

CHAPTER 9 : ENVIRONMENTAL MANAGEMENT PLAN (EMP)

9.1 INTRODUCTION

A framework Environmental Management Plan (EMP) is prepared to address the potential adverse environmental impacts throughout the Project. Detailed EMPs shall later be drafted for submission to the Department of Environment (DOE) Perak by the Project Proponent and/or the Main Contractor prior to the start of construction, after issuance of the Environmental Impact Assessment (EIA) Approval Conditions.

The main objectives of an EMP are to:

- i. Highlight all the environmental requirements and standards that need to be complied with as specified by DOE and related government agencies throughout the Project.
- ii. Outline the Pollution Prevention and Mitigation Measures (P2M2) and Best Management Practices (BMPs), including emergency responses and procedures, to be adopted during the different stages of the Project.
- iii. Set up environmental monitoring, auditing and training programmes for ensuring implementation and effectiveness of the proposed P2M2 or BMPs.
- iv. Propose an Environmental Management Team (EMT) and their respective responsibilities for on-site environmental management.

This chapter includes:

- i. A typical Environmental Management Team (EMT) and their responsibilities.
- ii. Environmental Performance Indicators (EPIs) and the target compliance criteria.
- iii. An environmental monitoring programme.
- iv. Briefs on environmental auditing and training programmes.
- v. Emergency Response Plan (ERP).

Hanamurni Sdn. Bhd. recognises and respects the environmental sensitivity of the development to the surrounding environment and therefore, is prepared to commit to an Environmental Management Plan (EMP) following the guidelines of the Department of Environment. With full commitments from the Project Proponent and with the advice of Nilaimas Services consultants, it is anticipated that this Project will cause minimal environmental impacts to nearby interests and the surrounding.

The ultimate aim is to show that the forest plantation activities will be carried out in a skilful and work-like manner with due consideration towards the preservation of environment and conservation of resources. It is also the intention of this report to highlight that the forest plantation activity can be successfully integrated into the local environment without detrimental effects, both in the short and long term. For other environmental matters with related to the operation, the forest plantation management shall try to fulfil the matters requirement from time to time.

9.2 PROPOSED MONITORING PROGRAMMED

The Project Proponent is committed to provide financial allocation for the proper management and implementation of the EMP. The forest plantation management is also committed to the principles and requirements for the forest plantation activities and operations which shall be undertaken in the area thereafter, and will fully agree on the EMP as part of the company's commitment towards environmental issue related to the forest plantation activity.

To manage the environment in the proper manner, a good and systematic management program must be adopted, with a strong emphasis on employee education, regular monitoring, environmental auditing and employing best management practices to prevent environmental issues from arising whenever possible.

An Environmental Management Team (EMT) must be set up by the project proponent to implement, monitor, audit and report based on

the Environmental Management Plan (EMP) on all matters pertaining to the environment.

9.2.1 Environmental Commitments

Table 9.1 shows the typical EMT and their responsibilities.

Table 9.1 : Key Members of EMT and Their Responsibilities

Key ERT Member	Responsibilities
DOE Perak	<ul style="list-style-type: none"> • Ensure that the PP, MC and Scs (if any), adhere to all environmental regulations and acts. • Carry out regular site inspections on the Project to observe and monitor environmental status and compliance. • Issue notification/instruction/penalty for non-compliance to the PP (if any).
Project Proponent (PP)	<ul style="list-style-type: none"> • To ensure that the Contract Documents include provisions for compliance with environmental requirements. The Environmental Quality Act, 1974 and other subsidiary legislation and guidelines shall be used as a reference; • To allocate an adequate budget for implementing the EMP; • To organize a structure for Environmental Management for the project, with clear defined roles and responsibilities, and reporting mechanism; • To establish a system to respond promptly to public complaints; • To review periodically, the overall monitoring program with respect to monitoring locations, frequency, parameters, environmental controls and mitigating measures, and revise if necessary; and • To conduct meetings with the Project Developer and Contractor to review environmental performance of the proposed works, to identify any improvements in working practices to avoid breaches of limit levels and bring a self-regulatory concept approach to environmental compliance.
Main Contractor (MC) and Sub-contractors (SC)	<ul style="list-style-type: none"> • To appoint the following EMT members: • Implement the EMP recommendations and requirements to ensure that all P2M2 are undertaken;

	<ul style="list-style-type: none"> • Take all reasonable care and steps to protect the environment (both on and off the Project site) and limit damage and nuisance to people and property resulting from pollution, noise and other disturbances, based on the recommendations; • Ensure that all workers go through induction trainings on environmental aspects coordinated by the EO or the EC; • Ensure that all workers go through induction trainings on environmental aspects coordinated by the EO; and • Carry out maintenance and rehabilitation of BMPs on site.
Environmental Consultant (EC)	<ul style="list-style-type: none"> • To prepare an Environmental Impact Assessment (EIA) report; • To prepare an Environmental Management Plan (EMP); • To advise proper execution of the environmental impact and compliance monitoring program; • To advise Project Proponent/ Contractor on the performance of an implementation of the EIA/ EMP and recommend appropriate changes as indicated by monitoring results; • To assist Hanamurni Sdn. Bhd. Contractor in reporting to the DOE; and • To liaise with the DOE and relevant regulatory authorities on environmental matters.

9.2.2 Types of Environmental Monitoring

9.2.2.1 Performance Monitoring (PM)

Performance Monitoring (PM) is the monitoring to ensure that the pollution control systems and other mitigation measures are perform in a good condition to reduce the adverse impacts from the proposed Project at a minimum level. Environmental Officer (EO) or Certified Competent Person shall carry out on-site performance monitoring. The Performance Monitoring (PM) programme, monitoring stations, recommended limits and frequencies are summarised in **Table 9.2**.

Table 9.2 : Summary of Impact Monitoring, Compliance Monitoring and Performance Monitoring

Types of Environmental Monitoring	Activity	Parameter	Recommended Limits	Monitoring Locations	Frequencies
Performance Monitoring (PM)	Sediment trap/ Basin	Silt Marker	2/3 of the height of silt marker	Referred to the LD-P2M2 attachment	After 12.5 mm of heavy rainfall
	Check dam				As needed
	Wash Trough	Structure	-		After 12.5 mm of heavy rainfall
	Temporary or Permanent Waterway Crossing (culvert/bridge)	Structure	-		
Compliance Monitoring (CM)	Air Quality	PM ₁₀	150 µg/m ³	One location within boundary of project site	Quarterly
	Noise	L _{Aeq}	Day: 55 dBA Night: 45 dBA		
	Water Quality (Discharge from Silt trap/ Sediment trap)	Total Suspended Solids (TSS)	50 mg/L	Number of pond proposed in the LDP2M2	After 12.5 mm of heavy rainfall
		Turbidity	50 NTU		
Impact Monitoring (IM)	Air Pollution	PM ₁₀	New Malaysia Ambient Air quality Standard	Refer to Figure 6.33	Quarterly
	Noise Level	L _{Aeq}	Annex A Schedule of Permissible Sound Levels Schedule 1: Maximum Permissible Sound Level (L _{Aeq}) by Receiving Land Use for Planning and New	Refer to Figure 6.33	Quarterly
		L _{max}			
		L _{min}			
		L ₁₀			
		L ₅₀			
L ₉₀					

			Development – Planning Guidelines for Environmental Noise Limits and Control		
	Erosion and Sedimentation	Total Suspended Solid (TSS)	National Water Quality Standard	Refer to Figure 6.16	Monthly
		Biochemical Oxygen Demand (BOD)			
		pH			
		Turbidity			
		Ammoniacal Nitrogen (NH ₃ -N)			
		Dissolved Oxygen (DO)			
		Chemical Oxygen Demand (COD)			

9.2.2.2 Compliance Monitoring (CM)

Compliance Monitoring (CM) is the monitoring activities to be carried out to ensure that the EIA condition of approval (COAs) are complied with. An environmental audit may also be carried out to assess the overall project compliance. An appointed Accredited Laboratory shall carry out on-site sampling and laboratory analysis. The Compliance Monitoring (CM) programme, monitoring parameters, monitoring stations, recommended limits and frequencies are summarised in **Table 9.2**.

9.2.2.3 Impact Monitoring (IM)

Impact Monitoring (IM) is the monitoring activities will be conducted once the proposed Project is approved for implementation to verify that the findings of the EIA study of the potential impacts identified during EIA preparation stage are correct, appropriate mitigation and prevention measures are properly implemented and the measures are effective in mitigation the adverse impacts to the environment. An appointed Accredited Laboratory shall carry out on-site sampling and laboratory analysis. The Impact Monitoring (IM) programme, monitoring parameters, monitoring stations and frequencies are summarised in **Table 9.2**.

The scope of the proposed monitoring program comprises the following key tasks:

- Site inspection to assess the current progress of construction works on site.
- Monitoring of water quality, discharge from silt traps, air quality and noise levels to assess environmental conditions against work progress and intensity.
- Analysis of the monitoring result, formulation, and recommendations on suitable measures areas of non-compliance and/or enhancement of environmental quality.
- Monitoring and measurement shall be carried out by trained qualified Technician or accredited laboratory under ISO Guide 25/SAMM 1.

- Monitoring and measuring equipment shall be controlled and maintained and a copy of the report shall be handed over to the Employer's Representative and DOE.

Based on the information described, it is recommended that environmental impact monitoring of the project be implemented according to the following sampling locations, the frequency of sampling and analytical methods. The purpose of monitoring is to identify any changes caused by the project activities. It will also establish whether mitigation measures adopted are sufficient to reduce impact.

i. Air Quality Monitoring

Air quality monitoring is important during the construction stage of the proposed project. Basic climatic data should be collected in conjunction with the air quality measurements. This should include ambient conditions during monitoring such as wind speed and direction, temperature and description of the general climatic conditions. This information can assist in the interpretation of the air quality data (e.g. wind speed and direction will assist in determining the degree of air mixing occurring and may help to qualify the importance of any contaminant concentration that may be detected). As a minimum requirement, some of the parameters (as per requested by DOE) specified in the DOE's ambient air quality guidelines shall be monitored. All records of monitoring shall be kept and presented to the authorities upon request.

There are five (5) air quality stations at the proposed project site that will be monitored during the construction of the project. The locations for air quality monitoring station are shown in **Chapter 6**. The air sample will be collected from a fixed point by drawing the air from the surrounding area through absorbing media via a pre-calibrated portable pump stationed at the fixed points.

Air Quality Monitoring Frequency

Air quality monitoring during the construction phase will be carried out at five (5) locations. A quarterly monitoring frequency is proposed during the construction phase. This is to ensure that dust suppression measures for potentially dusty construction activities; and vehicle movement are implemented. The monitoring exercise will also ensure regular maintenance of construction vehicle and equipment and prevent noxious exhaust emissions.

ii. **Water Quality Monitoring**

Monitoring is intended to determine complained about specified procedures and instruction with regards to environmental quality control. It is imperative that the Project proponent monitor the results of water quality monitoring closely, especially during the project development phase, and to take corrective actions whenever and wherever deterioration of the water quality occurs which can be attributed to the project development.

For the preservation of water quality in the proposed project area, the following is recommended:

- a) Monitoring of the water quality is carried out at least once a month during the land clearing and construction phase and also normal operations and maintenance phase. The water quality sampling stations are as shown in **Chapter 6**.
- b) The water quality monitoring points should include all of the sampling stations.
- c) All the station will be selected based on the following criteria:
 - Potential impact due to project development to the aquatic environment, water resources and water for human uses.
 - Upstream and downstream of the potential impact area.
 - Upstream of water intake point/water treatment plant.

Water Quality Monitoring Frequency

Water quality monitoring frequency can be divided into two phases, namely construction phase and operating phase as shown in **Figure**

9.2. Water quality monitoring at sixteen (16) locations at the proposed project site will be monitored.

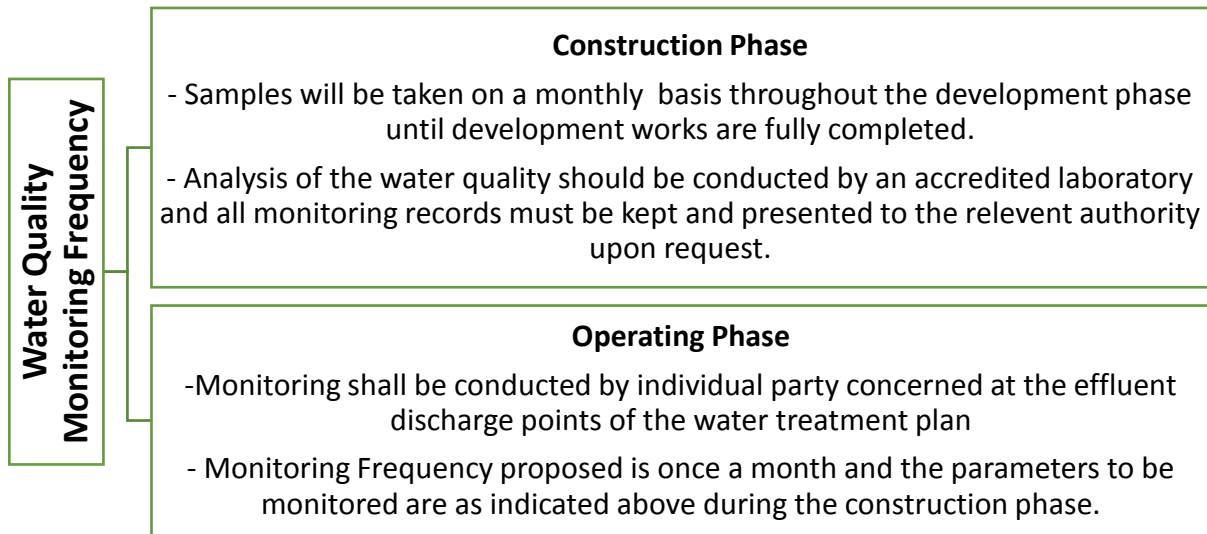


Figure 9.1 : Water Quality Frequency for both Construction and Operating Phase

iii. Noise Level Monitoring

Noise monitoring at five (5) locations at the proposed project site will be monitored. The locations of noise monitoring stations show in **Chapter 6**.

Noise Level Monitoring Frequency

Noise monitoring will be carried out at five (5) locations at day and night time during the construction phase. It is proposed that monitoring will be carried out on a quarterly basis during the construction phase.

iv. Sewage

Monitoring activities should emphasize on the performance of the sewerage treatment system in terms of compliance **Standard A of the Environmental Quality (Sewage) Regulations 2009**. Normally this activity would be within the purview of the treated wastewater should be arranged between IWK and the contractor maintaining and running the system.

9.2.3 Environmental Auditing

An Environmental Audit is required under Section 33A of the Environmental Quality Act 1974 (Act 127), to be conducted by a third party registered with DOE, i.e. having no other interest in the Project.

The environmental audit program is proposed to track and ensure the enforcement of specified environmental protection and pollution control measure. In order to ensure that the appropriate environmental protection and pollution control mitigation measure implemented, the audit session should be undertaken routinely by the professional audit team.

The main points of audit program are:

- Include the general environmental conditions in the vicinity of the site
- The pollution control and mitigation measure within the site

It should also review the environmental condition outside the site area which is likely to be affected, directly or indirectly by the site activities. The audit team shall refer to the following information in conducting the audit:

- The EIA approval condition from DOE.
- The EIA recommendations on environmental protection and mitigation measures.

The audit findings and their associated recommendations on improvements to the environmental protection and mitigating measure shall be submitted to the project proponent for taking immediate action. The contractor shall follow the procedures and time frames stipulated in the environmental audit for the implementation of the mitigation proposal. An action reporting system shall be implemented to report on any remedial measures implemented subsequent to the environmental audit.

9.2.4 Environmental Audit Checklist

There are two (2) main parts which form a checklist for the development of this proposed project, namely:

i. Section A – Scoping

Checklist as: [option (yes/ no/ maybe)] on issues related to an assessment from the pre-implementation, development and management of repairs that need to be addressed in the EIA Report.

ii. Section B – Details PEIA report format adopted by EIA consultants

Generally, it focuses on the details of the format of the report, the proposed cost, analysis, findings, program monitoring, repair and formulation of action PEIA study.

The main purpose of the preparation of the checklist is for use by Department of Environment for review and follow-up to the approval of PEIA reports. This section provides a checklist of the mitigation measures that must be taken to ensure that the mitigating measures are adequately carried out to meet various conditions stipulated by the authorities.

i. Planning and Design

- ✓ *Has the machinery been installed with the required noise control equipment?*

ii. Damage and Interference (on Structure, Roads, and Other Property)

- ✓ *Have all precautions been taken to avoid damages and interference (other than to the extent that is necessary for them to be removed or diverted to permit the execution of the works) to:*
 - a) *Watercourses or drainage systems?*
 - b) *Utilities?*
 - c) *Structures, roads, including street furniture, or other property?*
 - d) *Public or private vehicular or pedestrian accesses?*

- ✓ *Have all items, which are damaged or interfered with as a result of the works, and items which are removed to enable work to be carried out, been reinstated to at least the same condition as existed before the work started?*
- ✓ *Has written permission been obtained prior to any excavation or performance of any other work directly or indirectly affecting any utility (underground, overhead or on the surface)?*

iii. Access

- ✓ *Have the arrangements for the alternative access been agreed by the relevant authorities?*
- ✓ *Is the permanent access reinstated as soon as practicable after work is completed and the alternative access removed immediately if it is no longer required, and the ground surfaces properly reinstated?*
- ✓ *Are all necessary precautions been taken to protect structures or works being carried out by others adjacent to and, for the time being, within the site from the effects of vibrations, undermining and any other earth movements, or the diversion of water flow arising from the work?*

iv.Noise

- ✓ *Is noise monitoring carried out at locations and frequency determined by the DOE?*
- ✓ *Does the noise level comply with all requirements of the authorities?*
- ✓ *If it is necessary to work beyond 2200 hour, has the approval from relevant authorities been obtained?*
- ✓ *If any noise level gives rise to public complaints, has the contractor taken immediate steps to mitigate the problem such as limiting noise intense works to 0700 to 2200 hours?*

v. Water Quality

- ✓ *Is water containing soil particles or muddy water flowing as surface runoff or from other areas of the worksite being drained into a suitably designed silt trap before it is discharged into an outlet drain, ditch, stream or sea?*

- ✓ *Is silt trap size designed to conform to the total catchment area?*
- ✓ *Is the silt trap regularly de-silted?*
- ✓ *Have the sites for deposition of de-silting material been determined and approved by the authorities?*
- ✓ *Is the water drained from the silt trap being frequently monitored for TSS, and other relevant parameters?*
- ✓ *Are the sampling locations and frequency complying with the DOE requirement?*

vi. Site Cleaning and Disposal of Waste Material

- ✓ *Have all debris, spoil material, rubbish and other waste been cleared regularly from the site?*
- ✓ *Is the disposal site for the dumping of the waste material approved by the local authorities?*
- ✓ *Is the access to the work sites free of all debris, waste and excavated material and other obstructions?*
- ✓ *Are the waste oil and other scheduled waste being handled and disposed of according to procedures for scheduled wastes?*

vii. Safety

- ✓ Have the contractors ensured that all workers understand and comply with the standard safety procedures for handling heavy machinery, vehicles and equipment?
- ✓ Is there a safety officer to oversee that the overall safety compliance has been adhered to?
- ✓ Are first aid facilities available at all times at the construction site?
- ✓ Is there available immediate transportation to the hospital for medical treatment, if required?

9.3 RELATED ENVIRONMENTAL REGULATIONS

The legislative requirement includes in the EMP to observed and complied with. These are given below but unnecessarily are limited to it:

- Compliance with the Environmental Quality Act (Amendment) 1996.
- Contamination as given in the Environmental Quality Act 1974 (Act 127) and subsidiary legislation made thereunder.
- To adopt wherever necessary and applicable the Environmental Impact Assessment Guidelines produced by the DOE that is relevant to the project.
- Compliance with the Terms and Conditions of Approval that are issued by Authorities for the duration of this project.
- Compliance wherever possible with all the Malaysia Environmental Guidelines produced by the DOE and other relevant authorities.

9.3.1 Water Quality

Classes of water quality for inland surface waters as recommended in the National Water Quality Standard for Malaysia (NWQS) are presented in **Table 9.3** while **Table 9.4** shows water classes and its uses.

Table 9.3 : NWQS for Some Main Parameters of Concern

Parameter	Classes					
	I	IIA	IIB	III	IV	V
DO (mg/l)	7	5-7	5-7	3-5	3	<1
pH	6.5-9	6.5-9	6.5-9	5-9	5-9	-
BOD ₅ (mg/l)	8.5	3	3	6	12	>12
COD (mg/l)	1	25	25	50	100	>10
TSS (mg/l)	10	50	50	150	300	0
NH ₃ – N (mg/l)	25	0.3	0.9	0.9	2.7	300
Turbidity (NTU)	5	50	50	-	-	2.7
Oil and Grease (mg/l)	Natural levels	40;N	40;N	N	-	-
<i>E.Coli</i> (Counts/100ml)	10	100	400	5000 (20000a)	2000 (20000a)	-

Notes:
 TSS : Total Suspended Solids
 NH₃ – N : Ammoniacal nitrogen
 a : Maximum not to be exceeded
 N : Free from visible film, sheen, discoloration, and deposits

(Sources: Department of Environment, Malaysia)

Table 9.4 : Water Classes and its Uses

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

(Source: Department of Environment, Malaysia)

9.3.2 Air Quality

The Department of Environment (DOE) has adopted some recommended guideline levels (**New Malaysia Ambient Air Quality Standard**) for a number of pollutants including Total Suspended Particulates (TSP) and particulate matter (PM₁₀), lead and dust fall (**Table 9.5**).

The Environmental Quality (Declared Activities) (Open Burning) Order (2003), prohibits any open burning activity that has not been listed in the order. The installation of fuel burning equipment e.g. temporary generator sets is prohibited without prior written approval from the DOE (Regulation 5). The contractor shall submit the written notification to the DOE as per Regulation 5 of the Environmental Quality (Clean Air) Regulation 2014.

Emissions of black smoke from diesel powered vehicles and construction equipment must comply with the emission limits specified under the Environmental Quality (Control of emissions from Diesel Engines) Regulations 1996.

Table 9.5 : New Malaysia Ambient Air Quality Standard.

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

*mg/m³

(Source: Department of Environment, Malaysia)

9.3.3 Ambient Noise

Noise generated by the construction and operations phases of the project areas is governed by The Planning Noise Limits and Control. Protection of site personnel from the effect of excessive exposure to noise falls under the Department of Occupational Health and Safety (DOSH) via the Factory and Machinery (Noise Exposure) Regulations, 1989. The noise emitted from motor vehicles is controlled under the environmental quality (Motor Vehicle Noise) Regulation, 1987. **Table 9.6** present The Planning Noise Limits and Control.

Table 9.6 : The Planning Guidelines for Environmental Noise Limits and Control (Schedule 1: Maximum Permissible Sound Level (LAeq) by Receiving Land Use for Planning and New Development)

Receiving Land Use Category	Day Time 7.00 a.m – 10.00 p.m	Night Time 10.00 p.m – 7.00 p.m
Noise Sensitive Area, Low-Density Residential, Institutional (School, Hospital), Worship Areas.	50 dBA	40 dBA

Suburban Residential (Medium Density) Areas, Public Spaces, Parks, Recreational Areas.	55 dBA	45 dBA
Urban Residential (High Density) areas, Designated Mixed Development Areas (Residential – Commercial)	60 dBA	50 dBA
Commercial Business Zones	65 dBA	55 dBA
Designated Industrial Zone	70 dBA	60 dBA

9.3.4 Solid Waste

Solids waste are controlled by the Local Government Act 1976 and Refuse Collection, Removal and Disposal By-Laws specify that commercial and industrial waste may be collected and disposed of on a fee basis prescribed by local authorities. Contravention of the by-laws is an offense. Project proponent will be responsible for ensuring that solid wastes generated on the site shall be the domestic waste (worker’s quarters and site offices) or construction wastes are properly stored and then transported and disposed of at approved disposal site.

9.3.5 Schedule Waste Management

Both handling and disposal of schedule materials are covered under the Environmental Quality (Scheduled Wastes) Regulations, 2005. According to this regulation, scheduled waste can be defined as “any waste falling within the categories of waste listed in the First Schedule”. All categories of SW1, SW3 and SW4 are the type of waste that usually found during the construction phase shown in **Table 9.7**.

Table 9.7 : Category of Scheduled Waste and its Description

FIRST SCHEDULE (REGULATION 2)	
SW 1	Metal and metal-bearing wastes
SW 103 SW 107	Waste of batteries containing cadmium and nickel or mercury or lithium.

	Slags from copper processing for further processing or refining containing arsenic, lead or cadmium.
SW 3	Waste containing principally organic constituents which may contain metals and inorganic materials
SW 305	Spent Lubricating Oil.
SW 306	Spent Hydraulic Oil.
SW 4	Waste which may contain either inorganic or organic constituents
SW408	Contaminated soil, debris or matter resulting from cleaning-up of a spill of chemical, mineral oil or scheduled waste.
SW 409	Disposal containers, bag or equipment contaminated with chemical, mineral oil or schedule wastes.
SW 410	Rags, plastics, papers or filters contaminated with scheduled wastes.

These Regulations introduce the “cradle to the grave” waste management concept whereby a historical record is maintained providing documented details of the life-cycle of the waste from its generation through to its ultimate disposal. The specific requirement can be referred to Environmental Quality Act 1974 under Environmental Quality (Scheduled Waste) Regulations 2005. These types of wastes must have proper storage and handle on site.

Scheduled waste must be stored in the drum and placed at the designated area. The area must surround by the bund to control any spillage or leakage. Scheduled waste should be transported away by a licensed contractor approved by DOE for recycling. The Environmental Officer should keep updated the inventory of the scheduled waste in the file. Keep records of the consignment notes for the transportation and disposal of the scheduled waste.

9.4 LAND-DISTURBING POLLUTION PREVENTION AND MITIGATION MEASURES (LDP2M2)

The LD-P2M2 document is a legal pledge made by the Project Proponent to take efforts, measures, actions, or due diligence in accomplishing the overarching goal of protecting the environment and in mitigating the environmental impact in the process of implementation of the proposed development project. The focus of

the LD-P2M2 is on the prevention, mitigation and control of the discharge from the development area containing the major pollutant (suspended solids) resulting from land disturbing activities. Method of statement and land disturbing activities which are proposed to be carried out in phases are further elaborated in LD-P2M2 as follows (See **Appendix 5A**).

The LD-P2M2 will be read with the Erosion and Sediment Control Plan (ESCP) and other engineering plans or written instructions that may be issued in relation to development at the subject site. Contractors will ensure that all erosion and sediment control works are undertaken as instructed in the specification and constructed in accordance with the guidelines in Urban Stormwater Management Manual for Malaysia, 2nd Edition 2012 and Guidelines for Prevention and Control of Soil Erosion and Siltation (DOE, 1996). All contractors will be informed of their responsibilities in minimizing the potential for soil erosion and sedimentation of downslope areas.

The main principle of LD-P2M2 preparation is to ensure that erosion and sedimentation control measures are fully integrated into the development sequence. It can only be effective if construction and control practices are jointly planned during the planning and feasibility stages and implemented simultaneously throughout the construction stage. LD-P2M2 should be referred to frequently and refined by the owner and contractors as changes may occur in construction operations, which have significant effects on the potential for discharge pollutant. Regular maintenance of the established control structures is vital throughout the phases of the development. Well-maintained control structures will ensure that the extent of erosion/sedimentation problems is significantly reduced.

Removal of ground cover will expose the soil and thereby affect the quality of the surface run-off. The eroded soil will affect the water quality. Borehole logs indicate a thick layer of clay with some organic material. Erosion can be mitigated by constructing sediment basins. The basin will be constructed and maintained during the active logging and plantation operation stage. Once the site is capped,

erosion is minimal and vegetation would be established. Cover crops have to be introduced immediately as a control measure.

Erosion rate will be greater during opening up an area. The mitigation measures will be employed for erosion control. These include earth drain, check dams, sand bags, silt fence and turfing. The critical issue is to have maintenance on a regular basis and repair any damages immediately. Inspection must be done weekly and after each rainfall as a preventive measure. Design of sediment basins would be in compliance with MASMA published by DID Malaysia.

Typical requirements area:

- Basin length to settling depth ratio shall be less than 200:1
- Basin length to width ratio shall be greater than 2:1
- Side slopes shall not be steeper than 2(H) :1(V) and
- The 80th percentile 5 days rainfall shall be adopted, as this is an environmentally sensitive area.

The Project Proponent shall ensure that:

- i. All relevant parties including project consultant, contractors, and Environmental Officer (EO) understand LD-P2M2 in order to facilitate compliance with the minimum standards requirements.
- ii. All relevant pollution prevention and mitigation measures (P2M2s) especially temporary BMPs at the constructional phase are installed and maintained to mitigate the potential pollution due to land disturbing activities.

The following paragraphs detail out the P2M2s (which include BMPs) that are proposed to be installed at the Project site.

9.4.1 Scheduled Site Meeting

Project proponent together with Project Environmental Officer, project contractors and subcontractors will conduct site meeting and discuss matters pertaining land disturbing activities to discuss in detail all of the relevant scopes of work that have relevance to

pollution prevention and mitigating measures every week or fortnightly.

9.4.2 Construction Markers

- i. Physically mark on site will be provided to show the limit of the following:-
 - Land disturbing from any drainage way or waterway or watercourse within project site;
 - Areas not to be worked or disturbed, and
 - Buffer area or/and existing vegetation meant for temporary or permanent preservation and for protection.
- ii. The construction markers that will be installed are fences, tapes, flags or other similar marking device.

9.4.3 Stabilised Construction Entrance

The following P2M2 are proposed at a suitable distance from where these access roads join the existing paved roads or public road.

Stabilised Construction Access

A stabilised construction access is defined by a point of entrance or exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles. The stabilized construction access shall be provided at the entrance to the Project site.

9.4.4 Perimeter Control

Before land-disturbing activities are executed, perimeter control will first be constructed and made operational. The following perimeter controls are proposed to control discharges from the site to out of Project site.

Earth drain

Earth drain can be constructed across disturbed areas and around perimeter of construction sites and phasing subdivisions. Keep them

in place until the disturbed areas are permanently stabilised or adequately replaced. Earth drain are particularly useful for controlling runoff after top soiling and grassing before vegetation becomes established. Where works are occurring within the berm area, compact the topsoil over the berm area as a bund adjacent and parallel to the berm. This will act as an impoundment area and controlled outfall while also keeping overland flow away from the construction area.

9.4.5 Sediment Pond

Sediment pond is suitable for nearly all types of projects. Wherever possible, they should be constructed before land clearing and grading work begins. The pond must not be located in a stream or natural waterway but should be located to trap sediment-laden runoff before it enters any stream. All sediment basins will have one or more markers placed in the basin to clearly indicate the level at which design capacity is exceeded and when the sediment will need to be removed. Sediment removed from sediment basins will be disposed of at locations where further erosion and subsequent pollution to down slope will not occur.

Regular inspections are to be carried out to ensure structural stability and functionality of the inlet, outlet and outlet protection works. If the basin is located at the final discharge point from site, periodic water quality samples shall be collected and tested for total suspended solids (TSS) and turbidity to comply with DOE water quality limits of 50 mg/L TSS.

9.4.6 Runoff Management

Check dam

Check dam is a small temporary dam to be constructed across the temporary earth drain to reduce storm water flow velocity, thereby reducing the erosion of the temporary earth drain and promoting the sedimentation behind the dam. Temporary erosion and sediment control structures will be removed only after the lands they are protecting are stabilized.

Earth Drain

Earth drain is to be provided to divert off site runoff around the Project site, divert runoff from stabilized areas around disturbed areas, and to direct runoff into sediment control BMPs. All drains should be installed when the site is initially graded and remain in place until permanent BMPs are installed and/or slopes are stabilized. The drains will flow into the sediment pond before it is discharged into the nearest receiving waterways.

The drains shall be maintained by desilting during the course of the general platform development operations and shall be backfilled with compactor earth after completion of platform development. Drains are only effective if they are properly installed. As drains are mainly made of earth and soil, it is extremely important that proper earth compaction and surface cover properly stabilise through this BMP.

9.4.7 Temporary or Permanent Watercourse Crossing

Temporary Waterway Crossing

A temporary access waterway crossing is a culvert placed across a waterway to provide temporary access for construction purposes. TWC will provide a safe, erosion free access point across the existing waterway for vehicle crossing. However, caution should be exercised when applying this BMP as it is an in-stream construction. Weekly inspection and maintenance is required to check for structural failure, debris removal, inlet and outlet protection maintenance etc.

9.4.8 Temporary Stabilisation

Temporary stabilization is a condition where exposed soils or disturbed areas are provided a temporary vegetative and/or non-vegetative protective cover to prevent erosion and sediment loss. Temporary stabilization provided are temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate

erosion until further construction activities take place to re-disturb this area.

Cover Crops and Turfing

Temporary soil stabilization to exposed areas within fourteen (14) days after final formation level is reached on any portion of the site and within seven (7) days at exposed areas that may not be at final grade but will remain unattended for longer than fourteen (14) days.

It is important that the formed platform and slopes that has been constructed earlier need to be turfed or covered as soon as possible to prevent from wind erosion or further erosion into the waterways which will lead to sedimentation.

Lands recently turfed will be watered regularly until an effective cover has properly established and plants are growing vigorously. Further application of seed returfing might be necessary later in areas of inadequate vegetation establishment. Prior to the completion of construction, apply permanent erosion control to remaining disturbed soil areas. Sufficient erosion control materials shall be maintained onsite to allow implementation in conformance with this LD-P2M2.

9.4.9 Discharge

- i. All discharge runoff water from any land-disturbing activities shall be made through a sediment control P2M2 such as sediment basin and sediment controls which is regarded as the designated final discharge(s).
- ii. All disturbed areas shall drain to sediment control measures at all times during land disturbing activities and during site development until stabilised, after which, the sediment controls shall be removed. Any trapped sediment and the disturbed soil areas resulting from the removal of temporary measures shall be permanently stabilised to prevent further erosion and sedimentation.
- iii. The discharge point of the treated runoff shall be released by using a dissipater or other means of outlet protection.

- iv. All discharge run off water to offsite area shall only be allowed through a sediment basin or trap or other specified control measures.

Drainage Inlet and Outlet Protection

Drainage Outlet Protection is proposed to be placed at the outlet of the culvert or channel of the sediment basins to prevent scour caused by high flow velocities and to absorb flow energies to produce non erosive velocities. The type of DOP can be rock, grouted riprap, or concrete rubble, which will be determined by the contractor at later stage. In cases where loose rocks or rip rap are used, it is important to carry out regular inspections to avoid material wash off during large storm event. The outlet protection shall be provided at the outlet from the sediment basins and detention pond within the project site before flowing to the nearest waterway, see **Figure 9.2.**



Figure 9.2 : Drainage Outlet Protection (using rock outlet protection)

9.4.10 Corrective Actions

- i. In a case where a required P2M2 was installed incorrectly, or is not effective enough to produce a discharge that complies with

the discharge standards, the PP shall install a new or modified P2M2 or additional P2M2 and make it operational by no later than 7 calendar days from the time of discovery.

- ii. The Project Proponent shall within 7 calendar days of discovering the occurrence of one of the triggering conditions above complete a report as described in the Performance Monitoring Document (PMD) and which shall be reported in the Performance Monitoring Report (PMR). The report details which shall also be recorded in the logbook include the following:
 - a. Any follow-up actions taken to review the design, installation, and maintenance of P2M2s , including the dates such actions occurred;
 - b. A summary of P2M2 modifications taken or to be taken, including a schedule of activities necessary to implement changes, and the date the modifications are completed or expected to be completed;
 - c. The Project Proponent shall send a report with photographic evidence as soon as practicable whenever corrective actions or measures have been taken or scheduled to be taken, using an online communication medium to the DOE.
 - d. In all circumstances, the Proponent shall immediately take all reasonable steps to minimize or prevent the discharge of pollutants until a permanent solution is taken and an appropriate P2M2 is installed or applied and made operational, including cleaning up any contaminated surfaces so that the material will not be discharged in subsequent storm events.

9.4.11 Site Inspections

- i. Site inspections shall be conducted to check and to ascertain that all P2M2s specified in the EIA Report have been properly installed and maintained as well as to determine whether any

controls that is clearly not operating as intended or any P2M2s requires replacement, or additional P2M2s are required. The site inspections shall also assess if pollution is effectively being controlled and off-site discharge is being prevented in compliance with the EIA conditions of approval (COAs).

- ii. All inspection activities shall be recorded in the PM logbook.
- iii. At a minimum, inspections shall be conducted at the site prior to commencement of land clearing activities and after every storm event during construction and as specified in the established inspection schedule.
- iv. At a minimum, the following areas shall be inspected:
 - a. All areas that have been cleared, graded, or excavated and that have not yet completed stabilization;
 - b. Construction entrances/exits;
 - c. Roadways;
 - d. All P2M2s installed or applied at the site;
 - e. Material storage areas, spoil area, borrow area, or equipment storage and maintenance areas;
 - f. All areas where runoff water typically flows within the site, including drainage ways designed to divert, convey, and/or treat runoff water;
 - g. All points of discharge from the site;
 - h. All locations where stabilization measures have been implemented at least once every seven (7) days and within 24 hours after the end of a storm event.
 - i. A rain gauge shall be properly maintained at the site so as to determine if a storm event has occurred on the site. In a circumstance that a rain gauge is faulty, the storm event information shall be obtained from a weather station that is representative of the project site.
 - j. Major observations and incidents of non-compliance shall be recorded in the inspection report, as well as corrective actions and maintenance and shall be recorded in the PM log book.

9.4.12 Maintenance and Monitoring

Maintenance and monitoring of erosion, sediment control, and storm water quality will also conform to BMPs. The following sections describe the routine monitoring and maintenance practices that will be performed for the Project.

During Construction

The construction contractor will be responsible for the preparation, installation and removal of temporary erosion control measures described in this document

Contractor erosion control responsibilities will include:

- Initial inspection of erosion control measures as they are completed to ensure they will function as desired.
- Inspections following each rainstorm to ensure replacement of damaged or missing structures and materials
- Notifying project construction crew when to implement adequate precautions in anticipation of rainy weather conditions
- Defining a schedule for watering the access roads and other disturbed areas for dust suppression.
- Developing additional remedial erosion and sediment controls for problem areas, if any.
- Complying with other BMP requirement as required by DOE

A designated site representative will monitor and record the contractor and subcontractor's performance with respect to erosion/sedimentation control measures and management of construction materials, wastes, hazardous materials, and equipment. This representative will also inspect the site prior to anticipated storm events and after such events in accordance with the construction requirements.

Routine maintenance measures to be implemented include:

- The on-site detention will be monitored following each major rainstorm for accumulation of sediment. Sediment will be

removed in order to maintain adequate capacity of minimum settling depth.

- If sediment accumulates over 300mm foot behind the (sandbag) barrier, the contractor will remove or re-grade the sediment.
- If the sand bags are washed away as a result of storm runoff, the damaged sand bag area will be replaced by a silt fence or portable barrier (such as gabion). Special attention to these areas will be maintained until erosion is adequately controlled.
- Protected storage areas for stockpiled soils or other materials will be inspected. Coverings will be replaced as secured.

Post Construction

A self-auditing program will be established based on the inspection checklist. The developer/operator personnel based on the condition during handover/completion of site for CPC will make a site inspection using the checklist.

Project operator representative will monitor and record the erosion / sedimentation control measures and management of construction material, wastes, hazardous materials, and equipment during post construction. This representative will also inspect the site prior and after storm events in accordance with the ESCP's requirements. Any damage to the ESCP control measures shall be rectified back to its original conditions.

Records of these inspections will be kept for a period of 3 years after completion of the construction. Others measures taken during post construction include:

- Preserving existing trees and grass where possible to prevent erosion;
- Re-vegetating the site as soon as possible;
- Locating soil stockpiles away from roads or waterways;
- Limiting tracking of mud onto streets by requiring all vehicles to use stabilized designated access;

- Removing sediments carried off-site by vehicles or storms;
- Maintaining erosion and sediment practices through sediment removal, structure replacement etc.

As a summary, to prevent erosion and control sediment, the following primary principles will be adopted in the project site:-

- a. Integrate project design with site constraints.
- b. Preserve and stabilize drainage ways.
- c. Minimize the extent and duration of disturbance.
- d. Control stormwater flows onto, through, and from the site in stable drainage structures. Install perimeter controls.
- e. Stabilize disturbed areas promptly in a timely manner.
- f. Protect steep slopes. – All plantation slopes will be planted with cover crops and turf.
- g. Use sediment controls to prevent off-site damage.
- h. Protect inlets, storm drain outfalls, and culverts.
- i. Provide access and general construction controls.
- j. Inspect and maintain control measures. – Regular maintenance will be carried out where and when it is necessary.
- k. Employ experienced and competent personnel.

In addition to the measures taken in conformity with the above principles, erosion and sediment loss from the site shall be effectively controlled by applying appropriate Best Management Practices (BMPs).

The following temporary erosion control LD-P2M2 selection table shown in **Table 9.8** indicates the BMPs that shall be implemented to control erosion at the construction site.

Table 9.8 : List of Proposed LD-P2M2 Implementation Schedule

	BMP	Remarks/ recommendations	Implementation & Duration
Erosion Control	Cover Crops and turfing	Stabilise non-active areas after platforms are formed for each phase.	Need to be carried out at formed platform.
Sediment Control	Sediment basin and silt trap	34 silt trap and 2 detention pond are proposed for overall development.	Before commencement of any site clearing or platform development. Final sediment basin will be converted into detention pond once the respective areas are capped. The silt trap shall be inspected and desilted on a regular basis to ensure that they function optimally. Need to be monitored by daily basis and 24 hours after heavy rains.
	Check Dam	The platform in the project site is considered flat; only a few check dams are required.	To be placed immediately after earth drains are established.
	Earth Banks	Proposed across disturbed areas and around perimeter of construction sites and phasing subdivisions.	To be carried out when platform development are being carried out at this area.
Runoff Management Control	Earth Drain, cutoff drains, slope drains & diversion drains	Construct earth drain along the working area during platform development	Start of Construction and progressively as the site progresses.
	Drainage Outlet Protection (DOP)	To be provided at sediment basin outlets	To be constructed at the final outlets from sediment basin before flowing to the nearest waterway.
	Temporary Waterway	To be provided at any waterway	To be placed at waterway crossing if the area is affected during platform development stage.

	Crossing (TWC)	crossing within the site.	
Tracking Control	Stabilized Construction Access	Proposed at the entrance to the Project site.	Before construction start and progressively inspection during construction period as the site progresses. The construction of stabilized construction access is recommended before construction commence and to be monitored by daily basis and 24 hours after heavy rains.
Waste Management Plan	Rubbish bin (domestic waste)	Will be placed before forest plantation activity as per Ministry of Health, DOE and DOSH requirement.	To obtain approval and to be monitored by environmental officer by weekly basis. The disposal of the waste management is recommended at least twice a month.

9.5 REMEDIAL ACTIONS

As mentioned earlier, the EMP consists of measures that were proposed to mitigate potential adverse impacts through guidelines/procedures to be followed in compliance with the regulations imposed by the authorities.

9.5.1 EMP During Development Phase

The recommended procedures to be followed by the project developer are as listed in **Figure 9.3**.

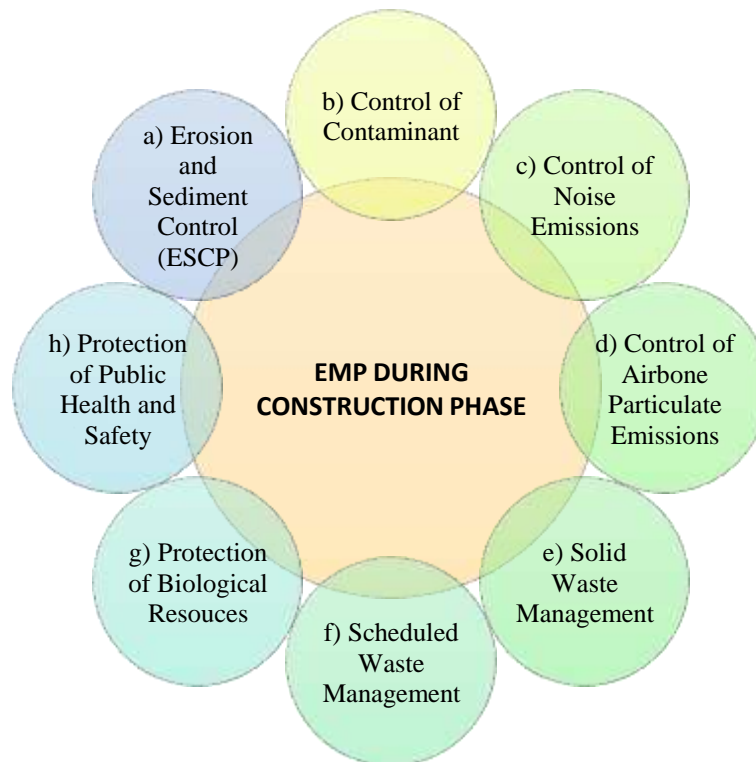


Figure 9.3 : Eight (8) elements of EMP during Construction Phase

a. Erosion and sediment control (ESCP)

As part of the design, drawing of ESCP that will be undertaken during site preparation and development shall be prepared. These shall follow the requirement by DOE. The sedimentation control measures carried out during the construction phase shall at a minimum consist of the following:

- i. The construction of the temporary earth drains, check dam, and sedimentation/retention pond within all drainage basins on site;
- ii. The use of silt traps where appropriate;
- iii. The use of interim vegetative ground covers in areas where earthworks have been suspended for a period of more than two months;
- iv. Carry out the de-silting work in check dam, silt trap and retention pond regularly.

Clearing and earthwork activities shall be minimized during days when significant rainfall occurs and a temporary drainage network should be provided. This is to route surface runoff to sediment ponds. Maintenance in term of de-silting sediment from drains and retention ponds is necessary. Re-vegetation on exposed land should also be carried out as soon as possible.

b. Control of Contaminants

Fuels, lubricant and solvents that are required for construction machinery must be stored in an orderly procedure within specially designated and clearly marked areas on site. All liquid containers shall be kept in the contaminant wall to avoid any spillage to any soil or water body. The liquid container shall be kept in good condition at all times and leaking containers shall be replaced or repaired immediately. Such storage areas shall not be located within 100 meters from any stream, pond or another water body on-site.

None of the following shall be allowed within 100 meters of any stream, pond or another water body on the site:

- i. Storage of construction equipment not in use
- ii. Any equipment maintenance activities.

Any spills of fuels or leakages from equipment will be contained immediately upon detection of the incident.

c. Control of Noise Emissions

The contractor shall comply with The Planning Guidelines for Environmental Noise Limits and Control residential areas for both daytimes (55 dB(A)) and night time (45 dB (A)) –Note: Suburban Residential (Medium Density) Areas. Public Spaces, Parks, Recreational Areas. (Sources: Schedule 1: Maximum Permissible Sound Level (LAeq) by Receiving Land use for planning and new development).

To the degree possible, development works which produce high noise levels should be limited to daytime hours, with quieter operations to

be carried out at night. The generation of unnecessary noise during construction shall not be permitted (e.g. the unnecessary idling and reviving of engines).

d. Control of Airborne Particulate Emissions

Open burning or cleared vegetation, debris and development waste shall not be allowed unless prior approval is obtained from Director General of Department of Environment.

On-site roads should be sprayed with water mist during times when significant visible dust occurs due to vehicle movements. Any soil loads being transported to or from the site shall be securely covered to prevent spillage or dusting.

Logging and construction vehicles shall be kept free of significant accumulations or dirt (including bodies, undercarriages, and wheels) while on public roadways. Vehicle washing bay (wash trough) should be provided at the exit/entrance points of the site.

e. Development Waste Management

Logging wastes will be stockpiled at matau location and wastes generated at project site will be removed from the site and disposed of at a licensed facility on a routine basis.

Waste containers and appropriate facilities shall be provided within any development camps. These facilities shall be serviced and maintained on a frequent and routine basis. The discharge of untreated sewage to existing surface water bodies shall not be permitted.

f. Scheduled Waste Management

The contractor shall ensure that the scheduled wastes generated by them are properly stored. Scheduled wastes shall be stored in containers which are compatible with the scheduled waste to be stored, durable and which are able to prevent spillage or leakage of the scheduled wastes to the environment.

Areas for the storage of the containers shall be designated, constructed and maintained adequately in accordance with the guidelines to prevent spillage or leakage into the environment. The contractor may store scheduled waste generated by him for 180 days or less after its generation provided that the quantity of scheduled waste accumulated on-site shall not exceed 20 metric tons. Any scheduled wastes identified will need to be disposed of by a licensed transporter at a recycling facility operated by a licensed scheduled waste contractor.

Used oils are classified scheduled waste under Environmental Quality (Scheduled Waste) Regulations 2005. Improper management and disposal of used oils can lead to serious contamination of the watercourses.

g. Protection of Biological Resources

Land clearing should be carried out in distinct phases to facilitate the natural relocation of terrestrial fauna. Site workers shall not be permitted to harm any animal, birds, reptile or amphibian encountered during the course of the construction.

h. Protection of Public Health and Safety

Prior to the commencement of any site activities, a written site-specific health and safety plan shall be prepared. Upon request, the plan will be made available for review by the DOE. The plan shall address the followings:

- i. Site security during day and night;
- ii. The proposed storage practices for fuels, solvents and other hazardous materials;
- iii. The safety practices that will be followed by the drivers of vehicles using adjacent public roads.

9.5.2 EMP During Operation Phase

a. Waste Management

Prior to handing over to the local authority, non-hazardous and domestic solid wastes should be managed properly by ensuring regular collection of waste. Adequate and strategically located collection areas should be provided. All solid wastes should be disposed of at approved landfill sites.

9.6 EMERGENCY RESPONSE PLAN (ERP)

An Emergency Response Plan (ERP) is an essential component of a facility's safety and loss strategy. It provides an organized structure for a chain of action to be put into motion in the event of an emergency of the proposed project site. In the context of emergency of the ERP, it is define as an incident, which has the potential to cause injury or loss of life, and/or damage to property and the surrounding environment.

This section outlines the requirements for the preparation of an ERP for the operational phase of the proposed project. The general outline of this plan is not intend to provide specific details on how to handle potential emergencies but has been included to highlight the salient areas of concern. Once the proposed project commences operation, this plan shall be use as template or guide for the development of a more detailed set specific plan. A description of various actions need to be taken in response to specific emergencies are discussed below.

9.6.1 Objective of ERP

The objective of the ERP is to have clear and specific response procedures for any emergency to mitigate the damage, whether minor/major, and to life, property or equipment. A detailed ERP shall be drawn up by the Project Proponent to be included in the detailed EMP and implemented throughout the Project.

The main objectives of developing the ERP are to:

- i. To establish a formalized emergency team and to control and contain any emergency on-site through prompt and effective response measures so that its effect is localized;
- ii. To ensure that the trapped or injured persons are rescued and given prompt and appropriate medical assistance;
- iii. To control the spread of the damage arising from the emergency situation to the environment including the nearest sensitive receptors;
- iv. Communicate information on the emergency to the relevant facility personnel and the relevant on-site parties, including the Police, Fire and Rescue Department, Department of Occupational Safety and Health (DOSH), Department of Environment (DOE) and the local authority;
- v. To keep information and records for investigation into the incidents/accidents;
- vi. To restore normality at the proposed project site prior to personnel re-entering the project site after an emergency and resuming work; and
- vii. To provide training for all the workers in emergency response management to maintain a high level of preparedness at all times.

9.6.2 Basis for Emergency Response Plan

The ERP is a formal document that identifies the potential emergency conditions at the proposed project site and specifies preplanned actions to be followed and to minimize property and environmental damages and loss of life. The documents specify the actions the facility's management shall undertake to moderate or alleviate the impact of accidents and contains step-by-step procedures and information to assist in issuing an early warning and notification messages to responsible emergency-management authorities.

Emergency response plans generally contain six (6) main elements:

- i. Identification of possible emergency situations**

An emergency identification exercise is to list emergency or hazard or abnormal situations resulting in the operation of the proposed project. From the exercise, the high and medium risk can be identified and the possible incident documented. The emergency response actions relevant to each of these hazards will be the focus of the emergency planning exercise.

ii. Notification flows chart

A notification flow chart indicates the nominated persons who are to be notified during the emergency and in order of priority. The information presented on the flow chart is needed to ensure the timely notification of persons responsible for handling the emergency situations.

iii. Emergency detection, evaluation and classification

Early detection and evaluation of the situation(s) or triggering event(s) that initiates or requires an emergency action is crucial. The establishment of procedures for reliable and timely classification of an emergency situation is necessary to ensure the appropriate course of action is taken based on the urgency of the situation.

iv. Responsibilities of personnel in an emergency

A clear definition of the responsibilities of personnel for ERP-related tasks must be determined during the formulation of the plan. The project manager or facility operators are responsible for developing, maintaining, managing and implementing the ERP.

The Federal and local emergency management officials have the statutory obligations for warning and evacuating affected areas. The ERP must clearly specify the responsibilities of the operator and when/how those responsibilities are transferred to government officials, to ensure timely and effective action.

v. Emergency awareness

Actions of the ERP are taken to moderate or alleviate the effect of a potential situation and facilities responses to the situations.

vi. Impact zone maps

Impact zone map delineates the areas that could be affected as a result of accidental events at the proposed project site. Impacted zone maps are used both by the project manager and emergency management officials to facilitate timely notification and evacuation of areas affected by accidental events.

9.6.3 ERP for the Proposed Project

i. Organisation

Within the facility management, a health, a safety and Environmental (HSE) committee have to establish to ensure all issues related to safety, health and environment pertaining to the facility, employees and surrounding environment, are adequately incorporated into the actual implementation of the ERP. However, the setting up of the committee is dependent on the number of persons employed at the facility. If the number is below 40, then the information of the committee is not required by law.

Upon agreement or acceptance of the proposed ERP by DOE and DOSH, the HSE committee shall ensure that all personnel are familiar with the plan. To ensure workability of the plan, training sessions and regular rehearsals by means of drills have to be conducted.

a) Establishment of 'Local Response Team'

A 'Local response Team' may be established through the initiation of the nominated HSE Committee. The team would comprise of the relevant government agencies and local authorities such as the local BOMBA (Fire and Rescue Department), DOSH (Department of Occupational, Safety and Health) and DOE (Department of Environment). The Government Agency Emergency Phone List is shown in **Table 9.9**.

Table 9.9 : Government Agency Emergency Phone List

No.	Agency	Location and Address	Contact Number
1.	Department of Environment (DOE)	Jabatan Alam Sekitar Perak, Tingkat 4 & 7, Bangunan Seri Kinta, Jalan Sultan Idris Shah, 30000 Ipoh, Perak.	No. Tel : 05-253 4749
2.	Department of Occupational, Safety & Health (DOSH)	Department of Occupational, Safety & Health Perak, Tingkat 3, Bangunan Sri Kinta, Jalan Sultan Idris Shah, 30000 Ipoh, Perak.	No. Tel: 05-254 9711 No. Fax: 05-255 5219 e-mail: jkkppk@mohr.gov.my
3.	Fire and Rescue Services Department (BOMBA)	Balai Bomba dan Penyelamat Pengkalan Hulu, Jalan Sri Andika, 33100 Pengkalan Hulu, Perak.	No. Tel : 04 - 477 8344 No. Fax: 04 - 477 0544 e-mail: bbp_pgklnhulu@bomba.gov.my
4.	Ibu Pejabat Polis Daerah Pengkalan Hulu	Ibu Pejabat Polis Daerah Pengkalan Hulu, Polis Diraja Malaysia 33100 Pengkalan Hulu, Perak.	No. Tel: 04-477 8222 No. Fax: 04-477 9127 e-mail: kpdphulu@rmp.gov.my
5.	Balai Polis Pengkalan Hulu	Balai Polis Pengkalan Hulu, 33100 Pengkalan Hulu, Perak.	No. Tel: 04-477 8222 e-mail: kpb_phulu@rmp.gov.my
6.	Hospital Gerik	Hospital Gerik, Jalan Intan, Pekan Gerik, 33300 Gerik, Perak.	No. Tel: 05-791 1333 No. Fax: 05-7911945
7.	Klinik Kesihatan Pengkalan Hulu	Klinik Kesihatan Pengkalan Hulu, Jalan Tasek, 33100 Pengkalan Hulu, Perak.	No. Tel : 04-477 8355
8.	Jabatan Kerja Raya (JKR) Daerah Hulu Perak	Jabatan Kerja Raya Daerah Hulu Perak, Pejabat Jurutera Daerah, JKR Hulu Perak, 33300 Gerik, Perak.	No. Tel: 05-791 1040 No. Fax: 05-791 2033 e-mail: huluperak.jkr@1govuc.gov.my

b) Types of Emergency

An emergency is an unforeseen combination of circumstances that disrupts normal operating conditions and poses a potential threat to

human life, health and property or the environment if not controlled, it has to be contained or eliminated immediately. Generally, emergencies in the project areas can be categorized into the following (Figure 9.4).

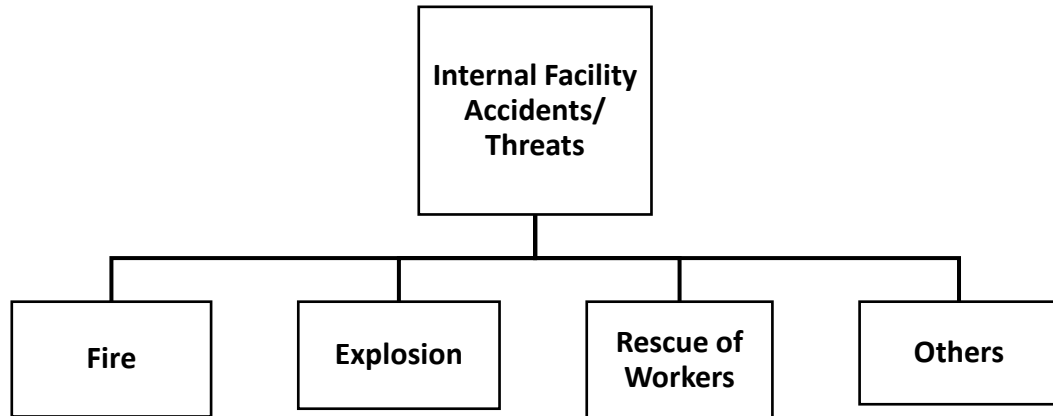


Figure 9.4 : Categories of Emergencies in Project Facility Area

Internal Facility Accident/Threats

- i. Fire**
: Caused by equipment malfunction
- ii. Explosion**
: Caused by equipment malfunction
- iii. Rescue of Workers**
: Any other form of emergency where a worker is trapped and has to be rescued to save his/her life.
- iv. Others**
: Extreme weather conditions such as climate that threatens the system and function of plant. Also, structural collapse or imminent collapse that threaten the integrity of structural system.

c) Emergency Classification Levels

Emergencies are classified according to their severity and urgency. An emergency classification system is one means of classifying

emergency events according to the different time at which they occur and to the varying levels of severity.

The emergency classification level for the types of emergencies described in the previous section can be further divided into three (3) levels of response. This three-level system is proposed as a general principle to activate the type of emergency response and is listed below:

i. Level 1 (Local Level)

This is an emergency situation where only the transfer stations operations personnel would be required to manage and control the emergency. Level 1 emergency would normally call for the station's own resources and equipment for the response.

ii. Level 2 (Area level)

This is an emergency situation which required action and management by the combined efforts of the in-house transfer station's response teams or any of the relevant government agencies (e.g. BOMBA).

iii. Level 3 (Divisional Level)

This is an emergency situation where a level 2 emergency has escalated into an uncontrolled situation and has resulted, or would result in, loss of many human lives, extensive property or environmental damage, and has reached a scale that is beyond the control and capabilities of all response teams combined. Consequently, an Evacuation action plan is then needed to be activated.

9.6.4 General responsibilities of On-Scene Commander (OSC) and Emergency Response Team

The purpose of having a nominated emergency response team is to take immediate action to combat the emergency at the local level (Level 1). In the event the emergency escalates to Level 2 or 3, the emergency response has to ensure proper actions are taken to

control the emergency while waiting for the arrival external assistance, such as BOMBA and other external aids.

The emergency response team is led by an On-Scene Commander (OSC). The OSC is usually a general officer who has operational control of emergency response forces and supervises all on-site operations at the scene of the accident. He is the responsible person for all decision relating to the management of the incident. As an OSC, he should be well versed with the transfer station's operation and must have in-depth knowledge of occupational safety and health.

The general responsibilities of an OSC during an emergency are as follows:

- To ensure all emergency response team members are assembled at the predetermined location according to their respective responsibilities.
- To assess information and the situation, and decide on the actions to be taken as outlined in the response flowchart
- To approved changes to the response plan during the event, if necessary.
- To direct the orderly evacuation of personnel not involved in the emergency response to a safe place.
- To ensure that all personnel is accounted for and coordinate search and rescue.
- To decide to raise the alarm for external assistance in the event the emergency escalates from Level 1 to Level 2 or 3.
- To coordinate between the team members and the sub-team members.
- To coordinate efficient handover or firefighting, area containment or other responsibilities upon the arrival of external assistance such as BOMBA.
- To ensure that the incident is recorded and reported to the HSE committee and the necessary government agencies, such as BOMBA, DOSH and DOE.

Typical emergency team members shall acknowledge his/her responsibilities as an emergency response member having pertinent duties and responsibilities in the event of an emergency situation. For each designated position in the team, there should be at least one (1) name assigned and two (2) others are standby.

For the project, in particular, the following sub-teams are to establish as part of the emergency response team:

- **Firefighting team**

The firefighting team members should comprise of employees that are familiar and trained for firefighting. Preferably, the team members should be experienced in handling the firefighting equipment.

- **Security control team**

During an emergency event, the security control team will be responsible for maintaining order at the premises and ensuring security at all time. This is crucial as there may be the presence of outsiders on the site during the emergency event. Some of the responsibilities of the security control team are to prevent unauthorized entry during the emergency, control of vehicle movement and providing access to external assistance team(s), take head counts and conducts search and rescue if needed.

- **First aid team**

The first aid team members shall be ideally personnel with basic knowledge of First Aid and CPR. In an emergency event, the first aid team will be required to provide immediate first aid to injured persons while waiting for the arrival of an ambulance, depending on its necessity.

- **Communication team**

The communication team assumes the role of team coordination and providing instructions through the command of OSC. The main responsibility of the team is to ensure the instruction is

correctly and timely conveyed to the right party during an emergency. The team will record instructions conveyed out by OSC and received from all parties.

- **Restoration/Remediation Team**

The restoration/remediation team is responsible for the recovery of any losses and damages caused by the incident. After overcoming the emergency and the situations have been secured, the team will investigate the cause of the incident and estimate the damages and losses. It is also the team's duty to propose remedial steps to restore the affected area (with the collaboration of government agencies if required) and proposed the mitigation measures to prevent future occurrence.

The personnel selected for the various teams named above may comprise of some persons but it is important that they understand their function in each specific contingency team.

d) Emergency Equipment

An emergency response plan must be based on realistic assessment of the availability of the emergency response facilities and equipment. To ensure that the emergency response team is able to control an emergency situation, the team has to be fully equipped with proper facilities and dedicated equipment. It is the responsibility of the facility manager with the assistance of HSE committee to ensure its efficiency.

9.7 CONCLUSION

A comprehensive EMP is to be drawn up after obtaining the EIA Approval Conditions from DOE, and incorporated in the contractor's terms of work to require them to safeguard the environment. A monitoring programme is included to guide the Project Proponent and Engineer Consultant/Main Contractor provide a cost-effective budget for all environmental work. The monitoring plans are by no means

definitive and should be modified to the changing circumstances in the Project phasing. An essential part of the ERP is to be drawn up before Project commencement and it should be reviewed and updated regularly.