mineral** – Any substance whether in solid, liquid or gaseous form occurring (a) naturally, (b) as a result of mining in or on the earth, or (c) as a result of mining in or under the sea or sea-bed, formed by or subject to a geological process, but excludes water, “rock material” as defined in the National Land Code [Act 56 of 1965] and “petroleum” as defined in the Petroleum Mining Act 1966 [Act 95]
- (h) **Mineral Ore** – Any mineral of economic interest from which one or more valuable constituents may profitably be recovered by treatment.
- (i) **Mineral Processing** – Any activity whereby minerals or mineral ores are treated for the beneficiation thereof but excludes smelting and refining.
- (j) **Mining Land** – Any land in respect of which a proprietary mining licence or mining lease issued or granted under any written law relating to mining is for the time being in force.
- (k) **Mining Lease (ML)** – Means a mining lease for the time being in force granted under any written law regulating mining.

Note¹ - Definition of the terminologies used in *EIA Order 2015, Schedule 1: Activity 8(a)*

- (l) **Operational Mining Scheme (OMS)** – An operational mining scheme approved under section 10 of the Mineral Development Act 1994.
- (m) **Proprietary Mining Licence (PML)** – A proprietary mining licence for the time being in force issued under any written law relating to mining.
- (n) Under the current mining law, ore processing outside mineral tenement area does not fall under the purview of the Mineral Enactment (Various States) but its operation is regulated under the Mineral Development (Licensing) Regulations 2016.
- (o) **Mining activity which includes ore processing within mineral tenement area is not subjected to an EIA under Schedule 1: Activity 8(a).**
- (p) **In the event where rock, e.g., limestone and granite, is classified as mineral, the activity will be classified as a mining activity and subjected to Second Schedule EIA.**

Note² - Definition of the terminologies used in *EIA Order 2015, Schedule 1: Activity 8(c)*

Continental Shelf

Continental Shelf Act 1966 defines the Continental Shelf as the sea-bed and subsoil of the submarine areas that extend beyond the territorial sea

- Throughout the natural prolongation of the land territory of Malaysia to the outer edge of the continental margin as determined in accordance with section 2B; or
- To a distance of two hundred (200) nautical miles from the baselines from which the breadth of the territorial sea is measured in accordance with the Baselines of Maritime Zones Act 2006 [Act 660] where the outer edge of the continental margin does not extend up to that distance, but shall not affect the territory of the States or the limits of the territorial waters of the States and the rights and powers of the State Authorities therein.

Note³ - Definition of the terminologies used in EIA Order 2015, Schedule 2: Activity 8(a)

1. **Mineral** – means any substance whether in solid, liquid or gaseous form occurring- (a) naturally; (b) as a result of mining in or on the earth; or (c) as a result of mining in or under the sea or sea-bed, formed by or subject to a geological process, but excludes water, "rock material" as defined in the National Land Code [Act 56 of 1965] and "petroleum" as defined in the Petroleum Mining Act 1966 [Act 95].
2. **New area** – New area may be interpreted as an area under a Mining Lease (ML) or Proprietary Mining License (PML) approved under the Mineral Enactment (Various States). The area may be green field area or an area which has been mined previously.
3. **New area** – May also be interpreted as a green field area.
4. **Large Scale** – Mining operation within a mining lease area:
 - (a) Which exceeds any of the following production limits:
 - (i) in the case of extraction of minerals from primarily alluvial deposits, annual throughput of 3.5 million cubic metres per year.
 - (ii) In the case of underground mining operations, annual combined run-of-mine ore, waste and overburden production of 100,000 tonnes per year (waste material not exiting mine mouth to be excluded); or (iii) in the case of open-cast mining operations extracting minerals from primarily non alluvial deposits, annual combined run-of mine ore, waste and over-burden production of 300,000 tonnes per year.
 - (b) With a capital and infrastructure investment exceeding one hundred and fifty million ringgit;
 - (c) With more than 250 employees or workers at the mine site on a typical day (including all shifts); or

Note³ - Definition of the terminologies used in EIA Order 2015, Schedule 2: Activity 8(a)

(d) Which uses any of the following mining practices:

- (i) extensive and continued use of explosive;
- (ii) continuous flotation circuits; or
- (iii) extensive and continued use of toxic chemical or agents.

5. **Small Scale Operation** – A mining operation other than a large scale operation as verified by JMG.

Note⁴ - Definition of the terminologies used in EIA Order 2015, Schedule 2: Activity 8(b)

National Physical Plan-3 2010 defines Environmentally Sensitive Areas 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 NPP-3 or the prevailing NPP. Determination of the Environmentally Sensitive Areas (ESA) shall be adopted from the definition set forth in the National Physical Plan (NPP-3) which has categorised ESA into three (3) Ranks, i.e. ESA Rank 1, ESA Rank 2 and ESA Rank 3.

Based on Schedule 2, item 8(b) Mining – *Mining of Minerals within or adjacent or near to environmentally sensitive area*, the following quantum can be applied to ascertain the definition of adjacent or near. However thorough modelling and impact assessment should be carried out to ensure that the quarry and mining activities shall cause adverse impacts to the nearest receptors.

Definition of the following terms shall be applicable:

- (a) **Within** – inside of Environmentally Sensitive Areas of Ranks 1, 2 and Rank 3.
- (b) **Near** – sharing a boundary with Environmentally Sensitive Areas of Rank 1, 2 and 3.
- (c) **Adjacent** – Project Site is within 500m of Environmentally Sensitive Areas of Rank 1, 2 and 3.

1.3 LEGAL DEFINITIONS: QUARRY

First Schedule
19. QUARRY
<i>Quarrying of rock material⁵.</i>

Note⁵ - Schedule 1: Activity 19	
1.	Quarry as a noun , means any open or underground excavation, other than which is controlled under any written law relating to mineral, made for extracting and removing rock material from any land and includes crushing or other treatment works on the site or elsewhere in the State.
2.	Quarry as a verb , means to break or excavate ground for the purpose of extracting and removing rock material from any land and includes the processes of crushing, grinding, dressing or other treatment of such material on the site or elsewhere in the State.
3.	Rock Material – Any earth, gravel, stone, coral, shell, guano, sand, loam or clay or any bricks, lime, cement or other commodities manufactured from the said materials unless otherwise specified by state laws.

Source: DOE, Malaysia (2018)

1.4 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).

1.4.1 Definitions under Mineral Development Act 1994

Common terms under the Mineral Development Act 1994 have been elaborated in Chapter One of this guidelines.

Section 10 - Section 10(1) of the Act specifies the need for the holder of a proprietary mining licence or mining lease to submit for approval by the Director of Mines an operational mining scheme for development work and mining on the land before the commencement of the said operations.

1.4.2 State Mineral Enactment of Various States in Malaysia

- (a) “mine”, when used as a noun, means any place, excavation or working wherein, whereon or whereby any operation connected with mining is carried on together with all buildings, premises, erections, water reservoirs, tailing ponds, waste, other dumps and appliances belonging or appertaining thereto above or below the ground or in or below the sea for the purpose of winning, obtaining or extracting any mineral by any mode or method or for the purpose of dressing, treating or preparing minerals ores.
- (b) “mining operation“ means the aggregate of all mines, including waste and tailing dumps, operating or planned in relation to mining land.

1.5 EIA DEVELOPMENT

This Guideline for Quarry and Mining, together with the EIA procedures therein, are produced to assist the Project Proponent when planning and developing new or expanding existing projects during the four major phases of project development, planning, pre-construction, construction and operations.

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.

The EIA report will contain important information for:

- (i) The Project Proponent to implement the mitigation measures in an environmentally and socially responsible manner.
- (ii) The DOE and other authorities to make an informed decision on the project, including preparation of the conditions of approval (COA).

- (iii) The public to understand the project and its potential impacts on the environment.

1.6 GUIDELINES OBJECTIVES

The objectives of the Guidelines are to:

- (a) 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.
- (b) 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.
- (c) 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.
- (d) 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.
- (e) Provide a clear framework for DOE to assess and approve the EIA reports.
- (f) Provide a clear understanding on the interpretation of various terms and definitions as contained in the prescribed activities pertaining to Quarry and Mining and to determine whether the Project falls under any prescribed activity based on the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015.

1.7 SCOPE OF THE GUIDELINES

- (a) Provide guidance and assistance to various stakeholders involved in the Environmental Assessment process.
- (b) Assist the regulatory agency and EIA practitioners to understand the main areas of concern and use that understanding to enhance the quality of the EIA study and report.
- (c) Inform the regulatory agency and EIA practitioners about the best environmental management practices in the quarry and mining sector.
- (d) Assist the regulatory agency to better assess the EIA report and arrive at an informed decision.

1.8 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: Existing Policies and Guidelines

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

Step 4: Engagement with Stakeholder

- (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 INTRODUCTION

In Malaysia, quarrying, though technically is of similar nature in activity with that of mining, is governed by different set of laws and thus separately administered. To the layman and the neighbouring community who share the same environment and thus the main receptors generally, the environmental impacts of both activities are the same.

List II in the 9th Schedule of the Federal Constitution states that land is a State matter. While Section 40 of the National Land Code 1965 (NLC) states that all State Land within its territories is vested in the State Authority including all minerals and rock material within or upon the land.

There are specific laws currently being enforced in controlling the development and operations of Quarry and Mining activities in Malaysia.

Two main and specific laws governing the mining industry in Malaysia are:

- (1) The State Mineral Enactments (SME), such as Mineral (Perak) Enactment 2003 for the State of Perak.
- (2) Mineral Development Act 1994.

The said legal instruments are State and Federal laws respectively.

With the formulation and implementation of Environmental Quality Act 1974, Quarry and Mining activities are subjected to various provisions in the Act in addition to the sectoral laws and regulations implemented to legally govern the industry.

The introduction of the EIA requirement for the industry, initially through the EIA Order 1987 and now the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015 have raised the need for a streamlined procedure to be implemented.

2.1.1 EIA Process

EIA is an integral part of the overall integrated project planning, which can provide benefits and value to any Quarry and Mining projects. It is a tool to evaluate the potential impacts arising from a proposed Quarry and Mining 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 Quarry and Mining 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.

2.1.2 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 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.

2.1.3 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.

2.1.4 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.

2.1.5 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.”

2.1.6 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 2.1.1 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 2.1.1: List of Possible Stakeholders

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

Stakeholder	Roles and Responsibility
GAs:	<ul style="list-style-type: none"> • 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. • 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. • The possible GAs to be considered for engagements are follows: <ul style="list-style-type: none"> • State Economic Planning Unit • Department of Mineral and Geoscience (JMG) • Public Works Department (JKR) • Local Authorities • Department of Drainage and Irrigation (DID) • Fisheries Department • Marine Department • Port Commission/Port Authority • Forestry Department Peninsular Malaysia • Department of Marine Parks Malaysia • Federal Department of Town and Country Planning (PLANMalaysia)
Affected Public and Local Population	<ul style="list-style-type: none"> • 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. • Preliminary engagement may include identifying public concerns for the project that needs to be addressed and feedback on mitigation measures. • These may include: <ul style="list-style-type: none"> • Local residents/community. • Fishermen. • Tourists. • Land owner. • Ports/Marina Operators. • Recreation/water sport's activity operator.
NGOs	<ul style="list-style-type: none"> • Provide input and feedback on issues of special interest. These may include: <ul style="list-style-type: none"> • NGO's related to environment. • Sailing institutions. • Other related NGOs.

2.1.7 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.

2.1.8 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.

2.2 POLICY AND GUIDELINES COMPLIANCE

2.2.1 National and State Policies and Plans

- (a) Quarry and mining in Malaysia are governed by 2 different sets of main laws, covering land matters and operation.
- (b) The main law governing the quarrying operation in Malaysia is the National Land Code (NLC) 1965 which deals with land disposal and relevant permits (Section 69, 70 and Section 77). Quarry Rules (Various States) such Perak Quarry Rules 1992 or Pahang Quarry Rules 2014 are enacted under Section 14, NLC 1965 with the objective to regulate the operation.
- (c) The main law governing the mining operation in Malaysia is the Mineral Enactment (Various States), such as Mineral (Perak) Enactment 2003, which dealt with the issuance of mineral tenements. Mining may only be carried out within approved Mining Lease (section 66, SME) or Proprietary Mining License (PML) (section 81, SME). Mineral Development Act 1994 dealt with the operational aspects of the mine where an Operational Mining Scheme (OMS) under section 10, Mineral Development Act 1994 is a requirement.

2.3 GOVERNING LAWS AND REGULATIONS ON MINING

Quarry and Mining activities in Malaysia, though technically similar, are governed by separate laws and regulations. Thus, mining, quarrying and their associated elements, such as minerals and rocks are legally defined and managed. Anomalies sometime arise as whether certain activities and elements in both sectors are defined or classified based on legal definition or otherwise.

In Malaysia, mineral is legally defined as any substance whether in solid, liquid or gaseous form occurring: naturally, as a result of mining in or on the earth, or as a result of mining in or under the sea or seabed, formed by or subject to a geological process, but excludes water, rock material as defined in the National Land Code and petroleum as defined in the Petroleum Mining Act 1966 (Mineral Development Act 1994).

The two main legal instruments that govern activities relating to mineral are the Mineral Development Act, 1994 and the Mineral Enactment (Various States). The Mineral Development Act came into force in August 1998, while the State Mineral Enactment have been adopted by the respective State Governments except for Sabah and Sarawak, ranging from 2001 to 2004.

2.4 MINERAL DEVELOPMENT ACT 1994

The Mineral Development Act 1994 defines the powers of the Federal Government for inspection and regulation of mineral exploration and mining and other related issues. It is the primary legislation that governs mining related activities in Malaysia. The legislation is enforced by the Department of Mineral and Geoscience of Malaysia.

As provided under section 63(2)(d) of the Mineral Development Act 1994, the former Ministry of Natural Resources and Environment has made the following regulations to further regulate certain relevant specific activities as follows:

- (a) Mineral Development (Operational Mining Scheme, Plans and Record Books) Regulations 2007.
- (b) Mineral Development (Blasting) Regulations 2013.
- (c) Mineral Development (Safety in Exploration and Surface Mining) Regulations 2014.
- (d) Mineral Development (Effluent) Regulations 2016.
- (e) Mineral Development (Licensing) Regulations 2016.

2.5 MINERAL ENACTMENT (VARIOUS STATES)

The State Mineral Enactment provides the States with the powers and rights to issue mineral prospecting and exploration licenses and mining leases and other related matters. The State Director of Land and Mines is responsible to administer these powers.

List of the said State Mineral Enactments are as follows:

- (a) Mineral (Selangor) Enactment 2000
- (b) Kelantan Mineral Enactment 2001
- (c) Pahang Mineral Enactment 2001
- (d) Mineral (Malacca) Enactment 2002
- (e) Negeri Sembilan Mineral Enactment 2002
- (f) Perlis Mineral Enactment 2002
- (g) Mineral (Terengganu) Enactment 2002
- (h) Mineral (Perak) Enactment 2003
- (i) Mineral (State of Johor) Enactment 2003
- (j) Mineral (Kedah) Enactment 2004

2.6 MINERAL REGULATIONS (VARIOUS STATES)

As provided under the provision of the State Mineral Enactments, the State Authorities of the relevant State have enacted Mineral Regulations to further regulate the enactments into practice.

List of the said State Mineral Regulations are as follows:

- (a) Mineral Regulations Kedah 2003
- (b) Mineral Regulations Perlis 2003
- (c) Mineral Regulations Kedah 2004
- (d) Mineral Regulations Terengganu 2005
- (e) Mineral Regulations Malacca 2006
- (f) Mineral Regulations Negeri Sembilan 2007
- (g) Mineral Regulations Pahang 2007
- (h) Mineral Regulations Selangor 2007
- (i) Mineral Regulations Perak 2008 (Pind. 2012)
- (j) Mineral Regulations Johor 2012

2.6.1 Mineral Development Act 1994

The Mineral Development Act 1994 (MDA 1994) is an Act to provide for the inspection and regulation of the exploration and mining of minerals and mineral ores and for other related matters. The MDA empowers the Department of Mineral and Geoscience to take full responsibility in enforcing requirements as stated in the Act.

Section 10(1) of the Act specifies the need for the holder of a Proprietary Mining Licence (PML) or Mining Lease (ML) to submit for approval by the Director of Mines an Operational Mining Scheme (OMS) for development work and mining on the land before the commencement of the said operations.

Section 12(1) emphasises on the need to comply with the approved operational mining scheme under Section 10.

Operational Mining Scheme as stated in Section 10(2)(c) should also include plans of the workings of the mine and, to incorporate the need to address the issue related to erosion and sedimentation as required under Section 19(1).

Regulation 3(1), Mineral Development (Operational Mining Scheme, Plans and Record Books) Regulations 2007 further elaborates on the Operational Mining Scheme (OMS), which should consist of information as follows: Regulation 3(1)(l) methods and procedures for removal of mineral ore and wastes; Regulation 3(1)(q) OMS shall include environmental protection measures including pollution control, monitoring and contingency plans.

Section 19(1) of MDA 1994 explicitly states the need for every person who undertakes fossicking, panning, exploration or mining to take such measures as are reasonable to prevent or minimize the erosion of the land which is the subject of the mineral tenement and the effects thereof.

While Section 19(2) specifies for every holder of a mineral tenement and his manager to provide and maintain the relevant retention works or other place as are necessary and adequate to prevent the products of erosion from being discharged into any river or drainage system.

On good and safe practices and environmental standards, Section 13 of MDA 1994 stipulates that fossicking, panning, exploration, mining and mineral processing shall be carried out in accordance with good and safe practices and such environmental standards as may be prescribed under this Act and any written law relating to environment.

2.6.2 State Mineral Enactment (Various States)

The State Mineral Enactments (Various states) is an Enactment to provide for mineral tenements and for purposes connected therewith.

Under SME, Mineral Tenement is defined as fossicking license, dulang licence, individual mining licence, prospecting licence, exploration licence, mining lease, proprietary mining licence, or any of them for the purpose of exploration or mining of minerals or mineral ores, as the case may be.

Section 113(a) and Section 113(b) of the Enactment emphasizes the needs for every holder of a mineral tenement who uses water in connection with their mining operations to comply with such water quality standards as may be prescribed by this Enactment or the Environmental Quality Act 1974 (EQA 1974) for the discharges.

It is mandatory on the part of the relevant parties to ensure that all discharges comply with the stipulated quality standard before it is discharged into any river, stream or watercourse; or before it leaves the land affected by the mineral tenement.

2.6.3 Quarry Rules (Various States)

The Quarry Rules (Various States) have been enacted under Section 14, NLC with the main objective to safe regulate the quarrying operation in the States. List of the said State Mineral Regulations are as follows:

- (a) Quarry Rules Perak 1992
- (b) Quarry Rules Kelantan 1997
- (c) Quarry Rules Selangor 2003
- (d) Quarry Rules Pahang 2004
- (e) Quarry Rules Terengganu 2007
- (f) Quarry Rules Negeri Sembilan 2009
- (g) Quarry Rules Johor 2016
- (h) Quarry Rules Perlis 2017

Rule 4(1), Perak Quarry Rules 1992 as an example specifies the need for a permittee or licensee to prepare and submit a Quarry Scheme Report for approval before the commencement of any quarry operation.

The Quarry Scheme Report as stated in Rule 4(2)(e) inter alia stipulates the need to provide measures for environmental protection in accordance with any law currently in force relating to environment or pollution control.

2.6.4 Mineral Development (Effluent) Regulations 2016

The Mineral Development (Effluent) Regulations 2016 defines effluent as any liquid waste produced by any exploration, mining or processing of mineral activities. The Regulation stipulate the parameter limits in effluent (Regulation 4) and method of effluent discharge (Regulation 6). The allowable effluent discharge of Suspended Solid which is relevant to ESC as specified in the Schedule (Regulation 4) is 50 mg/L.

It is a requirement under Regulation 6(1) for a mining lease holder to comply with the method of effluent discharged as specified in the approved operational mining scheme under Section 10 of MDA 1994.

Similarly, it is also mandatory for the license holder to comply with the method of effluent discharged as specified in the mineral processing scheme or storage management plan referred to in the Mineral Development (Licensing) Regulations 2016.

2.7 GUIDELINES AND GUIDANCE DOCUMENTS

The EIA report must also refer to the relevant guidelines and guidance documents issued by DOE and other Government Agencies (GAs) pertaining to environment-related system and management, and any other documents and notices issued from time to time, related to the EIA process and procedures.

The Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC) with the cooperation of the Department of Mineral and Geoscience (JMG) has produced Guidelines for the Mining and Quarrying Industry in Malaysia as part of the initiative to ensure the orderly operation of the industry.

Apart from the legislations, regulations, policies and plans mentioned above, **Table 2.7.1** provides list of guidelines and guidance documents for EIA reporting.

Table 2.7.1: List of Relevant Guidelines and Guidance Documents Related to Quarry and Mining

Guidelines/Guidance Document	Details and Scope
Guidelines for the Mining and Quarrying Industry in Malaysia – Mine and Quarry Rehabilitation (JMG, 2018)	Guidelines for the rehabilitation of mining and quarrying areas in Malaysia.
Guidelines for the Mining and Quarrying Industry in Malaysia – Keselamatan Kerja Lapangan (JMG, 2018)	Guidelines for the Safety and Health of workers within the Mining and Quarry establishment in Malaysia.
Guidelines for the Mining and Quarrying Industry in Malaysia – Mencarigali dan Penjelajahan (JMG, 2018)	Guidelines on how exploration of new mining areas in Malaysia.
Amalan Terbaik Peletupan dalam Industri Perlombongan dan Pengkuarian (JMG, 2018)	Guidance on the Best Management Practice of Blasting in the Mining and Quarrying Industry in Malaysia.
Amalan Hijau Terbaik Penggunaan Tenaga dan Air dalam Industri Perlombongan dan Pengkuarian (JMG, 2018)	Best Management Practices on Water and Energy Usage in the Mining and Quarrying Industry.
Amalan Terbaik Pengangkutan Mineral dan Batuan dalam Lombong dan Kuari (JMG, 2018)	Guidance on the Best Management Practices on the Transportation of the Mineral Rocks within the Mining and Quarrying Industry.
Best Practices for the Mining and Quarrying Industry in Malaysia – Visual and Aesthetic Impact in Mining and Quarrying (JMG, 2018)	Best Management Practices on the enhancement of Visual and Aesthetic Impact in the Mining and Quarrying Industry.
Guidelines for the Mining and Quarrying Industry in Malaysia – Dust and Noise Management (JMG, 2018)	Guidelines on Dust and Noise Management on Mining and Quarrying Industry in Malaysia.
Guidelines for the Mining and Quarrying Industry in Malaysia – Stockpiles, Dry Waste Dumps and Tailings Storage Facilities (JMG, 2018)	Guidelines for the provision for Stockpiles, Dry Waste Dumps and Tailings Storage Facilities.
Guidelines for the Mining and Quarrying Industry in Malaysia – Erosion and Sediment Control (JMG, 2018)	Guidelines for prevention of Soil and Sediment in the Mining and Quarrying Industry.
Guidance Document for Addressing Soil Erosion and Sediment Control (ESC): Aspects in the EIA Report as per Appendix 3 of the EGIM (DOE, 2016)	EIA reporting format concerning soil erosion and sediment control.

Guidelines/Guidance Document	Details and Scope
Guidelines for Erosion and Sediment Control in Malaysia (DID, 2010)	Guidelines for prevention and control of soil erosion and siltation for specific projects including examples of control measures and best management practices (BMPs).
Guidelines for Prevention and Control of Soil Erosion and Siltation in Malaysia (DOE, 2008)	Guidelines for prevention and control of soil erosion and siltation for specific projects including examples of control measures and BMPs.
Guidance Document for the Preparation and Submission of Environmental Management Plan (EMP) as per Chapter 6 of the EGIM (DOE, 2016)	Guidance for the preparation of the EMP post-EIA including translating into action, the P2M2s recommended in the EIA and the Conditions of Approval (COAs).
Guidance Document for the Preparation of the Document on Land-Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2) as per Appendix 4 of the EGIM (DOE, 2016)	Guidance for the preparation of the LD-P2M2 document which is to be included as part of the EMP to be submitted to DOE for approval.
<i>Manual Panduan Pemeriksaan BMPs untuk Kawalan Hakisan dan Sedimen</i> (DOE, 2015)	A manual of inspection procedures including checklists of the erosion and sediment control BMPs.
Geotechnical Terrain Mapping Manual (JMG, 2006)	A manual detailing the requirements to carry out geological terrain mapping (GTM) for hill and slope projects and the studies and maps required to be produced for any projects in these areas.
DID Manual Volume 2 – River Management (DID, 2009)	Provides methods to assess, manage and mitigate measures for river conservation, rehabilitation and restoration.

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.

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.

The primary function of scoping, also referred to as setting the TOR of an EIA, is to establish the environmental priorities and set the boundaries for the study. The objective of the TOR is to avoid creating a voluminous report and make the assessment process concise and focused. The TOR acts as a benchmark used by the appraisal committee to decide whether the EIA report has been complied meeting all the requirements or not.

There are various tools that can be used for scoping, such as questionnaire checklists, network method, comparison with other similar projects, matrix and ad-hoc methods, etc. The selection of scoping tools largely depends on the size of the project and the existing environmental and social characteristics of the project area. A site visit is advisable before framing the TOR, as the impacts of mining depend on site-specific characteristics to a large extent.

The TOR given below is a generic one and can be framed as per the project requirements.; ground realities and peculiarities of the project, applicable laws, rules, guidelines, policies as well applicability need to be considered before framing TOR for EIA study. There may be a possibility that some of the TOR is not applicable for a given project. The generic TOR is also applicable for quarries, but the size of the quarries, location sensitivity and relevance of questions needs to be carefully examined before framing TOR for a quarries project.

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.

3.4.1 Information on existing and future land use pattern of the study area

- (a) Land use pattern of area acquired for mining and land use pattern of study area (existing and future zoning as per the local plan).
- (b) Land ownership pattern of acquired land.
- (c) Distance of the project from human settlements, tourism products and key infrastructure installations, if applicable.
- (d) Catchment area characteristics of the study area, such as environmental sensitive areas, water recharge potential and drainage pattern.
- (e) Identification of areas vulnerable to erosion in the core area and buffer area separately.
- (f) If forest land or agricultural land are likely to be diverted, the impact on the availability of fodder, fuel, food and livelihoods, if applicable.

3.4.2 Information on sensitive receptors at project site and in the study area (if any)

Distance of forest areas, wildlife sanctuaries, national and state parks, geological park, biological corridors, archaeological sites, critical water-shed areas, settlements, tourism products (natural and cultural), important installations and sites of religious importance and others from the mine lease area.

3.4.3 Areas of forest land diverted (if any)

- (a) Discuss, if the project site or adjoining areas (such as the buffer zone) support any unique habitat, endemic, threatened or declining species or species of high economic/ecological value.
- (b) List of flora and fauna in the project area, duly authenticated by a government approved organization or GAs. The findings should be annexed with the report.
- (c) Presence of any wildlife corridors or locations favoured by migratory birds, animals at the project site or in the buffer zone, if any.

3.4.4 Information on the geological setting, mineral resource and mining plan

- (a) Mineral reserves (indicated, inferred, proven) in the mine lease area.
- (b) Characteristics of the mineral deposit (physical and chemical characterization).
- (c) Geological characteristics of the mining area. The project should undertake detailed geological investigation and highlight the technical and environmental issues arising from this investigation.
- (d) Details of the mine excavation plan.
- (e) Details of the mine excavation plan.
- (f) Details including the working depth, final working depth, and mineral recovery potential and progressive stage-wise working scheme until the end of mine life.
- (g) Details of mineral production schedule.
- (h) Details of waste generation (overburden, topsoil), as per the calendar plan as well as during the entire life of the mine. Overburden dump heights and terracing should be based on slope stability studies. The EIA should discuss the dumps section (in both longitudinal as well as cross section) with relation to the adjacent area.

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.

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

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.

3.7 DETERMINATION OF KEY PROJECT ACTIVITIES

Project activities are the basis for assessing the potential impacts from a project. The list of activities shall be provided by the Project Proponent in consultation with the Qualified Person or through discussions with the Project Proponent's team.

3.7.1 Quarrying and Mining Operations

Geologically, a quarrying or mining project site is underlain or overlain with deposits feasible for quarrying or mining. Thus, quarrying or mining operation can only operate on the area, capitalizing the available mineral/rock reserve, a site specific natural resource. The availability of economical mineral/rock deposit within the mining zone and also its location which is close to the available infrastructure are the determining factors which are considered for such project.

Naturally, the quarries or mines needs to be in the vicinity of the deposit and availability of infrastructure area. The selection of an appropriate site for the development of the quarries or mines are dependent inter alia, on the following several factors:

- (a) Type and condition of existing vegetation.
- (b) Availability of mineral or rock deposits

- (c) Economically viable mineral deposit for mining or rock for quarrying.
- (d) Access to the quarries/mines site.
- (e) Environmental concerns especially its proximity to build-up areas.

3.7.2 Concept of Quarrying and Mining

Quarrying and mining are natural resource base industries to extract minerals and rock materials respectively. The availability of mineral and rock reserves of sufficient economic quality and quantity within the project site are the pre-requisite requirements for the success of the operations.

The concept of the extractive industry is to utilize the available natural resource through physical processes involving extraction, crushing, screening, and mineral processing. Mining operation will normally involve mineral beneficiation process while quarrying operation involve crushing and downsizing process for the production of aggregates mainly for construction and cement manufacturing.

Blasting is used in the rock extraction while crushing and screening are the 2 main activities in the aggregate production. Conveyance of the bulk material products from the dedicated stockpile areas to the consumer is delivered by trucks or in some area by barges utilizing the available jetty facility in the vicinity of project site.

3.7.3 Quarrying and Mining Project Component

The overall planning process and operation of a producing unit with possible environmental impacts may be summarized in a flowchart as shown in **Figure 3.7.1** with the main stages of the project implementation comprise of the following:

- (a) The exploration and prospecting stage.
- (b) The development and initial site preparation and construction stage.
- (c) The operation stage.
- (d) The rehabilitation and abandonment stage.

The complete project activities as summarized in **Table 3.7.4**, commence from the prospecting and investigation program with the objective of identifying the availability of the mineral/rock deposit in the area both quantitatively and qualitatively. The prospecting program consists of activities which include desktop studies and field investigations ranging from samplings to drilling on the area under review. These are the activities which shall be carried out upon the approval of the exploration license on the project before the mining lease was approved by the State Authority.

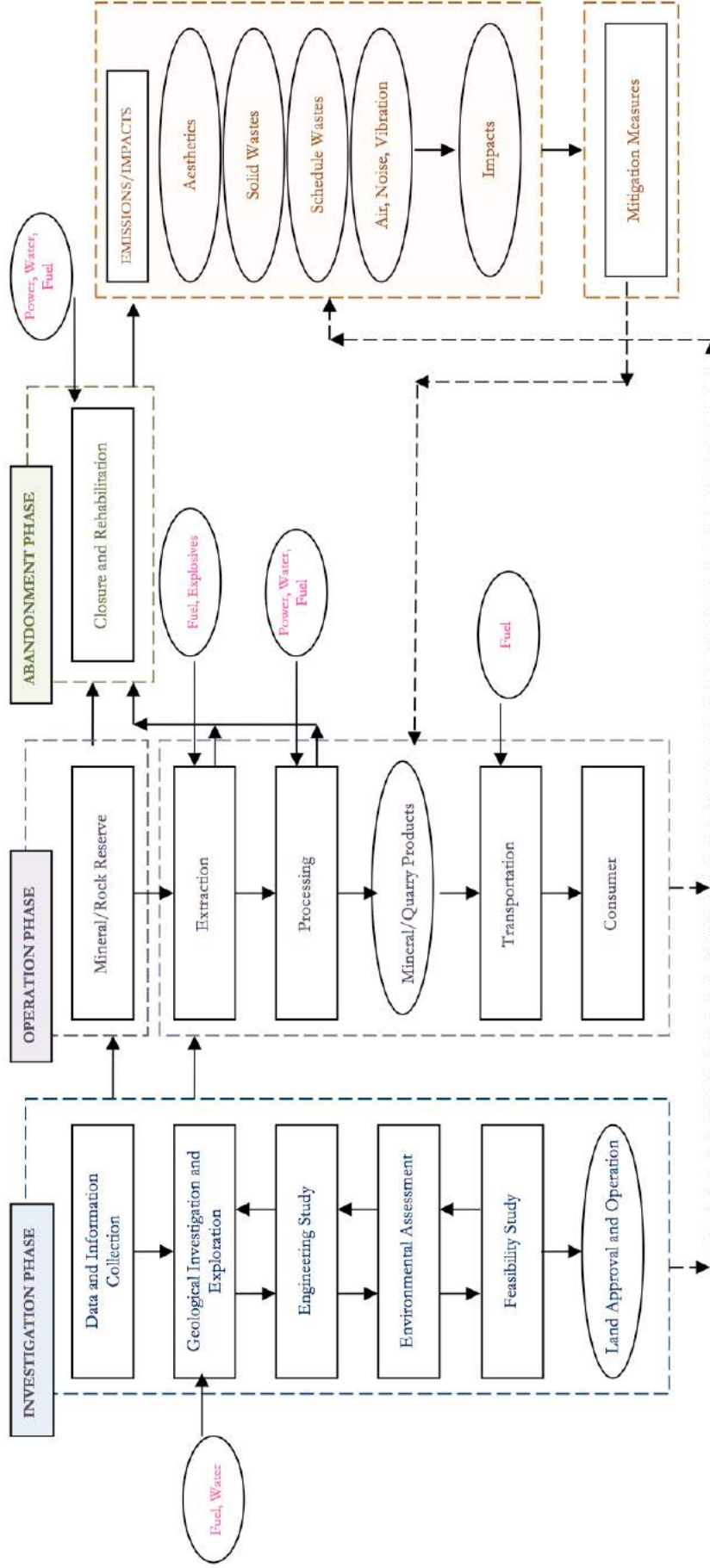
A proposed quarrying/mining operation shall involve a few stages of activities to extract the minerals/rocks, from overburden stripping, Run-of Mine (ROM) extraction, haulage and transportation to the processing plant, and beneficiation. Processing plant and other processing equipment are installed at the quarry/mine for the purpose of mineral beneficiation or rock processing which are being carried out systematically.

An overall quarrying or mining project normally involves actual planning and operation. Extraction of the resource deposit will utilize suitable methods with suitable height working benches for a safe and efficient working faces. A working platform is developed so as to have final benches of suitable width below the crest of the excavation. Average slope angles will vary according to the type of material in which the slope is constructed. In order to minimize the area opened at any one time and thus area exposed to erosion, staged extraction concept shall be adopted. This concept will also permit progressive rehabilitation whenever possible to be executed in the Project.

Table 3.7.4: Typical Generic List of Quarrying/Mining Activities

Stage	Activity
Investigation	Exploration Environmental Impact Assessment
Development	Site Clearing Overburden Removal Infrastructure Construction Mine/Quarry Face and Benches Development Processing Plant Installation
Production	Excavation Hauling Stockpiling Screening Processing Tailing Disposal (Mining)
Attachment	Rehabilitation

Figure 3.7.1: Quarries/Mines Activity Flow Chart and Its Environmental Impacts



Source: Selamat, A (2009) (Modified)

3.7.4 Operational Mining Scheme Plan

Section 10(1), Mineral Development Act 1994 stipulated that the holder of a mining lease shall be required to submit for approval by the Director of Mines an Operational Mining Scheme (OMS) for development work and mining on the land which is the subject of the said Mineral Tenement before the commencement of any development work or mining within the said area.

The statutory requirement and legal framework for Quarry and Mining may be drawn through the flowchart as shown in **Figure 3.7.2**.

The Act further stipulated under Section 10(2) that the OMS shall inter alia include: the expected date of commencement of production; a schedule of estimated annual raw ore production for the term of the Mineral Tenement; plans of the workings of the mine; and such information as may be prescribed by the department.

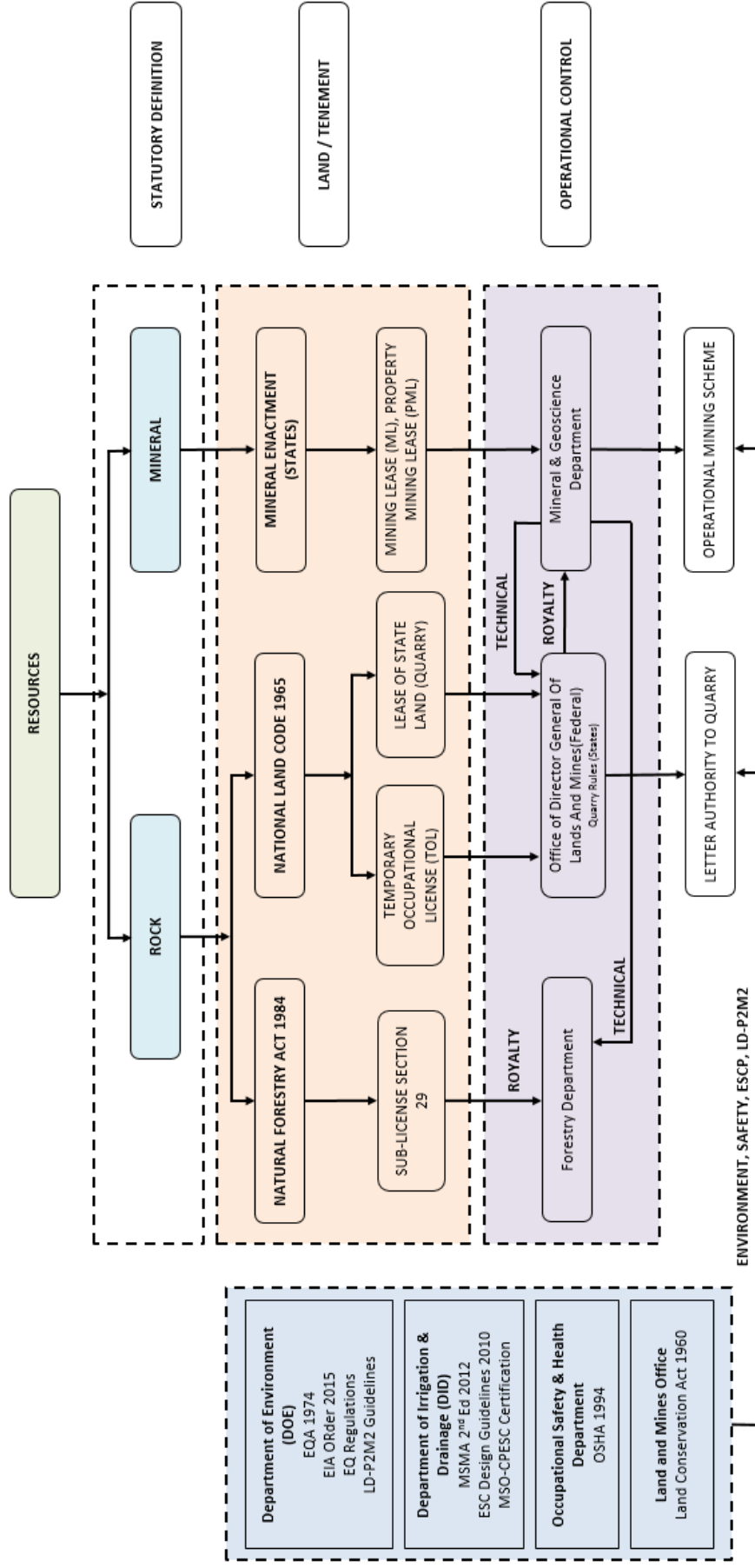
The OMS may only be approved if the execution of the scheme will provide a reasonably safe work place; and will not endanger adjoining communities [Section 10(4)].

The OMS shall be prepared based on the provisions of the Mineral Development (Operational Mining Scheme, Plans and Record Books) Regulations 2007, which has been gazetted and currently enforced.

The OMS must be submitted and approved by the Director of Mines before any mine could be allowed to operate, resume or reorganise its operation. It is a requirement that the OMS be prepared and submitted through a Consulting Mining Engineer and should be based on the Mineral Development (Operational Mining Scheme, Plans and Record Books) Regulations 2007. Information of relevance are as follows:

- (a) Availability of reserves.
- (b) Description of the overall operation of the mine.
- (c) Description of the status of the mining tenements.
- (d) Mineral processing descriptions.
- (e) Mine design for the operation.
- (f) Mine Dumps capacity.
- (g) Safety and environmental management.

Figure 3.7.2: Statutory Requirements and Legal Framework for Quarry and Mining in Malaysia



Source: Selamat, A (2009) (Modified)

The objectives of the quarry scheme report shall include inter alia the following:

- (a) Description of the overall operation of the quarry.
- (b) Rock-crushing operation at the quarry.
- (c) Details of the engineering aspect of the quarry design for the operation, which shall include rock extraction phases, based on the topography geology and sensitivity of the area.
- (d) Study on the blast design at the quarry, which include blasting specifications and method of initiation for primary and secondary blasting.
- (e) Study on the drainage pattern of the quarry site and the location of the silt traps.
- (f) Study on the buffer zone for the quarry based on the location of boundaries, blasting performance and position of sensitive areas.
- (g) To study and generally propose possible rehabilitation program of the quarry.
- (h) Formulation of abatement and mitigating measures on relevant areas.

The ultimate aim of the scheme report is to show that the quarrying activities has been and shall continue to be carried out in a skilful and work-like manner with due consideration towards preservation of environment and conservation of resources. It is also the intention of this report to highlight that the quarrying operations can be successfully integrated into the local environment without detrimental effects, both in the short and long term.

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 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 19	First Schedule Activity 8		Second Schedule Activity 8	
	Land-based	Land-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)	√	√	-	√	-
Mining including Operational Scheme	√	√	√	√	√
Land Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2)	√	√	√	√	√
P2M2	√	√	√	√	√
Baseline sampling (water, air, noise, vibration)* ¹	√	√	√	√	√
Topographic Survey	√	-	-	√	-
Bathymetry Survey* ²	-	-	√	-	√
Hydraulic Study* ³	-	-	√	-	√
Shoreline Assessment* ⁴	-	-	√	-	√
Ecological Habitat Mapping* ⁵	√	√	√	√	√
Stakeholder Consultation	√	√	√	√	√
Geological Terrain Mapping* ⁶	√	√	√	√	√
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)* ⁷	-	-	√	-	√
Marine Traffic Risk Assessment (Stage 2 Study)* ⁸	-	-	√	-	√
Geotechnical Study* ⁹	√	√	√	√	√
Landuse compatibility	√	√	√	√	√
Social Impact Assessment (SIA)	√	√	-	√	-
Traffic Impact Assessment (TIA)	√	√		√	-
Health Impact Assessment (HIA)	If required				
Heritage Impact Assessment	If required				
Wastes (biomass, scheduled wastes: construction, municipal, etc)	√	√	√	√	√

Notes:

- (i) First Schedule Activity 19: Quarry:- Quarrying of rock material
- (ii) First Schedule Activity 8: Mining:- (a) Ore Processing outside mineral tenement area, including concentrating of aluminium, copper, gold, iron, tantalum or rare earth element.
 - (b) Sand mining on land or river or in coastal area on in territorial waters not exceeding 3 nautical miles measured from the low-water line, involving and area of 20 hectares or more.
 - (c) Sand mining in Continental Shelf.
- (iii) Second Schedule Activity 8: Mining:-(a) Mining of Minerals in new areas involving large scale operation
 - (b) Mining of Minerals within or adjacent or near to environmentally sensitive areas.
 - I. *1 Vibration not Applicable
 - II. *2 Based on site conditions and project activities.
 - III. *3 Requirements based on the Guidelines for Preparation of Coastal Engineering Hydraulic Study and Impact Evaluation [Department of Irrigation and Drainage (DID), 2001].
 - IV. *4 Requirements based on DID Manual Volume 2 - Coastal Management (DID, 2009)
 - V. *5 If adjacent to ESAs Rank I and II as defined by PLANMalaysia.
 - VI. *6 indicates that preparation of the Geological Report must be carried out by professional registered with the Board of Geologist, Malaysia
 - VII. *7 indicates that the scope of Marine Baseline Traffic Assessment (Stage 1 Study) is described in detailed Table 4.1
 - VIII. *8 Marine Traffic Risk Assessment (Stage 2) study scope shall be determined and approved by Marine Department of Peninsular Malaysia and to be prepared by contractor/owner prior to commencement of works
 - IX. *9 indicates that preparation of the Geological Report must be carried out by professional registered with the Board of Geologist, Malaysia
 - X. 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: FLOWCHART TO CONDUCT MINING ACTIVITIES

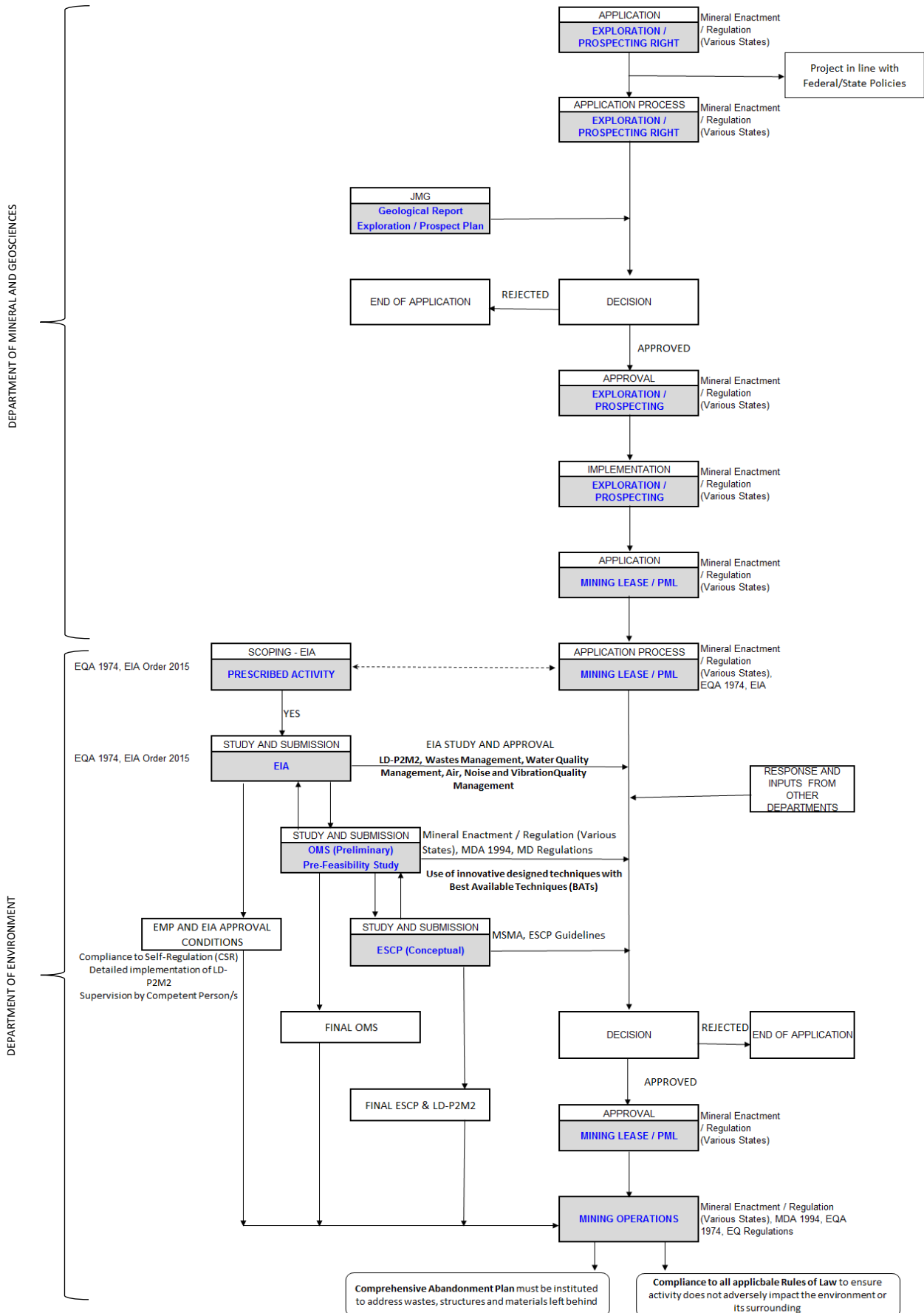
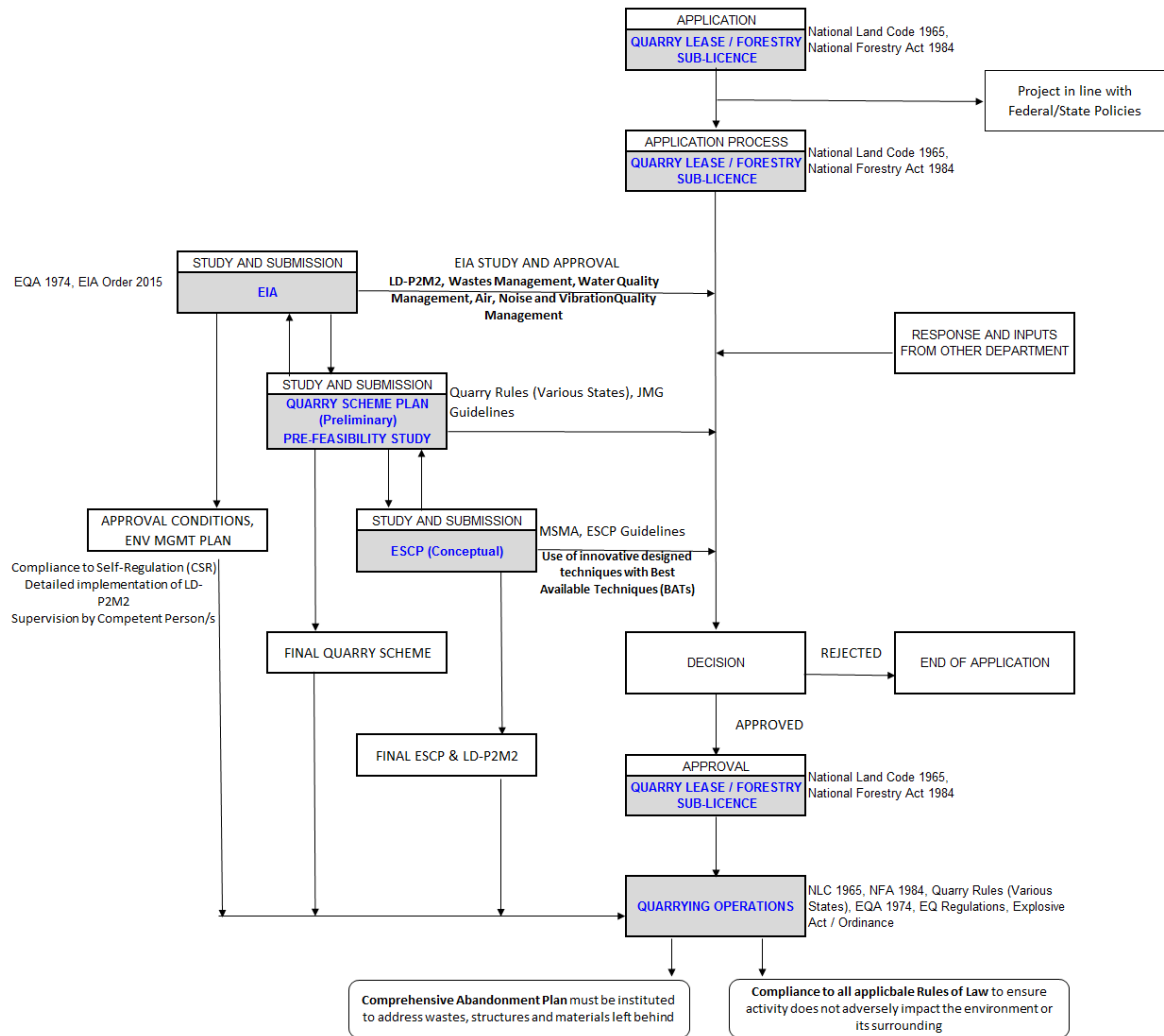


Figure 3.11.2: FLOWCHART TO CONDUCT QUARRY ACTIVITIES



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.

- (a) Surface and surface water characteristics in core and buffer areas.
- (b) Characteristics of topsoil and its thickness.
- (c) Characteristics of overburden with respect to pollution potential.
- (d) Baseline data on ambient air quality (PM₁₀, SO_x, NO_x, CO, PM_{2.5}) and state all generation of site-specific information on existing meteorological conditions such as temperature, humidity, rainfall, and wind speed, wind direction, wherever it is applicable.
- (e) Generation of ambient noise data by considering noise-prone areas and sensitive receptors.
- (f) Inventory of trees to be cut down.
- (g) The EIA report should provide an overview of the existing hydro-geological setting of the study area, describing the aquifers, hydraulic characteristics, groundwater quality and the interaction of surface water, if applicable.
- (h) Information on number and distances of water-bodies such as rivers, lakes, streams, springs, wells, etc. present in core and buffer zones.

- (i) Existing socio-economic status of the population (demographic characteristics and local amenities, livelihood patterns, income levels, literacy and the presence of indigenous and vulnerable groups) in the study area.
- (j) Data on the health status of local communities and common diseases prevailing in the area, if applicable.

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
Soil, Terrain and Geology	<ul style="list-style-type: none"> • Geotechnical report. • Description of local and regional soil and geology. • Description of existing topography based on land surveys. • Analysis of soil profile obtained from soil investigations. • Estimates of soil loss and sediment yield of the project site. 	<ul style="list-style-type: none"> • DOE • JMG • DID
Hydrology	<ul style="list-style-type: none"> • Description of hydrological systems within and surrounding the project site (rivers, streams and drainage). • Identification of downstream receptors such as water intake points (WIPs) and water treatment plants (WTPs). • Flood risk analysis, if required. 	<ul style="list-style-type: none"> • DOE • DID • State Water Authorities
Water Quality	<ul style="list-style-type: none"> • Sampling and analysis of water quality of waterways and water bodies within the ZOI. 	<ul style="list-style-type: none"> • DOE
Air Quality	<ul style="list-style-type: none"> • Sampling and analysis of ambient air quality of the project site and nearby sensitive receptors. 	<ul style="list-style-type: none"> • DOE
Noise Level and Vibration	<ul style="list-style-type: none"> • Measurement and analysis of ambient noise and vibration levels of the project site and nearby sensitive receptors. 	<ul style="list-style-type: none"> • DOE
Waste	<ul style="list-style-type: none"> • Estimation of the amount of biomass waste generated from site clearing. • Identification of potential scheduled wastes generated from the project site. • Identification of future spoil disposal areas. 	<ul style="list-style-type: none"> • DOE • Local Authority • SW Corporation

Aspect	Scope and Requirement	Relevant Agencies for Reference
Landuse	<ul style="list-style-type: none"> • Description of existing and future landuse (map and description) within the ZOI. • Identification of ESAs and impact receptors. • Landuse compatibility assessment. 	<ul style="list-style-type: none"> • Federal Town and Country Planning Department (PLANMalaysia)
Climate	<ul style="list-style-type: none"> • Obtain long-term (minimum 5-year) climate data to define the weather patterns for the project site. 	<ul style="list-style-type: none"> • Malaysian Meteorological Department (METMalaysia)
Geology/ Hydrogeological	<ul style="list-style-type: none"> • Description of regional geology. • Geological Terrain Mapping (GTM) of the project site and surrounding areas. • Develop the construction suitability map, which identifies clearly the areas with grading of slopes. • Seismicity assessment. • Hydrogeological assessment. • Geotechnical report. 	<ul style="list-style-type: none"> • JMG • Public Works Department (JKR)
Ecology	<ul style="list-style-type: none"> • Habitat mapping of ESAs (terrestrial and aquatic). • Provide an inventory, and assess the terrestrial and aquatic biodiversity within the Project site. • Identify any endemic, rare, endangered, threatened and near extinct species within the project site and surrounding ZOI. 	<ul style="list-style-type: none"> • Forest Department of Peninsular Malaysia (JPSPM) • PERHILITAN • Department of Fisheries (DOF)
Socio-economy	<ul style="list-style-type: none"> • Data on demography, and socio-economic profiles of stakeholders within the ZOI. • This shall be based on the findings of the SIA, if carried out separately. 	<ul style="list-style-type: none"> • Federal Town and Country Planning Department (PLANMalaysia)

Aspect	Scope and Requirement	Relevant Agencies for Reference
Public Health	<ul style="list-style-type: none"> Existing public health status. This shall be based on the findings of the Health Impact Assessment (HIA), if any. 	<ul style="list-style-type: none"> Ministry of Health (MOH)
History, Culture and Archaeology	<ul style="list-style-type: none"> Identify locations of significant historical, cultural, heritage and archaeological value (graves, ritual areas, heritage buildings, artefacts, pre-human habitation, etc.). 	<ul style="list-style-type: none"> National Heritage Department. Department of Museum.
Traffic (Land)	<ul style="list-style-type: none"> Existing traffic within and surrounding the project site. This shall be based on the findings of the TIA, if any. 	<ul style="list-style-type: none"> JKR
Traffic (Sea)	<ul style="list-style-type: none"> Marine Baseline Traffic Assessment. (Stage 1). Marine Traffic Risk Assessment (Stage 2). 	<ul style="list-style-type: none"> Marine Department Malaysia.
Infrastructure, Utilities and Amenities	<ul style="list-style-type: none"> Availability of existing and future utilities (water, electricity, sewerage, waste management, road networks, telecommunication, etc.). Discharge points of sewage and effluent. This shall be based on the findings of the <i>Laporan Cadangan Pemaju</i> (LCP), if any, or obtained from the Project Proponent. 	<ul style="list-style-type: none"> Water Supply Authority/ Providers. Indah Water Konsortium (IWK). Tenaga Nasional Berhad (TNB). JKR Local Authorities (PBT).

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 Quarry and Mining Activities

Typical issues and impacts and their respective issues of concern are as listed in **Table 5.2.1**.

Table 5.2.1: Quarry-related Activities and Potential Environmental Impacts

Activity	Potential Impacts	Issues of Concern
Site clearing	<ul style="list-style-type: none"> • Land acquisition: Displacement and loss of livelihood. • Civil works such as earth moving: Dust pollution, noise pollution, loss of biodiversity. • Site runoff: Increase in erosion/sediment deposition. • Influx of construction workers: Pressure on local resources and amenities. • Heavy equipment movement and operation: Noise pollution, dust generation, annoyance, health impacts on workers. • Habitant fragmentation and loss of habitat. 	<ul style="list-style-type: none"> • Soil erosion • Loss of flora and fauna. • Water pollution (silt). • Air and noise pollution. • Groundwater contamination. • Social concerns. • Loss of biodiversity.
Overburden and stockpiles	<ul style="list-style-type: none"> • Land degradation. • Land instability from incorrect earth removal or unstable deposition of spoil, leaving to landslides or erosion. • Discharge of sediment into water courses affecting in stream habitat. • Dust emissions affecting amenity and health. 	<ul style="list-style-type: none"> • Wastes management. • Soil erosion. • Air and noise pollution. • Loss of biodiversity.

Activity	Potential Impacts	
Material handling (loading/unloading, transfer, storage, etc.)	<ul style="list-style-type: none"> • Air pollution, public nuisance and occupational health hazard. 	<ul style="list-style-type: none"> • Air and noise pollution. • Wastes (municipal wastes). • Safety and health (vector-borne disease).
Noise, air blast and vibration from blasting, machinery and traffic	<ul style="list-style-type: none"> • Annoyance/disturbance. • Damage to structures due to ground vibrations. 	<ul style="list-style-type: none"> • Scheduled wastes management. • Air and noise pollution.
Quarry and Mines traffic	<ul style="list-style-type: none"> • Nuisance and safety issues for locals. • Noise and dust. 	<ul style="list-style-type: none"> • Water pollution (silt and debris). • Air (dust) and noise pollution. • Wastes (spoil disposal) • Visual/aesthetics.
Storage and use of fuel, chemicals and explosives	<ul style="list-style-type: none"> • Contamination of local water resources. 	<ul style="list-style-type: none"> • Wastes (spoil, municipal, scheduled wastes). • Air pollution (odour). • Health impact (disease, vectors, accidents). • Social concerns.
Altering water flow	<ul style="list-style-type: none"> • Reduced water flow from springs. • Changes in water flow direction. • Increased stormwater runoff. 	<ul style="list-style-type: none"> • Hydrological changes. • Water pollution (silt).
Site restoration	<ul style="list-style-type: none"> • Erosion and landscape scarring after quarrying has ceased. • Weed infestations. 	<ul style="list-style-type: none"> • Visual/aesthetics.

5.2.2 Key Associated Impacts

(a) Ecology

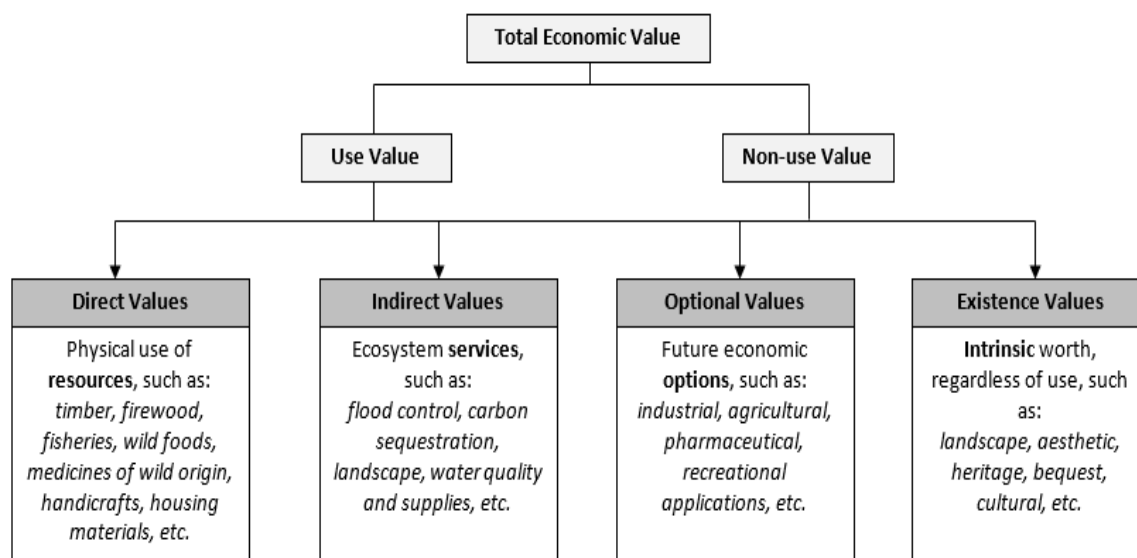
Ecology is important for maintaining the natural balance and sustenance of the ecosystem. It is defined as the 'sum of life'. Its components and processes include the variety of living plants, animals and other organisms, the genetic differences among them, the communities and ecosystems in which they occur, and the ecological and evolutionary process that keeps them functional. Ecology helps human beings in many ways — from providing products such as timber, firewood and food to providing services such as flood control, carbon sequestration, etc. (refer to **Figure 5.2.1**).

Development activities like quarries and mining can significantly alter the ecology of an area. The magnitude of impact on ecology again depends on land use pattern, size of plant, site sensitivity etc.

At present, in many parts of the world, mining projects are threatening forests as well as livelihoods of people dependent on forest-based economies, and creating conflict between wild animals and local inhabitants due to loss of forest cover (refer to **Table 5.2.2**). Assessing the impacts on ecology is an integral part of the Environmental Assessment process. In a country like Malaysia which is rich in ecology, impact of a mining project may be severe, if acquired land is close to forest or diverting forest land, which house endangered or threatened or restricted species. Moreover, most of the land in the country is forestland and thus any large scale change in land use pattern would lead to loss of ecology.

It is also true that all mining projects do not require an exhaustive biodiversity assessment. However, in case the project is coming up in an ecologically sensitive area, a detailed bio biodiversity assessment is recommended.

Figure 5.2.1: Economic value of Ecology



Source: Asna Kajvanshi, et al, Best practice guidance for biodiversity – inclusive impact assessment, Wildlife Institute of India, Dehradun, pp 5.

Table 5.2.2: Mining activities and their impact on Ecology

Activity	Examples of aspects	Issues of Concern
Extraction	Land clearing	Loss of habitat, introduction of plant diseases and siltation of water courses.
Blasting	Dust, noise, vibration	Smothering stomata, disturbance of fauna.
Digging and hauling	Dust, noise, vibration, water pollution	Disruption of water courses, impacts on aquatic ecosystems due to changes in hydrology and water quality.
Waste dumping	Clearing, water and soil pollution	Loss of habitat, soil and water contamination, sedimentation, acid mine drainage.
Processing/chemical use	Toxicity	Loss of species (fish kills, for example) or reproductive impacts.
Tailing management	Land clearing, water pollution	Loss of habitat, toxicity, sedimentation, water quality and stream flow.
Air emissions	Air pollution	Loss of habitat or species.
Effluent discharges	Water pollution	Loss of habitat or species, reduced water quality.

Activity	Examples of aspects	Issues of Concern
Building workshops and other structures	Land clearing, soil and water pollution	Loss of habitat, contamination from fuel, waste disposal.
Waste disposal	Oil and water pollution	Encouragement of pests, disease transfer, contamination of groundwater and soil.
Building power lines	Land clearing	Loss or fragmentation of habitat.
Provision of accommodation	Land clearing, soil and water pollution, waste generation	Loss of habitat, sewage disposal and disease impacts.
Activity	Example of aspects	Examples of biodiversity impact.
Access roads	Land clearing	Habitat loss or fragmentation, water logging upslope and drainage shadows down slope.
Population growth	Land clearing or increased hunting	Loss of habitat or species, stress on local and regional resources, pest introduction, clearing.
Water supply (potable or industrial)	Water abstraction or mine dewatering	Loss or changes in habitat or species composition.

Source: Asha Rajvanshi, et al, Best practice guidance for biodiversity – inclusive impact assessment, Wildlife Institute of India, Dehradun, pp 69.

(b) Erosion and Sedimentation

Potential Impacts: Land clearing removes the natural vegetation cover from the site and exposes the earth surface to the elements, leading to higher rates of erosion. Similarly, the hydrological character of the area may be altered as natural rivers are diverted, become silted up or filled in, which leads to increased runoff volume and velocity while retention time and infiltration rates are lowered. Erosion and sedimentation will likewise affect the aquatic ecology, water quality and may result in downstream flooding.

(c) **Hydrology**

Mining operations have very high impact on both the quality and quantity of water resources – both groundwater and surface water. Water is mainly used for ancillary activities such as dust suppression — spraying on haul roads, conveyors, waste dumps, loading and unloading points etc. – plantation and domestic consumption. The water consumption at a mine site depends on the size, method of mining and the equipment used. A large mine is likely to have higher water consumption as it has longer haul roads.

Quarry and Mining projects also reduces the surface water resources by disturbing the catchment area and by destroying streams and natural drains in the lease area. The impact is more pronounced on the local communities if they depend on these streams and waterways to meet their water requirements. The severity of impact on water resource depends on a number of factors: drainage patterns, the hydrology of the area, characteristics of the water, wastewater being discharged from the mine and the quantity of discharge, chemical composition of the mineral and overburden, erosion potential of the area, overburden management, and the ability of surface water to assimilate the pollution load.

Mining operations also disturbs soil and rock in the course of constructing and maintaining roads, opening pits, and creating waste dumps. In the absence of adequate prevention and control strategies, erosion of the exposed earth carries substantial amounts of sediments and silt into streams, rivers and lakes. Excessive sediments can clog riverbeds and choke watershed vegetation, wildlife habitat and aquatic organisms. Silt blankets at a stream's bottom can cut off the food supply of fishes. River siltation and deposition of silt on agricultural land can be very high if the mine is located on a hilly terrain and receives high rainfall.

(d) **Water Quality**

Potential Impacts: Water pollution during construction will be mainly from erosion and sedimentation. Fine silt increases the suspended solids and turbidity of the waterways, and can be detrimental to aquatic life as well as render the waterway unsuitable for other uses (potable water supply, recreation, etc.). Other potential sources include biomass degradation, sewage and sullage discharge from worker quarters and oil and grease spills.

During operations, sewage discharge from the development contributes to increased nutrients into the waterways, leading to eutrophication and ecological degradation.

5.2.3 Other Associated Impacts

(a) Air Quality

The impact of mining on air starts from the exploration phase, increases manifold during the operational phases, and may extend beyond the quarries or mines closure. The impact can be ascertained by the coating of black dust that covers everything in coal mining areas, similarly, in iron ore mining, everything appears reddish in colour. This is fugitive dust, a common phenomenon related to any type of mining; it comes from almost all the operations, such as land clearing, drilling, blasting, loading, transportation, crushing, storage and waste handling and storage.

Fugitive emission is more significant in the open-cast quarrying or mining area. The intensity of dust generation is also influenced by factors such as wind speed, hardness of the rock, mining technology, mode of transportation and the level of mechanisation. Conventional mining technologies – involving drilling and blasting — generate much more dust as compared to environment-friendly technologies like **surface miners, rippers and rock breakers**. Dust pollution potential of a quarries or mines gets exaggerated in semi-arid and arid areas. Poor mine planning and haphazard excavation tend to aggravate dust pollution as loose materials at broken sites are easily picked up by the wind, adding to the ambient dust levels.

In addition, inadequate dust suppression measures and poor quarries or mines management practices also cause air pollution, leading to widespread impact on local public health. The impact is more noticeable when the dust contains particles less than 10 microns in size; these particles are small enough to be inhaled.

During quarry operations, the potential sources of fugitive dust includes (a) the settled dust by wind (b) machine movement and transportation (c) size reduction (*The fine dust increases with subsequent stages of crushing i.e., more fine dust is generated in secondary crusher as compared to primary*) (d) handling of the stones at various stages.

Emission factors from various sources According United States Environmental Protection Agency (USEPA) study, particulate emission factors for various stone processing operations is given in **Table 5.2.3**.

Table 5.2.3: Particulate Emission Factors for Stone-Processing Operations

Process operation	Uncontrolled Emission Factor Kg/ton	% Contribution
Primary crushing	0.25	4.5
Secondary crushing and screening	0.75	13.6
Tertiary crushing and screening	3.0	54.5
Recrushing and screening	2.545.5	45.5
Conveying and material handling	1.0	18.2
Total	5.5	100

Source: Fine Particle Emission Inventory System, Office Of Research And Development, U. S. Environmental Protection Agency, Research Triangle Park, NC, 1985.

The above table indicates that maximum emissions occur during tertiary crushing followed by re-crushing and screening, the contribution of primary crushing is less mainly due bigger size of material

(b) **Noise and Vibration**

High level of noise is a key concern in quarries and mines projects. Noise pollution from quarries or mines operations is caused during drilling, blasting, loading and unloading, transportation and crushing, etc. This often leads to occupational hazards and causes annoyance to the local community (when human settlements are located close to the mining operations or when the transport route passes through human habitation) in the case of surface mining.

In addition to noise, another environmental and social repercussion of quarries or mines project is the ground vibration during blasting, which causes significant impact and causes direct loss to property such as cracks in houses and sometimes it may lead to collapse of temporary or permanent structures close to the mine. Mining operations that use deep hole drilling and blasting employing the delay detonators are bound to produce ground vibrations. The stress waves generated during blasting propagates radically in all directions and cause the rock particles to oscillate. This oscillation is felt in the form of ground vibration. This ground vibration is measured as the Peak Particle Velocity (PPV).

(c) **Human Environment**

Any mining project will have social impacts during three stages – Pre-operational phase, operational and post operational phase.

The key issues associated with these stages are described below:

- (i) **Pre-Operational Stage:** This is a very important stage for most projects as it is associated with displacement and therefore loss of livelihood. Displacement completely changes the lives of affected people as they lose their livelihood and are completely uprooted from their home. In such cases, rehabilitation and resettlement plans have to be developed and implemented in a way so as to minimise the negativity associated with displacement. This can be done by compensating affected people with land, employment, money or housing facilities and other benefits

During this stage it is crucial to anticipate future impact due to future zoning of land within buffer areas of potential quarry. Many land currently agriculture or forest planned for future settlements by the local plans. Therefore, prior to approval of any new quarry sites, as to avoid future land use conflicts, potential buffer land uses need to be properly assessed.

- (ii) **Operational Stage:** During the operational stage, the pollution that is generated from the activity at the project site affects the environment and people residing in and around the area. This could be in the form of pollution, scarcity of natural resources such as water, nuisance due to noise and vibration, increased safety risk and pressure on the existing roads due to increased transportation, and other diseases associated with pollution, etc. It is necessary to initiate and incorporate certain plans for mitigating these impacts. There would also be positive impacts such as direct and indirect employment generation, infrastructure development and better facilities for health and education.

(iii) **Post-closure stage:** The post closure is also significant as a closing down of the mines or a big quarries would have impact on the local community as it would directly or indirectly affect their livelihood. It is therefore important to plan an alternative for such scenario. Once the mine is closed, the existing building or infrastructure including waste storage site may have to be reclaimed. Post closure is especially important for mining projects where the minerals are exhausted after a certain period. In such situations, it is crucial to restore the ecological balance and also address the social concerns that such situations tend to generate.

(d) **Waste Management**

Quarry and mines wastes and its impacts

Quarries and mines operations generate significant quantity of wastes, which is referred as overburden". The ratio of wastes materials to the amount of mineral excavated is called as stripping ratio. For example, a stripping ratio of 4:1 means that four tonnes of waste rock are removed to extract one tonne of mineral. Higher the ratio, the greater is the waste generation; higher the waste generation, the greater is the air and water pollution potential – also, more land is required for waste disposal.

Overburden is normally stored in big piles within the mine lease area. The bigger the scale of the mine, greater is the quantum of waste generation. The waste generation in the mines depends on the depth of the mine. Deeper the deposit, the higher would be the potential for waste generation. The availability of the number of seams and the vertical depth between two seams are other factors that influence waste generation.

Most mining wastes are inert solid material. However, depending on the rock strata characteristics some toxics are inherently present in the overburden material — for example, heavy metals such as mercury, arsenic, lead, zinc, cadmium etc. These heavy metals leach out of the stored waste piles, contaminating the local environment. As a good environmental practice, it is crucial to understand the chemical characteristics of the waste and overburden before disposing it off.

The best use for waste rock is as a material for backfilling the excavated land; alternatively, it can be used for building roads or in construction – but all this is rarely done. In fact, in many cases, overburden and waste rock is left unattended which may lead to potential source of air and water pollution.

(e) **Traffic Safety and Health**

The working climate in a mine depends not only on local geological conditions, but also on the mine layout, mining methods, machinery used, extraction processes, and transportation modes. In quarries and mines project, the occupational health impacts primarily depend upon the dust composition, size and physico-chemical properties of dust. Particles 5 micron or less in size, usually referred to as PM_{2.5}, is the main causes of respiratory diseases such as asthma and pneumoconiosis. The chances of high health impact occur when particles are in the size range from 0.3 to 1 micron and the free silica content in the dust is high.

Respiratory diseases are common among workers and non-workers in open-cast mining areas due to the fugitive dust generated during mining activities. Other common diseases are common in quarries and mines area are bronchitis, severe dyspnea (shortness of breath) and eye afflictions such as cataract, conjunctivitis, corneal ulcers, glaucoma and squint trachoma. Dust suppression and the use of personal protective equipment are the only safeguards.

High noise is another occupational hazard in quarries and mining operations, where miners are exposed to high noise levels during the operation of noisy machinery at the face and loading point. The use of earplugs or earmuffs, work rotation, and encapsulation of noisy equipment as far as practicable are the possible remedial options.

Management of occupational health and adequate safety in mines is not a one-time job; it requires periodic evaluation and corrective action. Regular safety assessments, continual improvement and monitoring are some of the important components of mine safety.

Mine safety management should not be restricted to a mine's life, it is equally important to address these issues when the mine is closed down. Open voids, reclaimed as water reservoirs, have also led to many deaths due to people slipping and falling in them. In mine safety and management, monitoring and statutory compliance is crucial.

(f) **Mine Closure**

Quarry and mines reclamation is a crucial component of mine management and an important part of the life cycle of a mine. Reclamation of mines not only improves the landscape of the deformed area, but also helps control air and water pollution. Today, mine reclamation is a big challenge for governments as well as mine owners.

Quarry and mines closure plan should be prepared before it starts operating. A good closure plan is one in which the lease area is converted to functional land use, beneficial to the local community. There is a general tendency to keep a mine void as a water body but this is a poor practice. The void should be filled up as far as possible by overburden and the reclaimed land should be used for forestry, agriculture or grazing. If formation of a water body is unavoidable, then proper infrastructure should be set up for the use of the water either for irrigation or for fishery.

5.2.4 Impacts of Quarry and Mining

The potential impacts, which the Project could impose on the surrounding environment, during its preparation, operation and abandonment stages, shall be examined and evaluated in terms of the extent and nature of changes induced (i.e. whether there are significant adverse or beneficial implications), and spatial coverage and temporal nature of the displacements.

In order to facilitate these analyses, procedures related to the implementation and operations of the Project have been categorized into discrete activities. Pertinent environmental receptors, which could be impacted upon, should be identified and described.

In general, the potential environmental impacts from the Project may be categorised into and discussed separately under the following stages of development:

- (a) Investigation stage
- (b) Initial site preparation and development stage
- (c) Quarrying and operational stage
- (d) Rehabilitation and abandonment stage

Due to the nature of the Project i.e. quarrying and the proposed progressive phase-by-phase system of the quarrying operations, some of these stages may take place simultaneously on the Project site though at different localities. For example, while the actual quarrying operations are being carried out at one place, rehabilitation activities may be undertaken nearby at the same time.

5.2.5 Potential Impacts during Investigation Stage

The main activity during the investigation stage is the prospecting and geological exploration study and the EIA. Exploration stage normally requires mobilization of manpower and equipment involving the movement of vehicles, primarily along the existing roads. During the actual exploration, the main activities are as follows:

- (a) Field reconnaissance
- (b) Surveying and mapping
- (c) Drilling and sampling

Site specific investigation requires limited establishment of access tracks and paths and the stationing of equipment and personnel at locations throughout the study site for limited period of time. All these activities involve the use of light and portable equipment and tools, which can be easily transported to the site. The drilling rig is perhaps the heaviest equipment used. Small clearings and narrow rentises in the primary vegetation are also required for drilling, field reconnaissance and surveying purposes. In a hot and humid climate, it normally takes only a few months for an abandoned clearing to be re-colonised by the vegetation.

5.2.6 Potential Impacts during Initial Site Preparation and Development Stage

Initial Site Preparation and Development Stage shall involve several main activities, which may have potential impacts on the environment. Potential impacts from these activities are:

- (a) Boundary demarcation and positioning.
- (b) Provision of buffer areas within site.
- (c) Mobilization of workforce.
- (d) Transport of equipment and supplies.
- (e) Site clearing.
- (f) Overburden removal.
- (g) Construction of haulage road and working platform.
- (h) Improvement to drainage system.
- (i) Installation of crushers and other facilities.

- (j) Construction of silt trap.
- (k) Managing wastes at the Project site.

5.2.7 Potential impacts During Operational Stage

Operational stage in quarrying/mining shall be a continuous lifelong activity. The main activities during the operational stage include the following:

- (a) Clearing of quarries/mines site involving vegetation clearing.
- (b) Overburden stripping and waste disposal involving the stripping, haulage and stockpiling of soil and overburden.
- (c) Excavation and extraction which may involve blasting.
- (d) Loading and transportation of excavated materials to the processing plant.
- (e) Processing and stockpiling.

Potential impacts from these activities are:

- (a) Soil erosion, and associated sediment pollution and siltation on hill slopes, particularly during the initial land clearing and overburden stripping activities.
- (b) Loss of topsoil; loss of topsoil may be due to soil erosion and mixing with the overburden materials during the stripping and stockpiling activities.
- (c) Loss of fauna, flora, and their habitats.
- (d) Hydrological changes; increased runoff due to the clearing of existing vegetation, and changes to groundwater regime.
- (e) Aesthetics due to the changes to landscape but the modifying of the existing topographical feature shall be able to screen the visibility of quarries operation from adjacent interests.
- (f) Generation of solid waste and sewage disposal.

5.2.8 Potential Impacts during Rehabilitation and Abandonment Stage

Environmentally, restoration and rehabilitation are perhaps the most important activities of a quarrying Project for the abandonment stage. The main activities involved at this stage are as follows:

- (a) Back-filling of the excavated area in the future where ever possible.
- (b) Compaction, levelling, grading and topsoiling.
- (c) Afforestation by re-vegetate the worked out area or any identified areas which are not affected by quarrying/mining activities with fast-growing trees and suitable grasses or leguminous cover crops.

The rehabilitation program of any quarrying/mining operation is designed to restore the disturbed site. However, some adverse impacts may arise during the process of rehabilitation, or if the affected area are simply abandoned without any restoration. Such potential impacts include:

- (a) Soil erosion, and associated sediment pollution and siltation; on hill slopes. However, once the tasks are completed, such adverse impacts will be neutralised.
- (b) Fauna, flora and their habitats; if the low depression quarried-out area is not rehabilitated, it will eventually be filled with water, thus changing the habitat of the area concerned; if the areas are properly restored and re-vegetated, the forest environment may be re-created and the fauna may return.

5.3 TYPICAL QUARRY AND MINING ACTIVITIES

A typical depiction of quarry and mining is as shown in **Figure 5.3.1**.

Figure 5.3.1: Examples of Quarry and Mining Activities



Figure 5.3.1a: Typical layout setting of aggregate processing plant



Figure 5.3.1c: Side view of hill slope, sub-surface quarry



Figure 5.3.1b: Fleet of haulage articulate trucks at high capacity quarry



Figure 5.3.1d: Benches and haulage road at hill top limestone quarry



Figure 5.3.1e: Loading of quarry products on trucks for distribution



Figure 5.3.1g: Typical view of processing plant at a bauxite plant



Figure 5.3.1f: Typical conveyor system in operation at a gold mine



Figure 5.3.1h: Carbon in Leach (CIL) gold processing facility under construction



Figure 5.3.1i: Typical view of a gold mine Tailing Storage Facility (TSF)



Figure 5.3.1k: General view of Tailing Storage Facility (TSF) at a bauxite mine



Figure 5.3.1j: Truck washing facility at mine



Figure 5.3.1l: View of a truck wheel cleaning in progress

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
Erosion and Sedimentation	<ul style="list-style-type: none"> Revised Universal Soil Loss Equation (RUSLE). Modified Universal Soil Loss Equation (MUSLE). Computer models. 	<ul style="list-style-type: none"> Soil loss rates and sediment yield. Erosion risk and potential soil loss maps.
Landslide and Slope Failure	<ul style="list-style-type: none"> Soil investigations. Geological Terrain Mapping (GTM). Site assessment by qualified geotechnical engineer and/or Professional Registered Geologist. Risk analysis. Engineering design and estimation of Factor of Safety (FOS). 	<ul style="list-style-type: none"> Identification and mapping of high risk areas to avoid or to apply mitigation measures.
Hydrology	<ul style="list-style-type: none"> Hydrological procedures (DID). 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). Hydrological analysis in accordance with <i>Manual Saliran Mesra Alam Edisi-2</i> (MSMA-2) and approved by DID. 	<ul style="list-style-type: none"> Estimation of pre-construction and post-construction runoff.

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

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

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

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 as 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> <p>(a) Guidance Document for Addressing Soil Erosion and Sediment Control Aspects in the EIA Report (DOE).</p> <p>(b) Guidance Document for the Preparation of the Document on LD-P2M2 (DOE).</p> <p>(c) Guidelines on LD-P2M2 (DOE, 2017).</p> <p>(d) Guidelines for Erosion and Sediment Control in Malaysia (DID).</p> <p>(e) MSMA-2.</p> <p><u>Sediment basin/silt trap discharge</u></p> <p>(a) TSS: 50 mg/L, depending on locality.</p> <p>(b) Turbidity: 250 NTU.</p>
Water Quality and Pollution Control	<p>(a) <u>Ambient water quality</u>: National Water Quality Standards (NWQS).</p> <p>(b) <u>Sewage discharge</u>: Environmental Quality (Sewage) Regulations 2009.</p> <p>(c) <u>Toilets and septic tanks</u>: SPAN approved design and requirements.</p> <p>(d) <u>Effluent Discharge</u>: Environmental Quality (Industrial Effluent) Regulations 2009.</p>
Flood/Runoff Management	MSMA-2 requirements.
Air Quality	<p>(a) Environmental Quality (Clean Air) Regulations 2014.</p> <p>(b) MAAQS.</p>
Noise Level	<p>(a) The Planning Guidelines for Environmental Noise Limits and Control (DOE).</p> <p>(b) Factories and Machinery (Noise Exposure) Regulations 1989.</p>
Vibration	<p>(a) The Planning Guidelines for Environmental Vibration Limits and Control (DOE).</p> <p>(b) JMG requirements for blasting operations.</p>
Ecology	<p>(a) International Union on the Conservation of Nature (IUCN) and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) listing.</p> <p>(b) Wildlife Conservation Act 2010.</p> <p>(c) Feedback from Department of Marine Park Malaysia, DOF, PERHILITAN and JPMSM.</p>

Impacts	Evaluation Criteria
Landuse	(a) Structure Plans, Local Plans, Special Area Plans (SAP). (b) ESA Listing under the NPP-3. (c) Environmental Essentials for Silting of Industries in Malaysia. (d) 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).
Socio-economy	(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: <u>SIA Category 1:</u> Development projects under subsection 20B(1) and (2) of Act A1522 for coastal reclamation projects and major national infrastructure. <u>SIA Category 2:</u> Development projects under subsection 22(2A) Act 172 for new township development for population over 10,000 people OF covering area over 100 ha or both, major national infrastructure. <u>SIA Category 3:</u> Any other development projects with significant social impacts as ordered by the MPFN from time to time.
Wastes	<u>Scheduled wastes</u> Environmental Quality (Scheduled Wastes) Regulations 2005. <u>Other wastes</u> (a) Solid Waste and Public Cleansing Management Act 2007. (b) Local authority requirements.
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.

Land disturbing activities are on-going life long process in quarrying and mining, in line with its nature of operation. In contrast to other development project where earthworks will normally be carried out only during the early stage of the project, the dynamism of the land disturbing activities in mines and quarries reflect the uniqueness of the ESCP requirements of this sector.

Overburden stripping, Run-of-Mine (ROM) extraction or rock excavation, and land clearing is the land disturbing activities, which need to be carried out throughout the quarries or mines life operation.

Through the Operational Mining Scheme (OMS) and the Operational Quarry Scheme (OQS) designs, the management of run-off water flowing from the land disturbing areas within the project site has been taken into considerations.

Appropriate mitigation measures in protecting water bodies within the project site and its neighbouring interests are parts of important elements in the design of the OMS.

Process discharges and its containment is an important requirement in the operation of mines and quarries. The compounded effects of mine excavation involving certain types of mineral deposits with Acid Mine Drainage (AMD) phenomena is also being considered in the design of OMS.

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 APPROACHES TOWARDS P2M2 ADOPTION

6.3.1 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 Traffic
- (f) Visual

6.3.2 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.

6.3.3 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.

6.3.4 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 6.3.1**) 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 6.3.1: Standard Requirements for the LD-P2M2 Submission

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

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

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 Quantities (BQ) 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.

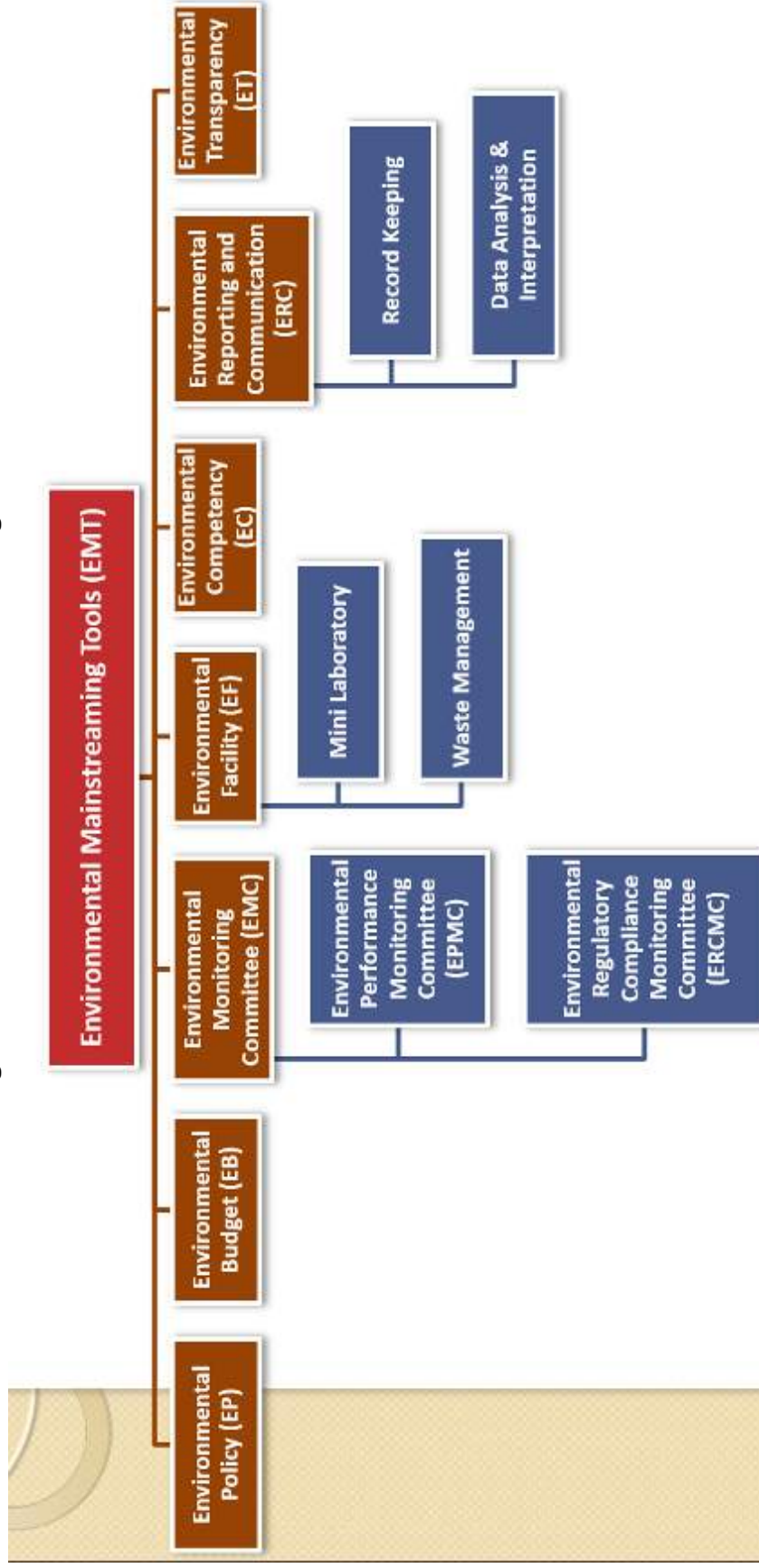
- (c) In-situ monitoring of TSS and Turbidity after rain event.
- (d) Monthly or Quarterly monitoring of air, noise and vibration qualities depending on sensitivity of receptor.
- (e) Planning, construction and maintenance of LD-P2M2 on site.
- (f) P2M2 notification and implementation.
- (g) Identification 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 (ERC MC) 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 Quarry and Mining

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

Project Details

- (a) Project title.
- (b) Name and contact details of the Project Proponent (contact person, address, telephone number, e-mail address).
- (c) Name of registered EIA Consulting Firm (EIA Team Leader, address, telephone number, e-mail address).
- (d) Location of project (coordinates, lot no, district, etc.).
- (e) Relevant map showing project location and accessibility.

Location

- (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)).
- (b) Project boundary and layout including boundary coordinates.
- (c) Description of location in relation to identifiable landmarks (e.g. city centres, main roads, towns, etc.).

Project Component and Design Details

- (a) Project details (land area, buffer requirements, lots and land status).
- (b) Project concept.
- (c) Project components.
- (d) Technology use.
- (e) Examples of similar project type and scale.

Note: The above shall be supported with technical drawings, illustration and diagrams.

Project Activities

- (a) Method statement to be provided for major project activities during pre-construction, construction and operational stages.
- (b) Manpower requirements.
- (c) Resource requirements (e.g. soil and aggregate sources, spoil disposal area, etc.).

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
Report Submission	Submission to DOE State Office	Submit to DOE HQ
No. of Reports	Minimum 12 hardcopies + 1 softcopy to State DOE 1 hardcopy + 1 soft copy to DOE HQ	Minimum 35 hard copies + 1 soft copy
No. of Corrected EIA (if needed)	5 hard copies + 1 soft copy	5 hard copies + 1 soft copy
Review Timeline	25 working days (5 weeks)	60 working days (12 weeks)
Public Participation	Required	Required
Public Display	Not required	Required
Web Display	Required Submit softcopy of the EIA Report to DOE State Office.	Required Submit softcopy of the EIA Report to DOE HQ.
Advertisement	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"> • All important tasks (e.g. studies, public engagements, modelling, etc., wherever relevant) were performed. • All TOR components were covered. • EIA Report complies with the report standard format. • Data and information are factually correct, can be verified, and technically defensible. • EIA report is coherent, legible and balanced. • Proposed P2M2s are considered to be best available technologies (BATs) or best practices. • Project Proponent made pledge to implement EMP and P2M2s. 	A	The EIA report can be approved.
<ul style="list-style-type: none"> • Most important tasks (e.g. studies, public engagements, modelling, etc., wherever relevant) were performed but minor ones were not performed. • All TOR components were covered. • EIA report complies with the report standard format. • Data and information are factually correct, can be verified, and technically defensible but some non-substantive facts cannot be verified. • EIA report is coherent, legible and balanced but some non-substantive information may not be presented clearly. • Some non-crucial content (e.g. maps) of EIA report are illegible or calculations not performed or incorrect. • Project Proponent made pledge to implement EMP and P2M2s. 	B	The EIA report can be approved.

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

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.
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.
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).
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.
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.

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.
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	<p>(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.</p> <p>(a) The ability of a built resource or natural resource to absorb population growth and related physical development without degradation.</p>
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.
Checklist	A list for verification purposes, a comprehensive list; an inventory.
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.
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.
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.

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.
Mangroves	One of several genera of tropical trees or shrubs which produce many prop roots and grow along low-lying coasts into shallow water.
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.
Mine	When used as a noun, means any place, excavation or working wherein, whereon or whereby any operation connected with mining is carried on together with all buildings, premises, erections, water reservoirs, tailing ponds, waste, other dumps and appliances belonging or appertaining thereto above or below the ground or in or below the sea for the purpose of winning, obtaining or extracting any mineral by any mode or method or for the purpose of dressing, treating or preparing mineral ores.
Mineral	Any substance whether in solid, liquid or gaseous form occurring (a) naturally, (b) as a result of mining in or on the earth, or (c) as a result of mining in or under the sea or sea-bed, formed by or subject to a geological process, but excludes water, "rock material" as defined in the National Land Code [Act 56 of 1965] and "petroleum" as defined in the Petroleum Mining Act 1966 [Act 95].

Mineral ores	Mineral ores are treated for the beneficiation thereof but excludes smelting and refining.
Mineral tenement	As defined in the Mineral Development Act 1994, a fossicking licence, dulang licence, individual mining licence, prospecting licence, exploration licence, proprietary mining licence, mining lease, or any of them for the purpose of exploration or mining of minerals or mineral ores, as the case may be, issued under any Federal or State law regulating mineral tenements.
Mineral Tenement	Fossicking licence, dulang licence, individual mining licence, prospecting licence, exploration licence, proprietary mining licence, mining lease, or any of them for the purpose of exploration or mining of minerals or mineral ores, as the case may be, issued under any Federal or State law regulating mineral tenements.
Mining Excavation	It involves bulk material handling where transportation is a critical issue of concerned. Thus it is necessary for the processing plant to be located as close as possible to the mine pit.
Mining Land	Any land in respect of which a proprietary mining licence or mining lease issued or granted under any written law relating to mining is for the time being in force.
Mining Lease	Means a mining lease for the time being in force granted under any written law regulating mining.
Mining Operation	<p>It generally consists of 2 major stages of activity:</p> <p>(a) Excavation of mineral bearing materials at the mine pit; and</p> <p>(b) Mineral processing for the beneficiation of the targeted minerals.</p> <p>From the technical and legal points of view, these 2 activities must be carried out within an approved mineral tenement.</p>
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 tract change(s).

Noise	A sound, especially one that is loud or unpleasant or that causes disturbance.
Oil spill	Release of a liquid petroleum hydrocarbon into the environment, especially marine areas, due to human activity and is a form of pollution.
Ore Processing	Second stage of mining operation. Mineral Development Act 1994 defines mineral (ore) processing as any activity whereby minerals or mineral ores are treated for the beneficiation thereof but excludes smelting and refining.
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) Prescribed Activity	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. 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.
Recreation	Activity of leisure, leisure being discretionary time.
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.

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.
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.
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.
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/B	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		1	(3,4)	0.8	V
Cl	mg/l	L	200	-	80	E
Cl ₂	mg/l	E	-	(0.02)	-	
CN	mg/l	V	0.02	0.06 (0.02)	-	IV
F	mg/l	L	1.5	10	1	
NO ₂	mg/l	S	0.4	0.4 (0.03)	-	
NO ₃	mg/l		7	-	5	
P	mg/l	O	0.2	0.1	-	
Silica	mg/l	R	50	-	-	
SO ₄	mg/l		250	-	-	
S	mg/l	A	0.05	(0.001)	-	
CO ₂	mg/l	B	-	-	-	
Gross-α	Bq/l	S	0.1	-	-	
Gross-β	Bq/l	E	1	-	-	
Ra-226	Bq/l	N	< 0.1	-	-	
Sr-90	Bq/l	T	< 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)	-	
Phendl	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)	-	
p-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 CaCO₃
 † = 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	-	8,5 - 8,5	8 - 9	8 - 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) ^a	5000 (20000) ^a	-
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 IIIB	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 ₃ -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 < 40 Hz</i>	<i>At high frequency >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

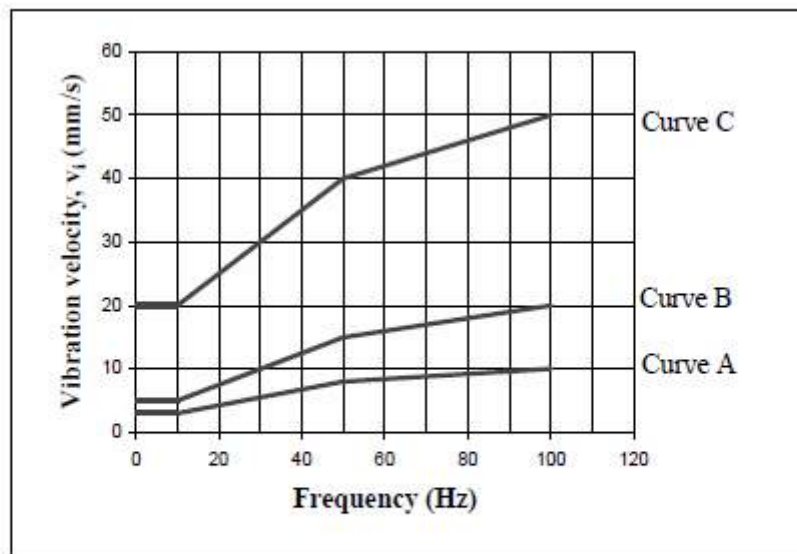


FIGURE 1
Foundation Vibration Velocity Limiting Values for Vectorial Sum of Vibration Levels in Three Orthogonal Axes.

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 (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 (SO_2)	1 Hour	350	300	250
	24 Hour	105	90	80
Nitrogen Dioxide (NO_2)	1 Hour	320	300	280
	24 Hour	75	75	70
Ground Level Ozone (O_3)	1 Hour	200	200	180
	8 Hour	120	120	100
*Carbon Monoxide (CO)	1 Hour	35	35	30
	8 Hour	10	10	10

* mg/m^3

APPENDIX 5

EXAMPLE OF ENVIRONMENTAL SCOPING MATRIX

(SOURCE: EGIM, DOE MALAYSIA)

Environmental Component	Project Activity																							
	Investigation				Site Preparation and Development										Operation and Production								Closure/Exit	
	Field Reconnaissance	Exploration, Site Surveying and Mapping	Soil Investigations (Drilling and Sampling)	Environmental Assessment	Establish Access Road	Boundary Demarcation and Positioning	Provision of Buffer Areas Within Site	Mobilization of Workforce	Transport of Equipment and Supplies	Site Clearing and Biomass Removal	Infrastructure Construction (Haulage Road and Working Platform)	Improvement to drainage system.	Installation of crushers or Processing Plant	Waste Disposal	Clearing of Quarries/Mines Site Involving Vegetation Clearing	Overburden Stripping and Waste Disposal	Digging and Hauling	Excavation and Extraction which may involve Blasting	Loading and Transportation of Excavated Materials	Processing and Stockpiling	Tailing Management and Waste Disposal	Site Restoration (Back-filling, Compaction and Topsoiling of the excavated area)	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																							
	Investigation				Site Preparation and Development								Operation and Production						Closure/Exit					
	Field Reconnaissance	Exploration, Site Surveying and Mapping	Soil Investigations (Drilling and Sampling)	Environmental Assessment	Establish Access Road	Boundary Demarcation and Positioning	Provision of Buffer Areas Within Site	Mobilization of Workforce	Transport of Equipment and Supplies	Site Clearing and Biomass Removal	Infrastructure Construction (Haulage Road and Working Platform)	Improvement to drainage system.	Installation of Crushers or Processing Plant	Waste Disposal	Clearing of Quarries/Mines Site Involving Vegetation Clearing	Overburden Stripping and Waste Disposal	Digging and Hauling	Excavation and Extraction which may involve Blasting	Loading and Transportation of Excavated Materials	Processing and Stockpiling	Tailing Management and Waste Disposal	Site Restoration (Back-filling, Compaction and Topsoiling of the excavated area)	Rehabilitation Works	
Surface Water																								
Shoreline																								
Bottom Interface																								
Flow Variation																								
Water Quality																								
Drainage Pattern																								
Water Balance																								
Flooding																								
Existing Use																								
Groundwater																								
Water Table																								
Flow Regime																								
Water Quality																								
Recharge																								
Aquifer Characteristics																								
Existing Use																								

Note: (S) - Short term (L) - Long-term (+) - Beneficial (-) - Negative (1) - Little significance (2) - Significant (3) - Very significant
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Environmental Component	Project Activity																								
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Biological Resources																									
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																									
Human Health and Safety																									
Physical Safety																									
Physiological Wellbeing																									
Parasitic Disease																									
Communicable Disease																									
Physiological Disease																									

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

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
Total		461	73	388

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 ³	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 ³	Once/year 2 times/year 3 times/year 4 times/year Continuous*
	Carbon monoxide (CO)	1000 mg/m ³	Periodic

iv. Heat and power generation : A1. Boilers

O₂ reference content 6% solid and 3% for others

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

v. A2. Combustion Turbines

O₂ reference content 15%

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

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

O₂ reference content 5%

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

K. Waste Incinerator in all sizes

O₂ reference content 11%

Pollutant	Limit value	Monitoring
Total PM	100 mg/m ³	Continuous*
NM VOC as total organic carbon	10 mg/m ³	Continuous*
Hydrogen chloride (HCl)	40 mg/m ³	Continuous*
Hydrogen fluoride (HF)	1 mg/m ³	Continuous*
Sum of SO ₂ and SO ₃ , expressed as SO ₂	50 mg/m ³	Continuous*
Sum of NO and NO ₂ expressed as NO ₂	200 mg/m ³	Continuous*
Carbon monoxide (CO)	50 mg/m ³	Continuous*
Cadmium and its compounds, expressed as cadmium (Cd)	Total	Periodic
Thallium and its compounds, expressed as thallium (Tl)	0.05 mg/m ³	Periodic
Mercury and its compounds, expressed as mercury (Hg)	0.05 mg/m ³	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 ³	Periodic
PCDD/PCDF	0.1 ng TEQ/m ³	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 1st January – 31st May 2018)

Table 1: EQA 1974 Compliance Status for palm oil mill effluent by States (From 1st January – 31st 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%
Total		461	689	635	49	
Average Compliance %						93%

Table 2: EQA 1974 Compliance Status for clean air emission by States (From 1st January – 31st 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%
Total		461	689	626	62	
Average Compliance %						91%

Table 3: EQA 1974 Compliance Status for scheduled wastes management by States (From 1st January – 31st 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%
Total		461	689	652	37	
Average Compliance %						96%

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 help 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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