ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES FOR DEVELOPMENT IN NATIONAL AND STATE PARKS

Department of Environment
Ministry of Natural Resources and Environment Malaysia

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Malaysia

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Department of Environment, Malaysia

ISBN 978-983-3895-57-1

Design and printed by:

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ACKNOWLEDGEMENT

The Department of Environment (DOE) would like to express our gratitude to all the government agencies (GAs), both at the Federal and State level, the local authorities, planners, developers, consultants, statutory consulters and non-governmental organizations (NGOs) in providing their input and information for the development of this Guidelines.

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 is the first edition of the **Environmental Impact Assessment Guidelines For Development In National and State Parks** following the amendments to the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015 of the Environmental Quality Act (EQA) 1974 on 28 August 2015.

In Malaysia, an **Environmental Impact Assessment (EIA)** is a statutory requirement for activities, which have been prescribed under Section 34A of the EQA 1974. These prescribed activities have been categorised under the new Order into the **First** and **Second Schedules**.

National and state parks safeguard our natural forests, which contain a diverse range of biodiversity and habitats, support important flora and fauna and has scenic qualities suited for recreation, tourism and research. Development in such areas should adopt low impact development (LID) concept in order not to degrade the ecosystem, safeguard the wildlife, maintain the water quality and allow for sustainable recreation and tourism.

The Guidelines aim to improve the quality of the environment when developing in national and state parks by:

- Defining environmental requirements for managing the development.
- Providing a range of tools and methods to avoid and/or to reduce and minimise the sources of environmental pollution to an acceptable level.
- Guiding the selection and application of these tools and methods to maintain a healthy environment during different phases of project implementation.

The Guidelines shall provide guidance to the Project Proponents, Qualified Person (i.e. DOE-registered EIA Consultants), and other EIA-related practitioners in the preparation and submission of EIA reports for activities related to development in **national and state parks** stated in the Order.

The Guidelines shall only be used within the framework of the EQA 1974 including its future updates, and its subsidiary regulations. While it is not legally applicable to the States of Sabah and Sarawak, the Guidelines can still be used as reference and guide for similar projects in these two states.

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

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ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES FOR DEVELOPMENT IN NATIONAL AND STATE PARKS

TABLE OF CONTENTS

PAGE

PAGE

LIST OF TABLES

Page

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS

AIs	Appointed Individuals
APCS	Air Pollution Control Systems
ARI	Average Recurrence Intervals
ATS	Active Treatment Systems
BATs	Best Available Technologies
BMPs	Best Management Practices
BOD	Biochemical Oxygen Demand
BQ	Bill of Quantities
C&D	Construction and demolition
CAR	Corrective Action Report
CEO	Chief Executive Officer
CFS	Central Forest Spine
CIDB	Construction Industry Development Board/*Lembaga Pembangunan Industri Pembinaan Malaysia*

CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CM	Compliance Monitoring
COA	Conditions of Approval
COD	Chemical Oxygen Demand
DG	Director General
DID	Department of Irrigation and Drainage/*Jabatan Pengairan dan Saliran*
DO	Dissolved Oxygen/Development Order
DOA	Department of Agriculture/*Jabatan Pertanian*
DOE	Department of Environment/*Jabatan Alam Sekitar*
DOF	Department of Fisheries/*Jabatan Perikanan*
DOSH	Department of Occupational Safety and Health/*Jabatan Kesihatan dan Kesihatan Pekerja*
e.g.	Example
EGIM	Environmental Impact Assessment Guideline in Malaysia
EIA	Environmental Impact Assessment
EIATRC	Environmental Impact Assessment Technical Review Committee
EM	Environmental Manager
EMP	Environmental Management Plan
EMT	Environmental Management Team
EO	Environmental Officer
EPD	Environment 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 Area
ESC	Erosion ad Sediment Control
ESCP	Erosion and Sediment Control Plan
ESI	Environmental Scoping Information
ESM	Environmental Scoping Matrix
etc.	*Et cetera*
FGDs	Focal Group Discussions
FRIM	Forest Research Institute of Malaysia
GAs	Government Agencies
GIS	Geographic Information System
GSR	Guided Self-Regulation
HIA	Health Impact Assessment
HQ	Headquarters
HRA	Health Risk Assessment
HWC	Human-wildlife conflicts
i.e.	*id est*
IETS	Industrial Effluent Treatment Systems
ILO	International Labour Organisation
IM	Impact Monitoring

IUCN	International Union on the Conservation of Nature
JAKOA	*Jabatan Kemajuan Orang Asli Malaysia*
JKPTG	Department Of Director General Of Lands And Mines/*Jabatan Ketua Pengarah Tanah dan Galian*
JKR	Public Works Department/*Jabatan Kerja Raya*
JMG	Minerals and Geoscience Department Malaysia/*Jabatan Mineral dan Geosains*
JPBD/ PLANMalaysia	Department of Town and Country Planning/*Jabatan Perancangan Bandar dan Desa*
JPSM	Forestry Department of Peninsular Malaysia/*Jabatan Perhutanan Semenanjung Malaysia*
JPSPN	National Solid Waste Management Department/*Jabatan Pengurusan Sisa Pepejal Negara*
KPKT	Ministry of Urban Wellbeing, Housing and Local Government/*Kementerian Kesejahteraan Bandar, Perumahan dan Kerajaan Tempatan*
KSAS	*Kawasan Sensitif Alam Sekitar*
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
LD-P2M2	Land Disturbing Pollution Prevention and Mitigation Measures
LID	Low Impact Development
L_{Max}	Maximum A-Weighted Continuous Sound Level
L_{Min}	Minimum A-Weighted Continuous Sound Level
LOS	Level of Service
LTS	Leachate Treatment Systems
MAAQS	Malaysian Ambient Air Quality Standards
METMalaysia	Malaysian Meteorological Department/*Jabatan Meteorologi Malaysia*
MMWQCS	Malaysia Marine Water Quality Criteria and Standards
MOH	Ministry of Health/*Kementerian Kesihatan*
MOM	Minutes of Meeting
MOSTI	Ministry of Science, Technology and Innovation/*Kementerian Sains, Teknologi dan Inovasi*
MPFN	National Physical Planning Council/*Majlis Perancang Fizikal Negara*
MSMA-2	*Manual Saliran Mesra Alam Edisi-2*
MUSLE	Modified Universal Soil Loss Equation
MWQI	Marine Water Quality Index
NGOs	Non-governmental Organisations
NHC	National Hydrographic Centre
NPCZP	National Physical Coastal Zone Plan
NPP-3	National Physical Plan-3
NRE	Ministry of Natural Resources and Environment/*Kementerian Sumber Asli dan Alam Sekitar*
NREB	Natural Resources and Environment Board
NTU	Nephelometric Turbidity Units
NWQS	National Water Quality Standards of Malaysia
O&G	Oil and Grease

P.E.	Population equivalent
P2M2s	Pollution Prevention and Mitigation Measures
PBT	Local Authorities/*Pihak Berkuasa Tempatan*
PERHILITAN	Department of Wildlife and National Parks Peninsular Malaysia/*Jabatan Hidupan Liar dan Taman Negara Semenanjung Malaysia*
PM	Performance Monitoring
PM_{10}	Particulate Matter 10 micrometres or less in diameter
$PM_{2.5}$	Particulate Matter 2.5 micrometres or less in diameter
PPE	Personal Protective Equipment
PRF	Permanent reserved forest
PSD	Pipe slope drain
PTD	Land and District Office/*Pejabat Tanah dan Daerah*
PTG	Land and Minerals Office/*Pejabat Tanah dan Galian*
Q&A	Question and Answers
RAC	Report Adequacy Check
RAMSAR	The Convention on Wetlands of International Importance
ROW	Right of Way
RQSAT	Report Quality Self-Assessment Tool
RUSLE	Revised Universal Soil Loss Equation
SAMM	*Skim Akreditasi Makmal Malaysia*
SI	Soil Investigation
SIA	Social Impact Assessment
SPAN	National Water Commission of Malaysia/*Suruhanjaya Perkhidmatan Air Negara*
SPC	State Planning Committee
SSA	Site Suitability Assessment
STP	Sewage Treatment Plant
STS	Sewage Treatment Systems
SWMM	Storm Water Management Model
TIA	Traffic Impact Assessment
TOC	Table of Content
TOR	Terms of Reference
TORAC	Terms of Reference Adequacy Check
TRC	Technical Review Committee
TSI	Trophic State Index
TSS	Total Suspended Solids
UNEP	United Nations Environment Programme
USM	Universiti Sains Malaysia
WIPs	Water Intake Points
WQI	Water Quality Index
WTPs	Water Treatment Plants
WWF	World Wildlife Fund for Nature
ZOI	Zone of Impact
ZOS	Zone of Study

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The **'Environmental Impact Assessment (EIA) Guidelines for Development in National and State Parks'** (hereinafter referred to as the 'Guidelines') is newly issued to align with the latest amendments in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015, of the Environmental Quality Act (EQA) 1974 (Act 127).

The amended Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015 came into force on 28 August 2015. It superseded the previous Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987, with a revised list of Prescribed Activities, which are now divided into the **First Schedule** (21 Prescribed Activities) and **Second Schedule** (17 Prescribed Activities).

Inter alia to the above, 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 Environmental Management Strategic Plan, with a focus on environmental mainstreaming and guided self-regulation (GSR).

The Guidelines are complementary to and shall be referred together with the Environmental Impact Assessment Guideline in Malaysia (EGIM) (DOE, 2016).

Compliance with the requirements set out in this Guidelines and EGIM (DOE, 2016) is the obligations of the Project Proponent as stated under Section 34A (2C) of the EQA 1974, and/or any amendments thereafter.

1.2 EIA FOR NATIONAL AND STATE PARKS PROJECTS

The Guidelines for development projects in national and state parks and 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 will entail a range of actions to identify, predict, evaluate and assess the impacts (both beneficial and adverse) with the main objective of protecting national and state parks and the surrounding buffer areas where the project is sited.

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.

The underpinning principles of the EIA process are detailed in the EGIM (DOE, 2016). Good practices in EIA preparation are shown in **Box 1**.

Box 1:
Good Practices for EIA

(i) Purposive: The EIA should meet its aims of informing decision making and ensuring an appropriate level of environmental protection and human health.

(ii) Focused: EIA should concentrate on significant environmental effects, taking into account the issues that matter.

(iii) Adaptive: The EIA should be adjusted to the realities, issues and circumstances of the proposals under review.

(iv) Participative: The EIA should provide appropriate opportunities to inform and involve the interested and affected publics, and their inputs and concerns should be addressed explicitly.

(v) Transparent: The EIA should be a clear, easily understood and open process, with early notification procedure, access to documentation, and a public record of decisions taken and reasons for them.

(vi) Rigorous: The EIA should apply the 'best practicable' methodologies to address the impacts and issues being investigated.

(vii) Practical: The EIA should identify measures for impact mitigation that work and can be implemented.

(viii) Credible: The EIA should be carried out with professionalism, rigor, fairness, objectivity, impartiality and balance.

(ix) Efficient: The EIA should impose the minimum cost burden on proponents consistent with meeting process requirements and objectives.

Source: EIA Training Resource Manual Second Edition (UNEP, 2002).

1.3 GUIDELINES OBJECTIVES

The objectives of the Guidelines are to:

(a) Provide a clear and concise guidance document on EIA preparation to the stakeholders, Project Proponents, Qualified Persons (i.e. DOE-registered Environmental Consultants), Government Agencies (GAs), Enforcement Officers (EO) and other EIA-related practitioners.

(b) Facilitate integration of the EIA into the overall project planning and development cycle, to ensure compliance with and adherence to the legal requirements within the framework of environmental sustainability.

(c) Provide a detailed step-by-step guidance with explanations of the EIA procedures and submissions, comprising:

(i) Environmental Scoping Information (ESI).
(ii) Terms of Reference (TOR).
(iii) EIA Reporting.

(d) 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 other environmental requirements by other authorities or agencies, to facilitate overall decision-making and project approval.

(e) Provide a succinct framework for the DOE to assess the EIA reports.

1.4 SCOPE OF THE GUIDELINES

The scope of the Guidelines covers development in national and state parks, which fall within the criteria provided in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015 (refer to **Section 2.3**).

1.5 OVERVIEW OF ENVIRONMENTAL ASSESSMENT PROCESS

This Section provides an overview of the step-by-step guide to the environmental assessment of a national and state park development project:

Step 1: Provide the Project Brief

When a Project Proponent wants to develop a project in a national or state park, some basic information regarding the project will be needed to enable the Qualified Person to understand the intent, objectives and scope of the proposed project (see **Section 2.2** for details).

Development in national or state parks in the Guidelines is subject to the following:

(a) To develop a new gazetted park: Depending on the size and scope, an overall integrated EIA would be needed to set the environmental conditions and policies (in tandem with the Park Management Plan) to guide all future development within the park (refer **Chapter 2**). Future development in the gazetted park may not require additional EIA (again this depends on the size and the prescribed activity) if the development abides by the components covered by the integrated EIA. In such cases, an EMP will suffice.

(b) To develop projects within existing established parks: Depending on the type and size of the project to be developed in an existing gazetted park, an EIA may or may not be required. Small-scale and low impact development (LID) projects such as the construction of park headquarters, visitors' resting and waiting areas, toilets, viewing areas, trails, carparks and the access roads to them, do not need an EIA because of the size and low impacts. In such cases, an EMP shall suffice.

However, the construction of tourist and recreational facilities (such as chalets and hotels) will require an EIA under the Second Schedule of Activity 12 (a) in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015.

Step 2: Identify the Legal Requirements

The Project Proponent undertaking the project has to comply with all legal requirements before developing the project and before carrying out the EIA (refer to the sections):

(i) **Section 2.3:** Overview of legislation and regulatory requirements.
(ii) **Section 2.4:** Common terms and definitions relevant to the Guidelines.
(iii) **Section 3.2:** Methods to carry out environmental screening.

As any development in national or state parks will fall within the Second Schedule, the Project Proponent and Qualified Person can proceed onto the scoping exercise.

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

The Project Proponent shall clear all policy and administrative matters relating to the project prior to submitting the EIA report to DOE.

Section 2.5 lists the policies and guidelines to meet environmental compliance by the Project Proponent.

Step 4: Carry Out Preliminary Stakeholder Engagement

Section 2.6 provides details of stakeholder engagements for projects in national and state parks.

It is prudent to carry out stakeholder engagements early, before the start of the project and the EIA. Constant engagement with the DOE is advisable (with the designated officer in charge), including the relevant GAs when preparing the TOR and EIA

Engagements include meetings and focal group discussions (FGDs) to obtain site information for scoping and the EIA.

Step 5: Preparation of the TOR and ESI

All development projects in national and state parks fall under the Second Schedule EIA. Hence, an ESI and the TOR shall be prepared. At this point of the study, qualitative data will suffice (see **Chapter 3**). However, if quantitative data is available, it should be included in the TOR.

Information needed in the TOR shall consist of, but not limited nor restricted to, the ones listed in the following Sections:

(i) **Section 3.4:** Site Suitability Assessment (SSA).
(ii) **Section 3.5:** Determination of the study boundary.
(iii) **Section 3.6:** Review of baseline data.
(iv) **Section 3.7:** Determination of key project activities.
(v) **Section 3.8:** Identification of significant impacts and priority setting.
(vi) **Section 3.9:** Establishment of study requirements for EIA
(vii) **Section 3.10:** Outlining of mitigation measures.

Step 6: Submission of the TOR

All data and information obtained during scoping shall be reviewed for preparation of the TOR report based on DOE requirements stated in the EGIM (DOE, 2016), and in this Guidelines. The TOR shall be submitted to DOE for review and endorsement as detailed in **Section 3.11**.

Step 7: Baseline Data Collection for EIA

After endorsement of the TOR by DOE, baseline data collection (primary and/or secondary) shall be carried out to obtain information of the project environment and its surrounding areas.

Chapter 4 provides the types of baseline data required for the EIA.

Step 8: Carry Out the EIA Studies

The major studies and components of the EIA report shall cover the following:

(i) **Chapter 5:** Impact assessment on the significant environmental issues.
(ii) **Chapter 6:** Identification of suitable pollution prevention and mitigation measures (P2M2s) to avert and/or to minimise the significant environmental issues arising from implementation of the project and identification of residual impacts.
(iii) **Chapter 7:** Provision of the Environmental Management Plan (EMP) framework.
(iv) **Chapter 8:** Conclusion to the EIA.

Step 9: Draft the EIA

The results of assessments and studies required by other GAs have to be incorporated into the EIA report. However, the whole of these GA individual reports need not be appended in the EIA Report; but they must be reviewed and approved by the respective GAs.

The format of the EIA report is detailed in **Chapter 8**.

Step 10: Carry Out Public Engagement

The Second Schedule EIA requires public engagements with the relevant stakeholders who are likely to be affected by the project directly or indirectly (e.g. communities or institutions, businesses and the general public), upon completion of the Draft EIA report.

The main objective of these public engagements is to brief the stakeholders regarding the project, the potential environmental issues and the proposed mitigation measures, to address their concerns and to seek any further required feedbacks. Some small-scale projects may not need this session since there is already a stakeholders' engagement prior to carrying out the TOR.

All findings from any public engagements shall be incorporated into the final EIA report (refer to **Sections 2.6 and 8.3** for further details).

Step 11: Submit the EIA report and Carry out Public Display

The EIA report shall be submitted to DOE headquarters (HQ) for review. The Qualified Person shall abide by the DOE procedures.

The Second Schedule EIA requires a public display of the EIA Report for the public to provide formal comments and feedbacks within a specified review period of one month to the DOE.

Details of the submission and review process are detailed in **Section 8.4**.

1.6 STRUCTURE OF THE GUIDELINES

The Guidelines for national and state parks are structured according to the step-by-step procedures highlighted in **Section 1.5**, divided into eight Chapters with their respective supporting sections below:

Chapter	Details
Chapter 1: Introduction	• Provides an introduction to the Guidelines covering the objectives, scope and structure.
Chapter 2: Environmental Project Planning	• Provides an overview on project planning and approaches to integrate the EIA process. • Outlines the necessary requirements for the project to undergo initial screening and assessment. • Provides a concise review of legislations, policies and relevant to development in national and state parks, and how they relate to the EIA process. • Provides the terms and definitions associated with national and state park development and their interpretations. • Details out the stakeholder engagement process.
Chapter 3: Terms of Reference (TOR)	• Provides the procedures to conduct screening and scoping the significant issues to prepare the TOR from the ESI. • Presents the structure and content for TOR reporting, including an overview of the review and approval process.
Chapter 4: Environmental Impact Assessment: Baseline Data	• Provides an outline of the relevant baseline information required for incorporation into the EIA report.
Chapter 5: Environmental Impact Assessment: Evaluation of Impacts	• Provides the methodology and tools to identify, predict, evaluate and assess the significant environmental impacts.
Chapter 6: Environmental Impact Assessment: Mitigation Measures	• Identifies appropriate P2M2s to minimise any negative impacts arising from the development of the project; and the types of measures to manage any residual impacts.
Chapter 7: Environmental Impact Assessment: Environmental Management Plan	• Provides an EMP framework for post-EIA. • Details out the GSR process for a project. • Provides the environmental monitoring and audit programmes for post-EIA.
Chapter 8: EIA Reporting and Review	• Presents the structure and content for EIA reporting, including an overview of the review and approval process.

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CHAPTER 2

ENVIRONMENTAL PROJECT PLANNING

2.1 INTRODUCTION

2.1.1 Environmental Impact Assessment Process

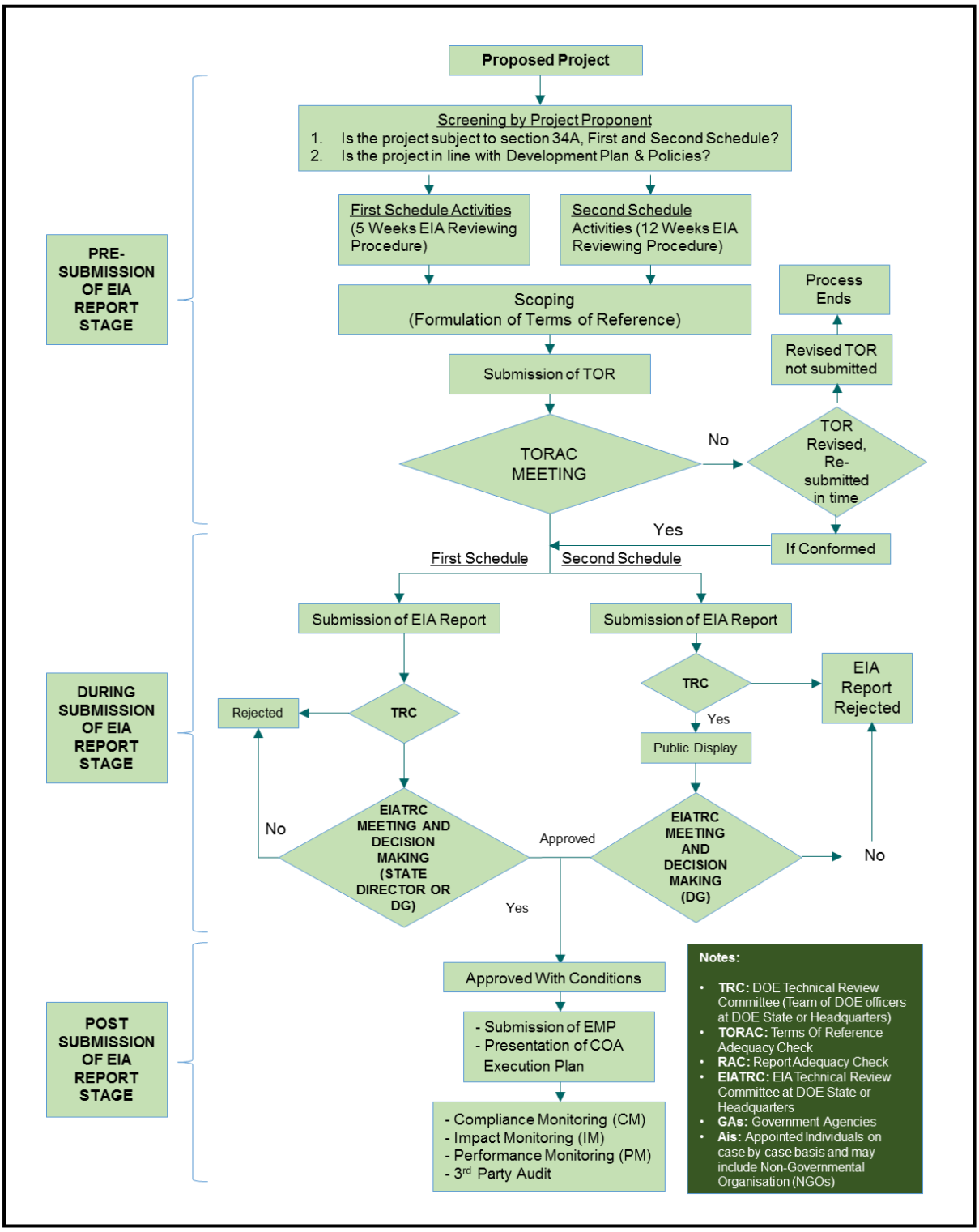
An Environmental Impact Assessment (EIA) is an integral part of an overall project development. Incorporation of the EIA process early during planning for the project provides significant benefits and value add to the project (see **Box 2**).

An EIA identifies the key areas of environmental significance and provides a means to decide, by the Project Proponent and the Qualified Person, on the types of mitigation measures to avert or minimise any adverse impacts at an early stage.

Specifically for development in national and state parks, an EIA is a very useful toolbox, since it has a wide range of tools to evaluate and mitigate any negative impacts arising from development on the physico-chemical, ecological and human components of the national and state park environment.

At the same time, the EIA can also enhance the project and the environment with the correct use of the EIA tools.

An overview of the EIA process is shown in **Figure 2.1.1**.



Source: Environmental Impact Assessment Guideline in Malaysia (EGIM) [Department of Environment (DOE), 2016].

Figure 2.1.1: EIA Procedures in Malaysia

Box 2:
Benefits of Incorporating EIA into Project Planning

(i) Ensures compliance to environmental and development policies, facilitating project approval and avoid instances where changes need to be made later.

(ii) Assist in Site Suitability Assessment (SSA) by identifying environmental constraints and limitations to ensure the best site is chosen, in tandem with other technical and financial considerations by the Project Proponent.

(iii) Complements other planning considerations to provide feedback towards technical and management deliberations by the Project Proponent.

(iv) Reduce the adverse impacts from a project and make it more environmentally and socially acceptable among the stakeholders. It can even become a positive selling point for the Project Proponent, e.g. adoption of green technology.

(v) Allows for the adoption of best available technologies (BATs) and best management practices (BMPs) in the project which would improve the overall quality of the project.

2.1.2 Integration of Environmental Compliance in National and State Parks Project Planning

A typical project cycle involves many phases requiring inputs from various technical specialists and consultants to provide reports for submissions to the approving authorities. Throughout the ambit of this project cycle, incorporation of environmental compliance can be carried out in three phasing steps as follows:

(a) Step 1: Planning Phase

Planning for national and state parks can fall into two categories:

(i) Development of new gazetted parks: New national and state parks can be proposed for gazettal by national and/or state governments under the existing national/state laws, for areas of high conservational value or have unique features that require protection to safeguard against

development. The Project Proponent is surmised to have an initial feasibility assessment of suitable sites for gazettal of the park.

Once a proposal for a new park is developed, it shall be reviewed by the relevant national and state bodies; henceforth termed the Approving Authority (e.g. Advisory Council of National Parks and Technical Committee Member of National Parks) to decide the merits of its inclusion as a national or state park.

If the project is within the state, the state will likely consult with a panel of relevant Government Agencies (GAs). Public consultation of the proposed park will also be carried out to obtain feedbacks for park gazettal. Any reservation of land for a national or state park shall be notified in the Gazette.

Park Management Plan: The newly gazetted national or state park may have an overall masterplan containing proposals for development of facilities and infrastructures within various zones under a Park Management Plan (see **Box 3**). The Plan, as approved by the national/state approving authority, will enable the park managers to carry out proper planning and management of development projects within the park.

EIA for park master planning: For a masterplan type of development, an integrated EIA is needed as the assessment will cover all the potential components of the development, while setting the environmental conditions to be met by any future individual development within the park. The integrated EIA shall adopt the Park Management Plan as a basis for assessment. After the EIA has been approved, EIAs for future individual development proposals will usually not be required, only an Environmental Management Plan (EMP) shall suffice.

(ii) Development of projects in existing established parks: For development in an existing gazetted park without a Park Management Plan or approved EIA, the project shall have to be assessed on a project-by-project basis, requiring individual EIAs for prescribed activities which fall under the Second Schedule. Cases where the development is not in line with the approved Park Management Plan may also require a new EIA to be submitted.

Environmental Scoping and Screening: In both cases, there is a need to gauge the potential environmental significance to the site and the surrounding areas, and to identify potential pollution prevention and mitigation measures (P2M2s) that can be incorporated into the project design early to avert any serious environmental and engineering problems/damage, such as from landslides, floods, etc.

The findings, termed the Environmental Scoping Information (ESI) will form the basis to develop the Terms of Reference (TOR) for the Department of Environment (DOE) endorsement.

(b) Step 2: Feasibility and Detailed Project Design Phase

The technical engineering designs of a proposed development will be submitted to the relevant approving authorities for approval, e.g. National Park Committee (for national parks) and/or a government/private park administrator (state parks). Often, additional approvals need to be obtained from the Forestry Department of Peninsular Malaysia (JPSM), the Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN) and/or other state agencies, for any construction and activities within.

As described in Step 1, for development in line with the integrated EIA, an EMP will suffice while for those without a Park Management Plan and a DOE approved EIA, the new development shall require a new EIA on a project-by-project basis, subject to the size and type of development.

Environmental Impact Assessment (EIA): If a project is a prescribed activity under the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015, an EIA is required for approval by the DOE before a project can proceed. The Project Proponent and the Qualified Person shall carry out the EIA based on the endorsed TOR.

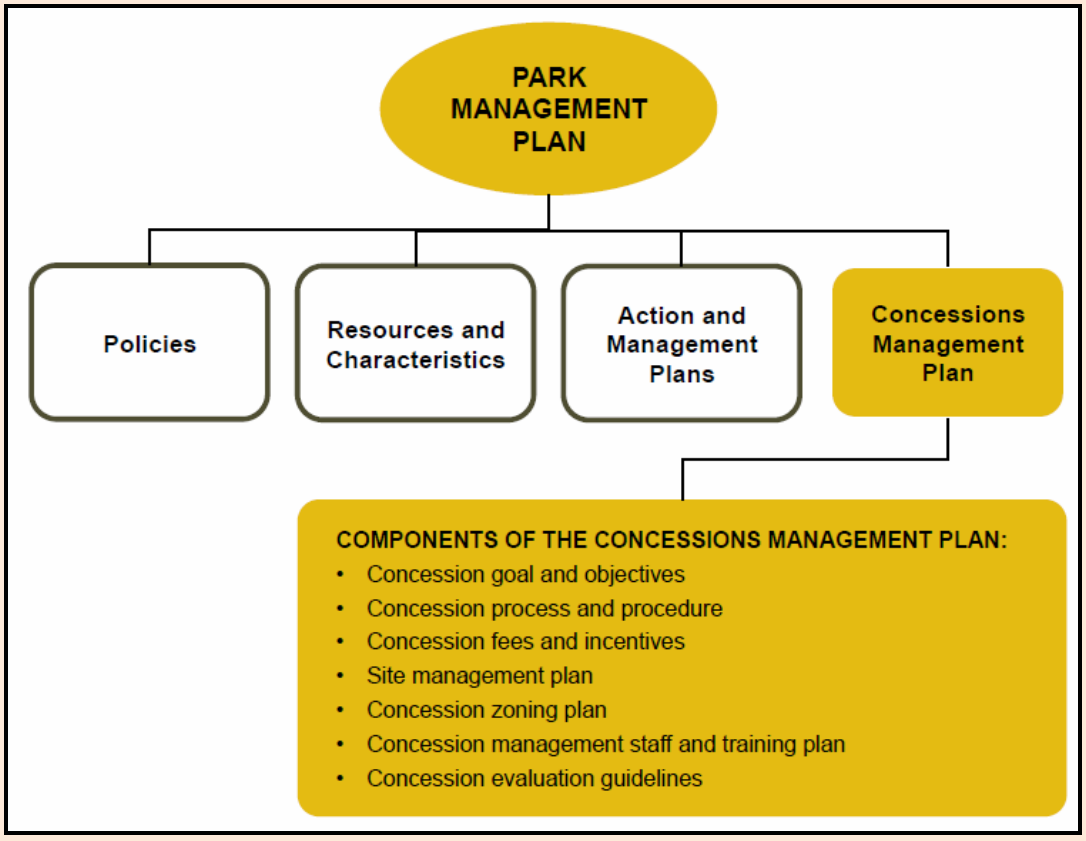
The EIA shall incorporate findings from the relevant sectoral studies such as wildlife relocation plans, tourism and socio-economic assessment, etc. as required to preserve the integrity of the park, by the other GAs. The recommendations to manage the significant environmental impacts espoused in the EIA shall be incorporated into the project design. For example, structural mitigation measures such as construction of silt traps and/or sediment basins, etc. shall be part of the engineering works to reduce the impacts of soil erosion.

Box 3:
Park Management Plan

(i) The Park Management Plan shall be developed in accordance with national/state planning guidelines incorporated with specific requirements from the various technical agencies such as PERHILITAN, JPSM, Department of Fisheries (DOF), Department of Irrigation and Drainage (DID), Minerals and Geoscience Department Malaysia (JMG), District and Land Office (PTD) and DOE. Stakeholder engagement may also form part of the development process to obtain public feedback.

(ii) The Plan shall cover, but not be limited to, the following components:
- (a) Policies.
- (b) Resources and Characteristics.
- (c) Action and Management Plans.
- (d) Concessions Management Plans.

(iii) The Park Management Plan shall be approved by the respective national/state approving authorities.



Source: The National Ecotourism Plan 2016 – 2025, Ministry of Tourism and Culture, 2016.

(c) Step 3: Construction and Operational Phase

Construction and operational activities have to comply with the Conditions of Approval (COA) issued by the DOE on approval of the EIA. The COA contains mitigation requirements for activities that may include site access establishment, mobilisation of machineries and equipment, setting up base camp, land clearing, earthworks and structural works.

Post-EIA: Environmental controls and management will be done through the EMP. The EMP and the plans for environmental monitoring and auditing, have to accompany all construction and operation works. These plans provide the integrative elements to ensure least degradation to the national and state park during work activities.

2.2 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.

Table 2.2.1 lists the types of information and components required to facilitate identification of the scope and requirements for environmental assessment.

Table 2.2.1: Sample Project Brief by the Project Proponent

Information	Details
Project Information	• Project title. • Details of Project Proponent [Company, address, contact person(s) and contact details]. • Project concept and description. • Project components. • Project layout plan. • Details of project activities. • Sources of materials. • Material storage areas. • Transport route and temporary access. • Project implementation schedule. • List of infrastructure, utilities and amenities.

Information	Details
Project Location	• Description of project location including boundary coordinates. • Maps (topographic, aerial, satellite, etc.) the locations of the site in relation to surrounding landuse, sensitive receptors and landmarks. • Supporting photographs and documentation. • Future landuse map (e.g. structure and local plans). • Zoning and landuse policies related to the project. • Identification of sensitive receptors (affected communities, areas of ecological importance, heritage and archaeological significance, etc.). • Buffer and setback requirements, if any.
Associated Studies (If Applicable)	• Flora and fauna study. • Social Impact Assessment (SIA). • Traffic Impact Assessment (TIA).

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

2.3 ENVIRONMENTAL LEGISLATIVE REQUIREMENTS

The Environmental Quality Act (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 Project Proponent and Qualified Person are required to refer to and adopt any latest amendments for their project.

The DOE under the Ministry of Natural Resources and Environment (NRE) is the main agency tasked to implement the EQA 1974 (Act 127). It has overall functions and responsibilities on environmental management and enforcement as prescribed under the said legislation and its subsidiary legislations and regulations.

The Project Proponent is responsible to comply with all prevailing and/or any new laws that were enforced or to be enforced in Malaysia.

2.3.1 Establishment of National and State Parks

(a) National Parks

National parks are established under Section 3 of the National Parks Act 1980 (Act 226) and/or state enactments (Kelantan, Pahang and Terengganu) (refer to **Appendix A**). Under the said Act, *the State Authority may, on the request of the Minister, reserve any state land within the state (including any marine area) for the purpose of a National Park, under a name to be assigned to it.*

National parks can also be gazetted under the respective state enactments such as the National Parks (Johor) Corporation Enactment 1989, which gives the Johor State Government the power to reserve land for the purpose of a park placed under the management of the Johor National Parks Corporation (JNPC).

To date there are a total of nine national parks gazetted in Peninsular Malaysia (refer **Appendix A**).

(b) State Parks

With reference to forests, the National Forestry Act 1984 (Act 313), lists 12 categories of permanent reserved forests (PRF) by functional classes under Section 10(1), as follows:

(i) Timber production forest under sustained yield.
(ii) Soil protection forest.
(iii) Soil reclamation forest.
(iv) Flood control forest.
(v) Water catchment forest.
(vi) Forest sanctuary for wildlife.
(vii) Virgin jungle reserved forest.
(viii) Amenity forest.
(ix) Education forest.
(x) Research forest.
(xi) Forest for national purposes.
(xii) **State park forest**.

The state authority has the power to constitute any land as a PRF by publishing it in the Gazette, for the purpose of conservation, tourism, recreational and research (refer **Appendix A**). These areas normally

comprise unique features of forest landscapes and/or having features that made them suitable for sustainable utilisation and conservation of forest biodiversity, flora and fauna.

State parks can also be established under the respective state enactments such as through the *Enakmen Perbadanan Taman Negeri Perak 2001* for the Taman Negeri Royal Belum.

State parks are administered under their respective state agencies, e.g. Department of Forestry Selangor (Forest Eco-Park and Forest State Park Division) for the Selangor State Park; or through state corporations and agencies such as Perak State Parks Corporation for the Royal Belum State Park.

(c) Other Protected Areas

The Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN), Forestry Department of Peninsular Malaysia (JPSM), DOE and state agencies, shall also have the mandate to request for an EIA to be carried out for any development within any areas of international and national ecological importance (refer to **Appendix B**). These may include, but are not limited nor restricted to:

(i) Wildlife reserves and sanctuaries.
(ii) RAMSAR sites.
(iii) Important Bird Areas (IBAs).
(iv) International Union for Conservation of Nature (IUCN) protected areas.
(v) United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Sites; Man and Biosphere Reserve; and Geo-parks.

The above said areas, although not falling strictly within the context of national or state parks, are of national or state importance and can be subjected to the same EIA process for the purpose of conservation, responsible tourism, recreation and research, if required by the relevant authorities.

2.3.2 EIA Requirements for Development in National and State Parks

The Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015 provides the legal basis for DOE to approve an EIA for specific prescribed activities under the First and/or Second Schedules.

For development in national and state parks, the prescribed activity falls solely under the **Second Schedule Activity 12 (a):** Development of tourist facilities, recreational facilities or other facilities in any national park or state park.

The legal adherence is based on sub-sections of the EQA 1974 (as of 5th February 2015), as follows:

(a) Section 34A(1): *The Minister, in consultation with the council, may by order prescribe any activity, which may have significant environmental impacts as prescribed activity.*

(b) Section 34A(2): *Any person intending to carry out any prescribed activity shall appoint a Qualified Person to conduct an EIA and submit a report thereof to the Director General in the manner as the Director General may prescribe.*

(c) Section 34A(2C): *The report shall be in accordance with the guidelines as the Director General may prescribe and shall contain:*

(i) An assessment of the impact such activity will have or is likely to have on the environment.

(ii) The proposed measures that shall be undertaken to prevent, reduce or control the adverse impact on the environment.

The prescribed activities mentioned above shall not apply to the States of Sabah and Sarawak of which natural resources management are subject to separate state legislations and requirements as shown in **Table 2.3.1**.

Table 2.3.1: Environmental Legislation for Sabah and Sarawak

State	Legislation	Authority
Sabah	Environment Protection Enactment (Prescribed Activities) (Environmental Impact Assessment) Order 2005	Environment Protection Department (EPD)
Sarawak	Natural Resources and Environment (Prescribed Activities) Order 1994	Natural Resources and Environment Board (NREB)

2.4 TERMS AND DEFINITIONS

All legal definitions and interpretations shall be based on the Interpretation Acts 1948 and 1967 (Act 388). Terms and interpretations shall also be based on any interpretation and relevant documents published or to be published by DOE.

The common terms and definitions adopted for this Guidelines are provided in the following Section. In case of doubt and uncertainty of the terms, clarification with DOE shall be carried out.

(a) National and State Parks

The definitions are as detailed in **Section 2.3.1**.

(b) Development

Under the Town and Country Planning Act 1976 (Act 172) and amendment thereof in 2006, "development" means the carrying out of any building, engineering, mining, industrial, or other similar operations in, on, over, or under land, the making of any material change in the use of any land or building or any part thereof, or the subdivision or amalgamation of lands; and "develop" shall be construed accordingly.

(c) Land Disturbing Activities

Based on the EGIM (DOE, 2016), "land disturbing activities" refer to any project development activity that is subject to Section 34A of the EQA 1974 involving clearing of trees or vegetation, excavating, raising or sloping of ground, trenching, grading and blasting.

(d) Tourist, Recreational and Other Facilities

"Tourism facilities" are as defined in the Tourism Industry Act 1992 (Act 482). This shall include "Accommodation premises" meaning any buildings including hostels, hotels, inns, boarding-houses, rest houses and lodging houses offered as lodging or sleeping accommodations to tourists for hire.

"Recreational facilities": Recreation is the sum total of activities that are carried out during an individual's leisure time. Recreational facilities shall include facilities used for sports, relaxation, entertainment or amusement.

"Other facilities" shall mean any associated and supporting facilities related to tourism and recreational development.

Examples of tourism, recreational and associated facilities are provided in, but not limited, to those described in **Table 2.4.1**.

Table 2.4.1: Examples of Tourism, Recreational and Associated Facilities

Buildings	Tourism and Recreational Facilities
• Hotel/resorts • Hostels/inns/bed and breakfast/lodges • Chalet/longhouse • Boarding/lodging house • Visitor center/reception • Conservation/educational centre/interpretive centre • Museum	• Shops/commercial lots • Outdoor adventure facilities • Jetties and mooring facilities • Swimming pool/hot springs • Restaurants • Hall/recreational club • Theme parks • Golf courses • Camp grounds • Caravan park • Utilities, facilities and amenities (roads, parking areas, toilets, canteens, quarters, bathing areas, water supply, etc.)

Source: Adapted from the National Ecotourism Plan 2016 – 2025 (Ministry of Tourism and Culture, 2016).

Notes:

(i) The above is for general guidance and reference only.

(ii) Facilities for park management and park managers' use shall not be considered as part of tourism, recreational and other facilities.

(e) Development Restrictions

Development restrictions and controls shall abide by the policies in the National Physical Plan-3 (NPP-3) and other relevant national/state policies (refer to **Appendix B** for more details).

National and state parks are categorised as ESA Rank I, with development restricted to research and eco-tourism activities. Thus, only low impact development (LID) projects are preferred, which safeguard the core park areas as well as its buffer zones [Department of Town and Country Planning (JPBD), 2014].

For new national and state parks, a Park Management Plan (see **Box 3**) shall be developed and approved by the national/state approving authority. This is to facilitate the approval of the EIA as detailed in **Section 2.1.2**. Development in existing national and state parks must abide by the rules and regulations set by the existing park authorities, and the enabling legislations and policies.

2.5 POLICY AND GUIDELINES COMPLIANCE

National and state parks form part of the Environmentally Sensitive Area (ESA) network in Malaysia. Any proposed development in these areas has to comply with and adhere to the requirements enabled in the national and state legislations and enactments, policies, local regulations, procedures and guidelines published by the national and state governments, agencies and local authorities.

The requirements can be either statutory or non-statutory and from one or more national or state agencies and authorities. Adherence to the policies and legislations will ensure that the development is in line with the requirements of the authorities to avoid complications in the project approval process.

2.5.1 Policy Adherence

The project has to meet all legal and environmental requirements (statutory and non-statutory) and procedures of Malaysia. The project shall be in line with and not contradict the current national and state development policies and plans, especially for high impact projects.

Due diligence shall be undertaken in regards to policy compliance and study requirements with the relevant agencies and government departments.

The Project Proponent and his team shall be required to engage with all the relevant national and state agencies (see also **Sections 2.5 and 2.6** for details) during the project planning stage.

The Project Proponent and Qualified Person are to determine the specific compliance requirements, based on the scope and nature of the project. Examples of critical requirements that shall be addressed are shown in **Table 2.5.1** (also refer to **Sections 2.5.2 and 2.5.3** for a list of relevant policies and guidelines).

Proof of compliance in the form of, but not limited to, GAs approvals, support letters and minutes of meetings (MOM), among others, shall be included as part of the TOR and EIA.

All policy and administrative matters and GA requirements at the national and state levels must be cleared before proceeding with the EIA submission.

Table 2.5.1: General Policy Adherence for National and State Parks Projects Prior to EIA Submission

Requirements/Compliance	Agencies/Department	Legal Requirements	Required Outputs
• Project approvals and/or supporting documents.	1. National Physical Planning Council of Malaysia (MPFN) 2. Advisory Council of National Parks/Technical Committee Member of National Parks 3. State Planning Committee (SPC)	• Town and Country Planning Act 1976 (Act 172)	• To ensure that the project complies with the national and state policies and requirements for development in national and state parks.
• Adherence to landuse compatibility (structure/local plan). • Development requirements in/near ESAs. • Social Impact Assessment (SIA) requirements.	4. PLANMalaysia (JPBD)	• Town and Country Planning Act 1976 (Act 172)	• To ensure that the project is in line with the structure/local/park management plans and compatible with the surrounding landuse. • To determine need for SIA for the project.
• Land status compliance. • Land acquisition. • Minerals release.	5. Department of Director General of Land and Mines (JKPTG) 6. Land and Mines Office (PTG) 7. District and Land Office (PTD)	• National Land Code 1965 (Act 56)	• To ensure that the project land status is correct with its intended development type. • To ensure there are no constraints on the land that may prohibit it from being developed.

Requirements/Compliance	Agencies/Department	Legal Requirements	Required Outputs
• Development requirements in permanent reserved forests (PRF). • Adherence to Park Management Plans.	8. Forestry Department of Peninsular Malaysia (JPSM) 9. State park managers	• Forestry Act 1984 (and amendments thereof) (Act 313) • State enactments.	• To determine the status of the forest, ensuring it can be developed and the types of allowable activities.
• Development requirements in/near wildlife sanctuaries and other protected areas. • Protection of flora and fauna. • Requirement for relocation plan, conservation, etc.	10. Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)	• Wildlife Conservation Act 2010 (Act 716)	• To determine the sensitivity of the site in terms of flora and fauna species and constraints for development.
• Development in fishery zones. • Conservation of turtles, terrapins, etc.	11. Department of Fisheries (DOF)	• Fisheries Act 1984 (Act 317)	• To determine constraints on conservation requirements for critical marine species.
• Hydrology assessment. • Permission for river diversion. • Requirement for river reserves and coastal setbacks. • Stormwater management requirements (MSMA-2). • Erosion and Sediment Control Plan (ESCP).	12. Department of Irrigation and Drainage (DID) 13. State Water Authority	• Street, Drainage and Building Act 1974 (Act 133) • State enactments on water resources, river basins and coastal areas	• Determine the hydrological and drainage condition of the site and requirements pertaining to changes in river systems, river mouths and runoff management requirements.

Requirements/Compliance	Agencies/Department	Legal Requirements	Required Outputs
• Development requirements within Orang Asli settlements and their roaming areas, agriculture plots, cultural, heritage, religious and archaeological sites.	14. Jabatan Kemajuan Orang Asli (JAKOA)	• Aboriginal Peoples Act 1954 (Revision 1974) (Act 134)	• To ensure that the area is not occupied by Orang Asli community and if so, how to manage impacts.

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

2.5.2 National and State Policies and Plans

The relevant policies and plans for development in national and state parks are listed in **Table 2.5.2**. They serve as references for the Project Proponent and the Qualified Person when undertaking the project.

Any change or amendment to existing policies and plans (i.e. updating, revision, new edition, etc.) shall be taken into account in the EIA by the Qualified Person.

Table 2.5.2: List of Policies and Plans Relevant to Development in National and State Parks

Policies and Plans	Details and Scope
National Physical Plan-3 (NPP-3) (JPBD, 2016)	National spatial planning guidelines: covers national and state parks.
National Policy on Biological Diversity 2016 – 2025 [Ministry of Natural Resources and Environment (NRE), 2016]	Covers specifically 17 national biodiversity targets with corresponding goals and action plans to achieve within 2016 – 2025.
National Ecotourism Plan 2016 – 2025 (Ministry of Tourism and Culture, 2016)	Provides an overview of ecotourism development in Malaysia including policy directions, focus areas, park management planning, strategies and implementation plans.
National Elephant Conservation Action Plan 2013 – 2022 (PERHILITAN, 2013)	Provides a focused conservation strategy that lays out specific actions for the year 2013 – 2022 with the overall goal of securing viable and ecologically functional elephant populations in Peninsular Malaysia.
National Physical Coastal Zone Plan (NPCZP) (JPBD, 2012)	National spatial planning guidelines for coastal zones and associated activities.
Central Forest Spine (CFS) I & II: Master Plan for Ecological Linkages (JPBD, 2009)	Planning requirements for development proposed in the Central Forest Spine (CFS) including primary and secondary linkages.
National Tiger Conservation Action Plan 2008 – 2020 (PERHILITAN, 2008)	Provides a comprehensive goals, priorities, targets and planned action to safeguard the remaining tiger population in Peninsular Malaysia.

Policies and Plans	Details and Scope
State Structure and Local Plans (Various Local Authorities and publishing dates)	State and local level planning guidelines for national and state parks, including development controls.
National Policy on the Environment [Ministry of Science, Technology and Innovation (MOSTI), 2002]	Specifies eight principles to harmonise economic development goals with environmental imperatives. It seeks to integrate environmental considerations into development activities and in all related decision-making processes; foster long-term economic growth and human development; and protect and enhance the environment.
National Forestry Policy 1978 (Revised 1992)	Policies relating to biological diversity conservation and sustainable utilisation of genetic resources, as well as the role of local communities in forest development.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	This Convention controls the trade and sale of wild animals and plants across borders. Malaysia is a Party to the Convention.
The Convention on Wetlands of International Importance (RAMSAR)	The Convention focuses on protection of wetlands, their wise use and management. Malaysia is a Party to the Convention.

Notes:

(i) Refer to **Appendix B** for further details.

(ii) 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.

2.5.3 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.

Apart from the legislations, regulations, policies and plans mentioned above, **Table 2.5.3** provides a list of guidelines and guidance documents for EIA reporting.

Table 2.5.3: List of Relevant Guidelines and Guidance Documents Related to Development Planning in National and State Parks

Guidelines/Guidance Documents	Details and Scope
Garis Panduan Perancangan Kawasan Sensitif Alam Sekitar (PLANMalaysia, 2017)	Provides the requirements for development in ESAs.
Guidance Document for Addressing Soil Erosion and Sediment Control (ESC): Aspects in the EIA Report as per Appendix 3 of the Environmental Impact Assessment Guidelines in Malaysia (EGIM) (DOE, 2016)	EIA reporting format concerning section on soil erosion and sediment control.
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 the pollution prevention and mitigation measures (P2M2s) recommended in the EIA and the Conditions of Approval (COA) into action.
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.
Manual Panduan Pemeriksaan BMPs untuk Kawalan Hakisan dan Sedimen (DOE, 2015)	A manual on inspection procedures including checklists, of the erosion and sediment control BMPs.
Peraturan-peraturan Taman Negeri Royal Belum (Pindaan) 2011 (Perbadanan Taman Negeri Perak Darul Ridzuan)	Details the requirements for visitors and tourist to state parks in Perak Darul Ridzuan.
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).
DID Manual Volume 2 – River Management (DID, 2009)	Provides methods to assess, manage and mitigate measures for river conservation, rehabilitation and restoration.

Guidelines/Guidance Documents	Details and Scope
DID Manual Vol 3 – Coastal Management (DID, 2009)	Provides planning requirements and management measures for coastal erosion control; river mouth/tidal inlet; hydraulic study methodology; tidal wave inundation and coastal drainage; coastal zone; and shoreline monitoring and maintenance.
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.
Stream Crossing Guidelines: An Ecological Approach (DID, 2008)	Details on stream crossing requirements.
Johor National Parks Rules and Regulations as per the National Parks Johor Corporation Enactment 1989	Details the requirements for visitors and tourist to national parks in Johor Darul Takzim.

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

2.6 STAKEHOLDER ENGAGEMENT

2.6.1 Introduction

Stakeholder engagement is an important process at the preliminary stage, prior to drafting the TOR. At the start of the proposed project, the Project Proponent and/or the Qualified Persons should pre-consult with DOE, the planning approval authorities and Government agencies (GAs) to confirm their study requirements and the approval process to be followed, and to obtain their feedbacks regarding the proposed project. All these will be taken into account in the TOR, EIA and by the EIA Technical Review Committee (EIATRC).

Consultations with other stakeholders, besides the GAs and approving authorities, are also needed and it is the Project Proponent and Qualified Person's responsibility to identify the key stakeholders to engage with at this early stage to assist in the preparation of the TOR and ESI.

The mechanisms for stakeholders' engagement in the EIA process can be direct, indirect and formal or informal. The EGIM (DOE, 2016) has succinctly 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."*

Engaging with stakeholders can have general benefits to a project as shown in **Box 4**.

Box 4:
Aims of the Stakeholder Engagement

(i) To understand the GA's key requirements, especially approvals process, and guidelines to be cleared for the project.

(ii) To convey the aims and scope of the development to the affected stakeholders, inform of potential impacts from the development and mitigation measures put in place to address them. This builds public trust and confidence towards the project.

(iii) To obtain feedbacks from the stakeholders on their concerns so that adjustments can be made for incorporation into the project designs and EIA for project implementation.

(iv) To allow early resolution of any conflicts and impasses, avoiding costly delays.

2.6.2 Identification of Stakeholders

The stakeholders can be grouped into three main groups from:

(i) GAs which have the powers and legal rights to administer, enforce and approve the project.

(ii) General public, organisations, properties and landowners who may be directly or indirectly be affected by the project.

(iii) Special interest groups or organisations representing their interests or influence, e.g. NGOs related to environmental conservation.

Table 2.6.1 presents an indicative, but non-exhaustive, list of stakeholders for engagements with, for projects in national and state parks.

Table 2.6.1: Key Stakeholders and their Roles and Responsibilities

Stakeholder	Roles and Responsibilities
Department of Environment (DOE)	• Administrator of the EIA process under the EQA 1974. • Responsible for the issuance of the COA for the EIA. • Post-EIA approvals, monitoring and enforcement.
Project Proponent	• 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.
Relevant GAs	• 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 relevant for the project. • List of pertinent requirements that need to be addressed is shown in **Table 2.5.1**.

Stakeholder	Roles and Responsibilities
Affected Public and Local Population	• 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. • These may include residents, Orang Asli, farmers, private land owners, etc. • Preliminary engagement may include identifying public concerns for the project that needs to be addressed and feedback on mitigation measures.
NGOs	• Provide input and feedback on issues of special interests.

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 identify the relevant stakeholders to engage for the project.

2.6.3 Methods of Engagement

The engagements are to be conducted based on the following steps:

(i) Step 1: Identify key areas of policy, regulatory and guidelines compliance from the relevant GAs.

(ii) Step 2: Obtain initial data and views from the GAs and stakeholders (communities, local leaders, tourism operators, etc.) to assist in preparation of the TOR.

(iii) Step 3: Document stakeholder feedbacks to identify areas of improvement to the initial technical project design and concept.

(iv) Step 4: Review and assess all information and feedback obtained to determine those relevant for incorporation into TOR and EIA.

Types of stakeholder engagement are provided in **Table 2.6.2**.

Table 2.6.2: Public Engagement Methods and Expected Outputs

Stakeholder	Type of Consultation	Information Requirement
DOE	• Meeting and/or pre-consultation.	• Comments on TOR/ESI and EIA process and requirements.
Project Proponent and Consultants	• Meetings and/or private consultation.	• Information required for the project. • Consultation on changes in project design. Incorporation of P2M2s.
Relevant GAs	• Meetings and/or private consultation. • Official correspondence.	• Agency requirements such as key elements of policies, regulations and guidelines to adhere to. • Methods to address those key elements and approval procedures.
Affected Public and Local Population	• Questionnaire surveys. • Interviews (formal and informal). • Focal group discussion (FGD). • Public briefing. • Project briefs. • Website.	• Project briefings. • Views and concerns on the project. • Inputs for project incorporation. • Conflict resolution mechanism.
NGOs	• Meetings and/or private consultation.	• Concerns and inputs on project.

Note: The list is not exhaustive and not all the above may be relevant to the project.

2.6.4 Documentation and Reporting

Findings from the stakeholder engagement shall be incorporated into the TOR, especially in regards to policy compliance and regulatory adherence.

Proof of engagement can be in the form of written reports, official response letters from the GAs, MOM, photos, etc.

CHAPTER 3

TERMS OF REFERENCE (TOR)

3.1 INTRODUCTION

The Terms of Reference (TOR) is the first major milestone in the overall Environmental Impact Assessment (EIA) process.

This Chapter, comprising 10 Sections, provides the steps in detail to prepare the TOR for submission and endorsement by the Department of Environment (DOE). These steps are as follows:

(i) **Section 3.2:** Environmental Screening Procedures.
(ii) **Section 3.3:** Environmental Scoping.
(iii) **Section 3.4:** Site Suitability Assessment (SSA).
(iv) **Section 3.5:** Study Boundary.
(v) **Section 3.6:** Baseline Data Review.
(vi) **Section 3.7:** Determination of Key Project Activities.
(vii) **Section 3.8:** Identification of Significant Impacts and Priority Setting.
(viii) **Section 3.9**: Establishment of Study Requirements for EIA.
(ix) **Section 3.10:** Outlining of Mitigation Measures.
(x) **Section 3.11:** Preparation and Submission of TOR/Environmental Screening Information (ESI).

3.2 ENVIRONMENTAL SCREENING PROCEDURES

Environmental Screening is carried out to determine whether or not a proposed project is a prescribed activity under the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015 (refer to **Table 3.2.1**).

Potential outcome criteria of project screening are shown in **Box 5**.

Table 3.2.1: Criteria for Screening of Development in National and State Parks

Activity	Interpretation
Second Schedule Activity 12 (a): Development of tourist facilities, recreational facilities or other facilities in any national park or state park	**Type of Development** (a) Applicable for new tourism, recreational and associated facilities development involving land disturbing activities within the boundary of a gazetted national or state park. (b) Covers both land- and marine-based buildings/facilities*. Note: * Tourism, recreational and associated facilities shall include, but not be limited nor restricted to, those referred in **Table 2.4.1**.

Box 5:
Potential Outcomes from Project Screening

(i) No EIA is required: If the project does not fall within any prescribed activities under the First or Second Schedule, and/or has insignificant impacts on the environment.

(ii) EIA is required: If the project will have potentially significant environmental impacts and/or falls within the prescribed activity under the First or Second Schedule.

(iii) Further studies and clarification from DOE: If the potential impacts from the project are uncertain, indeterminate, ambiguous or may not fall neatly within any prescribed activities, i.e. involving new technologies, DOE shall be consulted upon on the need for an EIA.

3.3 ENVIRONMENTAL SCOPING

The main objective of environmental scoping is to identify the environmental attributes and issues to determine the focus, depth, spatial and temporal boundaries of the EIA that are deemed significant and requiring assessment. Scoping shall be carried out in the early stage of the project cycle. It enables the EIA to focus only on the significant issues, impacts and sensitive receptors.

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

The scoping exercise (also refer to **Figure 3.3.1**) comprises the following steps, which are elaborated on in the accompanying Sections:

(i) Site Suitability Assessment (SSA): The SSA shall consider all alternatives or options to refine and improve upon the original concept design (refer to **Section 3.4**).

(ii) 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 (refer to **Section 3.5**).

(iii) 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 stakeholder engagements (refer to **Section 3.6**). Quantitative assessment can be provided where necessary and available.

(iv) Determination of Key Project Activities: The Qualified Person shall outline the key project activities at various phases of project implementation (pre-construction, construction and operations) (refer to **Section 3.7**).

(v) Identification of Significant Impacts and Priority Setting: This step will involve preliminary identification of significant issues for further detailed assessment in the EIA. Non-significant issues shall also be addressed accordingly in the EIA study but through general/qualitative impact prediction and evaluation (refer to **Section 3.8**).

(vi) Establishment of Study Requirements for EIA: Identify and detail out the methodologies and assessment tools to be carried out in the EIA for identified significant impacts (refer to **Section 3.9**).

(vii) Outlining of Mitigation Measures: Based on the identified significant impacts, the Qualified Person shall determine and select suitable mitigation measures to abate the impacts (refer to **Section 3.10**).

(viii) Preparation and Submission of ESI and TOR: Findings from the scoping exercise shall be compiled, collated and analysed to prepare the TOR for submission to DOE (refer to **Section 3.11**).

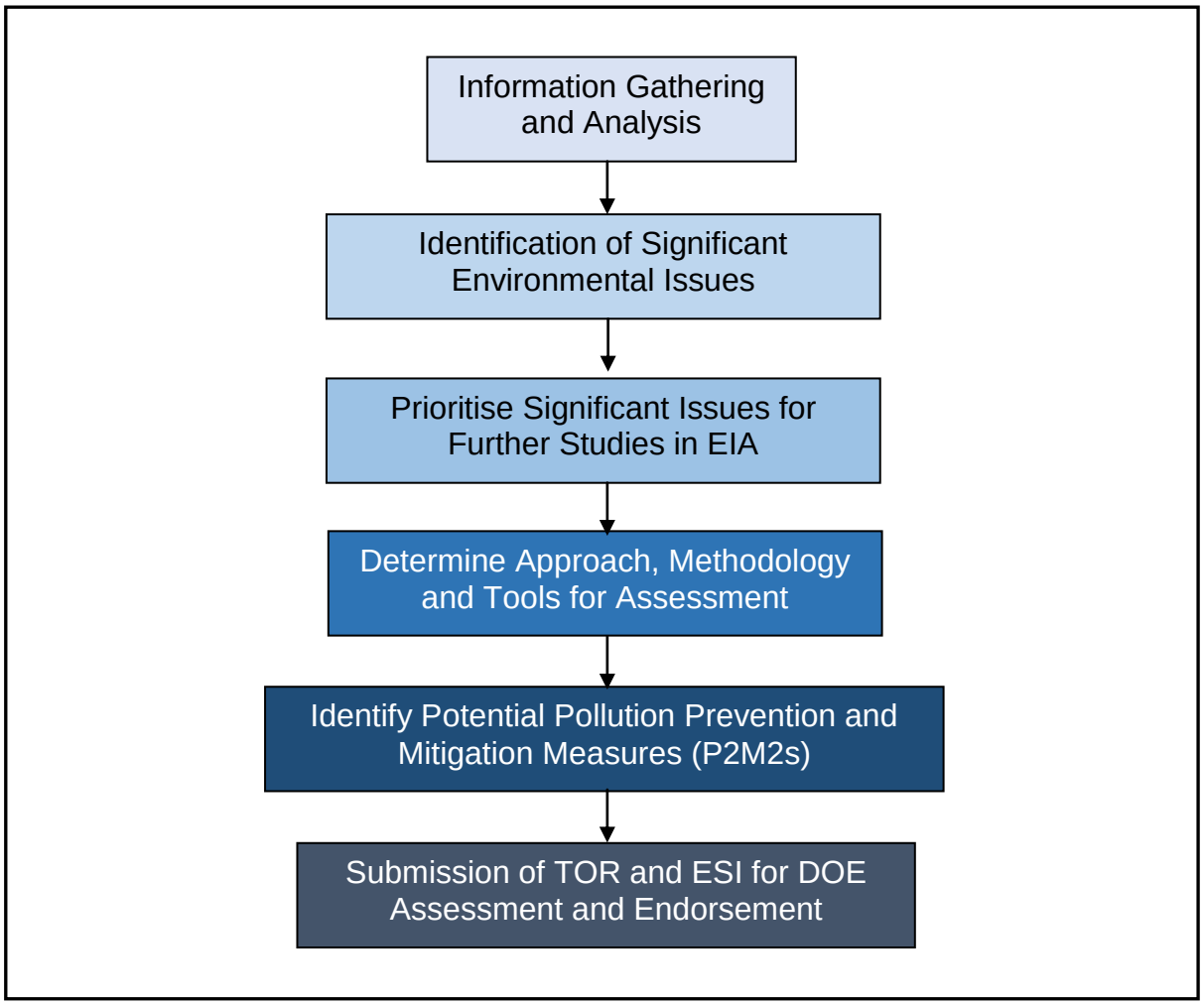


Figure 3.3.1: Flow Path for Environmental Scoping

3.4 SITE SUITABILITY ASSESSMENT (SSA)

The SSA is detailed in the EGIM (DOE, 2016). Generally, this is carried out at the feasibility stage where alternatives and options to the proposed concept and layout will be amended and finalised, which will form the basis in the scoping exercise (refer to **Table 3.4.1** for examples).

The scoping exercise will value add to this SSA through recommendations of pragmatic mitigation measures, such as P2M2s and best management practices (BMPs), where potential environmental degradation is anticipated when developing in national and state parks.

Table 3.4.1: Considerations in Project Alternatives and Options

Options	Considerations
Project Siting	• Adherence to national and state policies and guidelines. • Site constraints to the project and *vice versa*. • Location and proximity to sensitive receptors. • Park boundary and zonings. • Any alternative sites proposed for the project.
Terrain and Topography	• Conservational value. • Availability of land for buffers. • Possibility of avoidance of unsuitable terrain. • Type of terrain and limitations. • Visual/aesthetic impacts.
Accessibility	• Availability of access. • Proximity to construction/source materials. • Strategic locational advantages.
Technology Options	• Availability of technology to minimise impacts. • Best available technology (BAT) options. • Benchmarking with alternative technology. • Green technology adoption. • Ecological protection requirements.
Project Component and Design	• Adaptive design to suit terrain/sensitive areas. • Layout consideration. • Choice of construction methods.
Social Constraints	• Location within or close to existing communities. • Need for land acquisition and relocation. • Park carrying capacity.
Economy and Finance	• Potential employment and business. • Cost and benefit considerations. • Supply and demand scenarios.

Options	Considerations
Operations	• Carrying capacity. • Allowable activities and zoning. • Adoption of best practices and green development concepts. • Tourist management. • Resources management.

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

3.5 STUDY BOUNDARY

The study boundary is an important component in the TOR/ESI/EIA. Two types of study boundaries shall be used:

(i) The study boundary, which defines the ZOS. In terms of criteria, the ZOS is the study area generally encompassing a 5-km radial zone from the project boundary (refer to **Figure 3.5.1**). In terms of criteria, the ZOS is left to the Qualified Person to define the limits of the spatial boundary. Ideally for projects in national or state park, the study area should cover the core park zones and also buffer areas to determine impacts from the project.

(ii) The impact boundary, which defines the spatial area of the potential impacts to extend beyond the ZOS, and hence, this impact area is termed the ZOI. The ZOI may vary depending on the size of the project, e.g. a small-scale development within the state park shall have a smaller footprint as compared to assessing the entire park development (e.g. masterplan). The extent of the ZOI shall be determined by the Qualified Person based on the nature and extent of significant impacts.

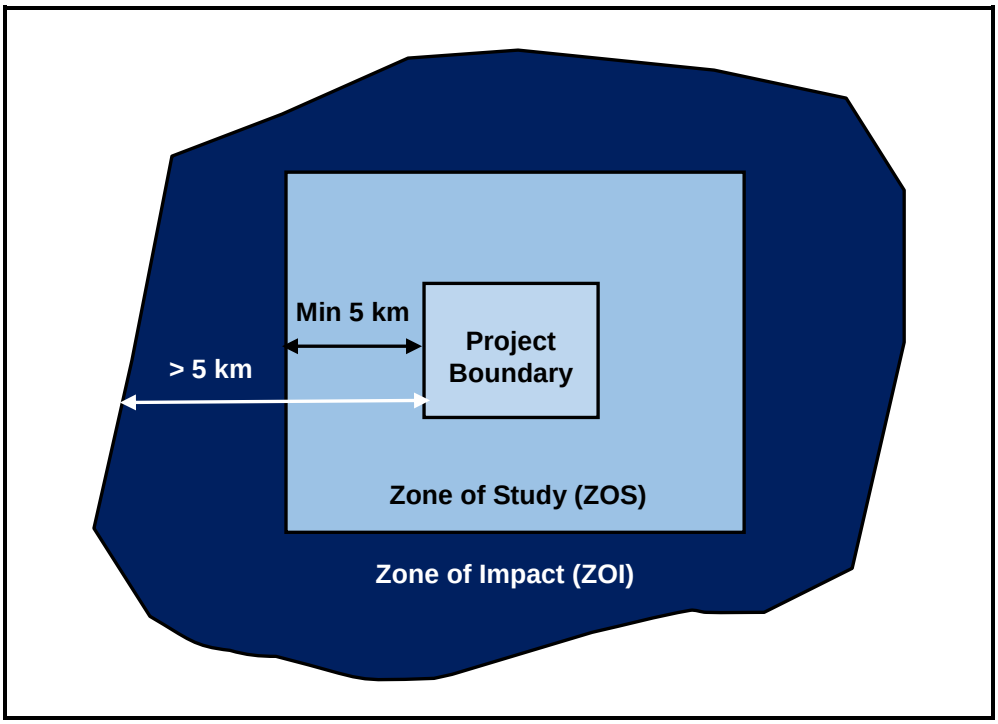


Figure 3.5.1: Diagram Showing the Difference between the ZOS and ZOI

3.6 BASELINE DATA REVIEW

Table 3.6.1 lists the indicative requirements for baseline description in the environmental scoping exercise. The baseline information shall be qualitative but shall be sufficiently adequate to assess the potential impacts on the sensitive receptors. Quantitative data and findings wherever available, shall be provided to support the assessment.

The level of details shall be based on factors such as area, size, types of activities and potential impacts to the surrounding sensitive terrestrial, coastal and marine environments of the national/state park.

If any of the items in the list 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 environmental scoping.

The criteria to decide on the priority of relevant items shall be based on the levels of significance.

Table 3.6.1: Baseline Requirements for Environmental Scoping

Baseline	Requirements	Data Source
Physico-chemical		
Landuse	• Landuse maps and photos. • Description of existing and future landuse (park boundary, buffer zone and surrounding areas, minimum 5-km) • Identification of ESAs.	• Topography maps. • Aerial or satellite imagery. • Structure and local plans (PLANMalaysia). • Site investigations.
Coastal Morphology	• Bathymetry • Description of coastal areas and landforms. • Description of accreting or erosional areas.	• Nautical charts from National Hydrographic Centre (NHC). • National Coastal Erosion Study 2015.
Geology/ Hydrogeology	• Description of local and regional geology. • Locations of aquifer and groundwater abstraction wells.	• Geological maps by the Minerals and Geoscience Department (JMG).
Soil and Terrain	• Topography and slopes. • Soil investigation (SI).	• Site survey. • Soil map by Department of Agriculture (DOA). • SI report.
Climate	• Climate data (min 5 – 10 years).	• Malaysian Meteorological Department (METMalaysia).
Hydrology and Hydrodynamics	**Landwards** • River system and catchment area. • Flood prone areas. **Marine** • Bathymetry. • Data on tides, current flow and speed, wave conditions, littoral drifts, sediment transport offshore winds, etc. (min 5 – 10 years). • Delineate high and low water mark lines in relation to project area.	• Topography maps. • Department of Irrigation and Drainage (DID) flood maps. • Tide charts. • Bathymetry survey. • Data from Marine Department of Peninsular Malaysia. • Site observations.

Baseline	Requirements	Data Source
Water Quality	• Water quality data (if any). • Locations of water pollution sources. • Locations of water intake points (WIPs) and water treatment plants (WTPs).	• State water resources departments. • Published reports by water agencies and DOE.
Air Quality	• Air quality data (if any) • Locations of air polluting sources.	• DOE published data. • Site observations.
Noise and Vibration Level	• Locations of high noise and vibration generators.	• Site observations.
Biological		
Ecosystem	• Description of existing ecology and habitats. • Identification of ESAs and conservation areas (forest reserves, wetlands, mangroves, wildlife reserves, etc.). • Presence of endemic, rare, threatened, endangered and near extinct flora and fauna. • Forest inventory. • Fisheries data.	• Secondary information. • PERHILITAN, Department of Fisheries (DOF) and Forestry Department Peninsular Malaysia (JPSM). • *Buku Kawasan Sensitif Alam Sekitar* (DOE). • Site observations.
Social Aspects		
Demography	• Details of demographics. • Local economic profile. • Identification of social impact stakeholders (Orang Asli, farmers, tourist operators, etc.)	• Population census from Department of Statistics and JAKOA. • Local plans from PLANMalaysia. • Interviews. • Site surveys.
Public Health	• Description of public health status.	• Morbidity statistics and public health data from Ministry of Health (MOH).
Heritage, Culture and Archaeology	• Locations of historical and cultural sites.	• Data from Department of Museums, National Heritage Department, JAKOA, etc.

Baseline	Requirements	Data Source
Land Traffic	• Access to project site. • Condition of access roads. • Traffic data.	• Public traffic data by the Public Works Department (JKR). • Road maps. • Site visit.
Infrastructure, Utilities and Amenities	• Water, electricity, sewerage, road, telecommunication and waste.	• Information from utility providers. • Local plans from PLANMalaysia.

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

3.7 DETERMINATION OF KEY PROJECT ACTIVITIES

Project activities are the basis for assessing the potential impacts. **Tables 3.7.1 – 3.7.3** provide a summary list of activities in a typical national and state park development project by phases. The list is not exhaustive and the Qualified Person shall add to the list whenever necessary.

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

Activities	Issues of Concern
<u>Site access</u> • Vegetation and biomass clearing. • Establish temporary stream/river crossing.	• Soil erosion • Water pollution [silt, oil and grease (O&G)] • Loss of biodiversity • Air and noise pollution
<u>Site surveys</u> • Commissioning of surveys. • Establishment of temporary camp sites. • Vegetation clearing for survey works.	
<u>Soil investigations</u> • Commissioning of surveys. • Establishment of temporary camp sites. • Vegetation clearing for survey works. • Drilling of boreholes/digging of pits to obtain samples to obtain site samples. • Lab analysis of samples.	

Activities	Issues of Concern
Environmental assessment • Site assessment. • Collection of samples. • Analysis of samples.	
Land acquisition (if any) under Social Impact Assessment (SIA) and local authorities' scope • Identification of affected lots and population. • Issue notice and undertake compensation. • Develop relocation plans through consultation. • Acquire property. • Demolition of structures and buildings.	• Socio-economy (relocation) as part of the SIA requirement by PLANMalaysia • Landuse change • Wastes (demolition)

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

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

Activities	Issues of Concern
Establish access road • Cut new road to project site or rehabilitate existing road. • Establish temporary stream crossing. • Establish drainage and culverts. • Levelling and compacting of the road surface. • Laying of aggregates.	• Loss of biodiversity and wildlife disturbance • Soil erosion • Water pollution (silt) • Air and noise pollution
Base camp and site facilities establishment • Construct site office, worker quarters, canteen, toilets and bathing areas, stockpile areas, storage facilities and workshops. • Establish utilities and infrastructure: power supply, water, telecommunications, etc. • Provide temporary treatment systems, e.g. septic tanks for toilets, waste collection areas.	• Loss of biodiversity and wildlife disturbance • Water pollution (TSS, sewage and sullage) • Drainage (runoff from site) • Air and noise pollution • Wastes (municipal wastes) • Safety and health (vector-borne disease)

Activities	Issues of Concern
<u>Worker recruitment, mobilisation of equipment and materials</u> • Employ workers to carry out construction work. • Transport equipment and materials required for construction to the storage areas. • Setup workshop areas for servicing and maintenance work.	• Socio-economy (employment, social conflicts – from SIA) • Safety and health (communicable disease, sanitary conditions, accidents and injury) • Air and noise pollution • Wastes (municipal and construction wastes) • Traffic (congestion from heavy vehicle transport)
<u>Site clearing and biomass removal</u> • Cut, removal and disposal of vegetation. • Establish temporary biomass disposal site.	• Loss of biodiversity and wildlife disturbance • Wildlife relocation • Soil erosion • Hydrology and drainage (Increased runoff) • Wastes (biomass disposal) • Water pollution (silt and debris) • Air (dust) and noise pollution • Safety and health (respiratory effects from dust inhalation) • Wastes (biomass) • Visual/aesthetics • Human-Wildlife Conflict (HWC)
<u>Earthworks (cut and fill)</u> • Excavation, filling and drilling works. • Import and export of fill material. • Platform formation for construction. • Construction of erosion and sediment control measures. • Slope and exposed areas protection works (compaction, turfing, lining, etc.).	• Soil erosion • Hydrology and drainage (Increased runoff, impacts to downstream users) • Water pollution (silt and debris) • Air (dust) and noise pollution • Wastes (spoil disposal) • Ecological deterioration (silt) • Safety and health (accidents) • Visual/aesthetics
<u>Drainage works</u> • Diversion of streams and existing drainage. • Establish temporary drainage lines, sediment basins/silt traps and outlets. • Drainage protection works (lining, check dams, compaction, etc.).	• Bank and coastal erosion. • Water pollution (silt) • Aquatic/marine habitat deterioration (river/estuary alteration, silt) • Flood risk

Activities	Issues of Concern
<u>Structural works and facilities establishment</u> • Piling and foundation works. • Batching plant establishment/concrete mixing. • Formworks and concrete pouring for building structures. • Brickworks, roofing and finishing. • Construction of associated facilities (power supply, water supply, telecommunications, waste disposal, etc.).	• Soil erosion • Water pollution (silt) • Air and noise pollution • Hydrology and drainage (Increased runoff, impacts to downstream users) • Wastes (construction wastes)
<u>Waste disposal</u> • Provision of temporary waste collection and disposal sites. • Collection of accumulated wastes for disposal at designated disposal sites. • Sewage management.	• Wastes (spoil, municipal, scheduled wastes) • Air pollution (odour) • Health impact (disease, vectors, accidents) • Water pollution (floatables, sewage, leachate)
<u>Establishment of permanent access</u> • Construction of permanent access road. • Closure of temporary access.	• Soil erosion • Water pollution (silt)
<u>Final finishing and landscaping</u> • Installation of street lighting, utilities and amenities. • Planting of trees and vegetation in completed areas.	• Visual/aesthetics (enhancement)

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

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

Activities	Issues of Concern
<u>Operation of tourism and/or recreational facility</u> • Management of impacts from human activities in the project area. • Traffic management. • Solid waste management.	• Water pollution (sewage and sullage) • Air and noise pollution (traffic, human activities) • Traffic (congestion) • Wastes (municipal wastes) • Effects on wildlife and environment • Socio-economy (employment, economic growth) • Human-Wildlife Conflict (HWC)
<u>Visitor Management and Conservation Work</u> • Tourist management. • Carry out conservation work. • Park patrols and enforcement. • Security.	• Water pollution (sewage and sullage) • Carrying capacity (overcrowding, resource use) • Ecological impacts (poaching, illegal gathering of flora and fauna, damages) • Park visitor's safety • Socio-economy (employment, business) • Traffic (congestion)
<u>Infrastructure, utility and amenities maintenance</u> • Maintenance of sewage treatment system. • Monitoring of effluent quality. • Conduct repairs as necessary. • Maintenance of infrastructure: roads, drainage, power supply, telecommunications, etc. • Maintenance of landscaping.	• Water pollution (sewage and sullage) • Air and noise pollution • Safety and health • Wastes (municipal wastes) • Visual/aesthetics
<u>Site decommissioning</u> • Demolition of unwanted temporary structures and buildings. • Removal of machinery, materials and workers from the site. • Fill in depressions and holes. • Removal of wastes.	• Soil erosion • Water pollution (silt) • Air and noise pollution • Safety and health • Wastes (demolition wastes)

Activities	Issues of Concern
Rehabilitation works • Erect hoarding. • Establish protection measures for slopes and exposed areas (compaction, turfing and structural measures). • Provide coastal protection measures. • Revegetation or landscaping.	• Soil erosion • Water pollution (silt) • Air and noise pollution • Safety and health • Wastes (demolition wastes)

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

3.8 IDENTIFICATION OF SIGNIFICANT IMPACTS AND PRIORITY SETTING

3.8.1 Selection of Scoping 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.

Table 3.8.1 lists the advantages and disadvantages of the various common methods used. The list given is not exhaustive and any other suitable method can be used if relevant.

A useful tool is the Environmental Scoping Matrix (ESM) to amalgamate the scores from a series of criteria; ranging them from major to minor negative and positive formats of environmental impacts (see **Appendix C** for an example of the matrix used for national and state park projects).

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 (see **Box 6**).

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

Table 3.8.1: Advantages and Disadvantages of Impact Identification Methods

Method	Advantages	Disadvantages
Checklists	• Easy to understand and use. • Good for site selection and priority setting. • Simple ranking and weightages.	• Do not distinguish between direct and indirect impacts. • Do not link action and impact. • The process of incorporation of values can be controversial.
Matrices	• Link action to impacts. • Good method for displaying EIA results.	• Difficult to distinguish direct and indirect impacts. • Have potential for double-counting of impacts.
Networks	• Link actions to impacts. • Useful in simplified form to check for second order impacts. • Handles direct and indirect impacts.	• Can be very complex if used beyond simplified version.
Overlays	• Easy to understand. • Focus and display spatial impacts. • Good siting tool.	• Can be cumbersome. • Poorly suited to address impact duration or probability.
GIS and Computer Expert Systems	• Good for impact identification and spatial analysis. • Good for experimenting.	• Heavy reliance on knowledge and data. • Often complex and expensive.

Source: EIA Training Resource Manual Second Edition (UNEP, 2002).

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 best method to adopt for their study.

Box 6:
Criteria for Determining Significance of Environmental Impacts

(i) Magnitude: Defined as the degree and scale of an impact (may be detrimental or beneficial) towards sensitive receptors due to a proposed activity.

(ii) Permanence: Defined as to whether the effects are temporary in nature (e.g. only during certain work activities or only during the construction stage), or may result in permanent effects (e.g. landform alteration due to cut and fill).

(iii) Reversibility: A measure of whether mitigation measures can be implemented in rehabilitating the site back to its original state or better.

(iv) Cumulative Effects: A measure of whether the effects will be accumulative singly or in combination with other effects from nearby sites/activities (that may be detrimental or beneficial) over a time period.

3.8.2 Key Issues Related to Development in National and State Parks

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

(i) Ecosystem and sustainability: National and state parks are designated as protective areas with limited development in order to protect and conserve the natural environment within, although human activities are permitted for purposes of research and eco-tourism. Many parks have unique habitats, which sustain a host of flora and fauna species, including endemic, rare, endangered, threatened and near extinct species. Development involving land clearing will degrade the overall integrity of the park. The degree of impact depends on the extent and size of the development.

(ii) Site access: National and state parks are often left in its natural state with only certain parts made accessible for human activities. Developing new access in the park will impact the park through increase in erosion and sedimentation, leading to water pollution of the pristine rivers and waterbodies. Accessibility can also inadvertently increase the risk of poaching or illegal harvesting of timber and forest products.

(iii) Carrying capacity: A large number of tourists inadvertently increases the demand for accommodation and resource use (e.g. water, food, and the need for disposal of sewage and wastes) in the area. The park can only sustain a set number of visitors before environmental degradation set in. GAs such as JPSM and PERHILITAN should be consulted to determine the optimal number of daily visitors and overnight travellers permitted in the park, to ensure the carrying capacity is adhered to. This shall ideally be part of the Park Management Plan.

(iv) Orang Asli community: Large forest areas in the Central Spine Forest (CFS) are home to many Orang Asli communities, who still practise their traditional free roaming lifestyle; collecting and subsisting on the natural forest resources. There is therefore a need to consider the presence of Orang Asli in the national and state parks in the EIA in terms of their livelihood and practices.

(v) Human-wildlife conflicts: The presence of increasing tourists in the national and state parks and the shrinking habitats may increase human-wildlife conflicts (HWC). Animals, fed by tourists, may increase their inclination to attack or forage for food. In the worst case scenario, problem animals may have to be relocated to another area further away from human habitation.

(vi) Introduction of invasive species: Any development in national and state parks must ensure that these areas are not invaded by invasive species that may thrive in the new environment and displace the existing species unknowingly and/or accidentally. Cases of introduced species have led to a decline in many local animals due to their rapid breeding rate, non-selective diet or lack of natural predators to control the newcomers. Eradication of such species is often costly and difficult.

(vii) Hazards: Park management has to take into account the potential hazards in the park. Floods, forest fires and landslides can occur resulting in destruction of property and lives. Pollution, injuries and diseases such as leptospirosis, can occur when the rivers are contaminated. These factors have to be assessed to ensure there are plans for emergency responses.

3.9 ESTABLISHMENT OF STUDY REQUIREMENTS FOR EIA

Once the key environmental impacts have been identified and prioritised (see **Section 3.8.2**), the subsequent step is to establish the appropriate study requirements to address these significant impacts.

The scope of the EIA studies are dependent on the scale and extent of the development, its relationship to adjacent land uses and nearby sensitive receptors, the type of planning and study approvals as required by the relevant GAs, which will be generally determined in consultation and engagement with these agencies (refer to **Section 2.6**), and other relevant criteria.

The Qualified Person shall provide the methodologies, assessment/modelling tools, and expected outputs derived from the assessment of the significant impacts, as part of the TOR. **Table 3.9.1** provides a list of applicable studies. This list is only indicative and non-exhaustive as site conditions can vary from project to project. Hence, it is the responsibility of the Qualified Person to check and verify the applicability and extent of the relevant studies to be conducted for a specific project.

The EIA Technical Review Committee (EIATRC) shall later assess the adequacy of the proposed studies and may recommend additional studies to be incorporated into the TOR.

Table 3.9.1: List of Applicable Studies to be Considered in the EIA

Study Reference	Approving Authority	Prescribed Activities		
		Second Schedule Activity 12 (a)		
		Park Development Planning	Development of <1 ha	Development of ≥ 1 ha
Slope Analysis • Terrain and slope classification	JMG/JKR	√	√	√

Study Reference	Approving Authority	Prescribed Activities		
		Second Schedule Activity 12 (a)		
		Park Development Planning	Development of <1 ha	Development of ≥ 1 ha
Erosion and Sediment Control • LD-P2M2 • Erosion and Sediment Control Plan (ESCP)	DOE DID	√	√	√
Baseline Sampling • Water, air, noise and/or vibration	DOE	√	√	√
Ecological Habitat Mapping • Terrestrial, aquatic and/or marine*[1]	PERHILITAN/ JPSM/DOF	√	√	√
Flora and Fauna Studies • Terrestrial, aquatic and/or marine*[1]	PERHILITAN/ JPSM/DOF	√	√	√
Hydrology Assessment • Basin/River systems • Runoff • Flood risk	DID	√	-	√
Pollution Study • Sewage • Waste Management (Biomass, Scheduled Wastes, Construction and Demolition, Domestic, etc.)	DOE/ National Solid Waste Management Department (JPSPN)/ Local Authority (PBT)	√	-	√

Study Reference	Approving Authority	Prescribed Activities		
		Second Schedule Activity 12 (a)		
		Park Development Planning	Development of <1 ha	Development of ≥ 1 ha
Carrying Capacity Study	PLANMalaysia	**As required by the relevant Government Agencies (GAs)**		
Soil investigations (SI)	JMG/JKR			
Geotechnical Report	JMG/JKR			
Fisheries Resources Assessment	DOF			
Landuse Compatibility	PLANMalaysia			
Social Impact Assessment (SIA)	PLANMalaysia			
Traffic Impact Assessment (TIA)	JKR			
Health Impact Assessment (HIA)	MOH			
Heritage Impact Assessment	Department of National Heritage			

Notes:

(i) Activity 12 (a): Development of tourist facilities, recreational facilities or other facilities in any national park or state park.

(ii) *[1] To be carried out as required by the relevant GAs: PERHILITAN, JPSM and DOF.

(iii) 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.

3.10 OUTLINING OF MITIGATION MEASURES

The Qualified Person with the assistance of the technical consultants and specialists shall assess the BATs, BMPs and options for P2M2 to address the identified key environmental issues.

At this point in the TOR/ESI, the identified measures shall be qualitative and descriptive only, to be further detailed in the EIA stage.

3.11 PREPARATION AND SUBMISSION OF TOR/ESI

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

3.11.1 TOR Table of Content (TOC)

The TOR 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).

The TOR shall contain, but not limited to, the following:

(a) Introduction: Include the title to the project and a brief introduction to the project details.

(b) List of Consultants/Study Team: Include the list of Consultants and Study Team (DOE registration number, academic background, experience, area of study and declaration). The EIA consultant team shall be led by a Team/Project Leader/Manager who shall be responsible for the EIA report.

(c) Project Scope: Detail out the legal requirements to carry out the project. Provide description on the project, project activities and implementation schedule.

(d) Alternatives Consideration: Provide the assessment of the various alternatives/options considered for the project and detail out the justifications and reasons for selection of the final project layout, components and/or details.

(e) Significant Environmental Impacts to be Studied: Include the findings from the environmental scoping and detail out the significant impacts which will result from the project activities that are required to be included in the EIA.

(f) Study Boundary: Delineate the study boundaries and identify the environmentally sensitive areas (ESAs) within the zone of study/zone of impacts.

(g) Assessment Standards: List the standards, criteria, acceptable limits, etc. that will be used to assess the environmental impacts.

(h) Timeline of Study: Detail our all studies/investigations to be carried out, including indicative dates.

(i) Consideration of Concurrent Projects: List potential concurrent or planned projects that may result in cumulative impacts.

(j) Description of Modelling Tools and Assessment Methodologies: List the modelling tools and methodologies to undertake the impact assessment and evaluation of significance.

(k) Possible Mitigation Measures: Outline the mitigation measures or BMPs from similar projects that may be used to address the environmental impacts from the project.

The ESI shall be appended as part of the TOR as a supporting document. The format for the ESI is as detailed in Appendix 8 of the EGIM (DOE, 2016).

3.11.2 TOR Adequacy Check (TORAC) Process

A review shall be carried out by the EIATRC comprising the DOE officers and appointed individuals (AIs) and/or GAs.

The TORAC requirements and procedures shall follow the requirements as detailed out in the EGIM (DOE, 2016) or any future amendments to it.

The adequacy of the scoping exercise and the TOR shall be decided in a TORAC meeting, chaired by the DOE Headquarters (HQ) (refer to **Box 7** for possible outcomes).

When the TOR Report is endorsed, the Project Proponent shall proceed to the EIA stage.

Box 7:
Outcomes from TORAC Review

At the end of the process, the TORAC meeting can decide the following:

(i) Endorse the report.

(ii) Endorse the report with revisions, where a Revised TOR shall be submitted.

(iii) Reject the report with reasons (a fresh TOR can still be submitted).

CHAPTER 4

ENVIRONMENTAL IMPACT ASSESSMENT: BASELINE DATA

4.1 INTRODUCTION

This Chapter provides a range of baseline data for the Environmental Impact Assessment (EIA). There are two types of data forming the baseline for a national and state park development project. These are secondary and primary data.

4.2 SECONDARY DATA COLLECTION

Secondary data includes information and statistical data from various sources but mainly from official published reports, census, publications and research papers. They are collected to form the basic information brief for the project.

All sources of information and statistics have to be clearly referenced and acknowledged alongside the date of publications in the EIA [Department of Environment (DOE) Notice 1/2012 dated 6 Jan 2012]. References for all maps, photos and diagrams will also need to be included in the EIA.

4.3 PRIMARY DATA COLLECTION

Primary data is collected to fill in gaps in information or to obtain first-hand data for detailed assessment. Common methodologies include site surveys and sampling programmes at-site and off-site.

The sampling and assessment area shall be bounded by the Zone of Study (ZOS). However, if the impact is much further away, then the Zone of Impact (ZOI) shall be part of the sampling and assessment area. This has to be clearly defined in the EIA. An example of this is erosion and water pollution, for which the impacts are felt much further away than the ZOS to the ZOI. Hence, the latter must be included in the assessment study.

Data collection covers three major environmental components:

4.3.1 Physico-chemical Environment

In line with the DOE's environmental mainstreaming, the EIA study shall focus on the core aspects of pollution in the physico-chemical environment, which are water, air and wastes. Baseline information on these three core aspects are needed to determine the state of the environment before, during, and after project implementation when benchmarked against the DOE standards.

A baseline sampling plan, which includes locations, methods of sampling, frequency and parameters to be sampled, shall be decided based on the project site. Details of the sampling plan and schedule (person in charge, time, date and location of sampling) must be clearly stated in the EIA.

Table 4.3.1 provides a range of baselines for sampling and studies. The recommended parameters for water, air, noise and vibration, and the standards to benchmark them against, are provided as reference (refer to **Appendix D** for details).

All samples must be analysed by a *Skim Akreditasi Makmal Malaysia* (SAMM) accredited laboratory or equivalent.

All test certificates and data shall be included in the appendix of the EIA as supporting evidence (DOE Notice 1/2012 dated 6 Jan 2012).

4.3.2 Biological Environment

The biological environment is very wide ranging in scope. The relevant agencies such as the Forestry Department of Peninsular Malaysia (JPSM) and the Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN) must be consulted prior to carrying out data collection, surveys and assessments of the results.

For national and state parks which include permanent reserved forests (PRF), wildlife sanctuaries, protected areas, etc. a lot of general information already exists in the various agencies, which can be referred to as secondary data. Similarly, other organisations such as Forestry Research Institute of Malaysia (FRIM), World Wide Fund for Nature (WWF), etc. have published research and inventories of flora and fauna in selected areas.

Specific to the project site when secondary data is unavailable, primary data will be collected because construction activities will cause secondary impacts to the fauna in the area. Their displacement will result in their population decline due in part to loss of habitats and lack of food sources. The survey will provide an indication of the types of animals found in the area or vicinity, so that a wildlife management plan can be developed if needed. Rare plants can also be relocated within another area in the park.

The scope and requirement for the biological studies are to be determined by the respective Government Agencies (GAs), and assessment reports are to be approved by the said GAs before incorporation of the findings as part of the EIA report (refer to **Table 4.3.2**). If the biological impact of the Project is not significant, then, secondary data would suffice.

4.3.3 Human Environment

Socio-economic data such as population can be obtained from the census but for an accurate population statistics in the parks and its vicinity, these data are best collected from the local authorities, district offices (PTD), *ketua kampungs*, park managers, etc. Focal group discussion (FGDs) and direct person-to-person interviews can be used to collect population profiles while information on the Orang Asli can be obtained from Jabatan Kemajuan Orang Asli (JAKOA).

The Project Proponent shall abide by the requirements, guidelines and procedures of PLANMalaysia in carrying out a Social Impact Assessment (SIA). PLANMalaysia shall review, endorse and enforce the requirements of the SIA. For the purpose of the EIA, only the main findings from the SIA shall be incorporated.

Other aspects that may affect communities within the vicinity of the project site shall be considered if they are deemed as significant issues. The requirements may include, but not be limited to, public health, heritage and culture, archaeology and traffic (refer to **Table 4.3.2**). The findings of these studies must be incorporated into the EIA.

Table 4.3.1: Recommended Sampling Requirements for EIA Studies

Aspect	Recommended Parameter		Guidelines/Standards	Recommended Requirements
River Water Quality	**In-situ Measurements** • Dissolved Oxygen (DO) • Temperature • Conductivity • pH **Ex-situ Analysis** • Biochemical Oxygen Demand (BOD) • Chemical Oxygen Demand (COD) • Total Suspended Solids (TSS) • Ammoniacal Nitrogen (AN) • Mercury (Hg) • Cadmium (Cd) • Chromium Trivalent (Cr^{3+})	• Chromium Hexavalent (Cr^{6+}) • Arsenic (As) • Cyanide (CN) • Lead (Pb) • Copper (Cu) • Manganese (Mn) • Nickel (Ni) • Tin (Sn) • Zinc (Zn) • Boron (B) • Iron (Fe) • Phenol • Free Chlorine (Cl_2) • Sulphide (S^{2-}) • Oil and Grease (O&G) • Total coliform • Faecal coliform	National Water Quality Standards of Malaysia (NWQS)	• One time composite sampling. • Upstream and downstream of major rivers and streams within the ZOI. • Minimum two sampling locations (depending on river type) • Multi-depth sampling for deep rivers (>1 m deep). • Water quality parameters shall be selected based on the site conditions.

Aspect	Recommended Parameter		Guidelines/Standards	Recommended Requirements
Estuarine and Marine Water Quality	**In-situ Measurements** • DO • Temperature • Conductivity • pH • Turbidity • Salinity	**Ex-situ Analysis** • TSS • As • Cd • Cr^{6+} • Cu • Pb • Hg • Zn • CN • Ammonia (Unionised) • Nitrite (NO_2) • Nitrate (NO_3) • Phosphate (PO_4) • Phenol • O&G • Faecal coliform • *E. Coli** • Enterococci*	Malaysia Marine Water Quality Criteria and Standards (MMWQCS)	• Only if site is adjacent to coastal areas. • Sampling must be at least 100 m from coastline. • Sampling done for high tide and low and spring and neap tides, once each. • Multi-depth sampling (top, middle and bottom). • Minimum five sampling locations. Note: * DOE Notice 3/2014 dated May 2014 for projects located near recreational and/or tourist beaches

Aspect	Recommended Parameter		Guidelines/Standards	Recommended Requirements
Lake Water Quality	**In-situ Measurements** • DO • Temperature • Conductivity • pH • Turbidity	**Ex-situ Analysis** • TSS • AN • Nitrite (NO_2) • Nitrate (NO_3) • Phosphate (PO_4) • Chlorophyll a • O&G • Faecal coliform • *E. Coli*	NWQS/Putrajaya Lake Water Quality Standards	• One time composite sampling. • Sampling: Inlet, middle and outlet of lake (more for large lakes of >1 ha). • Multi-depth sampling, top, middle and bottom (depending on lake depth). • Water quality parameters shall be selected based on the site conditions.
Air Quality	• $PM_{2.5}$ *1 • PM_{10} *1 • Carbon Monoxide (CO)*2 • Sulphur Dioxide (SO_2)*2 • Nitrogen Dioxide (NO_2)*2 • Ozone (O_3) *2*3 Source: DOE Notice 1/2015 dated Mar 2015		Malaysian Ambient Air Quality Standards (MAAQS)	• Parameters to be sampled are dependent on site conditions. • One time sampling at minimum two stations (upwind and downwind). • Project boundary and nearest receptors. Note: *1 24-hrs *2 1-hr *3 Ozone needs to be measured for selected projects only. Justification needs to be provided for its omission.

Aspect	Recommended Parameter	Guidelines/Standards	Recommended Requirements
Noise Level	• L_{Aeq} • L_{Max} • L_{Min} • L_{10} • L_{50} • L_{90}	Guidelines for Environmental Noise Limits and Control (DOE)	• Parameters to be sampled are dependent on site conditions and need. • One time sampling (24-hrs for day time and night time). • Project boundary and nearest receptors.
Vibration	• Requirements as per Schedules 1 – 6 of the Planning Guidelines for Vibration Limits and Control	The Planning Guidelines for Vibration Limits and Control	• Parameters to be sampled are dependent on site conditions and need. • One time sampling (1-hr for day time and night time). • Project boundary and nearest receptors.

Note: The list above is indicative and non-exhaustive. The Project Proponent and Qualified Person shall include and provide any additional baseline sampling including parameters, as required by DOE, other GAs and/or deemed necessary for the project.

Table 4.3.2: Additional Sampling and Study Requirements

Aspect	Recommended Parameter	Reference	Sampling Requirements	Approving Authority
Geology and Soil	• Site topography based on land surveys. • Soil profile analysis including K-value for erosion analysis.	• JMG/JKR requirements	• Soil Investigation (SI). • Hand auger (determine K-value).	• Minerals and Geoscience Department (JMG) • Public Works Department (JKR)
Hydrology	• Stream flow. • Riverbed cross section.	• DID requirements	• Site survey to verify river system and drainage. • Stream gauging to ascertain flow and river bed cross-section. • Identification of downstream sensitive receptors.	• Department of Irrigation and Drainage (DID)

Aspect	Recommended Parameter	Reference	Sampling Requirements	Approving Authority
Ecological Assessment	• Habitat mapping • Species inventory (including photographs) • Abundance and diversity assessment **Terrestrial Flora and Fauna** • Flora inventory • Mammals • Avian • Herpetofauna **Aquatic and Marine Flora and Fauna** • Mangroves, coral reefs and seagrass beds • Turtle landing areas and sanctuaries • Fishery resources • Phytoplankton and zooplankton • Benthic organisms • Marine flora & fauna	• International Union on the Conservation of Nature (IUCN) Red List • Wildlife Conservation Act 2010 (Act 716) • Fisheries Act 1985 (Act 317)	• Terrestrial: Surveys within project site and adjacent. • Aquatic and marine: Within coastal project site and ESAs (Planktons, coral reefs, seagrass beds, artificial reefs, etc.) • Fishing grounds and reserves.	• JPSM. • PERHILITAN. • Department of Fisheries (DOF).

Aspect	Recommended Parameter	Reference	Sampling Requirements	Approving Authority
Landuse	• Current landuse • Future and committed landuse • Sensitive receptors • Zoning and compatibility	• Structure and local plans • Park Management Plan	• Site surveys. • Mapping to update information. • Within the ZOI.	• PLANMalaysia • JPSM • PERHILITAN
Social Impact Assessment (SIA)	• Population profile • Identification of stakeholders • Perception survey	• Manual for SIA of Project Development	• Carried out as part of the SIA. • Surveys on target groups potentially affected by the project. • Surveys shall represent the stakeholders in the ZOI. • Stakeholder engagement conducted.	• PLANMalaysia
Public Health	• Population profile • Public health status	• Guidance Document on Health Impact Assessment (HIA) in EIA	• Carried out as part of the HIA. • Surveys on target groups potentially affected by the project. • Surveys shall represent the stakeholders in the ZOI. • Stakeholder engagement be conducted.	• Ministry of Health (MOH)

Aspect	Recommended Parameter	Reference	Sampling Requirements	Approving Authority
Traffic	• Traffic count for peak traffic periods	• JKR requirements	• Carried out as part of the Traffic Impact Assessment (TIA). • Traffic surveys at major junctions leading to project site.	• JKR
Wastes	• Estimation of biomass from site clearing. • Potential waste (biomass, domestic, construction & demolition, scheduled wastes) generation.	• DOE and PBT requirements	• Site surveys to ascertain existing site conditions.	• DOE • PBT
Heritage, Culture and Archaeology	• Identify and determine significance of value of such sites within or near to project site.	• National Heritage Register	• Site surveys and interviews with authorities and locals.	• National Heritage Department. • Department of Museum. • Jabatan Kemajuan Orang Asli (JAKOA)

Note: The list above is indicative, non-exhaustive and may not be relevant to the project. It is the responsibility of the Project Proponent and Qualified Person to include and provide any additional information required by the GAs from the outcome of stakeholder engagements.

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CHAPTER 5

ENVIRONMENTAL IMPACT ASSESSMENT: EVALUATION OF IMPACTS

5.1 INTRODUCTION

There are many methods to assess the environmental impacts. Generally, all methods of impact assessment seek to compare the existing environment against a predicted future environment caused by activities during different phases of project implementation.

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

(i) Established and proven methods and models.
(ii) Adequate, accurate and up-to-date data for assessment.
(iii) Results can be replicated and is reproducible by independent evaluators.
(iv) Cost-effective and for any software, it can be purchased (propriety software and tools can also be used). Widely accepted freeware is acceptable.

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

Only significant issues shall be assessed in detail in the EIA. Issues that are not significant shall only be addressed qualitatively.

5.2 PREDICTION AND EVALUATION OF IMPACTS

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

(i) Scale of the project (land area, total disturbed areas, etc.).
(ii) Intensity of development (total land clearing, phasing of land clearing).
(iii) Potential pollution sources from the project.

(iv) Magnitude and complexity of impacts.
(v) Area of impacts (localised versus transboundary).
(vi) Probability of cumulative impacts (effects of project on adjacent land areas and *vice versa*).
(vii) Sensitivity of nearby receptors [e.g. Environmentally Sensitive Areas (ESAs)].

Table 5.2.1 provides a list of typical significant components and impacts related to development in national and state parks as a guide. Photo inventories are very important evidences in the evaluation exercise and should be provided (see examples in **Figure 5.2.1**).

Key assessments include, but are not limited to, the following:

5.2.1 Ecology

Assessment Requirements

(i) Mapping of important habitats and ESAs, e.g. forest reserves, mossy forests, lakes and wetlands, etc.
(ii) Inventory of existing flora and fauna (terrestrial, aquatic and/or marine) in the project area and surrounding impact zones to ascertain the level of biodiversity.
(iii) Identification of critical species benchmarked with the lists published by the International Union for Conservation of Nature (IUCN) red list or similar references. The assessment can be based on field surveys (animal trapping, baiting, camera traps, and observations of secondary animal signs) or literature review to produce the inventory.
(iv) Recommendation of mitigation measures if there are any important flora and fauna that are in need of relocation or protection.

Evaluation of Impacts

(i) Determination of the level of encroachment into ESAs such as permanent reserved forests (PRF) or ecologically rich habitats.
(ii) Indication of possible loss of habitat and its flora and fauna, which may include endemic, rare, endangered, threatened and/or near extinct species.
(iii) Identification of project activities that could disturb animal behaviour, leading to their dispersal afar or limiting their range.

(iv) Effects of increased accessibility to the project site and opening up of pristine areas, e.g. to establish access roads, leading to poaching risks.
(v) Impacts from increased human-wildlife conflicts (HWC).
(vi) Impacts from operational activities e.g. tourism and recreation to the integrity of the park and ecosystem.

Output

(i) Highlight important areas (through the habitat map) which should not be built-upon or if there is no other option to determine suitable mitigation measures to minimise the impacts or replace the lost area.
(ii) Identification of critical areas to incorporate mitigation measures such as viaducts to allow for safe passage of animals or need to translocate important species at risk from the project, and how to go about it.
(iii) Develop wildlife management plan.

5.2.2 Erosion and Sedimentation

Assessment Requirements

(i) Assessment of the scale of land clearing and removal of vegetative cover at the site to determine the rate of erosion.
(ii) Assessment of the conditions of the hydrological and drainage systems and how they may be altered as streams and rivers are diverted and/or become silted up or filled in, leading to increased runoff volume and velocity while their retention time and infiltration rates are reduced.
(iii) Assessment of the extent of erosion and sedimentation that will likewise affect the aquatic ecology and water pollution downstream.
(iv) Determination of suitable best management practices (BMPs) and mitigation measures to reduce the effects of erosion and sedimentation.

Evaluation of Impacts

(i) Calculate the rate of soil erosion and sediment yield using standard formulae and site specific information (surveys, soil particle analysis, terrain characteristics, hydrological data, etc.), to determine the extent of erosion and sedimentation as a result from land clearing.
(ii) Provide erosion scenarios such as with or without mitigation measures in the assessment.

(iii) Run simulation to determine the BMPs that shall be adopted to minimise the negative effects.

Output

(i) Adoption of avoidance principles in the design and layout of the project to avoid sensitive areas or in designing technical and engineering solutions to minimise erosion and sediment plume.
(ii) Identify suitable BMPs to be incorporated in the project through the land-disturbing and pollution prevention and mitigation measures (LD-P2M2) based on the modelling results.

5.2.3 Hydrology

Assessment Requirements

(i) Assessment on the scale of land clearing and alterations to the hydrological and drainage characteristics of the site.
(ii) Determination of the scale of the drainage system that may also be altered to take in the storm flows from the project development.
(iii) Evaluation of the hydrological conditions before and after project development such as higher peak flows, increased velocities at critical points in the lowlands downstream for any localised flooding.
(iv) Determination of impacts to downstream users, e.g. water treatment plants (WTPs), water intake points (WIPs), aquaculture areas, recreational areas, etc.

Evaluation of Impacts

(i) Delineate the river basins encroached on by the project and river systems within that are affected.
(ii) Collect hydrological data and assess long-term rainfall trends.
(iii) Use mathematical or simulation models to ascertain the different hydrological conditions pre- and post-project implementation.
(iv) Determine the potential impacts and provide appropriate mitigation measures as part of the Land-Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2), to minimise any adverse effects within and surrounding the project site.

Output

(i) Runoff hydrographs detailing pre and post-development runoff scenario and flood risk maps.
(ii) The hydrological and drainage systems of the project site and its impacts on surroundings will form part of the technical and engineering works.
(iii) However, the types of mitigation measures needed will be proposed by the Qualified Person to be incorporated in the LD-P2M2, mainly to ensure reductions in flow velocity and volume during the land clearing, construction and operational phases.

5.2.4 Water Quality

Assessment Requirements

(i) Assessment of the types and scale of impairment to water quality of the rivers and streams at the project site and the surrounding areas.
(ii) Determination of potential sources that include siltation from land clearing and earthworks (see also erosion and sedimentation), biomass degradation, sewage and sullage discharge from worker quarters and oil and grease (O&G) spills.
(iii) During operations, improper treatment of sewage can also contribute to increased nutrients into the waterways, leading to their ecological degradation and thus its impacts on users need to be ascertained.

Evaluation of Impacts

(i) There is a variety of models to determine pollution loadings in the rivers and waterways. Choose the most suitable model to simulate the loading and determine the magnitude and extent of the impacts further downstream especially for key water pollutants indicators [biochemical oxygen demand (BOD), ammoniacal nitrogen (AN) and coliform].
(ii) At the project site, identify potential water polluting sources (toilets, worker quarters, canteen, batching plant, workshops, etc.). This will determine the development of BMPs for the site.
(iii) For the downstream section of the rivers, to identify the users and sensitive habitats and determine the impacts if any.
(iv) Determine whether the pollution load will affect any WIPs, WTPs, sensitive ecological habitats, etc.

Output

(i) Suitable BMPs and treatment systems identified to minimise the effects of discharges to the waterways, e.g. silt traps, sewage treatment systems, etc.
(ii) Effectiveness of these BMPs can be simulated to estimate load reductions, ensuring pollutants are controlled at-site to reduce off-site impacts to meet the requirements and standards of various agencies.

5.2.5 Waste Management

Assessment Requirements

(i) Identification of the types of wastes generated during construction and operations such as biomass, scheduled, construction, domestic and municipal wastes and their impacts.
(ii) Assessment of the impacts from these wastes and required management measures required to be carried out.

Evaluation of Impacts

(i) Identify and estimate the quantum of all waste sources with the assistance of the technical and engineering consultants.
(ii) Assess the severity of impacts from improper management of such wastes on water quality (leachate), odour, air quality and public health.
(iii) Identify locations of temporary storage areas within the project site.
(iv) Identify locations where the wastes will be eventually disposed off.

Output

(i) Identification of proper temporary disposal sites and storage facilities for wastes generated on-site including mitigation measures against spillage and other impacts.
(ii) Mitigation measures for proper waste management to be incorporated into project site management to ensure that all wastes are properly managed and disposed off at designated locations so as not to pollute the environment.

5.2.6 Social Impacts

Assessment Requirements

(i) The key feature is to determine whether there is land and property acquisition and relocation of communities (i.e. Orang Asli). These issues often cause psychological, emotional and impacts to those who are affected and have to be handled with great care.

(ii) Assess to extent of impacts from dust, pollution, noise, hazards, etc. on nearby communities and worker at-site. However, the project can also provide positive benefits such as increased job opportunities and business to the local population.

(iii) Assess the views and perception of the affected stakeholders and if their inputs, recommendations and requirements of the project and mitigation measures to address their concerns.

(iv) Determination of park carrying capacity is also crucial to ensure that future activities shall not result in exceedance, which may result in deterioration of the environment, increase in utility and amenity demand, impairment of natural resources and functions, and degradation of quality of tourism and recreational services.

Evaluation of Impacts

(i) Identify the extent of land acquisition and affected stakeholders.

(ii) Delineate the survey catchment and determine statistically, the number of representative surveys required to ensure reliability and representativeness of the stakeholders. For the EIA, the impacts are evaluated mainly on the communities living within the Zone of Study (ZOS). If there is a need, those in the ZOI will also be assessed in terms of the impacts on them.

(iii) Data for surveys can be obtained through FGDs, interviews and site questionnaire surveys. Findings shall be analysed and the output assessed.

(iv) The main findings from the Social Impact Assessment (SIA) shall be incorporated in the EIA.

(v) For the case of national and state parks, the carrying capacity and also impacts on tourism and recreation shall also be assessed.

Output

(i) Land and property acquisition and relocation of communities must be settled first by the Project Proponent prior to EIA commissioning and submissions.
(ii) The findings from the social impacts, mainly from surveys and FGDs can be contentious and often skewed. Therefore, the assessments should have overall on-the-ground judgements even after the surveys are interpreted by the Qualified Person.
(iii) Assessment of the carrying capacity of the parks to determine if any exceedance and also the required increase in infrastructure, amenities and utilities required to sustain the increase in people during and post-construction.

5.2.7 Air Quality and Noise

Assessment Requirements

(i) Air Quality: Identification of potential air pollution generating sources from the project site and nearby sensitive receptors that may result in elevated dust levels and dispersions from construction and rock blasting works.

(ii) Noise Levels: Assessment of high ambient noise environment and activities that pose impairment hazards to the workers, wildlife and any nearby receptors from machineries and equipment on-site.

Evaluation of Impacts

(i) Air Quality: Air quality models are mainly Gaussian-based and many are available in the market. Use the most suitable one to simulate the air pollutant dispersion patterns and map it to determine the range of impacts. The level of pollutants pre and post-development shall be assessed for the major sensitive receptors.

(ii) Noise Levels: This again can be modelled or calculated based on increases in noise levels, mapped as noise contours over a given area. Impact of noise on wildlife is another aspect that can be looked into on how noise affects the normal behaviour of animals.

Output

(i) Both air and noise model simulations shall identify the extent of the potential impacts to any nearby sensitive receptors.
(ii) Critical levels for pollutants at sensitive receptors shall be identified to be mitigated to ensure the levels are within acceptable limits and to ensure those working in such areas are protected against.

5.2.8 Land Traffic

Assessment Requirements

(i) Description of how construction materials, workers and machinery are mobilised to/fro from the construction site. Higher vehicle volume can cause congestion, damaged roads, material spillage and increased risk of road accidents.
(ii) Identification of the need for mitigation measures during construction and operational phases for traffic management.

Evaluation of Impacts

(i) Review and incorporate the main findings from the Traffic Impact Assessment (TIA) into the EIA. The TIA is carried out separately by a Traffic Consultant and endorsed by the Public Works Department (JKR). This is confined to public road access to the park only, if any.
(ii) The main impact elements (risk to accidents, air quality and public health) for the EIA are communities living along the logistic road during construction.
(iii) During the operation phase, the extra volume of traffic generated by the project will also affect any communities along the road, and shall be assessed.

Output

(i) Identification of potential issues related to traffic during construction and operations and incorporation of structural and non-structural measures to address these issues as proposed by the TIA Consultants.
(ii) Identification of risk factors from various activities to nearby communities, such as from accidents, health, etc.

5.2.9 Safety and Health

Assessment Requirements

(i) Construction entails higher risks to the safety and health of the workers and any surrounding communities from pollution, diseases, accidents and hazards, and these risks are to be assessed.

Evaluation of Impacts

(i) Use risk assessment models to ascertain the level of risk from specific activities.
(ii) Determine the level of risk to neighbouring receptors to ascertain whether the level is within acceptable levels.
(iii) In terms of health, surveys on existing health conditions of receptors can assist in monitoring for sudden decrease in community health during pre- and post- project implementation.
(iv) For workers, possible impacts on their safety and health in the line of work shall be assessed, e.g. working in high noise areas, handling hazardous materials, confined spaces, at height, etc.
(v) Assess requirements for park operations to ensure the safety of tourists and visitors including medical facilities and treatment, emergency response plan, evacuation plans, guides, etc.

Output

(i) The qualitative/quantitative risk to receptors can assist to determine the types of BMPs necessary to reduce the risks.
(ii) Findings from the Health Impact Assessment (HIA) can also provide possible preventive and mitigation measures to safeguard worker and community health during construction and operation.

5.2.10 Summary

Table 5.2.1: Typical Issues and Impacts from National and State Parks Development

Issues	Impacts
Ecology	**Earthworks and construction** • Disturbance and possibly loss of habitats. • Loss of riparian and terrestrial habitats and associated flora and fauna in affected areas. • Forest fragmentation. • Exploitation of forest resources, e.g. firewood harvesting, bush meat, pet trade, etc. by workers and poachers. • Introduction of alien and invasive species. **Operation** • Tourism impacts on natural resources if exceeding carrying capacity. • Human disturbances affect normal animal behaviour and pattern. • Resource damage by visitors, e.g. trampling of grasses, chopping of trees, litter, etc. • Human-wildlife conflicts (HWC).
Erosion and Sedimentation	**Construction** • Soil erosion and sedimentation. • Terrestrial and aquatic ecological damage. • Riverbank collapse.
Water Quality	**Earthworks and construction** • Water pollution from soil erosion and sedimentation. • Impacts to downstream water users, e.g. water intake points (WIPs), recreational areas, aquaculture farms, lakes, coastal areas, settlements, etc. • Soil contamination and water pollution due to leakage of oil and chemicals from equipment and machinery operations. • Sewage and sullage from toilets and work camps. • Scheduled waste contamination in water courses. **Operation** • Sewage and sullage from operations and STPs. • Waste disposal from tourist facilities. • Eutrophication.

Issues	Impacts
Wastes	**Earthworks** • Biomass wastes from land clearing. • Construction and demolition (C&D) wastes. **Construction** • Solid wastes from work camps and top-side development. • Scheduled wastes from workshops and refuelling stations can result in land and water contamination. • Odour and unsightliness from improper waste management. **Operation** • Waste management.
Social Impacts	**Earthworks** • People (Orang Asli) may require relocation. • Nuisance and disturbance to nearby communities and tourists. • Affects access of the fishing community. **Construction and operation** • Increase job opportunities, employment and business. • Conflicts due to presence of foreign workers. • Loss to tourism during construction period. • Increased demand for facilities, utilities and amenities. • Increased tourism activities may result in overcrowding.
Air Quality	**Earthworks and construction** • Dust generation from earthworks and vehicular movement. • Emission from fuel burning equipment. • Open burning by workers. • Health problems of workers and nearby residents. **Operation** • Increased emission from vehicular traffic.
Noise	**Earthworks and construction** • High noise levels from piling, demolition works, construction, machineries and vessels. **Operation** • Noise from human activities and vehicular traffic.

Issues	Impacts
Land Traffic	**Earthworks, construction and operation** • Heavy vehicle access along public roads. • Spillage onto roads. • Traffic congestion. • Damage to roads. • Safety risk to road users and communities.
Safety and Health	**Earthworks and Construction** • Work-related injuries. • Improper waste management attracts pests and scavengers. • Risk of communal disease spread. • Accidents. **Operation** • Water-related hazards. • Safety and health risks. • Public health due to polluted waters.
Visual Impact	**Earthworks** • Loss of vista. • Reduced quality of life. **Operation** • Landscaping will improve overall aesthetics.

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

Loss of natural habitat to development

Forest fragmentation

Introduction of alien and invasive species

Poaching and illegal trafficking

Natural disasters

Human-wildlife conflicts

Orang Asli communities

Impacts from unsustainable tourism

Note: Photos sourced from online sources and used based on creative common fair use policies, all rights reserved to their respective owners.

Figure 5.2.1: Photo Inventory of Common Impacts associated with National and State Park Development Projects

5.3 PREDICTION METHODS AND TOOLS

There is a wide range of predictive tools and models for evaluation and prediction of impacts. Among the accepted methods and tools are:

(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.

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 local conditions of the site.

The EIA Report must be scientifically and technically sound and whenever necessary, quantitative impact prediction on the more significant impacts should be carried out. If computer modelling is carried out, e.g. for water and air quality assessment, flooding etc, 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.

All modelling exercises carried out shall capture the impacts under various scenarios, either for short-, mid- to long-term for the worst-case scenario. The outputs of the modelling studies shall be presented in a concise manner and all uncertainties shall be discussed.

Technical reports, data analysis and tables and raw data, where necessary, shall be included as appendix in the EIA to support the impact assessment methodology.

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.

Tables 5.3.1 summarises examples of the available and accepted predictive 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 5.3.1: Examples of Prediction Methods for Environmental Impacts

Impacts	Prediction Methods	Output
Erosion and Sedimentation	• Revised Universal Soil Loss Equation (RUSLE). • Modified Universal Soil Loss Equation (MUSLE). • Computer models.	• Soil loss and sediment yield. • Erosion risk and potential soil loss maps.
Hydrology	• Computer models for estimating runoff, flood peak, 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 *Manual Saliran Mesra Alam Edisi-2* (MSMA-2) and approved by Department of Irrigation and Drainage (DID).	• Estimation of pre-construction and post-construction runoff. • Flood risk map.

Impacts	Prediction Methods	Output
Water Quality	• 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. • For estuarine and marine environments, hydrodynamic models such as MIKE21, Delft3D, etc. • Operational sewage discharge modelled using Qual2K or Delft3D or MIKE11.	• Estimation of total suspended solid (TSS) (erosion), Biochemical Oxygen Demand (BOD) and Ammoniacal Nitrogen (AN) (sewage) concentrations affecting rivers and downstream sensitive areas. • Estimation of pollution loads and extent of effects on sensitive receptors.
Air Quality	• Gaussian plume dispersion models to assess dust generation and gas dispersion over an area under the worst case scenario.	• Dispersion contour maps to indicate 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	• 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.	• Quantitative values for noise levels at sensitive receptors. • Noise contour maps indicating levels at sensitive areas. • Comparison of computed values to DOE's permissible noise limits.

Impacts	Prediction Methods	Output
Ecology	• Habitat mapping to determine population of rare, endangered, threatened and near extinct species. • Assessment of bird fly ways, wildlife ranges and population groups, feeding grounds, migration routes, etc. • Comparative assessment of conservation status and sensitivity of habitat, flora and fauna. • Ecological models for species diversity and population change. • Ecological carrying capacity assessment based on population of visitors and other criteria. • Limit of Acceptable Change (LAC). • Spatial models such as GLOBIO3.	• Identification of sensitive habitats and occurrence of rare, endangered, threatened and near extinct species that may require protection. • Delineation of areas appropriate for development, i.e. away from Environmentally Sensitive Areas (ESAs) based on avoidance principle. • Ecological carrying capacity defined to minimise damage to the natural resources, habitats and species.
Social Impacts	• Social and economic surveys on affected population. • Perception survey to ascertain acceptance of project. • Social Impact Assessment (SIA).	• Socio-economic profiling. • Public opinion survey results. • Stakeholder feedbacks including mitigation measures.
Landuse	• Compatibility assessment based on structure plan, local plan and other guidelines. • Adherence to the required buffers based on National and state guidelines.	• Landuse compatibility and buffer requirements.
Public Health	• Qualitative/quantitative health risk assessment (HRA) encompassing hazard identification, exposure assessment and risk characterisation.	• Potential health impacts to nearby population.
Biomass	• Estimation on total biomass based on vegetation types and published studies values.	• Predicted biomass waste generation.

Impacts	Prediction Methods	Output
Scheduled Wastes	• Identification of potential scheduled wastes generation during construction and operations based on project activities.	• Predicted scheduled waste generation.
Solid Wastes	• Waste generation estimation based on population.	• Predicted waste generation.
Infrastructure and Utilities	• Existing demand estimation methods by regulators e.g. Population equivalent (P.E.) calculations [National Water Services Commission (SPAN)]. • Comparison of existing supply to meet future demand to determine adequacy.	• Estimates of demand.
Aesthetics	• Visual assessment on scenic and aesthetic quality of the area. • Analyses of unique (physical, geological, ecological) scenic values and comparative assessment with and without project. • 2-D and 3-D Viewshed Analysis. • Economic valuation.	• Before and after scenario. • Qualitative.

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

5.4 CRITERIA AND STANDARDS

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/or various Government Agencies (GAs) (refer to **Appendix D**).

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 5.4.1 provides a list of the evaluation criteria for various environmental components as a guide.

Based on the prediction methods and tools, the outcomes shall be derived (see **Box 8**).

Table 5.4.1: Criteria and Standards for Environmental Parameters

Impacts	Evaluation Criteria
Erosion and Sedimentation	**Guidance Documents** (a) Guidance Document for Addressing Soil Erosion and Sediment Control Aspects in the EIA Report (DOE, 2016). (b) Guidance Document for the Preparation of the Document on LD-P2M2 (DOE, 2016). (c) Guidelines for Erosion and Sediment Control in Malaysia (DID, 2010). (d) *Manual Saliran Mesra Alam Edisi-2* (MSMA-2) (DID, 2012). **Sediment basin/silt trap discharge** (a) TSS: 50 mg/L or 100 mg/L, depending on locality. (b) Turbidity: 250 NTU.
Water Quality and Pollution Control	(a) Ambient water quality: National Water Quality Standards (NWQS). (b) Ambient marine water quality: Malaysia Marine Water Quality Criteria and Standards (MMWQCS). (c) Sewage discharge: Environmental Quality (Sewage) Regulations 2009. (d) Toilets and septic tanks: SPAN approved design and requirements.
Flood/Runoff Management	MSMA-2 (DID, 2012) requirements.
Air Quality	(a) Environmental Quality (Clean Air) Regulations 2015. (b) Malaysian Ambient Air Quality Standards (MAAQS).
Noise Level	(a) The Planning Guidelines for Environmental Noise Limits and Control 2nd Edition (DOE, 2007). (b) Factories and Machinery (Noise Exposure) Regulations 1989.
Vibration	(a) The Planning Guidelines for Environmental Vibration Limits and Control 2nd Edition (DOE, 2007).

Impacts	Evaluation Criteria
Ecology	(a) International Union on the Conservation of Nature (IUCN) and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) listing. (b) Fisheries Act 1985. (c) Wildlife Conservation Act 2010. (d) Feedback from the Department of Fisheries (DOF), PERHILITAN and Forestry of Department Peninsular Malaysia (JPSM).
Landuse	(a) Structure Plans, Local Plans, Special Area Plans (SAP). (b) Environmental Sensitive Area (ESA) Listing under the National Physical Plan-3 (NPP-3) (JPBD, 2016). (c) Park Management Plan. (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 Occupational Safety and Health (DOSH) requirements. (d) International Labour Organisation (ILO) and other guidelines. (e) Guidance Document on HIA in EIA (DOE, 2004). (f) EIA Guidelines for Risk Assessment (DOE, 2004). (g) Park Management Plan.
Social Impacts/ Heritage, Culture and Archaeology	(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) Social Impact Assessment (SIA) requirements in the context of the Town and Country Planning Act (Amendment) 2017 (Act A1522) for three categories: (i) SIA 1: Development projects under subsection 20B(1) and (2) of Act A1522 for coastal reclamation projects and major national infrastructure. (ii) SIA 2: Development projects under subsection 22(2A) Act 172 for new township development for population over 10,000 people or covering area over 100 ha or both, major national infrastructure and development in slope and hill areas. (iii) SIA 3: Any other development projects with significant social impacts as ordered by the National Physical Planning Council (MPFN) from time to time.

Impacts	Evaluation Criteria
Wastes	**Scheduled wastes** Environmental Quality (Scheduled Wastes) Regulations 2005. **Other wastes** (a) Solid Waste and Public Cleaning Management Act 2007. (b) Local authority requirements.
Treatment Systems	(a) Technical Guidance Document on the Design and Operation of Industrial Effluent Treatment Systems (DOE, 2015). (b) Technical Guidance Document on Performance Monitoring of Industrial Effluent Treatment Systems (DOE, 2015). (c) Technical Guidance Document on Performance Monitoring of Air Pollution Control Systems (DOE, 2006).
Visual Aesthetics	Public perception on acceptability.

Notes:

(i) Refer to **Appendix D** for details on specific standards and limits.

(ii) 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.

Box 8:
Outcomes from Impact Assessment

(i) No Impact: This scenario occurs when there are very low to no sensitive receptors in the vicinity of the project to receive the impacts. Examples are communities living very far away, where they are only indirectly affected such as through traffic along the main roads. Another scenario is when there are terrain constraints such as steep slopes, but the Project Proponent has decided to redesign the layout without affecting these areas.

(ii) Significant Impact: This scenario is based on the predictive results. In the assessment, if the results showed that the project will generate detrimental impacts, then mitigation measures will have to be provided to address the issues. Any residual impacts shall also be clearly stated in the EIA.

(iii) Non-significant Impact: Impacts will inevitably occur in project development but it may not result in significant exceedance of the accepted criteria or standards. An example is TSS from erosion and sedimentation. The TSS emanating from land clearance that abides by Class II waters of the NWQS is acceptable. Under this scenario, the impact is classified as non-significant, with the level of impact abiding by the stipulated criteria and standards.

CHAPTER 6

ENVIRONMENTAL IMPACT ASSESSMENT: MITIGATION MEASURES

6.1 INTRODUCTION

The focus of this Chapter is on the pollution prevention and mitigation measures (P2M2) to sustain the integrity of the project and its surrounding areas, through:

(i) Avoidance of negative impacts through selection of best options/alternatives.
(ii) When an adverse impact cannot be avoided, to adopt appropriate preventive measures and best management practices (BMPs) to reduce and minimise the impacts.
(iii) Ensure residual impacts are kept within acceptable levels.

6.2 LAND DISTURBING POLLUTION PREVENTION AND MITIGATION MEASURES (LD-P2M2)

The LD-P2M2 is a mandatory requirement under the Department of Environment (DOE), to mainstream the environmental agenda towards a culture of guided self-regulation (GSR) by placing the onus of environmental protection and management clearly on the Project Proponent to comply.

The P2M2 is the most important section in an Environmental Impact Assessment (EIA) report. The P2M2 is required as long as there are land disturbing activities, or land-based activities that interface with the sea; subject to Section 34A of the Environmental Quality Act (EQA) 1974.

The Guidance Document for the *Preparation of the Document on LD-P2M2* is provided in Appendix 4 of the Environmental Impact Assessment Guideline in Malaysia (EGIM) (DOE, 2016).

6.2.1 Application of P2M2

The underpinning principles of P2M2s are to reduce environmental degradation and pollution through management measures best suited to the site conditions to preserve the integrity of the site and to ensure public safety. The general approach is by means of the following:

(i) The extent of the P2M2s shall correspond to the degree of significance of the predicted impact. Once an impact is identified as significant, P2M2s shall be recommended in the EIA (e.g. as part of the engineering designs for any reinforcement works, sediment control, etc.). For minor issues, simple management actions will suffice, e.g. water bowsing for dust control at site and hoardings for noise.

(ii) Priority shall be given to control at source (e.g. reducing erosion and surface runoff) than to rectify the impacts later on (e.g. maintenance of silt traps and removal of accumulated silt from the drainage system).

(iii) Mitigation has to be site and project-specific. The P2M2s need not be complex and costly, but shall instead be practical, easy to implement and effective.

(iv) The P2M2 shall include adequate explanations based on the design and function; and supported by diagrams, illustrations, photos and maps. The technical reports and specifications of the P2M2 shall be included as an appendix in the EIA.

(v) The use of new technology is encouraged if it can be proven to be effective in mitigating the impacts.

(vi) P2M2s require regular inspection, maintenance and rehabilitation. These shall be incorporated as part of the environmental management requirements of the project, including the allocation of sufficient budget for such a purpose.

(vii) Effectiveness of P2M2s shall be recorded and documented as part of the monitoring and audit programmes (refer to **Chapter 7**).

(viii) The Qualified Person shall propose best management practices (BMPs), if deemed necessary.

(ix) The P2M2s and BMPs shall be incorporated early into the overall project design and as part of the LD-P2M2 document.

The submission of the EIA and the pledge given by the Project Proponent shall reflect a commitment towards ensuring the P2M2s are implemented during all stages of work activities. These efforts shall include but not limited, to measures, actions or due diligence in accomplishing the overarching goal of protecting the environment in project implementation.

6.2.2 LD-P2M2 Checklist

The information to be included is as per the LD-P2M2 Submission Checklist in **Table 6.2.1** adapted from the EGIM (DOE, 2016). All submissions shall be accompanied by relevant technical drawings and maps.

Table 6.2.1: Standard Requirements for the LD-P2M2 Submission

Requirement	Information to be Included
Project Activity and Implementation	• Phasing plan. • Project implementation schedule. • Description of construction activities. • Construction schedule complete with timeline or charts for P2M2s installation. • Construction method statements.
Information and Analysis on Project Development	• Selected weather and rainfall data. • Site runoff velocity and flow rates (pre- and post-development). • Description of 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.

Requirement	Information to be Included
	• 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	• 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.

6.3 POLLUTION CONTROL SYSTEMS

One of the main features in the LD-P2M2 is the use of pollution control systems. For any construction in national and state parks, the concerns are ecological impacts, erosion, slope failures and water pollution. It is judicious to plan and install P2M2s before land clearing and construction commence.

During the operational phase, top-side development will generate different types of pollutants, mainly from discharges of sullage, sewage and surface flows. Depending on the scale and volume of such pollutants, a pollution control system plan incorporating appropriate P2M2s is advocated together with specifications of the control equipment and the technical engineering maintenance works. The most common is for the Sewage Treatment Systems (STS). Other systems, whenever necessary, may include Industrial Effluent Treatment Systems (IETS), Air Pollution Control Systems (APCS) and Leachate Treatment Systems (LTS), if they are part of the overall project.

It has to be reiterated here that generally, large-scale projects are deterred from being constructed in the national and state parks.

The Project Proponent shall engage a Qualified Consultant to prepare the detailed designs of any Pollution Control Systems for the EIA study. The

Qualified Consultant must be a professional engineer who holds a current registration certificate issued by the Board of Engineers, and also be a certified Competent Person under Section 49A of the Environmental Quality Act (EQA) 1974.

Detailed requirements for specific pollution control systems and their applicability can be referred to in the Announcement by DOE dated March 2017.

6.4 P2M2S FOR NATIONAL AND STATE PARKS PROJECTS

The following sections provide the objectives and implementation steps for P2M2 for national and state parks projects:

6.4.1 Ecological Management

Objective: To safeguard the critical habitats and biodiversity of important flora and fauna from degradation during pre- and post-project implementation.

Implementation Steps

(i) The main purpose of national and state parks is for the protection of unique and important ecological systems that can be beneficially used for conservation, research, tourism and recreation. Thus, is it important that any development does not result in the degradation of these ecosystems. As policy dictates, only low impact development (LID) shall be allowed.

(ii) The avoidance principle shall be applied for any development within the national and state parks. The approaches shall include minimising the development areas, adoption of sufficient buffers, and confining earthworks, land clearing and construction activities, to within the designated work area. Although this may require more planning and time, it is worthwhile as a conservation strategy.

(iii) It is judicious to have a Park Management Plan for each national and state park, showing clearly areas where development and the types of activities that can be carried out. Any development on the said designated area can be confined and integrated into the Plan seamlessly.

(iv) Design of project components shall take into consideration the surrounding environment. Minimise the removal of vegetation and avoid cut and fill.

(v) Any sightings of rare, endemic, threatened, near extinct and endangered flora and fauna are to be notified to the relevant authorities such as the Forestry Department of Peninsular Malaysia (JPSM), Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN) and/or Department of Fisheries (DOF) for appropriate actions.

(vi) Large trees which are designated for conservation shall be clearly marked and not allowed to be felled. Rare and important flora species (including mosses, shrubs, saplings, etc.) may be required to be transplanted from the construction site, placed within a nursery and later replanted post-construction.

(vii) Any felling of trees of commercial value shall be notified to and approved by JPSM before any works are allowed. All felling protocols and requirements shall adhere to the guidelines set by JPSM.

(viii) Where forest fragmentation threatens the safe passage of animals, crossings, viaducts, bridges, etc. shall be provided. PERHILITAN and/or JPSM must be consulted for appropriate actions.

(ix) Degraded areas shall be rehabilitated after completion of construction.

(x) During operations, consideration of human-wildlife conflicts (HWC) shall be taken into account and managed.

Box 9:
P2M2 Checklist for Ecological Management

Earthworks and Construction

Measures to minimise disturbances to wildlife and flora. Examples include:

(i) Implement the Park Management Plan, if available.
(ii) Practice avoidance principle.
(iii) Ban on poaching.
(iv) Delineate work area.
(v) Notify relevant authorities (JPSM or PERHILITAN) of any sighting of rare, endangered, threatened and near extinct wildlife.
(vi) Wildlife Management/Relocation Plan.

Operation

In ESAs, the following requirements shall be adhered:

(i) Viaduct/animal crossings.
(ii) Signage to warn motorists.
(iii) Human-Wildlife Conflict (HWC) resolution mechanism.
(iv) Set rule and regulations against visitors damaging the environment and feeding the animals.
(v) Implement the Park Management Plan, if available.

6.4.2 Erosion and Sediment Management

(a) Site Clearing and Earthworks

Objective: To address soil erosion and sediments at source to reduce the impacts downstream affecting lowland communities and environmental sensitive areas (ESAs) near rivers and waterways.

Implementation Steps

(i) Establish proper scheduling and phasing of P2M2 implementation in accordance to the project implementations schedule.

(ii) Retain much of the natural vegetation by reducing the total worked area. Demarcate site and buffer areas.

(iii) Reduce the period of slope and cleared areas exposure.

(iv) Stabilise bare slopes and apply protective covers when not working on them.

(v) Properly protect stockpile areas.

(vi) Implement P2M2 for erosion and sediment control measures to reduce soil erosion and surface flows downstream.

(b) Runoff and Stormwater Management

Objective: To properly manage runoff from the project site to prevent localised flooding and risk of flooding downstream, especially during the rainy seasons.

Implementation Steps

The EIA shall assess the impacts of the drainage system to intercept the rapid conveyance of stormwater by using a series of retardation methods from P2M2 and *Manual Saliran Mesra Alam Edisi-2* (MASMA-2) designed to manage the volume of flows down the slopes. These include, but are not limited to, the following:

(i) Installation of temporary drains to minimise concentrated water flows during construction. In area constraint sites, pipe slope drains (PSD) can be used to convey runoff into sediment containment system.

(ii) Channelling discharges via a series of check dams to a sediment pond to reduce velocity and peak flows. Temporary energy dissipater structures are often used to reduce flow velocity.

(iii) The size and capacity of the drains must be sufficient to take in at least a storm of 10-year ARI event (see also MSMA-2).

(iv) All drainage and waterway banks shall be stabilised, e.g. rock cover, turf reinforcement mats, etc.

(v) Proper stream crossing and culverts are required along waterways to prevent blockage or restriction in flows.

(c) Sediment Control

Objective: To ensure effective control of sediments at-site, using tools in P2M2 (both structural and non-structural) to reduce water pollution and sedimentation of rivers.

Implementation Steps

(i) Installation of sediment control devices and structures such as silt fences, silt traps, sediment basins, barriers and use of active treatment systems.

(ii) Retardation/capture structures and devices are to be designed to accommodate the calculated runoff volume to allow adequate time for suspended sediments to settle before the runoff is conveyed further.

(iii) Use of active treatment systems (ATS) such as flocculants, anionic polymers, etc. in space constraint locations to accelerate entrapment and settlement of fine sediments.

(iv) Regular inspection and maintenance of the structures to ensure their performance efficiency, especially after heavy storm events.

(v) Sediment control also extends to spillage of materials and mud trekking from vehicles and measures to address these must be put in place, including tyre washing facilities, entrance stabilisation, road cleaning and dust control.

Box 10:
P2M2 Checklist for Erosion and Sediment Management

Site Clearing and Earthworks

Erosion and sedimentation management during earthworks and construction include:

(i) Phased construction.
(ii) Erosion, sediment and drainage controls in the LD-P2M2.
(iii) Stabilised entrance and access roads.
(iv) Slope turfing.
(v) Temporary cover for exposed areas, e.g. erosion control mats, mulching, etc.

Runoff and Stormwater Management

Flooding and drainage issues are prevalent for disturbance on hill and slopes. Measures to minimise such occurrences include:

(i) Temporary drainage system based on MSMA-2.
(ii) Cascading and pipe slope drains (PSD) along berms and steep slopes.
(iii) Inlet and outlet protection.
(iv) River buffer provision.
(v) Stream crossing.
(vi) River alteration to have approval from the DID.

Sediment Control

Entrap and retain sediments prior to discharge out of the project site. Examples include:

(i) Sediment basin/silt trap.
(ii)
(iii) Active Treatment System (Anionic).
(iv) Wash trough/wheel washing at main entrance/exit.
(v) Road cleaning.
(vi) BMP inspection and maintenance.

Operation

Erosion and sedimentation will not be major impacts and no mitigation measures are necessary with the exception of slope maintenance and rehabilitation in the case of erosion and failure.

Permanent drainage network and retention systems (e.g. detention ponds, dry ponds, rain harvesting system, etc.) to be installed at-site to capture runoff from the site.

6.4.3 Slope Stabilisation and Protection

Objective: If the project is located in a national and state park that is hilly, it will be necessary to ensure cut and fill slopes are properly protected against any potential geo-hazards that may result in severe erosion, landslides, mudslides and slope failures, which may endanger the workers and visitors.

Implementation Steps

(i) The measures under the LD-P2M2 shall be incorporated in the slope designs of the project early to ensure slope stability. The critical factors for slope failures are rainfall with accompanying poor drainage on slopes, soil conditions and geological structures.

(ii) Slopes shall be designed as per technical engineering calculations. All slopes have to be properly protected, monitored and rehabilitated during the different phases of project implementation.

(iii) The level of details in the geotechnical engineering solutions for slopes shall be provided by the qualified geotechnical team based on the requirements of the technical agencies, such as the Minerals and Geoscience Department (JMG) and Public Works Department (JKR).

Box 11:
P2M2 Checklist for Slope Stabilisation and Protection

Earthworks and Construction

The measures to prevent landslides and slope failures from occurring before, during and after the implementation of the project. Examples include:

(i) Adequate buffer zone/setback provided.
(ii) Slope benching with suitable protection measures (runoff and erosion control).
(iii) Geotechnical measures for identified hazard areas.

Note:
Reference can be made to JMG and JKR requirements for slope design and monitoring.

Operation

The measures are intended to ensure that slopes are well maintained and not at risk of failure. Slopes are required to be monitored and periodic maintenance carried out.

6.4.4 Water Pollution Control

Objective: To prevent water pollution in rivers and waterways within and in the surrounding areas of the project site. Where possible, to maintain water quality at baseline conditions or better within the DOE prescribed limits.

Implementation Steps

(i) Potential water pollutants are constituents of silt, sewage, sullage, machinery discharges, nutrients, oil and grease (O&G), etc. Silt traps and sediments ponds will be able to trap most of the physical constituents such as silt and sediments except for dissolved materials and O&G before final discharge.

(ii) Proper storage areas including adequate bunding are to be provided for scheduled wastes, chemicals, spoils, fuel tanks and waste disposal areas.

(iii) Suitable treatment system especially for sewage and sullage shall be utilised to ensure that the discharge quality meets the agencies and local authority's standards during the construction and operational phases of the project.

(iv) In case of accidental release such as O&G or schedule wastes, measures are to be put in place to contain, remediate and remove the contaminants from the waterways.

Box 12:
P2M2 Checklist for Water Pollution Control

Earthworks and Construction

Measures to prevent TSS and O&G from entering into the downstream rivers and drainage systems during the construction phase must be proposed.

(i) LD-P2M2.
(ii) Septic tank and toilet facility at base camp to follow the National Water Services Commission (SPAN) requirements.
(iii) Establish proper workshop area.
(iv) Bunded storage for scheduled waste storage, chemical storage and fuel tank area.

Operation

During the operational period, high loadings of sewage and sullage to be treated to the stipulated standards.

A proper STS shall be required if there are any sewage generated. O&G traps required in commercial areas, canteens and kitchens.

6.4.5 Air Pollution Control

Objective: To minimise fine dust dispersion from construction activities and transport of materials to and from the site.

Implementation Steps

(i) Clean up all spillage along logistic roads and entrances/exits cleaned up.

(ii) Any potential emission sources such as fuel burning equipment have to comply with the relevant agencies' requirements and limits.

(iii) Regular housekeeping to remove mud trekking along public roads.

(iv) All emissions shall be ensured to meet the DOE emission standards while open burning is prohibited at all times.

Box 13:
P2M2 Checklist for Air Pollution Control

Earthworks and Construction

The measures to include dust suppression methods, especially if dust pollution affects sensitive receptors. Some examples include:

(i) Wet suppression along main logistic routes and earth stockpiles.
(ii) Measures to reduce equipment and vehicular emissions.
(iii) Measures during blasting operations should include supervisions and adherence to safety measures, among others, to prevent injuries and safety concerns, e.g. from fly rock, vibration and noise.

Operation

During the operational phase, open burning of wastes shall be prohibited. Small-scale and controlled camp fires are allowed within the park rules set by the Park authorities.

6.4.6 Noise and Vibration Control

Objective: To minimise noise and vibration disturbance to nearby receptors and wildlife as well as to protect workers in high noise environment.

Implementation Steps

(i) Noise and vibration impacts can be addressed through measures, such as phasing construction work; use of measures to reduce, enclose and supress machinery; use of physical barriers; or maintaining natural ones.

(ii) Protection of workers through the use of personal protection equipment (PPE) is important to a work environment.

Box 14:
P2M2 Checklist for Noise and Vibration Control

Earthworks and Construction

Examples of measures include:

(i) Perimeter hoarding.
(ii) Regular servicing of equipment, machinery and vehicles.
(iii) PPE for workers.

Operation

Landscaping and natural buffers can help soften the noise from human activities. For noisy machineries such as gen-sets, these can be enclosed to reduce noise.

6.4.7 Waste Management

Objective: To minimise the amount of waste generated from the site and to ensure proper collection, storage and disposal of the different types of wastes generated during construction and operations.

Implementation Steps

(i) Wastes comprise biomass, municipal, construction and demolition (C&D) and scheduled wastes, all of which require specific management strategies.

(ii) The key approach is to ensure proper storage facilities or disposal sites are provided on-site and the regular collection and disposal of such wastes to their designated sites.

(iii) General housekeeping of the construction site is also important. No open burning of wastes is allowed.

Box 15:
P2M2 Checklist for Waste Management

Earthworks and Construction

Solid Wastes
The measures for proper solid waste management include:

(i) Temporary disposal area.
(ii) Waste bins in active work areas.
(iii) Regular housekeeping.
(iv) Disposal at a local authority licensed landfill.

Scheduled Wastes
The measures must include proper scheduled waste management controls in adherence to the Environmental Quality (Scheduled Wastes) Regulations 2005. Some examples include:

(i) Scheduled waste storage area with bunding.
(ii) Scheduled waste inventory.
(iii) Proper scheduled waste labelling.
(iv) Spill kit.
(v) Competent person trained in scheduled waste management.

Operation
Adequate bins and disposal sites need to be provided to collect and store wastes. Regular disposal services shall be required.

6.4.8 Safety and Health

Objective: To ensure the safety and health of the workers and the general public is not compromised with ongoing construction works.

Implementation Steps

(i) Safety and health measures are intended to address issues such as work place conditions, worker's health. This include preventive checks on any communicable diseases among the workers, provision of

personal protective equipment (PPE), firefighting equipment, safety trainings and having an emergency response plan (ERP) in place.

(ii) Proper work procedures are designed at-site and off-site to prevent unauthorised entry from the public into the active work site to reduce the risks of accidents and injuries.

(iii) Tourists' safety shall be ensured by the operators in all recreational and tourism activities. Adequate medical and treatment facilities shall be provided in case of emergencies.

Box 16:
P2M2 Checklist for Safety and Health

Earthworks and Construction

The measures for safety and health are:

(i) Emergency Response Plan (ERP).
(ii) Safety officer employed.
(iii) PPE requirements.
(iv) Workers to have CIDB green card.
(v) Health checks on workers to prevent spread of communicable diseases.
(vi) Training.

Operation

The measures are designed to ensure the safety of visitors to the parks:

(i) Provide adequate medical facilities to treat common ailments and injuries.
(ii) Have an evacuation plan in case of emergencies and natural disasters.
(iii) Personnel to have proper training in first aid treatment.
(iv) Monitor water quality and incidents of diseases, e.g. leptospirosis.

6.4.9 Land Traffic Management

Objective: To manage traffic along logistic roads to reduce the risk of accidents and inconvenience to the general public.

Implementation Steps

(i) A traffic management plan is necessary in the case of road logistics and closure or partial closure, to accommodate heavy vehicular traffic to and from the project site throughout the construction and the operation period.

(ii) Improvements in road infrastructure will be necessary to ensure future traffic to and from the project site is smooth with low congestion.

Box 17:
P2M2 Checklist for Land Traffic Management

Earthworks and Construction

The measures should include proper land traffic control and management to minimise traffic woes.

(i) Schedule heavy vehicle traffic.
(ii) Have a transportation plan ready.
(iii) Impose speed limits.

Note:
Shall abide by local authorities and JKR requirements for traffic management and transportation requirements.

6.4.10 Visual

Objective: To reduce the impact of visual intrusion during and after construction.

Implementation Steps

(i) Wherever possible, preserve the natural areas not affected by construction. This includes all river courses and buffers.

(ii) Use of hoardings or barriers can also reduce the direct visual impacts.

(iii) Rehabilitation of the site through landscaping and replanting will help to soften and even reverse some of the impacts during construction.

6.5 RESIDUAL IMPACTS

Impacts that persist even after all mitigation measures are judiciously undertaken, are termed residual impacts. The extent of residual impacts shall be clearly detailed in the EIA report.

Box 18:
Case Study of Development in National and State Parks – Penang National Park

The Penang National Park (2,563 ha) is located at the north-western corner of Penang Island at Teluk Bahang. The marine waters at 0.5 nm offshore are also within the Park boundary and are managed by PERHILITAN. This Park is unique because it includes dipterocarp forests, highlands, swamps, a meromictic lake and coastal areas (sandy and rocky beaches). The existing Park buildings and facilities include the Pejabat Taman Negara Pulau Pinang, Park ranger station, jetty, gazebos, a turtle sanctuary, a hanging canopy bridge, a lighthouse and toilets.

A mix of Hill Dipterocarp Forest and Coastal Forests in Penang National Park

Scoping of Issues

- The Park presently is quite environmentally pristine. It has limited development and the number of visitors is limited.
- Park development may require land access involving tree cutting, land clearing, piling, etc., all of which may cause ecological/habitat disturbance.
- Development may affect the low carrying capacity of the Park if the number of tourists and those catering to the tourists increase.
- Encroachment and poaching of wildlife within the park may occur even though the Park is not rich in megafauna.
- Visitors feeding wildlife such as the Long-tailed Macaques may alter their natural behaviors. This may result in human-wildlife conflicts where they could attack humans or raid campsites for food.
- A sudden surge of visitors may lead to overflows from septic tanks because originally these were not designed to cater to a large number of tourists. They have to be redesigned to cater to a larger influx of people.

Box 18:
Case Study for Development in National and State Parks – Penang National Park

Existing BMPs at the Park

- Presently, any development in the Park has to be reviewed and approved by the Penang National Park Committee comprising stakeholders such as PERHILITAN, Forestry Department Peninsular Malaysia (JPSM), Department of Fisheries (DOF), Marine Department, Universiti Sains Malaysia (USM), etc.
- The main building structure, namely, the Pejabat Taman Negara Pulau Pinang is sited at the boundary of the Park to minimise ecological disturbance and pollution at the Park heartlands.
- As part of solid waste management, the Park employs the "Leave No Trace" principle to prevent visitors from littering the park or from removing anything from the park (e.g. flora, fauna, shells, stones, etc.).
- The visitor limit for the Park at any one time is 100 persons, to maintain the carrying capacity.
- Access is restricted to paths and tracks while vehicles are not allowed in.
- Feeding of wildlife is prohibited in the Park.

Recommended BMPs for New Development in the Park

- Minimise cut and fill in the Park, e.g. mark trees to be cut and those to be retained.
- Phase out cut and fill and build around the forest and hill contours.
- Development shall be low in density.
- Regular patrolling will discourage poachers from entering the Park.
- Prohibit visitors from feeding wildlife.
- Conduct a carrying capacity study to determine the maximum number of visitors that can be supported by the Park.
- Limit the number of visitors to be aligned to the carrying capacity of the Park.
- Regularly de-sludge the septic tanks to prevent leaks and overflows.
- Development is not allowed at specific locations where endangered species of importance are found at that location.

Build around trees

Regular ranger patrols

"Leave No Trace" Principle

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CHAPTER 7

ENVIRONMENTAL IMPACT ASSESSMENT: ENVIRONMENTAL MANAGEMENT PLAN

7.1 INTRODUCTION

The Environmental Management Plan (EMP) is a legal document prepared by the Project Proponent incorporating pollution prevention and mitigation measures (P2M2s) and best management practices (BMPs) stipulated in the Conditions of Approval (COA) by the Department of Environment (DOE).

Key contents of the EMP are formatted as the scope of works in the Bill of Quantities (BQ) for the contractors to bid for project development.

Other than mitigation measures, the EMP includes the guided self-regulation (GSR) requirements, an environmental monitoring plan and an audit programme to assess the effectiveness of the P2M2s implementation.

The EMP is a living document and has to be updated whenever there are major changes to the project design, layout or construction methods that could result in impacts not originally stated in the EMP.

7.2 EMP FRAMEWORK

In the Environmental Impact Assessment (EIA) phase, the project may not have sufficient information of 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 submit the detailed EMP concurrently with the EIA Report if there is already sufficient information for the EMP. The EMP can later be updated to incorporate the requirements of the COAs.

The format for the EMP shall be based on the requirements stated within the Environmental Impact Assessment Guideline in Malaysia (EGIM) (DOE, 2016), and shall contain details from the Land Disturbing Pollution Prevention

and Mitigation Measures (LD-P2M2) Document, and the proposed monitoring and audit programmes.

7.3 GUIDED SELF-REGULATION (GSR)

Details on the GSR for the project shall be incorporated into the EMP framework as required in the Environmental Mainstreaming Directive issued by DOE.

This shall cover the seven environmental mainstreaming tools:

(i) Environmental Policy.
(ii) Environmental Budgeting.
(iii) Environmental Monitoring Committee.
(iv) Environmental Facility.
(v) Environmental Competency.
(vi) Environmental Reporting and Communications.
(vii) Environmental Transparency.

7.3.1 Environmental Policy

This refers to the Project Proponent's Environmental Policy and the conveyance of such policies throughout the organisation.

7.3.2 Environmental Budgeting

The Project Proponent has to provide an environmental budget for environmental-related commitments, e.g. personnel, P2M2, monitoring, auditing, training, remedial and rehabilitation works.

If the budget is not available during the EIA stage, the Project Proponent shall provide a pledge to allocate adequate budget for the project during the post-EIA stage to ensure compliance.

The budget requirements shall also form part of the BQ for the contractors at the contractual stage.

7.3.3 Environmental Monitoring Committee

The Project Proponent is required to identify and setup an Environmental Regulatory Compliance Monitoring Committee (ERCMC) at the policy level headed by the Chief Executive Officer (CEO), or organisation chairman.

At the working level, the Environmental Performance Monitoring Committee (EPMC) is chaired by a senior officer of the organisation.

For large-scale projects involving multiple contractual work packages by many contractors, the respective main contractors are required to have their respective Environmental Management Teams (EMTs) comprising at least a minimum number of personnel such as an Environmental Manager (EM) and an Environmental Officer (EO).

The organisation chart along with the roles and responsibilities of all relevant parties in charge of environmental management for the project in national and state parks shall be included in the EMP framework.

7.3.4 Environmental Facility

The EMP shall provide the range of environmental facilities in the project, such as industrial effluent treatment system (IETS), sewage treatment systems (STS), air pollution control system (APCS), BMPs, P2M2 structures and associated supporting utilities and facilities that need operational and maintenance support.

7.3.5 Environmental Competency

Training requirements are needed to ensure competency for environmental management for all relevant site personnel.

The proposed training programme and requirements shall be included in the EMP framework.

7.3.6 Environmental Reporting and Communication

The EMP framework shall contain a reporting time schedule for various submissions during the post-EIA phase, which shall include:

(i) Environmental Management Plan.
(ii) Monitoring Reporting.
(iii) Audit Reporting.

The mode of communication between the ERCMC, EPMC and the respective EMTs must be clearly defined.

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

7.4 MONITORING AND AUDIT PROGRAMMES

The environmental monitoring and audit programmes are important components 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 categories:

(a) Performance Monitoring (PM)

(i) Relates to monitoring of the performance treatment systems such as IETS, STS and APCS.

(ii) This shall be undertaken by a Competent 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. Samplings and measurements are usually taken either of the ambient parameters (water, air and noise) or of the discharges (sewage, sediment basin).

(ii) This 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 on-site.

(ii) This task must be carried out by a Qualified Person such as the Environmental Consultant.

7.4.2 Monitoring Methodology

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 the impacts are perceived to affect sensitive receptors.

Details of the monitoring programme are decided upon by the Qualified Person and Environmental Consultants, and to be approved by DOE before implementation. The monitoring locations, frequencies, parameters to monitor, recommended limits, instrumentation and personnel requirements have to be identified in the EMP.

The monitoring programme shall be tailored for requirements of all national and state park projects, based on site conditions and types of development. **Table 7.4.1** shows a typical monitoring programme for national and state park projects.

DOE has the right to mandate any changes to/or requires additional information and data apart from those specified in the said Table.

7.4.3 Environmental Audit

Environmental auditing is a post-EIA evaluation process to determine the effectiveness and performance of the mitigation measures put in by the Project Proponent to comply with the COAs.

Audit requirements are guided by the Environmental Audit Guidance Manual by DOE. The audit must be undertaken by an independent third party as a DOE registered auditor.

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 National and State Parks Projects

Aspect	Phase	Method	Parameters	Frequency
Water Quality	Construction	Grab sampling or other accepted standard methods (upstream and downstream of waterways)	**Ambient** Relevant parameters of the National Water Quality Standards (NWQS)	Monthly
		Grab sampling or other accepted standard methods (multiple locations and depths within the lakes)	**Ambient** Putrajaya Ambient Lake Water Quality Standards Trophic State Index (TSI)	Monthly
		Grab sampling or other accepted standard methods (along coastline at minimum three depths)	**Ambient** Relevant parameters of the Malaysian Marine Water Quality Criteria and Standards (MMWQCS)	Monthly
		In-situ sampling at final discharge point	**Sediment basin/silt trap discharge** Total suspended solid (TSS) and turbidity.	After every heavy rain event (12.5 mm measured by rain gauge)
	Operational	Sampling at sewage treatment plant (STP) final discharge outlet	**Sewage** Environmental Quality (Sewage) Regulations 2009	Monthly

Aspect	Phase	Method	Parameters	Frequency
Air Quality	Construction	Measurement by approved air sampler (boundary and nearest receptors)	**Ambient** Relevant parameters of the Malaysian Ambient Air Quality Standards (MAAQS)	Quarterly
Noise Level	Construction	Measurement by approved noise meter (boundary and nearest receptors)	**Ambient** The Planning Guidelines for Environmental Noise Limits and Control, 2nd Edition (DOE, 2007)	Quarterly
Vibration	Construction	Measurement by approved vibration meter	**Ambient** The Planning Guidelines for Vibration Limits and Control in the Environment, 2nd Edition (DOE, 2007)	During piling and blasting works
Ecological Monitoring*[1]	Construction	Site surveys and inventory	• Terrestrial flora and fauna surveys. • Fisheries surveys (near coastal areas). • Phytoplankton and zooplankton assessment. • Terrestrial and marine flora and fauna surveys (only if location is near the coastal area).	Half-yearly during construction Yearly for 2 years during operations

Notes:

(i) 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 monitoring requirements based on the COA or as required by DOE.

(ii) *[1] Ecological monitoring shall be based on requirements from the Forestry Department of Peninsular Malaysia (JPSM), Department of Wildlife and National Parks Malaysia (PERHILITAN) and Department of Fisheries (DOF).

CHAPTER 8

EIA REPORTING AND REVIEW

8.1 INTRODUCTION

This Chapter provides the format and procedures for an Environmental Impact Assessment (EIA) Report to be submitted to the Department of Environment (DOE) for approval, after the completion of all other necessary studies and requirements.

8.2 EIA REPORT

8.2.1 EIA Report Format

The Environmental Impact Assessment Guideline in Malaysia (EGIM) (DOE, 2016) provides the specifications and format for EIA reporting under Section 4.6 and Appendix 9.

The EIA report shall typically include the following contents:

(a) Declaration from the Project Proponent and Qualified Person in the format detailed in Appendix 9 of EGIM (DOE, 2016). The declaration must be printed in the respective company's letterhead and attached to the EIA.

(b) Executive Summary of the EIA Report in Bahasa Malaysia and English.

(c) 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).

(d) Review of the policy, regulatory and legal requirements for the project (refer to **Chapter 2** for details).

(e) Terms of Reference (TOR) for the EIA Study as endorsed by the DOE (refer to **Chapter 3** for details). Endorsement letter from DOE to be attached as an appendix to the EIA report.

(f) Statement of need for the project. Supporting arguments for the project to justify its needs and necessity shall be included as part of the report. Key points to include can include the examples in **Box 19**.

Box 19:
Key Points for Statement of Need

Among key supporting arguments for a project can include, but are not limited to the following:

(i) Fulfilment of or adherence to the goals of national and state policies and plans.
(ii) Provision of essential services to the community or stakeholders, e.g. more visitors, improved facilities amenities, etc.
(iii) Improving the existing environmental conditions of the area.
(iv) Social and economic benefits to society.
(v) Bringing new green and sustainable technology that will benefit the community and country.

(g) Deliberation on the alternatives and project options (refer to **Section 3.4**).

(h) 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 8.2.1**).

(i) Description of the baseline conditions (physical, chemical, ecology and socio-economy) within the Zone of Study (ZOS) that may be impacted by the project (see **Chapter 4**).

(j) Assessment of the significant impacts (positive and negative), prediction of the extent and effects on nearby sensitive receptors and proposal of pollution prevention and mitigation measures (P2M2s) to

minimise or enhance these impacts and any potential residual impacts (see **Chapters 5 and 6**).

(k) Details of public consultation and engagement as part of EIA requirements.

(l) Environmental Management Plan (EMP) incorporating the Land Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2), monitoring and audit programme (see **Chapter 7**).

(m) Appendices containing technical studies, supporting documentation, results of analysis, list of references, etc. to be included.

An EIA Checklist is provided in **Appendix E** as a reference.

Table 8.2.1: Recommended Project Description in EIA Report

Project Details
(i) Project title.
(ii) Name and contact details of the Project Proponent (contact person, address, telephone number, e-mail address).
(iii) Name of registered EIA Consulting Firm (EIA Team Leader, address, telephone number, e-mail address).
(iv) Location of project (coordinates, lot no, district, etc.).
(v) Relevant map showing project location and accessibility.
Location
(i) General site plan including Zone of Study (ZOS) (5-km radius from project boundary)
(ii) Project boundary and layout including boundary coordinates.
(iii) Description of location in relation to identifiable landmarks (e.g. city centres, main roads, towns, etc.).
Project Component and Design Details
(i) Project details (land area, buffer requirements, lots and land status).
(ii) Project concept.
(iii) Project components.
(iv) Technology use.
(v) Examples of similar project type and scale.
Note: The above shall be supported with technical drawings, illustration and diagrams.

Project Activities
(i) Method statement to be provided for major project activities during pre-construction, construction and operational stages.
(ii) Manpower requirements.
(iii) Resource requirements (e.g. soil and aggregate sources, spoil disposal area, etc.).
Infrastructure, Utilities and Amenities Requirement
Details of the estimated demand for:
(i) Water supply.
(ii) Electricity.
(iii) Sewerage.
(iv) Telecommunications.
(v) Transport system.
(vi) Waste management.
Project Implementation Schedule
(i) The estimated timeline for various phases of project implementation from planning, to construction and operational phases.
(ii) Details of each stages of implementation.

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

8.2.2 Executive Summary

The Executive Summary provides a concise brief of the findings and recommendations from the EIA. It shall be written in non-technical language, both in Bahasa Malaysia and English, presenting the following information:

(i) Title of the project.
(ii) Name and contact details of the Project Proponent.
(iii) Name and contact details of EIA Team members.
(iv) Location of the project site.
(v) Relevant maps showing project location and sensitive receptors and extent of the ZOS.
(vi) Alternatives considered.
(vii) A tabulation of significant impacts and proposed P2M2s (format as detailed in EGIM).
(viii) Description of monitoring and audit programme [Performance Monitoring (PM), Compliance Monitoring (CM) and/or Impact Monitoring (IM)].
(ix) 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.

8.2.3 Data Deliverables

The Project Proponent shall make available all relevant data collected during the EIA study (in raw or processed format) along with the EIA report, when requested by DOE.

Examples of such data include – sampling results (certificates and raw data), modelling databases, baseline data (surveys, hydrographic data and climate data), metadata files, etc. This data shall also be provided to the relevant government agencies (GAs) upon request.

8.2.4 Conclusion to the EIA Report

The Qualified Person shall provide a pledge that the EIA Study is carried out professionally and that the recommendations for P2M2 to be implemented will be able to mitigate against the identified environmental impacts to an acceptable level to ensure minimal degradation of the environment.

The Project Proponent shall also provide a pledge that he has understood the studies and recommendations in the EIA, and shall carry out all P2M2 recommended in the EIA.

8.3 STAKEHOLDER ENGAGEMENT AND PUBLIC DISPLAY

The stakeholder engagement process shall be ongoing since the project planning stage (see **Section 2.6** for details). In the EIA phase, stakeholder engagement is essential for the Project Proponent to brief the stakeholders about the project and the potential impacts, and to obtain their feedback on the suggested mitigation measures.

For a Second Schedule EIA, there are additional mandatory requirements prior to the approval of the EIA report. These include:

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 Zone of Impact (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.

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.

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.

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.

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.

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).

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.

Box 20 provides some examples of good practices when engaging with the stakeholders:

Box 20:
Good Practices in Stakeholder Engagement

(i) Stakeholder Identification: Selection of stakeholders should be inclusive, encompassing and without bias. The focus should be those that are directly affected by the project within the zone of impact (ZOI) but may include any other relevant stakeholders.

(ii) Transparency: The stakeholder engagement process shall be carried out in a transparent and inclusive manner, with ample opportunities for the relevant stakeholders to obtain information, provide comments and submit feedbacks.

(iii) Information Disclosure: Information provided should be adequate and relevant to allow for stakeholders to understand the project and make informed decisions. Sufficient time should be allowed for information assessment and feedback.

(iv) Communication Tools: Communication can be in many forms – reports, formal meetings, focal group discussions (FGDs), information sheets, surveys, websites, etc. The method should best be suited to the target audience, with information communicated in simple to understand language and none too technical.

(v) Notification: All stakeholders should be informed and notified appropriately of any meetings or discussions to be held and given ample time to make arrangements. All efforts shall be made to ensure representative attendance by the stakeholders.

(vi) Selection of Venue: Meeting locations should be in a venue close by, convenient and accessible to the stakeholders. This would ideally be near the project site. For public display of EIA reports, these shall be at locations open and accessible to the public, e.g. public library, police station, local authority office, etc.

(vii) Documentation: All engagements shall be properly documented and reported in the EIA. Actions taken to address the issues brought up shall be clearly spelled out and mitigation measures incorporated as part of the project design. It is a good practice to follow up with the stakeholders on actions taken.

(viii) Accountability and Continuity: All comments and feedbacks from stakeholders shall be assessed and reviewed objectively. Actions shall be taken by the Project Proponent to address legitimate concerns. Stakeholder management should be throughout the project lifespan. Provision of platforms for stakeholders' engagement post-EIA is a best practice that should be adopted.

8.4 EIA REPORT SUBMISSION AND REVIEW PROCESS

The EIA report submission shall be in line with the steps and procedures outlined in the EGIM (DOE, 2016). The EIA Report Quality Self-Assessment Tool (RQSAT) in the EGIM (DOE, 2016) can be used by the Project Proponent and the Qualified Person to assist in conducting self-check of the quality of the EIA prior to submission to the DOE, to avoid rejection.

An EIA Checklist is appended in **Appendix E**, which is required to be filled in by the EIA preparer and included in the EIA report.

If the EIA is approved, DOE will issue the Conditions of Approval (COA) to the Project Proponent. If the EIA is rejected, a fresh EIA can be submitted. Details in **Box 21**. This marks the end of the EIA process.

Box 21:
Outcomes from EIA Review Process

The possible outcomes of the EIATRC meetings are:

(i) Approval of the EIA Report, provided that the report meets with the requirements of Section 34A (3) of the Environmental Quality Act (EQA) 1974.

(ii) Rejection of the EIA Report, where the report does not meet the requirements of Section 34A (3) of the EQA 1974.

REFERENCES

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REFERENCES

Berglund, B. & Lindvall, T. (1999). **Guidelines for Community Noise**. World Health Organisation.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (1983). **Text of the Convention**. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Department of Environment (1993). **Buku Panduan Kawasan Sensitif Alam Sekitar**. Department of Environment, Ministry of Natural Resources and Environment.

Department of Environment (2006). **Technical Guidance on Performance Monitoring of Air Pollution Control Systems**. Department of Environment, Ministry of Natural Resources and Environment.

Department of Environment (2007). **The Planning Guidelines for Environmental Noise Limits and Control**. Department of Environment, Ministry of Natural Resources and Environment.

Department of Environment (2008). **Guidelines for Prevention and Control of Soil Erosion and Siltation in Malaysia**. Department of Environment, Ministry of Natural Resources and Environment.

Department of Environment (2015). **Malaysia Environmental Quality Report 2015**. Department of Environment, Ministry of Natural Resources and Environment, Malaysia.

Department of Environment (2015). **Technical Guidance Document on the Design and Operation of Industrial Effluent Treatment Systems**. Department of Environment, Ministry of Natural Resources and Environment.

Department of Environment (2015). **Technical Guidance Document on Performance Monitoring of Industrial Effluent Treatment Systems**. Department of Environment, Ministry of Natural Resources and Environment.

Department of Environment (2016). **Environmental Impact Assessment Guidance in Malaysia**. Department of Environment, Ministry of Natural Resources and Environment.

Department of Irrigation and Drainage (1997). **Guidelines on Erosion Control for Development Projects in the Coastal Zone (JPS 1/97)**. Department of Irrigation and Drainage, Ministry of Natural Resources and Environment.

Department of Irrigation and Drainage (2010). **Guidelines for Erosion and Sediment Control in Malaysia**. Department of Irrigation and Drainage, Ministry of Natural Resources and Environment.

Department of Irrigation and Drainage (2012). **Urban Stormwater Management Manual for Malaysia**. Department of Irrigation and Drainage, Ministry of Natural Resources and Environment.

Department of Town and Country Planning of Peninsular Malaysia (2016). **National Physical Plan-3 (NPP-3).** Department of Town and Country Planning of Peninsular Malaysia (JPBD)

Department of Town and Country Planning of Peninsular Malaysia (2012). **National Physical Coastal Zone Plan (NPCZP).** Department of Town and Country Planning of Peninsular Malaysia (JPBD)

Department of Town and Country Planning of Peninsular Malaysia (2009). **Central Forest Spine I & II: Maste Plan for Ecological Linkages.** Department of Town and Country Planning of Peninsular Malaysia (JPBD)

Environment Protection Department (2005). **Environment Protection Enactment (Prescribed Activities) (Environmental Impact Assessment) Order 2005**. Environmental Protection Department, Sabah.

Forestry Department (1992). **National Forestry Policy 1978 (Revised 1992)**. Forestry Department, Ministry of Natural Resources and Environment.

Law of Malaysia (2006). **Factories and Machinery Act 1974 (Act 139) (Revised – 1974), Rules and Regulations**. National Malaysia Berhad, Malaysia.

Law of Malaysia (2010). **Fisheries Act 1985 (Act 482) Rules and Regulations**. National Malaysia Berhad, Malaysia

Law of Malaysia (2010). **Wildlife Conservation Act 2010 (Act 716) Rules and Regulations**. National Malaysia Berhad, Malaysia.

Legal Research Board (1994). **Occupational Safety and Health Act 1994 (Act 514), Regulations, Rules and Orders**. International Law Book Services, Kuala Lumpur.

Legal Research Board (2006). **Tourism Industry Act 1992 (Act 482), Regulations, Rules and Orders**. International Law Book Services, Kuala Lumpur.

Legal Research Board (2007). **Solid Waste and Public Cleansing Management Act 2007 (Act 672), Regulations, Rules and Orders**. International Law Book Services, Kuala Lumpur.

Legal Research Board (2013). **National Parks Act 1980 (Act 226), Regulations, Rules and Orders**. International Law Book Services, Kuala Lumpur.

Legal Research Board (2015). **Environmental Quality Act 1974 (Act 127), Regulations, Rules and Orders**. International Law Book Services, Kuala Lumpur.

Ministry of Natural Resources and Environment (2016). **National Policy on Biological Diversity 2016 – 2025**. Ministry of Natural Resources and Environment.

Ministry of Science, Technology and Innovation (2002). **National Policy on the Environment**. Ministry of Science, Technology and Innovation.

Ministry of Tourism and Culture (1997). **Pelan Ekopelancongan Kebangsaan Malaysia**. Ministry of Tourism and Culture.

Natural Resources and Environment Board (1995). **Natural Resources and Environment (Prescribed Activities) Order 1994**. Natural Resources and Environment Board, Sarawak.

The Convention on Wetlands of International Importance (RAMSAR) (2017). **About RAMSAR**. http://www.ramsar.org/, viewed 23 March 2017.

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GLOSSARY

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GLOSSARY

Air Pollution Control Systems (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).
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 approve a project and/or activity under their jurisdiction by law.
Aquatic	Pertaining the ecosystem influenced by water and all its plants and animals that live within or nearby which has adapted to life in such environments.
Auditing	Evaluation process carried out by an independent auditor to determine effectiveness and performance of P2M2 and to ensure compliance of a project with the 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.
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 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.
Biomass	The total weight, volume or quantity of organisms in a given area.
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	1. Maximum population size of the species that the environment can sustain indefinitely, given the food, habitat, water, and other necessities available in the environment. 2. The ability of a built resource or natural resource to absorb population growth and related physical development without degradation.

Catchment	The area determined by landform within which falling rain will contribute to runoff at a particular point such as a stream or river. Often, it is used synonymously with basin or watershed.
Central Forest Spine (CFS)	The backbone of Peninsular Malaysia's ESA network which comprises of four major forest complexes [i] Banjaran Titiwangsa-Banjaran Bintang-Banjaran Nakawan, [ii] Taman Negara-Banjaran Timur, [iii] South East Pahang, Chini and Bera Wetlands, and [iv] Endau Rompin Park-Kluang Wildlife Reserves.
Competent 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.
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 a terrain's surface created from terrain elevation data.
Disaster Risk Factor	The level of risk and susceptibility of an area towards natural or man-made disasters, such as tsunamis, wildfires, landslides, flood, drought, etc.
Disposal Area	A designated or gazette area specifically for the storage of wastes 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 functional unit.

Eco-tourism	A form of tourism focused on the discovery of cultural and natural heritage and committed to respecting the environment while contributing to the well-being of local people.
EIA Adequacy Check	Initial review of the EIA by a technical committee comprising of DOE HQ/state officers to determine compliance with the TOR.
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.
Endemic Species	Native to, and restricted to, a particular geographical region. Highly endemic species, those with very restricted natural ranges, are especially vulnerable to extinction if their natural habitat is eliminated or significantly disturbed.
Environment	The area (specific zone to be affected by the project), and all natural resources (physical, biological and human resources), people, economic development and quality-of-life values.
Environmental 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 at other information, e.g. environmental budget, monitoring and audit programmes and roles and responsibilities of the EMT.
Environmental Management Team (EMT)	Specialist 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 Officer (EO)	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 tasks include 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 management environmental compliance at the working level during construction and operational 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 phases of a project.
Environmental Quality Act 1974 (EQA)	The main legislation governing environmental management in Malaysia, contains provisions on setting up of an environmental management body; rules and regulations for specific activities within its jurisdiction; powers for enforcement and licensing; etc.
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. Forms and important part of the EIA process.
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 (ESAs)	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.
Gazette	The official publication of a government organisation institution, or protected area.
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.
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.
Government Agencies (GAs)	Personnel from government ministries, agencies and/or department with a role in specific committees, approving authorities or decision making bodies.
Guided Self-Regulation (GSR)	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, competent persons and involvement of environmental professionals with specific roles.

Health Impact Assessment (HIA)	A report which assesses the health impacts of policies, plans and projects using quantitative, qualitative 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.
Hill/Highland	Areas above elevations of 300 m from MSL characterised by undulating and mountainous hills and ridges.
Hill-Station	Town or village located in the low mountains or highland areas.
Hydrology	The study of the rainfall and runoff process and relates 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 Activities	Activities such as clearing of trees or vegetation, excavating, raising or sloping of ground, trenching, grading and blasting.
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.
Logging	The act or process of felling and extracting timber from forest, especially in the form of logs.
Low Impact Development (LID)	Techniques in construction, material sourcing, developmental design and operations that produces low impacts to the natural environment.
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.
Modelling	To simulate a particular feature of the world using mathematical and computer aids to better understand, define, quantify and visualise the process.
Monitoring	To measure, systematically and repeatedly, the continuing conditions to track change(s).

National Parks	Protected areas comprising of PRF which contains significant ecological resources, wildlife and plant diversity, unique features and scenic value that requires protection and conservation. Gazetted under the National Parks Act 1980 (Act 226).
Noise	A sound, especially one that is loud or unpleasant or that causes disturbance.
Orang Asli	Collective term for ethnic groups who are widely regarded as comprising Peninsular Malaysia's original inhabitants.
Performance Monitoring (PM)	Monitoring of performance systems, e.g. IETS, STS and APCS.
Permanent Reserved Forest (PRF)	The total area of forest land that has been legally designated for retention for forestry as defined under the Forestry Act 1985.
Personal Protective Equipment (PPE)	Equipment designed to safeguard a user against harm when working in risk and hazard areas.
Pollution Prevention and Mitigation Measures (P2M2)	The various methods (structural and non-structural) required to ensure that pollution does not occur or at least minimised as a result of a project.
Prescribed Activity	Any activity specified by the Director General of Environment under the Environmental Quality (Prescribed Activity) (Environmental Impact Assessment) Order 2015, as requiring to undergo an EIA.
Project Activities	Specific 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. He/she shall bear responsibility to ensure that the project meets all environmental requirements mandated by DOE and other GAs or is liable to be held accountable under the law.
Protected Area	An area of land and/or sea especially dedicated to the protection of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means. (IUCN)
Public Display	Mandatory viewing of a Second Schedule EIA for a 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, e.g. Environmental Consultant.
Recreation	Activity of leisure, leisure being discretionary time.
Residual Impacts	Impacts that still persists despite P2M2 and BMPs put in place.
Revised TOR	Final version of the TOR after incorporation of comments from the TRC and additional information.
Riparian Area	Pertaining to the banks of streams, wetlands, lakes or tidewater. A relatively narrow strip of land that borders a stream or river, which often coincides with the maximum water surface elevation of the 100-year storm.
Risk	A combination of the likelihood of an occurrence of a hazardous event with specified period or in specified circumstances and the severity of injury or damage to the health of people, property, environment or any combination of these caused by the event.
Runoff	The portion of precipitation that runs off the surface as opposed to soaking in.
Sampling Station	Locations 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 (Scheduled Wastes) Regulations 2005 (Amendment 2007).
Scoping	Initial phase in an EIA to identify the key environmental issues and the study spatial and temporal boundaries. The scoping will identify the required investigations and assessment of significant impacts during the subsequent phases of the EIA process.
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.
Seismicity	The occurrence or frequency of ground vibrations or earthquakes in a region.
Self-regulation	The adoption and implementation of measures and practices by a Project Proponent on their own initiative without requiring intervention of the authorities to safeguard the environment and meet all regulatory requirements of the country.

Setback	Distance which a building or other structure is set back from a street or road, a river, a shore or any other place which is deemed to need protection.
Sewage	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.
Sewage Treatment System (STS)/ Plant (STP)	Any facility designed and constructed for the purpose of reducing the 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.
Slope	A ratio of run (horizontal) to rise (vertical)
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 tunneling, 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.
State Park	State parks are parks established by the states in Peninsular Malaysia under the National Forestry Act 1984 (Act 313) and state enactments for the purpose of conservation, tourism, recreation and research purposes.
Stormwater	Water that originates during precipitation events, e.g. rainfall.
Suspended Sediment	Sediment suspended in a fluid by its (fluid) turbulent flow.
Technical Review Committee (TRC)	A panel of decision makers comprising DOE officers, 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, IAs 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.
Tourism	Activity of traveling to a place for pleasure and/or the business of providing hotels, restaurants, entertainment, etc. to cater to the needs of travelers.
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 an audience.
Wastes	Any substance which is discarded after primary us. 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, usually with respect to its suitability for a particular purpose.
Water Quality Index (WQI)	An index integrating six water quality parameters to provide a general categorisation to determine the condition of the water source.
Wildlife Preserve/ Sanctuary	A protected area designated for the conservation and preservation of the habitat and wildlife deemed endangered, near extinct, threatened, and/or endemic.
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.

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APPENDICES

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APPENDIX A

LIST OF GAZETTED NATIONAL AND STATE PARKS

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APPENDIX A

LIST OF GAZETTED NATIONAL AND STATE PARKS

Table A.1: List of Gazetted National Parks in Peninsular Malaysia

National Parks					
State	**Park**	**Year Gazetted**	**Enactment**	**Governing Agency**	**Area (ha)**
Penang	Taman Negara Pulau Pinang	2003	National Parks Act 1980	PERHILITAN	2,563
Kelantan	Taman Negara Kelantan	1938	Taman Negara (Kelantan) Enactment No. 14 of 1938	PERHILITAN	80,250
Pahang	Taman Negara Pahang	1939	Taman Negara (Pahang) (Amendment) Enactment No. 6 of 1990	PERHILITAN	248,121
Terengganu	Taman Negara Terengganu	1939	Taman Negara (Terengganu) Enactment No. 6 of 1939	PERHILITAN	103,082
Johor	Taman Negara Johor Endau-Rompin (Peta)	1993	National Parks (Johor) Corporation Enactment 1989	Johor National Park Corporation	19,562
Johor	Taman Negara Johor Endau-Rompin (Selai)	1993	National Parks (Johor) Corporation Enactment 1989	Johor National Park Corporation	29,343
Johor	Taman Negara Johor Pulau Kukup	1997	National Parks (Johor) Corporation Enactment 1989	Johor National Park Corporation	647
Johor	Taman Negara Johor Gunung Ledang	2005	National Parks (Johor) Corporation Enactment 1989	Johor National Park Corporation	8,611
Johor	Taman Negara Johor Tanjung Piai	2004	National Parks (Johor) Corporation Enactment 1989	Johor National Park Corporation	526

Source: Department of Wildlife and National Parks (PERHILITAN), 2017.

Table A.2: List of Gazetted State Parks in Peninsular Malaysia

State Parks					
State	**Park**	**Year Gazetted**	**Enactment**	**Governing Agency**	**Area (ha)**
Kelantan	Taman Negeri Gunung Stong	1992	National Forestry Act 1984 (Act 313)	Forestry Department, Kelantan	21,910
Melaka	Taman Negeri Melaka	-	National Forestry Act 1984 (Act 313)	Forestry Department, Melaka	-
Pahang	Taman Negeri Endau-Rompin	-	National Forestry Act 1984 (Act 313)	Forestry Department, Pahang	40,197
Perlis	Taman Negeri Perlis	-	National Forestry Act 1984 (Act 313)	Forestry Department, Perlis	4,380
Penang	Taman Negeri Bukit Panchor	-	National Forestry Act 1984 (Act 313)	Forestry Department, Penang	-
Selangor	Taman Negeri Selangor	2005	National Forestry Act 1984 (Act 313)	Forestry Department, Selangor	108,000
Perak	Taman Negeri Royal Belum	2007	Perak Stake Park Corporation Enactment 2001	Perak State Parks Corporation	117,500

Source: Forestry Department Peninsular Malaysia, 2017.

Table A.3: List of Other Protected Areas in Peninsular Malaysia (under PERHILITAN Jurisdiction)

Other Protected Areas			
State	**Park**	**Year Gazetted**	**Area (ha)**
Perlis	Rezab Hidupan Liar Wang Pinang	1984	68
Kedah	Rizab Tuntung Bukit Pinang	1976	1
Perak	Rezab Hidupan Liar Sungkai	1928	2,468
Perak	Rezab Hidupan Liar Batu Gajah	1952	45
Perak	Rizab Tuntung Bota Kanan	1993	6
Selangor	Rezab Hidupan Liar Sungai Dusun	1964	4,330
Selangor	Paya Indah Wetlands	1996	450
Johor	Rezab Hidupan Liar Pulau Tioman	1972	9,456
Pahang	Tapak Ramsar Tasek Bera	2007	31,225
Pahang	Rezab Hidupan Liar Krau	1923	62,395
Terengganu	Rizab Tuntung Bukit Palong	1991	1
Perak	Rezab Hidupan Liar Chior	1903	689
Kuala Lumpur	Rezab Hidupan Liar Bukit Nanas	1906	16
Kuala Lumpur	Rezab Hidupan Liar Bukit Sungai Puteh	1922	36
Selangor	Rezab Hidupan Liar Selangor Hill	1922	44
Selangor	Rezab Hidupan Liar Bukit Kutu	1922	1,943
Pahang	Rezab Hidupan Liar Bukit Fraser	1922	2,979
Kuala Lumpur	Rezab Hidupan Liar Kelab Golf Di Raja Selangor	1923	403
Negeri Sembilan	Rezab Hidupan Liar Port Dickson Islands	1926	0.5

Other Protected Areas			
State	**Park**	**Year Gazetted**	**Area (ha)**
Kuala Lumpur	Rezab Hidupan Liar Bukit Sungai Puteh	1932	4
Johor	Rezab Hidupan Liar Endau Kota Tinggi	1933	45,581
Johor	Rezab Hidupan Liar Endau Kluang/ TNJ Endau-Rompin	1933	48,905
Johor	Rezab Hidupan Liar Endau Kluang	1933	52,493
Selangor	Rezab Hidupan Liar Klang Gate	1936	130
Johor	Rezab Hidupan Liar Segamat	1937	12,216
Negeri Sembilan	Rezab Hidupan Liar Four Bird Islands	1954	1
Pahang	Rezab Hidupan Liar Pahang Tua	1954	1,335
Selangor	Rezab Hidupan Liar Templer Park	1956	966
Pahang	Rezab Hidupan Liar Bukit Fraser	1957	200
Melaka	Rezab Hidupan Liar Tanjung Tuan	1971	75
Perak	Rezab Sembilan Pulau	1972	1

Source: PERHILITAN, 2017.

APPENDIX B

POLICIES AND GUIDELINES FOR DEVELOPMENT IN NATIONAL AND STATE PARKS

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APPENDIX B

POLICIES AND GUIDELINES FOR DEVELOPMENT IN NATIONAL AND STATE PARKS

1.0 NATIONAL PHYSICAL PLAN 3 (NPP-3) [DEPARTMENT OF TOWN AND COUNTRY PLANNING (JPBD), 2016]

The NPP-3 provides a systematic categorisation of Environmentally Sensitive Areas (ESAs) and the level of protection and developmental controls allowed for these areas.

In terms of national and state parks, this is highlighted under the following Policies:

(a) Policy KD1.1: Enhancing Conservation and Preservation of National Ecological Assets (refer **Table B.1** for a list of protected areas).

(b) Policy KD1.2: Management and Control of Development in ESAs (refer **Table B.2** for developmental restrictions on development within ESAs).

The locations of permanent reserved forests (PRF) and protected areas are shown in **Figure B.1**.

Table B.1: General Classification of Protected Areas and Relevant Legislation

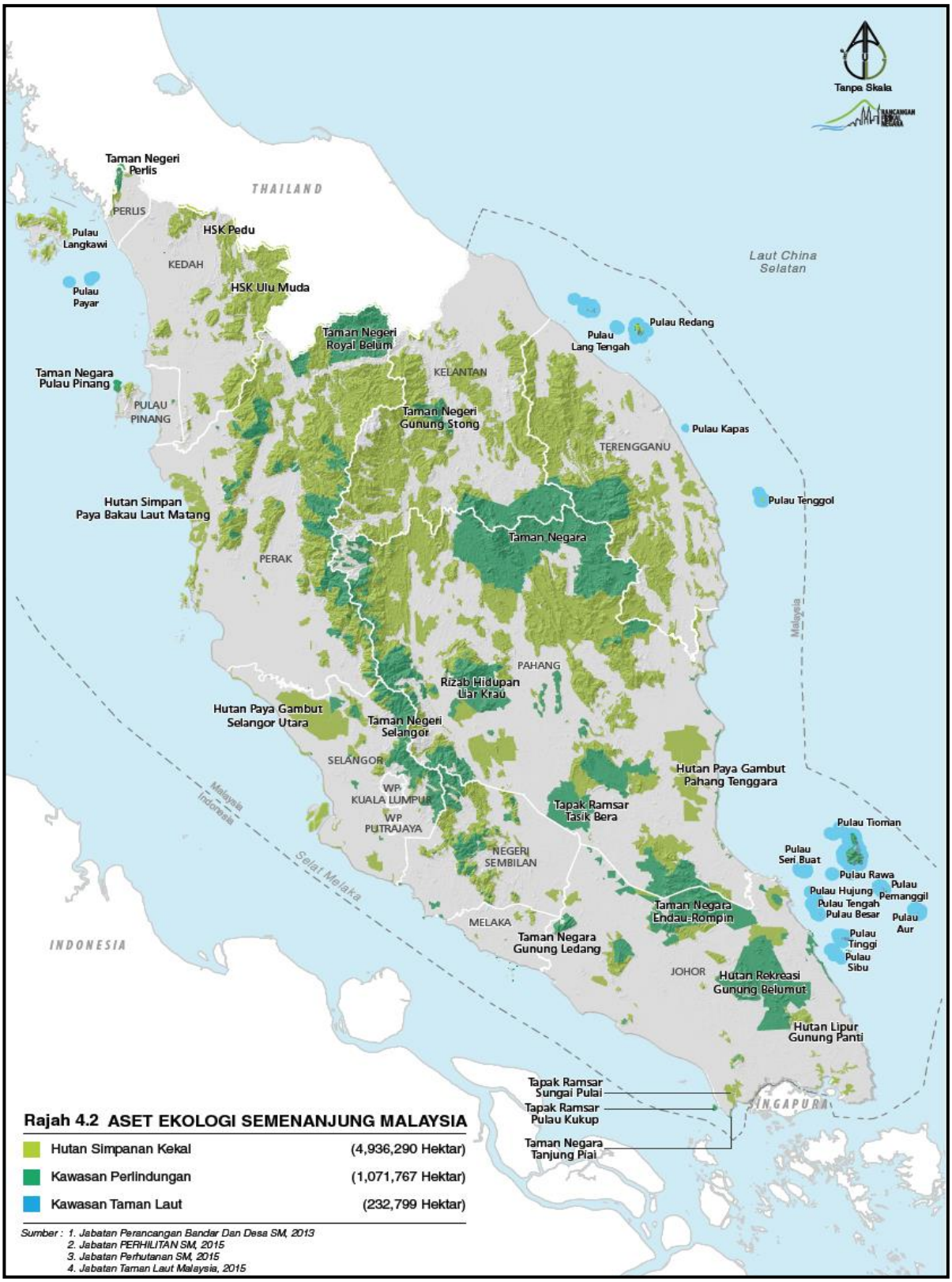
Protected Areas	Act
(a) Hutan Simpan Kekal • Hutan Pengeluaran Kayu di bawah Perolehan Berkekalan • Hutan Perlindungan Tanah • Hutan Tebus Guna Tanah • Hutan Kawalan Banjir • Hutan Tadahan Air • Hutan Perlindungan Hidupan Liar • Hutan Simpanan Hutan Dara • Hutan Lipur • Hutan Pelajaran • Hutan Penyelidikan • Hutan bagi Maksud Persekutuan • Hutan Taman Negeri (b) Kawasan Larangan Perikanan (c) Rizab Hidupan Liar (d) Santuari Hidupan Liar (e) Taman Negara (f) Taman Negeri (g) Taman Laut	• Wildlife Conservation Act 2010 • National Forestry Act 1984 • Fisheries Act 1985 • National Parks Act 1980 • *Enakmen Perbadanan Taman Negeri Perak 2001* • *Enakmen Perbadanan Taman Negara (Johor)* • *Enakmen Taman Negara Kelantan 1939* • *Enakmen Taman Negara Pahang 1939* • *Enakmen Taman Negara Terengganu 1939* • National Land Code 1965

Source: NPP-3, JPBD, 2016.

Table B.2: Management Criteria for ESAs – National and State Parks

ESA Rank	ESA	Management Criteria
Rank 1	Existing protected areas and new proposals	• Development, agriculture and logging are not allowed with exception of eco-tourism, research and education.
Rank 2	Areas between 300 – 1,000 m contour.	• All development and agricultural activities in these areas must abide by existing and future regulations and guidelines. • These areas are to be identified, mapped and detailed in the State Structure Plan and Local Plans
	Areas located within the 500 m buffer zone around Rank 1 areas.	• The 500 m buffer zone is to be modified if there are existing or committed development and control measures put in place based on the area's features. • The landuse inventory at the Local Plan level must be updated.
Rank 3	Areas between 150 – 300 m contour.	• All development and agricultural activities in these areas must abide by existing and future regulations and guidelines.
	Areas located within the 500 m buffer zone around Rank 2 areas.	• Controlled development whereby the type and intensity of development must abide by the landuse constraints.
	Coastal Areas	• All coastal development are to abide by the National Physical Coastal Zone Plan, State ISMP, existing guidelines or any future guidelines in totality.

Source: NPP-3, JPBD, 2016.



Source: National Physical Plan 3 (JPBD, 2016).

Figure B.1: Locations of Permanent Reserved Forests, Protected Areas and Marine Parks in Peninsular Malaysia

2.0 CENTRAL FOREST SPINE I & II: MASTER PLAN FOR ECOLOGICAL LINKAGES (JPBD, 2009)

The main objectives of the Central Forest Spine (CFS) study is to restore the connectivity of forest complexes throughout Peninsular Malaysia (refer **Figure B.2**).

The CFS seeks to remedy fragmentation by formulating viable land use and management guidelines for sustainable development in Ecological Corridors identified (refer **Figure B.3**):

(a) Primary Linkages which are more vital and strategic in connecting larger forest complexes.

(b) Secondary Linkages which are complementary and focused on non-forested land which cannot be reforested due to human land use are identified.

The CFS is divided into two volumes:

(a) CFS I which covers the northern states (i.e. Kedah, Perak, Kelantan, Terengganu and Pahang).
(b) CFS II which covers the southern states (i.e. Selangor, Negeri Sembilan, Melaka, Johor and southern Pahang).

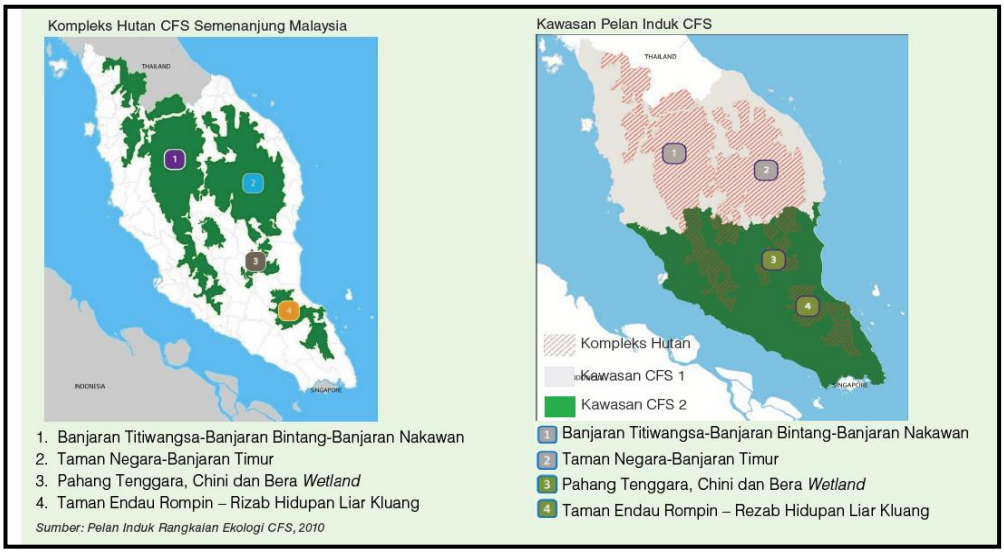
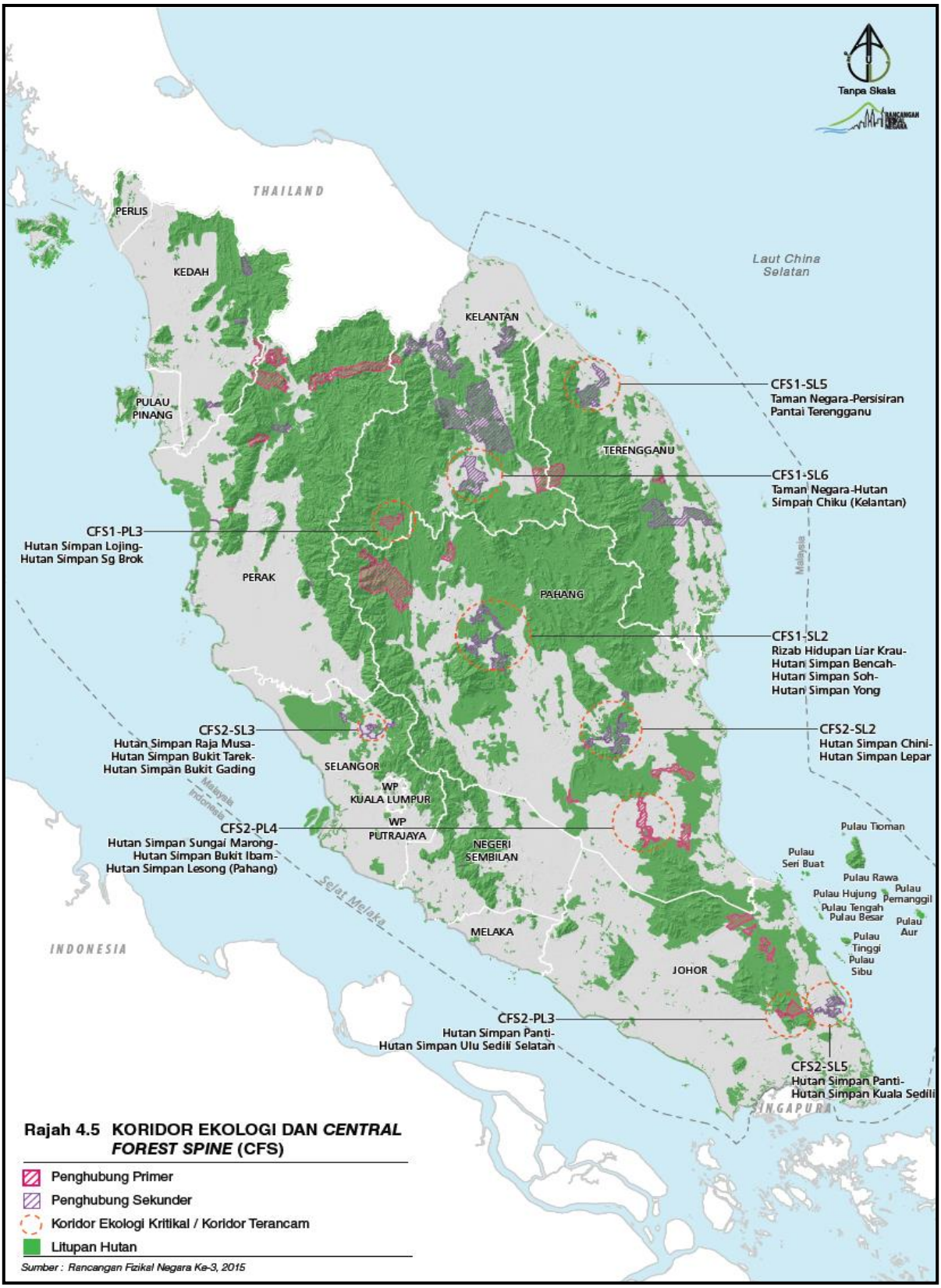


Figure B.2: CFS I and II within Peninsular Malaysia



Source: NPP-3, JPBD, 2016.

Figure B.3: Ecological Corridors of the Central Forest Spine

3.0 NATIONAL POLICY ON BIOLOGICAL DIVERSITY 2016 – 2025 [MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT (NRE), 2016]

The National Policy on Biological Diversity 2016 – 2025 seeks to conserve Malaysia's biological diversity and ensure that its components are used in a sustainable manner. Five goals are set to meet these aims, they are as follows:

(a) Goal 1: We have empowered and harnessed the commitment of all stakeholders to conserve biodiversity.

(b) Goal 2: We have significantly reduced the direct and indirect pressures on biodiversity.

(c) Goal 3: We have safeguarded all out key ecosystems, species and genetic diversity.

(d) Goal 4: We have ensured that the benefits from the utilization of biodiversity are share equitably

(e) Goal 5: We have improved the capacity, knowledge and skills of all stakeholders to conserve biodiversity.

Seventeen targets spread over each of the five goal are formulated which provide focus on specific areas. There are indicators to ensure that each target will be achieved by 2025.

Of the five goals, Goal 3 may be the most relevant as it aims to protect key ecosystems, species and genetic diversity. This can be achieved by conserving 20% of our terrestrial areas through protected areas (e.g. national and state parks), as mentioned in Target 6.

4.0 NATIONAL FORESTRY POLICY 1978 (REVISED 1992)

The National Forestry Policy was accepted by the National Land Council (NLC) in 1977 and endorsed on 19 April 1978 and later revised in 1992 (endorsed 19 November 1992).

The main objectives of the Policy are to:

- Conserve and manage the nation's forest based on the principles of sustainable management.
- Protect the environment, to conserve biological diversity, genetic resources and to enhance research and education.

The main features (relevant to the Guidelines) of the Policy include:

(a) To dedicate as PRF sufficient areas strategically located throughout the country, in accordance with the concept of rational landuse. The PRF will be managed and classified under four major functions; (i) Protection Forest; (ii) Production Forest; (iii) Amenity Forest; and (iv) Research and Education Forest.

(b) To manage the PRF in order to maximize social, economic and environmental benefits to the nation and its people in accordance with the principle of sustainable management.

(c) To undertake and support intensive research programmes on forestry and forest products aimed at enhancing maximum benefits from the forest.

(d) To promote education in forestry and undertake publicity and extension services in order to generate better understanding by the community on the multiple values of forests.

(e) To provide for the preservation of biological diversity and the conservation of areas with unique species of flora and fauna.

(f) To develop a comprehensive program in community forestry to cater to the needs of rural and urban communities.

(g) To set aside specific areas for the purpose of forestry education and other scientific studies.

5.0 CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES)

The objective of the convention is to ensure that the international trade of wild animals and plants does not threaten their survival.

The species covered by CITES are listed in the three appendices, according to the degree of protection:

Appendix I: Includes species threaten with extinction. Trade in specimen of these species is permitted only in exceptional circumstance.

Appendix II: Includes species not necessarily threaten with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.

Appendix III: Includes species that area protected in at least one country, which has asked other CITES Parties for assistance in controlling trade

6.0 THE CONVENTION ON WETLANDS OF INTERNATIONAL IMPORTANCE (RAMSAR)

The Ramsar Convention is an intergovernmental treaty that provides the framework for the conservation and sustainable use of wetlands. The Convention was adopted in the Iranian city of Ramsar in 1971 and ratified by Malaysia in 1975.

There are currently seven sites designated as Wetlands of International Importance (Ramsar sites). Three of which are national parks in Johor (i.e. Taman Negara Johor Tanjung Piai, Taman Negara Johor Sungai Pulai, and Taman Negara Johor Pulau Kukup).

Various resolutions, recommendations, strategic plans, guidelines, planning documents, manuals and handbooks haVE been produced to promote the wise use of the Ramsar sites.

7.0 NATIONAL ECOTOURISM PLAN 2016 – 2025 (MINISTRY OF TOURISM AND CULTURE, 2016)

This Plan is intended as a guide for future development in eco-tourism sites. The table below describes the guidelines related to ESAs:

No.	Guidelines	Description
1.	Marine Parks and Islands	**(i) Protection Status:** Marine ecotourism sites should be awarded some level of protection status through a proper gazette notification for protection/conservation. Areas that should be given protection status include: • All designated Marine Protected Areas (MPAs) and Marine Reserves. • Critical land areas on uninhabited islands. • Mangrove forests on islands and marine parks. • Important water catchment areas on islands. **(ii) Zoning:** Zoning plans and landuse planning should be established and implemented to ensure the sustainable use of land and marine resources of marine parks and islands, as well as sustainable tourism development at the site. A zoning plan should include the following: • Identifying important areas that should be given protection status. • Identifying areas for research, recreation and tourism, usually in uninhabited islands. Identified areas on such islands may be leased to private operators for specific periods with appropriate conditions but should not be alienated to private ownership. • A buffer zone should be established at the beach areas, with a setback of minimum 50 m from the high water mark and construction should not be allowed.

No.	Guidelines	Description
		(iii) Use of Natural Resources • The use of natural resources of marine parks and islands should be regulated and monitored appropriately. • Dredging and mining of sea sand, corals and other marine resources in marine parks should be prohibited. • Extraction of groundwater through tube wells should be monitored and extraction limits should be set based on the capacity of the freshwater lens and all environmental impacts of freshwater use. • Commercial fishing, spear-fishing and other forms of fishing should be banned together with the collection of marine resources. • Forest clearing should not be permitted in areas gazetted for protection or with slopes greater than 20°. Furthermore, appropriate measures should be taken to mitigate soil erosion during and after forest clearing activities. **(iv) Establishing carrying capacity:** Carrying capacities for marine parks and islands should be established through appropriate studies to avoid environmental deterioration of the sites. The establishment of carrying capacity will set a maximum limit to the number of tourist at one time on the beach areas and the surrounding waters of the marine park/island. Mitigation measures will also be proposed to help divert visitor pressure away from beach areas such as the use of floating pontoons, etc.

No.	Guidelines	Description
		(v) Tourism Development • The development of tourism facilities and activities should be carried out in a manner where there is minimal impact to the environment. • Tourist facilities should be limited to lowland areas. Inland areas behind beaches should be developed mainly for low density tourist accommodation, providing only basic services and amenities. • Inhabited islands and low density tourist areas should have a central sewerage system, with no direct discharge into the sea allowed. • No development should be allowed in caves and its surrounding areas, and on very small islands that are less than 5 hectares in area as defined by the Marine Parks Conceptual Plan 1995. • Uninhabited and rugged coasts with caves, headlands and high cliffs along the shore should not be developed for tourism. • Development of additional jetties on islands should first be properly evaluated, as these coastal structures may affect coastal hydrology and detract from the aesthetic value of beach areas. • Certain recreational tourism activities should be prohibited e.g. jet skiing and water skiing, as they impose high danger risks to tourists. Carefully designated zones should be designated if these activities are to be carried out.

No.	Guidelines	Description
2.	National Parks, Reserves and Other Forest	**(i) Management:** Ideally, it is recommended that every national park, reserve and other forested ecotourism sites to have a management plan that includes specific planning for ecotourism development and activities in the site. Preparation of the management plan is the responsibility of the authorized management personnel of the site and should include consultation with other stakeholders such as tour operators, local communities and non-governmental organisations. A typical management plan should provide for the following plan: • Zoning and facilities - The plan will address and identify zones that are suitable for protection, conservation and ecotourism use, followed by the zoning and access into these areas respectively. • Ecotourism impact monitoring - The plan will highlight the methods for continuous monitoring of the impacts of tourism towards the site and provide key indicators that serve as early warnings when the carrying capacity of the site is reaching its threshold level and would thus need relevant assessments and action to be carried out. • Site maintenance - The plan will provide for the regular maintenance of tourism facilities (e.g. trails, chalets etc.), waste disposal protocols and cleaning schedules etc. • Site development - The plan will also provide plans for the future development of the site and provides necessary details of the objective of the development, the means and the impact management for the development and maintenance phases.

No.	Guidelines	Description
		(ii) Zoning: Zoning should be based on the type and intensity of permitted use and on a system of evaluating and classifying land and water areas. Examples of zones include both high and low intensity used zones and restricted areas that function as protection and conservation areas. **(iii) Tourism Facilities Development** • Development of tourism facilities should be based upon the site's zoning plans and carried out in a manner those results in minimal impacts to the site's natural environment. • Siting and design of buildings should be as unobtrusive as possible, with adequate access between buildings and the site for tourists. • Hotels, restaurants and stores should be developed outside the site's boundaries in order to reduce impacts on the area. • Construction methods and materials should be designed to minimize impacts on the environment; Buildings, where possible, should be of treated woods and may have a concrete foundation, base and structural support where necessary in clearings and should not exceed the height of the tree canopy (limited to one or two-storeys). • Exotic plants i.e. non-native, decorative fast-growing species should NOT be planted within the gazetted areas.

No.	Guidelines	Description
3.	Mangrove Sites	**(i) Zoning** • Proper zoning of mangrove sites should be carried out to identify areas for development and for tourism activities. • Zoning should help to determine incompatible tourism activities e.g. canoeing as opposed to motorized fishing boats. • Areas zoned for building development should be confined to the dry inland edge of the mangrove belt and not within the mangrove itself. **(ii) Tourism Facilities Development** • Development of tourism facilities should be carried out in a manner that minimises impacts to the natural environment of the mangrove site. • Where possible, access to mangrove areas should either be by boat or via a raised boardwalk. Boardwalks should be made of treated durable wood with either floating or raised stilts above the level of high tides and follows sinuous routes. • Felling of trees to clear routes for boardwalks and other structures should be minimised and the seaward lines of trees should not be disrupted. • The concept of buildings and boardwalks to be the structures within the forest should be practiced i.e. buildings are not to be higher than the tree canopy and must be on stilts similar to the style of rural villages etc. • Observation towers may protrude from the tree canopy and should be in limited numbers and unobtrusive in appearance. • Mud should not be excavated and left exposed to dry in heaps during operation works as this would cause acidic conditions that contaminate water and make the environment unsuitable for many life forms.

No.	Guidelines	Description
		(iii) **Waste Disposal Management:** Litter must be controlled strictly in mangrove sites. A litter collection programme should be designed to alleviate problems of litter accumulation from the sea. Sanitary facilities should be located as far inland as possible and must ensure that wastes are never discharged into the mangrove or offshore (iv) **Health and safety:** Tourists need to be aware that biting insects are part of the mangrove ecosystem. Health and safety guidelines should be developed with respect to insect-borne diseases and to aid tourists on how to avoid or reduce insect bites with appropriate clothing and repellents.
4.	Recreational Forest Reserves	**(i) Site Management:** Recreational forests are normally part of Forest Reserves. Management and maintenance of the recreational area should thus be covered in the Reserve's overall Management Plan. However, a specific site management plan for the site itself may be developed pertaining to visitor control and management of the area which is typically more intense than larger forest reserves. The plan should address the following issues pertaining to visitor usage of recreational forest reserves: • Allocated parking lots. • Litter control and management. • Damage to vegetation by chopping, trampling etc. • Prohibited activities along rivers and streams etc. • Erosion control. • Potential for human-wildlife conflicts. **(ii) Operator Qualifications:** There is currently an increasing trend towards privatisation and concessions for the operation of facilities in recreational forest reserves. Private operators must demonstrate fulfilment of necessary criteria in order for the application to be approved.

No.	Guidelines	Description
5.	Limestone Hills & Cave Sites	**(i) Site Zoning:** Proper zoning of limestone hills and cave sites is necessary to ensure that ecotourism activities do not have severe impacts towards the fragile nature of the sites. The zoning plan should include: • A buffer zone consisting of tall natural vegetation that should always be left at the base of limestone hills to an extent of 50 – 100 metres. If natural vegetation has been removed, then such a buffer should be recreated by planting native trees and allowing natural regeneration to assist. The natural features of caves and its entrances should also be disturbed as little as possible. • The visual area around the entrance should remain free from vending operations, food concessions, structures, parking lots and intrusive exhibits or signs. • Accommodation, lavatories, interpretive centres, camping sites and food outlets should all be zoned well away from the cave entrances. **(ii) Tourism Facilities and Development:** All man-made installations within and near caves should be minimal and should rely on natural materials to reduce visual and environmental impact. Examples include: • Emphasising the physical structure that is safe and suitable for visitors. • Permanent safety handrails, ladders and anchor points for ropes should be of non-corrosive metal. • If boardwalks cannot be built then paths should be improved only where necessary using concrete or stone brought into the cave (asphalt, tar and oil should be prohibited to be used in or near caves). • Signs should be small, unobtrusive and moveable and should not be attached to delicate rock formations; the method of attachment should also not damage rock.

No.	Guidelines	Description
		• Lighting should be minimal in number of light sources, intensity and the duration it is switched on. Low wattage neon lighting is ideally recommended and should be switched on for only a few minutes when visitors are actually present. • Waste and sewage disposal facilities should not be constructed within caves; all litter and waste must be prevented or removed by visitors. **(iii) Establish Carrying Capacity** • Carrying capacity needs to be properly determined in order to ensure that tourist arrivals do not leave significant impacts to the site. • Total visitor loads for individual cave sites need to be imposed to minimise damage, prevent excessive local commercialisation and to preserve the aesthetics of the cave in order to ensure good visitor experiences. These limits should consider both the size of groups allowed and the number of total groups allowed per day, week or month. • User permit procedures have to be developed to restrict access and restrain efforts to overload caves in a short-sighted attempt to maximise profits. **(iv) Tourist Control and Management**: Tour groups are advised to be kept small for safety and control and to provide a good visitor experience. Tourist behaviour needs to be regulated well to ensure that human activities do not leave significant impacts to the site. Prohibited behaviours include writing, painting or scratching on cave walls and limestone rocks, breaking of delicate rock formations, killing or disturbing cave life forms such as bats, birds, nests, and other vertebrates and invertebrates, and discarding of litter and waste.

No.	Guidelines	Description
		(v) Operator Qualifications • Cave tour operators will need to have substantial knowledge of the site and should have specific training and experience in caving techniques, emergency and medical/first-aid training and some familiarity with cave science and conservation. • Individuals and operating firms need to be carefully selected and are determined based on the experience, training, resources and conduct of the individual/firm in order to ensure the long-term survival of cave resources and the safety of tourists. • New caving guides should undergo practical training for a set minimum period with both governmental bodies and nongovernmental groups trained in caving. • Each tour operator and guide should develop best management practices with respect to the dangerous and challenging nature of the caves.
6.	Rivers, Waterfalls & Lakes	**(i) Managing Natural Environment and Resources:** In site planning, it is recommended that the natural water levels of the rivers, waterfalls and lakes must not be altered. The natural vegetation should also not be cleared, except for specific planned purposes in accordance with a management plan, any alteration to the natural vegetation should be minimised. **(ii) Zoning and Development Control:** Development projects such as golf courses or agricultural land should be zoned at an adequate distance so as to prevent or minimise sedimentation, eutrophication or entry of chemicals into the natural water body. Zoning should also be carried out to determine areas for permitted tourism activities like jet skiing and water skiing. Development control measures should also be developed and implemented within the site and its surrounding areas:

No.	Guidelines	Description
		• Buffer zones, sewage treatment systems, building designs and other facilities should follow the criteria similar to those for coastal tourism • Artificial construction should be minimized. Where it is necessary to reinforce river banks, material similar to naturally occurring materials e.g. granite cobbles should be used. • Lake shore and river bank erosion control measures should also be implemented and enforced. **(iii) Control of Tourism Activities:** Specific tourism may be permitted in artificial lakes within the identified zones. Tourism operators are responsible for ensuring that these activities do not pose threat to tourists and to wildlife in the area. Tour operators should also employ methods that guarantee good tourist experience e.g. use of battery powered boats or rowing boats for wildlife watching from boats.
7.	Beach Sites	**(i) Site Zoning:** Beach areas should be properly zoned for recreational activities such as swimming and motorised water sports and clearly demarcate restricted areas. Recommendations from the Water Sports Council as well as the Fisheries Department should be taken into account when developing the various zones. **(ii) Development Control** • Development along the beaches should be limited to single-storey or one and a half storeys and are recommended to be constructed on stilts. • Light sources such as neon lights at stalls and light shining towards the sea should be avoided or minimised so as not to interfere with wildlife nesting on the beach. • Motorised vehicles should not be allowed on beaches at any time except when it is necessary for essential beach repairs, e.g. repair of major erosion damage.

No.	Guidelines	Description
8.	Montane Areas	**(i) Site Zoning:** Zoning of montane ecotourism sites should be carried out carefully and should leave a high percentage of natural vegetation as intact as possible. Slopes above 20° should be zoned as protected areas and restricted from any form of clearing and development. Building developments should also be sited well away from water courses to reduce pollution risks. **(ii) Facilities Development** • All building development in montane areas should be minimised in height and ground area. • If constructing in high altitudinal areas is necessary, the buildings should be as small as possible and built with non-polluting materials and with minimum need for site preparation. • Access roads should be minimised, well-maintained and constructed by taking into account the possibility of natural landslides. • Innovative methods of sewage disposal must be studied if no suitable area is available to construct toilet facilities e.g. aboveground bioprocessing tanks. Visitors should also be properly instructed on ways to dispose human waste in a sanitary manner if toilet facilities cannot be provided. • Walking routes should be designed in a manner that restricts tourists to a particular trail; whereby the use of railings and embankments. **(iii) Protection of Natural Resources:** It is highly recommended that consultation be carried out with appropriate experts pertaining to the location of rare and endemic flora and fauna before development takes place on the site. The location of these natural resources should be retained in their natural condition together with an adequate buffer zone to ensure their long-term survival. **(iv) Pollution Control:** Methods to reduce pollution during construction and operational works in montane sites need to be implemented so as to reduce negative impacts towards the fragile ecosystem. Solar power is recommended to be used where possible as an energy source as it helps reduce pollution levels and there is no need for transporting fuel or developing power lines into the area.

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APPENDIX C

ENVIRONMENTAL SCOPING MATRIX

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APPENDIX C

ENVIRONMENTAL SCOPING MATRIX

Table C.1: EIA Matrix of Project Activities and Impacts for Development in National and State Parks

Environmental Component	Project Activity																				
	Pre-Construction					Construction										Operational			Closure/ Exit	
	Site Access	Site Surveys	Soil Investigations	Environmental Assessment	Land Acquisition	Establish Access Road	Base Camp and Site Facilities Establishment	Worker Recruitment, Mobilisation of Equipment and Materials	Site Clearing and Biomass Removal	Earthworks (Cut and Fill)	Drainage Works	Structural Works and Facilities Establishment	Waste Disposal	Establishment of Permanent Access	Final Finishing and Landscaping	Operational of Tourism and/or Recreational Facility	Visitor Management and Conservation Works	Infrastructure, Utility and Amenities Maintenance	Site Decommissioning	Rehabilitation Works
Land																				
Landforms																				
Soil Profiles																				
Soil Composition																				
Slope Stability																				
Subsidence and Compaction																				
Seismicity																				
Flood Plains/Swamp																				
Landuse																				
Engineering and Mineral Resources																				
Buffer Zones																				
Surface Water																				
Shoreline																				
Bottom Interface																				
Flow Variation																				
Water Quality																				
Drainage Pattern																				
Water Balance																				
Flooding																				
Existing Use																				
Groundwater																				
Water Table																				
Flow Regime																				
Water Quality																				

Environmental Component	Project Activity																				
	Pre-Construction					Construction										Operational			Closure/ Exit	
	Site Access	Site Surveys	Soil Investigations	Environmental Assessment	Land Acquisition	Establish Access Road	Base Camp and Site Facilities Establishment	Worker Recruitment, Mobilisation of Equipment and Materials	Site Clearing and Biomass Removal	Earthworks (Cut and Fill)	Drainage Works	Structural Works and Facilities Establishment	Waste Disposal	Establishment of Permanent Access	Final Finishing and Landscaping	Operational of Tourism and/or Recreational Facility	Visitor Management and Conservation Works	Infrastructure, Utility and Amenities Maintenance	Site Decommissioning	Rehabilitation Works
Recharge																				
Aquifer Characteristics																				
Existing Use																				
Atmosphere																				
Air Quality																				
Air Flow																				
Climate Change																				
Visibility																				
Noise																				
Intensity																				
Duration																				
Frequency																				
Biological Resources																				
Terrestrial Vegetation																				
Terrestrial Wildlife																				
Other Terrestrial Fauna																				
Aquatic/Marine Flora																				
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																				

Environmental Component	Project Activity																				
	Pre-Construction					Construction										Operational			Closure/ Exit	
	Site Access	Site Surveys	Soil Investigations	Environmental Assessment	Land Acquisition	Establish Access Road	Base Camp and Site Facilities Establishment	Worker Recruitment, Mobilisation of Equipment and Materials	Site Clearing and Biomass Removal	Earthworks (Cut and Fill)	Drainage Works	Structural Works and Facilities Establishment	Waste Disposal	Establishment of Permanent Access	Final Finishing and Landscaping	Operational of Tourism and/or Recreational Facility	Visitor Management and Conservation Works	Infrastructure, Utility and Amenities Maintenance	Site Decommissioning	Rehabilitation Works
Social and Economic																				
Employment																				
Housing																				
Utilities																				
Amenities																				
Property and Settlement																				
Aesthetic and Cultural																				
Landforms																				
Biota																				
Wilderness																				
Water Quality																				
Atmospheric Quality																				
Climate																				
Tranquillity																				
Sense of Community																				
Community Structure																				
Man-made Object																				
Historic Places or Structure																				
Religious Places or Structure																				
Landscape																				

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

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APPENDIX D

ENVIRONMENTAL STANDARDS

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APPENDIX D

ENVIRONMENTAL STANDARDS

1.0 RIVER WATER QUALITY

Table D.1: National Water Quality Standards (NWQS) for Malaysia

Parameter	Unit	Class					
		I	IIA	IIB	III	IV	V
AN	mg/L	0.1	0.3	0.3	0.9	2.7	>2.7
BOD	mg/L	1	3	3	6	12	>12
COD	mg/L	10	25	25	50	100	>100
DO	mg/L	7	5 – 7	5 – 7	3 – 5	<3	<1
pH	-	6.5 – 8.5	6 – 9	6 – 9	5 – 9	5 – 9	-
Colour	TCU	15	150	150	-	-	-
Electric Conductivity*	µS/cm	1,000	1,000	-	-	6,000	-
Floatables	-	N	N	N	-	-	-
Odour	-	N	N	N	-	-	-
Salinity	%	0.5	1	-	-	2	-
Taste	-	N	N	N	-	-	-
Total Dissolved Solids	mg/L	500	1,000	-	-	4,000	-
TSS	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	5,000 (20,000)a	5,000 (20,000)a	-
Total Coliform	count/ 100 mL	100	5,000	5,000	50,000	50,000	>50,000

Source: Malaysia Environmental Quality Report (EQR) 2015, DOE, 2015.

Notes: N = No visible floatable materials or debris, no objectionable odour or no objectionable taste.
* = Related parameters, only one recommended for use.
** = Geometric mean.
a = Maximum not to be exceeded.

Table D.1: National Water Quality Standards (NWQS) for Malaysia (Continued)

Parameter	Unit	Class				
		I	IIA/IIB	III	IV	V
Aluminium, Al	mg/L		-	(0.06)	0.5	
Arsenic, As	mg/L		0.05	0.4 (0.05)	0.1	
Barium, Ba	mg/L		1	-	-	
Cadmium, Cd	mg/L		0.01	0.01* (0.001)	0.01	
Chromium, Cr(IV)	mg/L		0.05	1.4 (0.05)	0.1	
Chromium, Cr(III)	mg/L		-	2.5	-	
Copper, Cu	mg/L		0.02	-	0.2	
Hardness	mg/L		250	-	-	
Calcium, Ca	mg/L		-	-	-	
Magnesium, Mg	mg/L		-	-	-	
Sodium, Na	mg/L		-	-	3 SAR	
Potassium, K	mg/L		-	-	-	
Iron, Fe	mg/L		1	1	1 (Leaf) 5 (Others)	
Lead, Pb	mg/L	NATURAL	0.05	0.02* (0.01)	5	LEVELS
Manganese, Mn	mg/L		0.1	0.1	0.2	
Mercury, Hg	mg/L	LEVELS	0.001	0.004 (0.0001)	0.002	ABOVE
Nickel, Ni	mg/L		0.05	0.9*	0.2	
Selenium, Se	mg/L	OR	0.01	0.25 (0.04)	0.02	IV
Silver, Ag	mg/L		0.05	0.0002	-	
Stanium, Sn	mg/L	ABSENT	-	0.004	-	
Uranium, U	mg/L		-	-	-	
Zinc, Zn	mg/L		5	0.4*	2	
Boron, B	mg/L		1	(3.4)	0.8	
Chlorine, Cl	mg/L		200	-	80	
Chlorine, Cl_2	mg/L		-	(0.02)	-	
Cyanide, CN	mg/L		0.02	0.06 (0.02)	-	
Flouride, F	mg/L		1.5	10	1	

Source: Malaysia EQR 2015, DOE, 2015.

Notes: * = At hardness 50 mg/L $CaCO_3$.

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

N = Free from visible film sheen, discolouration and deposits.

Table D.1: National Water Quality Standards (NWQS) for Malaysia (Continued)

Parameter	Unit	Class				
		I	IIA/IIB	III	IV	V
Nitrite, NO_2	mg/L		0.4	0.4 (0.03)	-	
Nitrate, NO_3	mg/L		7	-	5	
Phosphorus, P	mg/L		0.2	0.1	-	
Silica	mg/L		50	-	-	
Sulphide, SO_4	mg/L		250	-	-	
Sulfur, S	mg/L		0.05	(0.001)	-	
Carbon dioxide, CO_2	mg/L		-	-	-	
Gross – alfa	Bq/L		0.1	-	-	
Gross – beta	Bq/L		1	-	-	
Ra – 226	Bq/L		<0.1	-	-	
Sr – 90	Bq/L		<1	-	-	
CCE	µg/L		500	-	-	
MBAS/ BAS	µg/L		500	5,000 (200)	-	
O&G (Mineral)	µg/L		40; N	N	-	
O&G (Emulsified edible)	µg/L		7,000; N	N	-	
PCB	µg/L	NATURAL	0.1	6 (0.05)	-	LEVELS
Phenol	µg/L		10	-	-	
Aldrin/Dieldrin	µg/L	LEVELS	0.02	0.2 (0.01)	-	ABOVE
BHC	µg/L		2	9 (0.1)	-	
Chlordane	µg/L	OR	0.08	2 (0.02)	-	IV
T – DDT	µg/L		0.1	(1)	-	
Endosulfan	µg/L	ABSENT	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	1,800	-	

Source: Malaysia EQR 2015, DOE, 2015.

Notes: * = At hardness 50 mg/L $CaCO_3$.

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

N = Free from visible film sheen, discolouration and deposits.

Table D.2: DOE Water Quality Classification by WQI

Water Quality Index	Index Range		
	Clean	Slightly Polluted	Polluted
WQI	81 – 100	60 – 80	0 – 59

Source: Malaysia EQR 2015, DOE, 2015

Table D.3: DOE WQI Classification

Parameter	Unit	Class				
		I	II	III	IV	V
AN	mg/L	<0.1	0.1 – 0.3	0.3 – 0.9	0.9 – 2.7	>2.7
BOD	mg/L	<1	1 – 3	3 – 6	6 – 12	>12
COD	mg/L	<10	10 – 25	25 – 50	50 – 100	>100
DO	mg/L	>7	5 – 7	3 – 5	1 – 3	<1
pH	-	>7.0	6.0 – 7.0	5.0 – 6.0	< 5	>5.0
TSS	mg/L	<25	25 – 50	50 – 150	150 – 300	>300
WQI		**>92.7**	**76.5 – 92.7**	**51.9 – 76.5**	**31.0 – 51.9**	**<31.0**

Source: Malaysia EQR 2015, DOE, 2015

2.0 MARINE WATER QUALITY

Table D.4: Malaysia Marine Water Quality Criteria and Standards (MMWQCS)

Parameter	Unit	Class 1	Class 2	Class 3	Class E
		Preservation, marine protected areas, Marine Parks	**Marine life, Fisheries, Coral reefs, Recreational and Mariculture**	**Ports, Oil and Gas Fields**	**Mangroves, Estuarine and Rivermouth water**
Temperature	°C	≤ 2°C increase over maximum ambient	≤ 2°C increase over maximum ambient	≤ 2°C increase over maximum ambient	≤ 2°C increase over maximum ambient
Dissolved Oxygen	mg/L	>80% saturation	5	3	4
Total Suspended Solids	mg/L	25 mg/L or ≤ 10% increase in seasonal average, whichever is lower	50 mg/L (25 mg/L) or ≤ 10% increase in seasonal average, whichever is lower	100 mg/L or ≤ 10% increase in seasonal average, whichever is lower	100mg/L or ≤ 30% increase in seasonal average, whichever is lower
Oil and Grease	mg/L	0.01	0.14	5.0	0.14
Mercury*	µg/L	0.04	0.16 (0.04)	50	0.5
Cadmium	µg/L	0.5	2 (3)	10	2
Chromium (VI)	µg/L	5	10	48	10
Copper	µg/L	1.3	2.9	10	2.9
Arsenic (III)*	µg/L	3	20 (3)	50	20 (3)
Lead	µg/L	4.4	8.5	50	8.5
Zinc	µg/L	15	50	100	50
Cyanide	µg/L	2	7	20	7
Ammonia (unionised)	µg/L	35	70	320	70
Nitrite (NO_2)	µg/L	10	55	1,000	55
Nitrate (NO_3)	µg/L	10	60	1,000	60
Phosphate	µg/L	5	75	670	75
Phenol	µg/L	1	10	100	10

Parameter	Unit	Class 1	Class 2	Class 3	Class E
		Preservation, marine protected areas, Marine Parks	Marine life, Fisheries, Coral reefs, Recreational and Mariculture	Ports, Oil and Gas Fields	Mangroves, Estuarine and Rivermouth water
Tributylyin (TBT)	µg/L	0.001	0.01	0.05	0.01
Faecal coliform	-	70 faecal coliform count/100 mL	100 faecal coliform count/100 mL & (70 faecal coliform count/100 mL)	200 faecal coliform count/100 mL	100 faecal coliform count/100 mL & (faecal coliform count/100 mL)
Polycyclic Aromatic Hydrocarbons (PAHs)	µg/L	100	200	1,000	1,000

Source: Malaysia EQR 2015, DOE, 2015

Note: * MWQCS in parentheses are for coastal and marine water areas where seafood for human consumption is applicable.

Table D.5: Malaysia: Marine Water Quality Index Classification

Marine Water Quality Index	Index Range			
	Excellent	Good	Moderate	Poor
MWQI	90 – 100	80 – <90	50 – <80	0 – <50

Source: Malaysia EQR 2015, DOE, 2015

3.0 SEWAGE DISCHARGE STANDARDS

Table D.6: Acceptable Conditions of Sewage Discharge of Standards A and B of the Second Schedule (Regulation 7), Environmental Quality (Sewage) Regulations, 2009

Parameters	Unit	Standard A	Standard B
Temperature	°C	40	40
pH	–	6.0 – 9.0	5.5 – 9.0
Biochemical Oxygen Demand (BOD_5) at 20°C	mg/L	20	50
Chemical Oxygen Demand	mg/L	120	200
Suspended Solids	mg/L	50	100
Oil and Grease	mg/L	5.0	10.0
Ammoniacal Nitrogen (enclosed water body)	mg/L	5.0	5.0
Ammoniacal Nitrogen (river)	mg/L	10.0	20.0
Nitrate Nitrogen (river)	mg/L	20.0	50.0
Nitrate Nitrogen (enclosed water body)	mg/L	10.0	10.0
Phosphorus (enclosed water body)	mg/L	5.0	10.0

Source: Environmental Quality (Sewage) Regulations 2009.

Table D.7: Existing Sewage Treatment System (Approved before January 1999)

Parameter	Unit	Communal Septic Tank		Imhoff Tank		Aerated Lagoon		Oxidation Pond		Mechanical System	
		Standard		Standard		Standard		Standard		Standard	
		A	B	A	B	A	B	A	B	A	B
(a) BOD_5 at 20° C	mg/L	200	200	175	175	100	100	120	120	60	60
(b) COD	mg/L	-	-	-	-	300	300	360	360	180	240
(c) Suspended Solids	mg/L	180	180	150	150	120	120	150	150	100	120
(d) Oil and Grease	mg/L	-	-	-	-	-	-	-	-	20	20
(e) Ammoniacal Nitrogen	mg/L	-	-	100	100	80	80	70	70	60	60

Source: Environmental Quality (Sewage) Regulations 2009.

Table D.8: Existing Sewage Treatment System (Approved after January 1999)

Parameter	Unit	Standard	
		A	B
(a) BOD_5 at 20° C	mg/L	20	50
(b) COD	mg/L	120	200
(c) Suspended Solids	mg/L	50	100
(d) Oil and Grease	mg/L	20	20
(e) Ammoniacal Nitrogen	mg/L	50	50

Source: Environmental Quality (Sewage) Regulations 2009.

4.0 RAW DRINKING WATER QUALITY

Table D.9: National Guidelines for Raw Drinking Water Quality

No.	Parameter	Unit	Benchmark
1.	Sulphate, SO_4	mg/L	250
2.	Hardness, $CaCO_3$	mg/L	500
3.	Nitrate, NO_3	mg/L	10
4.	Coliform	-	Must not be detected in any 100 mL sample
5.	Manganese, Mn	mg/L	0.1
6.	Chromium, Cr	mg/L	0.05
7.	Zinc, Zn	mg/L	3
8.	Arsenic, As	mg/L	0.01
9.	Selenium, Se	mg/L	0.01
10	Chloride, Cl	mg/L	250
11.	Phenolics	mg/L	0.002
12.	Total Dissolved Solids	mg/L	1000
13.	Iron, Fe	mg/L	0.3
14.	Copper, Cu	mg/L	1.0
15.	Lead, Pb	mg/L	0.01
16.	Cadmium, Cd	mg/L	0.003
17.	Mercury, Hg	mg/L	0.001

Source: National Guidelines for Raw Drinking Water Quality, Ministry of Health, 2000.

5.0 AIR QUALITY

Table D.10: Malaysian Ambient Air Quality Standards (MAAQS)

Pollutant	Unit	Averaging Time	IT-1 (2015)	IT-2 (2018)	Standard (2020)
PM_{10}	$\mu g/m^3$	1 year 24 hours	50 150	45 120	40 100
$PM_{2.5}$	$\mu g/m^3$	1 year 24 hours	35 75	25 50	15 35
SO_2	$\mu g/m^3$	1 hour 24 hours	350 105	300 90	250 80
CO	mg/m^3	1 hour 8 hours	35 10	35 10	30 10
NO_2	$\mu g/m^3$	1 hour 24 hours	320 75	300 75	280 70
O_3	$\mu g/m^3$	1 hour 8 hours	200 120	200 120	180 100

Source: DOE Notice 1/2015, DOE, 2015.
Note: IT = Interim

6.0 NOISE AND VIBRATION

Table D.11: Schedule 1 – Maximum Permissible Sound Level (L_{Aeq}) by Receiving Landuse for Planning and New Development

Receiving Landuse Category	Maximum Permissible Sound Level (L_{Aeq}) [dB(A)]	
	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	40
Suburban Residential (Medium Density) Areas, Public Spaces, Parks, Recreational Areas.	55	45

Receiving Landuse Category	Maximum Permissible Sound Level (L_{Aeq}) [dB(A)]	
	Day Time 7.00 am – 10.00 pm	Night Time 10.00 pm – 7.00 am
Urban Residential (High Density) Areas, Designated Mixed Development Areas (Residential – Commercial).	60	50
Commercial Business Zones.	65	55
Designated Industrial Zones	70	60

Source: The Planning Guidelines for Environmental Noise Limits and Control, 2nd Edition, DOE, 2007.

Table D.12: Schedule 3 – Maximum Permissible Sound Level (L_{Aeq}) to be Maintained at the Existing Noise Climate

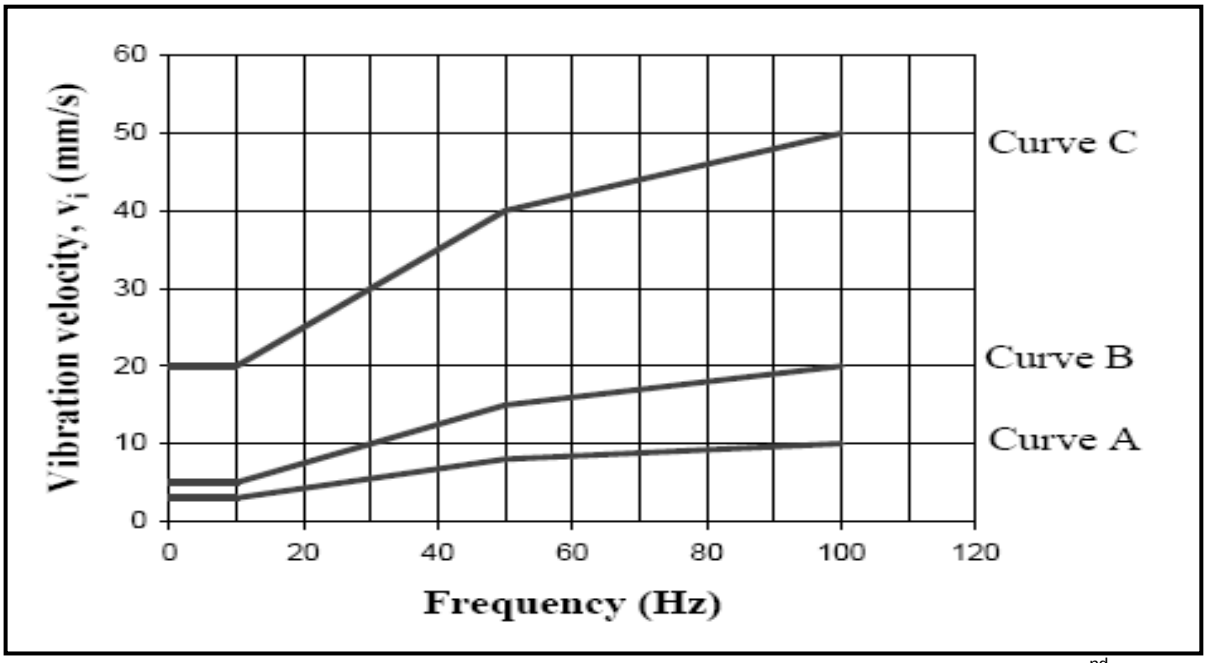
Existing Level	New Desirable Level	Maximum Permissible Level
L_{Aeq}	L_{Aeq}	L_{Aeq} + 3 dB(A)

Source: The Planning Guidelines for Environmental Noise Limits and Control, 2nd Edition, DOE, 2007.

Table D.13: 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 D.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: The Planning Guidelines for Vibration Limits and Control in the Environment, 2nd Edition, DOE, 2007.



Source: The Planning Guidelines for Vibration Limits and Control in the Environment, 2nd Edition, DOE, 2007.

Figure D.1: Foundation Vibration Velocity Limiting Values for Vectoral Sum of Vibration Levels in Three Orthogonal Axes

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APPENDIX E

EIA CHECKLIST

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APPENDIX E

EIA CHECKLIST

E.1 CHECKLIST FOR TERMS OF REFERENCE (TOR)/ ENVIRONMENTAL SCOPING INFORMATION (ESI)

Item		Adequacy Check		Remarks
		Yes	No	
1.0	**Is the project a NEW development?**			
2.0	**Is the project an AMENDMENT to an existing development? If so,**			
	(a) Was an EIA previously prepared for the existing development?			
	(b) Does the addition involve new area development? If so how much and where?			
3.0	**Does the project involve development in national or state parks?**			
	(a) Was there a park management plan done?			
	(b) Is the development for the overall park?			
	(c) Is it a standalone project within the park?			
4.0	**Has policies compliance been met by the Project Proponent?**			
	(a) National/state approvals			
	(b) Landuse compatibility			
	(c) Land status			
	(d) Forestry and wildlife management			
	(e) Fisheries management			
	(f) Hydrology assessment			
	(g) Orang Asli community issues			
	(h) Others (SIA, TIA, HIA, etc.)			
5.0	**Who were involved in the scoping tasks?**			
	(a) Project Proponent			
	(b) Park managers			
	(c) Town planner/Architect			
	(d) Engineering consultants			
	(e) Environmental consultants			

Item		Adequacy Check		Remarks
		Yes	No	
	(f) Affected stakeholders			
	(g) Government agencies (GAs)			
	(h) Others			
6.0	**Does the project involve the following activities:**			
	(a) Site assess			
	(b) Land clearing			
	(c) New borrow area/quarry			
	(d) Cut-and-fill/earthworks			
	(e) Buildings which require foundations			
	(f) Infrastructures and amenities			
	(g) Pollution treatment systems			
7.0	**Geographic Scope**			
	(a) Are the following features intersected by the Project?			
	(i) Rivers/lakes			
	(ii) Coastal areas/islands			
	(iii) Wetlands/mangroves			
	(iv) Forest reserves			
	(v) Tourism/recreational areas			
	(b) Are the environmental issues with each feature identified?			
8.0	**Timeline**			
	(a) Project implementation schedule (by phase in chronological order of occurrence)			
9.0	**Project information provided:**			
	(a) Project concept and layout			
	(b) Project activities			
	(c) Material sources and storage			
	(d) Infrastructure, utilities and amenities requirement			
10.0	**Site Suitability Assessment (SSA)**			
	(a) Site constraints/suitability addressed?			
	(b) Have the affected public be informed/consulted?			
	(c) Alternative project layout provided?			

Item		Adequacy Check		Remarks
		Yes	No	
	(d) Best Available Technology (BAT) considered?			
	(e) No Project Option?			
11.0	**Significant Impacts scoped and prioritised?**			
	(a) Identified Impacts			
	(i) Ecology			
	(ii) Erosion and sedimentation			
	(iii) Hydrology			
	(iv) Water quality			
	(v) Air quality and noise			
	(vi) Human environment			
	(vii) Waste management			
	(viii) Traffic			
	(ix) Socio-economy			
	(x) Safety and health			
	(b) For each significant impact, were the methods and scope sufficient for impact assessment?			
	(c) Were mitigation measures proposed to address the significant impact?			

E.2 CHECKLIST FOR ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

Item		Adequacy Check		Remarks
		Yes	No	
1.0	**Executive Summary (Brief and Concise)**			
	(a) In Bahasa Malaysia			
	(b) In English			
2.0	**Introduction**			
2.1	(a) Title of the Project			
	(b) Project Proponent details			
	(c) EIA Consultant details			
	(d) Project location (boundary coordinates)			
	(e) Relevant maps showing project location and ESAs			

Item		Adequacy Check		Remarks
		Yes	No	
2.2	Legal requirements			
3.0	**Terms of Reference**			
4.0	**Statement of Need**			
	(a) Principle reasons for proposed Project (include relevant supporting documents)			
	(b) Aim of Project			
5.0	**Project Options**			
	(a) Alternatives considered?			
	(b) Project optimisation done?			
6.0	**Project Description**			
6.1	Project concept:			
	(a) Layout plan (map)			
	(b) Landuse zoning and compatibility			
	(c) Size and land requirement			
	(d) Project component			
	(e) Method statement			
	(f) Labour requirement			
	(g) Raw material requirement			
	(h) Infrastructure/utilities/amenities			
6.2	Project activities: Construction			
6.3	Project activities: Operational			
6.4	Project implementation schedule (Chart)			
7.0	**Description of Existing Environment**			
7.1	Baseline			
	(a) Physico-chemical:			
	(i) Landuse (5-km radius)			
	(ii) Topography			
	(iii) Geology and soil			
	(iv) Climate			
	(v) Hydrology/drainage			
	(vi) Water quality			
	(vii) Ambient air quality			
	(viii) Ambient noise and vibration levels			
	(b) Biological			
	(i) Terrestrial (flora and fauna)			

Item		Adequacy Check		Remarks
		Yes	No	
	(ii) Aquatic (flora and fauna)			
	(iii) Marine (flora and fauna)			
	(c) Socio-economy			
	(i) Demography			
	(ii) Public Health			
	(iii) Historical, cultural and archaeological aspects			
	(iv) Fishermen community			
7.2	Others:			
	(a) Traffic Impact Assessment			
	(b) Health Impact Assessment			
	(c) Social Impact Assessment			
8.0	**Evaluation of Impacts**			
8.1	Detailed examination of impacts during:			
	(a) Pre-construction phase			
	(i) Site access			
	(ii) Site surveys			
	(iii) Soil investigations			
	(iv) Environmental assessment			
	(v) Land acquisition			
	(b) Construction phase			
	(i) Establish access road			
	(ii) Base camp and site facilities establishment			
	(iii) Worker recruitment, mobilisation of equipment and materials			
	(iv) Site clearing and biomass removal			
	(v) Earthworks			
	(vi) Drainage works			
	(vii) Structural works and facilities establishment			
	(viii) Waste disposal			
	(ix) Establishment of permanent access			
	(x) Final finishing and landscaping			
	(c) Operational phase			

Item		Adequacy Check		Remarks
		Yes	No	
	(i) Operation of tourism and/or recreational facilities			
	(ii) Visitor management and conservation work			
	(iii) Infrastructure, utility and amenities maintenance			
	(d) Decommissioning			
	(i) Site decommissioning			
	(ii) Rehabilitation works			
9.0	**Pollution Prevention and Mitigation Measure (P2M2)**			
9.1	Environmental Aspects			
	(a) Ecology management			
	(b) Erosion and sedimentation			
	(c) Hydrology and drainage			
	(d) Water pollution			
	(e) Air quality and dust control			
	(f) Noise and vibration control			
	(g) Waste management			
	(h) Public health and safety			
	(i) Infrastructure and utility			
10.0	**Environmental Management Plan (EMP)**			
10.1	Guided Self-Regulation detailed out?			
10.2	Pollution Control Systems provided?			
10.3	LD-P2M2 included?			
10.4	Proposed Monitoring Programme:			
	(a) Location of monitoring points			
	(b) Frequency of monitoring			
	(c) Parameters to be measured			
	(d) Procedures for reporting and enforcement			
9.5	Environmental Audit Programme			
10.0	**Study Findings/Conclusions**			
11.0	**Reference**			
12.0	**Appendices**			

ISBN 978-983-3895-57-1

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