

CHAPTER 10: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

10.1 INTRODUCTION

An Environmental Management Plan (EMP) is vital to give the Project Proponent a framework in order to mitigate effectively against any impacts which is significant and subsequently, rendering them to minimal, acceptable level which is stipulated by the State DoE (Department of Environment). The primary objective is to ensure the proper implementation of all environmental considerations recommended [i.e., Pollution Prevention and Mitigation Measures (P2M2)] for the proposed development in the Environmental Impact Assessment (EIA) report. This section presents the environmental management plan for the proposed Project. The management plan covers both construction and operational phases of the Project. The EMP comprises of these following topics:

- Principles of Environmental Management Plan;
- Establishment of Environmental Management Unit;
- Environmental Monitoring System;
- Environmental Training.

This proposed EMP shall be reviewed from time to time to ensure that it satisfies the corporate objectives and commitments of the developer and subsequently the contractors engaged by them. All parties involved in the proposed development must be sensitive to the site constraints and be informed and aware of the environmental impacts and Pollution Prevention and Mitigation Measures (P2M2) that must be implemented to ensure compliance to the environmental requirements.

10.2 Principles of Environmental Management Plan

An Environmental Management Plan (EMP) is an institutional arrangement through which environmental impacts could be controlled. The objectives of an EMP are as follow:

- identify the set of responses to mitigate potentially adverse impacts;
- determine requirements to meet the responses effectively and timely;
- describe the means for meeting the requirements;
- provide feedback information to be used by executing agency and other in evaluating Projects' interactions with the environment.

10.3 On-site Management Plan

Basically, the on-site management plan is a series of arrangements to secure an effective implementation of mitigation measures. These arrangements shall be communicated to the different levels of the EMP hierarchy i.e. from the consultants to the developer and finally to the on-site project team (which comprise of the appointed contractors, technical staff and workers themselves). In particular, it is the systematic arrangement of pollution control measures during the operations phase to curtail potential pollution, which is the key focus.

A. Pre-operations Phase

The on-site management plan during pre-operations phase generally includes:

- Traffic management scheme which specifies the approved haulage routes and includes inventory of daily trips in terms of frequency and nature of transport;
- Maintenance programme to be established for pollution control structures (i.e. leachate treatment system), heavy vehicles and machinery and all erosion and sedimentation control elements are to be made regularly;
- Training programme to be devised for on-site workers to include awareness of the requirements pertaining to good environmental practices i.e. minimize waste generation, proper disposal of waste material, observing on-site speed limits, practice standard safety procedures whilst working;
- Health and safety management plan, which specifies and records health screening provisions and the respective medical results of on-site workers. This plan shall be integrated with the safety guidelines for the pre-operations workers.
- Formulation and implementation of other plans as required by the Department of Environment before execution of works on-site.

During the project implementation stage, developer shall:

- Allocate administrative responsibilities for planning and managing the environmental requirements as outlined in the EIA Approval Condition.
- Ensure the implementation of pollution prevention and mitigation measures (P2M2).
- Implement a monitoring programme (i.e., Impact Monitoring, Compliance Monitoring and Performance Monitoring) to check the effectiveness of the mitigation measures provided.
- Ensure that mitigation measures are incorporated in all relevant contract and design.

B. Operational Phase

- Implementation of the programmes, plans and schedules drafted during the pre-operations stage.
- Inventories of the input waste must be documented extensively with details of the waste supplier, the logistic route used, the transport provider and personnel involved all documented in manner that allows for immediate retrieval of data and for quick reference.
- Regular maintenance and inspection of the equipment on-site to ensure that they are always in optimal operating condition. Records of maintenance and inspection must be available for reference at the office.
- An Environmental Management Plan (EMP) must be drawn up and available at the plant/landfill site office. All employees must undergo initial induction training on safe environment management procedures and best practices prior to commencing work at the landfill expansion site.

10.4 Management Team and Environmental Management Unit (EMU)

Collective effort towards systematic implementation of the environmental management programmes is vital to secure an effective EMP. As such, the establishment of a team of personnel with defined roles and responsibilities is required in the EMP. At this preliminary stage, the administration hierarchy for planning and management is illustrated in **Figure 10.1** and their respective roles in the overall framework of the EMP are depicted in **Figure 10.2**.

Environmental Officer (EO) and Certified Competent Person

Environmental Officers and Certified Competent Person shall be appointed before the commencement of works at site (Note: Certified Competent Person needs to be a CePIETSO qualified and CePSWaM qualified or any equivalent qualification).

Currently, the appointed competent person for the handling of leachate treatment plant is En. Mohd Saiful Afendi Bin Abdul Rani (Certified Environmental Professional in the Operation of Industrial Effluent Treatment System – Biological Processes CePIETSO-BP/15074, Validity: 01/12/2015 - 01/12/2016). In addition, Project Operator WLSB has planned to send their staff En. Nor Haszma Mohd Hashim and En. Najmi Mohammad Salfullah to attend the

coming EIMAS course of Certified Environmental Professional in the Operation of Industrial Effluent Treatment System by year 2016.

Duty and Job Scope of the competent person for the Operation of Industrial Effluent Treatment System on site are:

- To operate the leachate treatment system for a sanitary landfill
- Conducting measurements, collecting samples and conducting analysis
- Preparing performance monitoring report and presenting it to the DOE
- Making decision on IETS/LTP matters
- Initiating efforts to introduce new/improved work or monitoring procedure in IETS/LTP operation

In term of Scheduled Wastes, the appointed competent person for the handling of scheduled wastes is En. Hashim Bin Wahab (Certified Environmental Professional In Scheduled Wastes CePSWaM/15386, validity: 11/8/2015 - 15/8/2016). Meanwhile, WLSB has planned to send their four (4) staff to attend EIMAS course of Certified Environmental Professional In Scheduled Wastes this year. Four (4) staffs are En. Faizi Abu, En. Haironizam Kassim, En. Muhammad Saufi Saroni and En. Ahmad Hafizi Abdul Manan.

Duty and job scope of the competent person for the Scheduled Wastes Management on site are:

- Formulate an implementation plan for full compliance with the regulatory and requirements of the Environmental Quality (Scheduled Wastes Regulations, 2005).
- Assist the operation department to monitor and control the special management in the disposal site.
- Conduct training to company staff on scheduled waste management on the topic of special waste management.
- Propose and review company procedures in scheduled waste management.
- Plan, propose and implement company's waste reception procedures of Scheduled Wastes.

Figure 10.1: The Environmental Management Chart of the Proposed Project

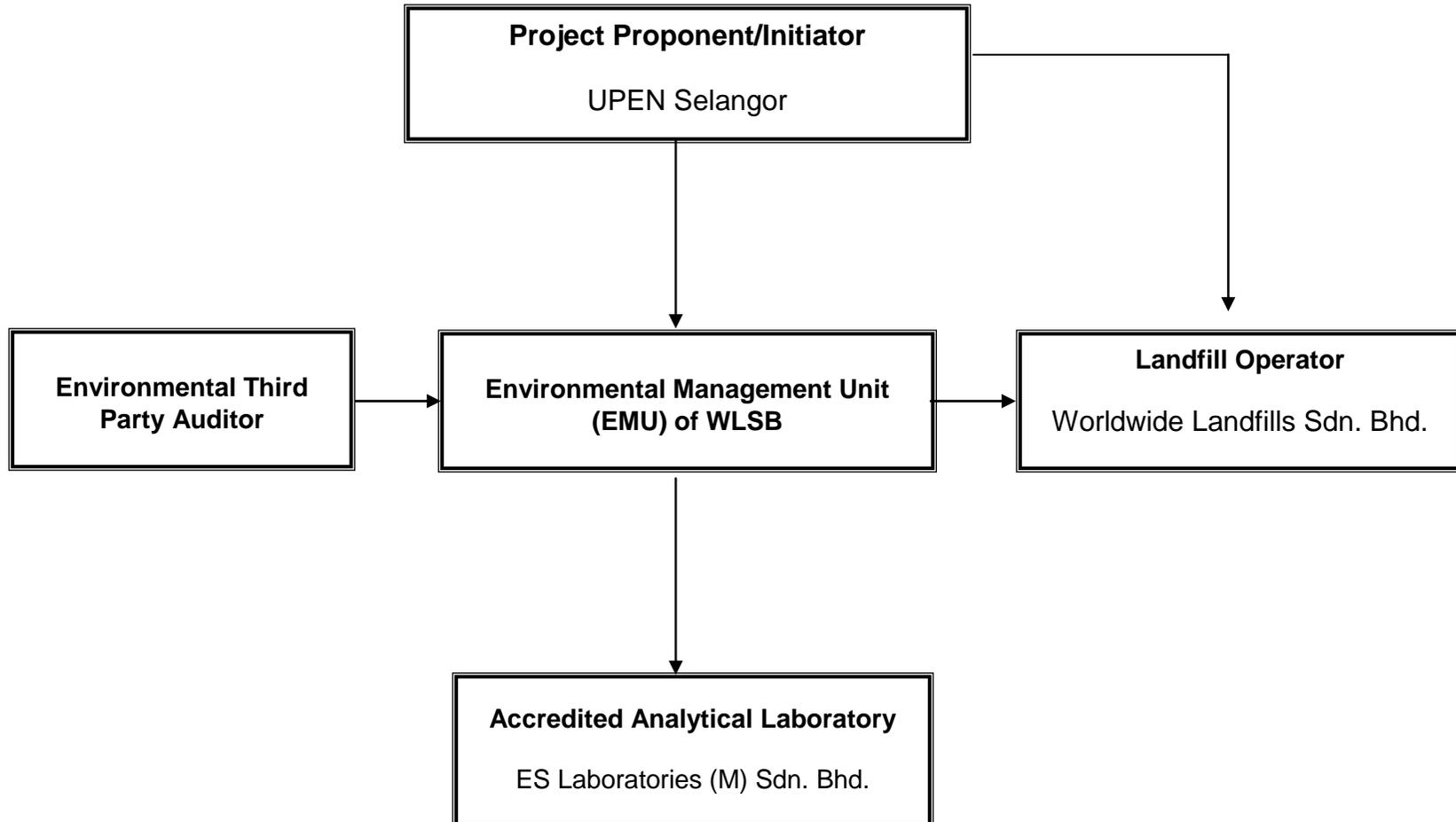
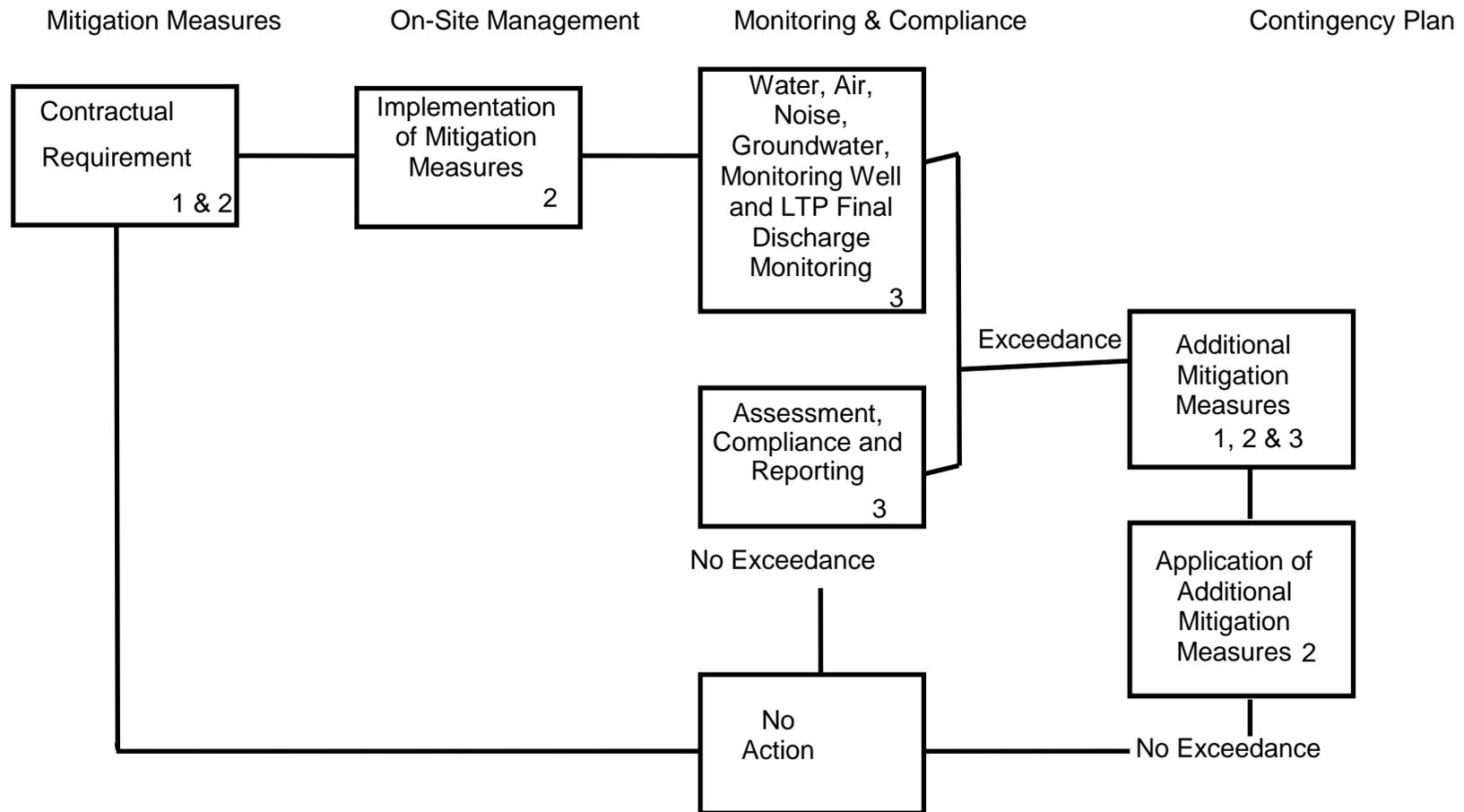


Figure 10.2: Overall Framework of the Environmental Management Plan



Responsibilities for tasks are denoted thus: 1-Owner/Project Proponent; 2-Chemical Process Engineer; 3-Environmental Consultant

10.5 Environmental Requirements

In implementing the EMP, the developer/landfill operator shall comply with the relevant Federal and State Laws, Regulations and Guidelines (as below), environmental regulations enacted pursuant to the Environmental Quality Act (Amendment) 2012. In addition, the EIA terms of approval conditions that will be allude that all prevention and control measures; stated in the EIA study will be adhered to. The project proponent and the contractor shall be responsible ensuring that that all applicable laws, regulations and guidelines are complied with.

Environmental quality monitoring during the construction and operation phase is a standard requirement as part of the approval conditions of the EIA submission. Presented in **Table 10.1** below is a list of standard requirements, which are pertinent to this development.

Table 10.1: Relevant Standards, Regulations and Guidelines

Activities	Legal and Other Requirements
Site clearing and earthworks	<ul style="list-style-type: none"> • Environmental Quality Act (Amendment) 2012. • National Land Code, 1965 • Environmental Quality (Scheduled Waste) (Amendment) Regulations 2007. • Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015, item 14(b)(ii), construction of sanitary landfill facility. • Urban Stormwater Management Manual (D.I.D, 2012). • Street, Drainage and Building Act, 1974 • Town and Country Planning Act, 1976 and its Amendments. • Guidelines on the Prevention and Control of Soil Erosion and Siltation in Malaysia (DOE, 1996) • Environmental Quality (Compound of Offences) Rules 1978 • Factories and Machinery (Safety, Health and Welfare) Regulation, 1970 • National Forestry Act, 1984 • Pesticide Act, 1974

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Activities	Legal and Other Requirements
Water Quality Control and Monitoring	<ul style="list-style-type: none"> • Environmental Quality Act (Amendment) 2012. <ul style="list-style-type: none"> - Sec. 25: Restriction of pollution on inland water • Environmental Quality (Compound of Offences) Rules 1978 • The effluent criteria for the parameters shall adhere to the Environmental Quality Act (Amendment) 2012 and the Environmental Quality (Sewage) Regulations 2009 • Local Government Act 1976 <ul style="list-style-type: none"> - Sec. 69: Committing nuisance in streams • The National Water Quality Standards for Malaysia (NWQS) by the DOE. • Second Schedule (Regulation 13) of Environmental Quality (Control of Pollution from Solid Waste Transfer Station and Landfill) Reg. 2009: Acceptable Conditions for Discharge of Leachate.
Noise and Air Quality Control and monitoring	<ul style="list-style-type: none"> • Malaysian Ambient Air Quality Standards 2013 • Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996 • Environmental Quality (Control of Emission from Petrol Engines) Regulations 1996 • Environmental Quality (Motor Vehicle Noise) Regulations 1987. • Environmental Quality (Licensing) Regulations 1977 • Environmental Quality (Compounding of Offences)(Open Burning) Rules 2000 • Environmental Quality (Compound of Offences) Rules 1978 • Environmental Quality Act (Amendment) 2012 <ul style="list-style-type: none"> - Sec. 22: Restriction of pollution at the atmosphere - Prohibition of open burning - Sec. 23: Restriction of noise pollution • Factories and Machinery (Noise Exposure) Regulations 1989 (DOSH)
Solid Waste Management/ Scheduled Waste Management	<ul style="list-style-type: none"> • General waste (industrial, commercial and domestic waste) is controlled under the Local Government Act 1976. • Environmental Quality (Scheduled Waste) (Amendment) Regulations 2007. • Environmental Quality (Compound of Offences) Rules 1978

10.6 Environmental Management System

There is a basic need in the formulation of the Environmental Management Plan (EMP), to establish a suitable Environmental Monitoring System (EMS), which would monitor at suitable regular intervals all relevant environmental parameters which serves as a quantitative feedback mechanism on the effectiveness of the recommended best management practice. The EMS will therefore require significant sampling and personnel competent in interpretation of the parameters.

Basically, the monitoring program is a set of procedures targeted towards periodical measurement of environmental parameters. Accumulation of on-site data for selected environmental indicator provides a platform to evaluate environmental performance by comparisons to baseline and compliance levels. Three (3) types of monitoring will be discussed at the subsequent subchapter which need to be carried out to ensure that the proposed Pollution Prevention and Mitigation Measures (P2M2) will be properly implemented at the Project Site.

Selection of environmental components, monitoring stations, parameters and frequency are governed by the EIA approval conditions to be issued by DoE upon careful consideration of all aspects of the Project. At this preliminary stage the issue of water quality is identified as being the most prominent (Chapters 7 and 8). As such, the monitoring scheme recommended for this development mainly deals with monitoring of sediment basin discharge and surface water quality of Sg. Sembilang itself as well as LTP final discharge from the landfill during the landfill development phase, all BMPs component, air and noise.

A) Construction/Expansion Phase

- Allocation of budget by the Project Proponent to implement the EMP during the construction phase.
- Implementation of Erosion and Sediment Control according to the method statement and approved ESCP plan for all the major activities of the Project that may cause erosion and sedimentation.
- Implementation of materials and waste management which includes raw materials and stockpiles, solid waste management during earthwork and construction phase, scheduled waste management in compliance with Environmental Quality (Scheduled

Waste) Regulations 2005, biomass and construction waste management during land clearing and construction phase.

- Measures to prevent of open burning.
- Monitoring of the water quality, air quality and noise level by indicating location with longitude and latitude, frequency, parameters, testing method and schedule.
- The appointed Department of Standards accredited laboratory shall carry out on-site sampling and laboratory analysis.
- Water Quality Monitoring:
 - Grab surface water quality samples are proposed to be at ten (10) sampling locations, i.e., W1, W2, W3, W4 & W5 (Sg. Sembilang) and W6, W7 (Project Site earth drain). **Figure 10.3** showing the proposed surface water quality sampling locations during construction phase;
 - During construction stage, only WQI parameters together with turbidity level are proposed to be assessed. This is because the main pollutants are TSS and organic level due to land clearing and earthworks activities. The final discharge point (WT-FD) for the existing LTP will be monitored as per scheduled.
 - Monthly assessment for suspended solids at the sediment basins to be constructed; suspended solids limit of 50 mg/L is likely to be imposed on surface discharges from sediment basins outlets.
 - Grab groundwater quality samples for monitoring wells are proposed to be at four (4) sampling locations i.e., **GW1, GW2, GW3, and GW4**. **Figure 10.3** showing the proposed groundwater quality sampling locations during construction phase;
 - Groundwater level of the monitoring wells need to be monitored monthly based on the established four (4) nos. i.e., **MW1, MW2, MW3 and MW4** constructed on site as shown in **Figure 10.3**.
- Air and Noise Monitoring
 - Air quality monitoring especially for PM₁₀ and PM_{2.5} level; and noise monitoring at the nearest receptors as depicted in **Figure 10.4** are proposed to be conducted on a quarterly basis. The location shall be the same with Baseline Monitoring locations (2015) as discussed in **Chapter 6**, i.e., **subchapters 6.8 and 6.9** of this DEIA Report.

B) Operational Phase

- As the proposed project site is an expansion landfill from the existing, thus there is no expected wastewater discharge to the surrounding but is channeled to the existing leachate treatment plant (LTP) in the eastern portion of the Landfill. Thus, in monitoring

the quality of the drainage system, any failure in the part of proper management and maintenance of the plant can be detected and addressed.

- Monitoring discharged water quality (point WT-FD) from the leachate treatment plant (LTP) should be conducted every month at the predetermined baseline sampling points (i.e., Sub-Section 6.4.1, especially at point W2 & W3, i.e., before, after and at the final discharge point of LTP into the Sg. Sembilang). The parameters and method of analysis shall follow **Table 6.2**. Apart from that, continuous online monitoring of LTP discharge should be installed as per the requirement under the Environmental Quality (Control of Pollution from Solid Waste Transfer Station and Landfill) Regulations 2009.
- Monitoring of groundwater quality is also important during the Landfill operational stage to monitor any leachate contamination into the groundwater system. The parameters to be monitored are the same with the Baseline parameters. Apart from the monitoring well that has already been established within the Site, i.e., MW1 – MW4 shall be monitored as proposed in Chapter 6, **Figure 6.1** of this DEIA Report.
- Monitoring program for air quality is deemed essential to safeguard against the potential of unexpected emissions. It should be conducted on a quarterly basis, especially for methane and hydrogen sulphide parameters.
- Noise intrusion is not expected to be significant during Landfill operational phase considering that the nearest receptor is located 800m away (i.e., Tuan Mee Workers Quarters).
- Manpower support, i.e. qualified team of personnel to:
 - implement all the practical environmental conservation measures as proposed in this EIA report.
 - manage the program i.e. coordinating with the environmental consultant and laboratory team in the water monitoring program.
 - implement necessary prevention or best practice method in the event of poor environmental quality.

10.6.1 *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 Department of Standards

accredited laboratory shall carry out on-site sampling and laboratory analysis. The Impact Monitoring (IM) programme, monitoring parameters, monitoring stations and frequencies are summarized in **Table 10.2**.

10.6.2 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 Department of Standards 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 summarized in **Table 10.2**. Currently Project Operator, WLSB has been carried out compliance monitoring on monthly basis at the existing Jeram Sanitary Landfill and appointed Lab is E S Laboratories (M) Sdn. Bhd.

10.6.3 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 summarized in **Table 10.2**.

Project operator, WLSB is conducting the performance monitoring (In situ and Ex-situ) of the leachate treatment system on weekly and monthly basis and LTP discharge is analysed by ES Laboratories Sdn. Bhd. For In-situ test, it is being carried out on daily and weekly basis within the landfill laboratory. Parameters monitored in-situ on site are pH, temperature, DO, sludge volume, sludge volume index, MLSS, Manganese (Mn) and Ammoniacal Nitrogen (AN). Meanwhile, heavy metal and chemical parameters are being monitored ex-situ by ES Laboratories Sdn. Bhd. In addition, parameter such as BOD₅, COD, Ammoniacal Nitrogen (AN) and Total Suspended Solid (TSS) on Raw Leachate and Final Discharge (WT-FD) are being carried out on weekly basis. The performance monitoring schedule is tabulated in **Table 3.10** in Chapter 3.

Figure 10.3: Proposed Surface Water, LTP Final Discharge, Groundwater and Monitoring Well Sampling locations

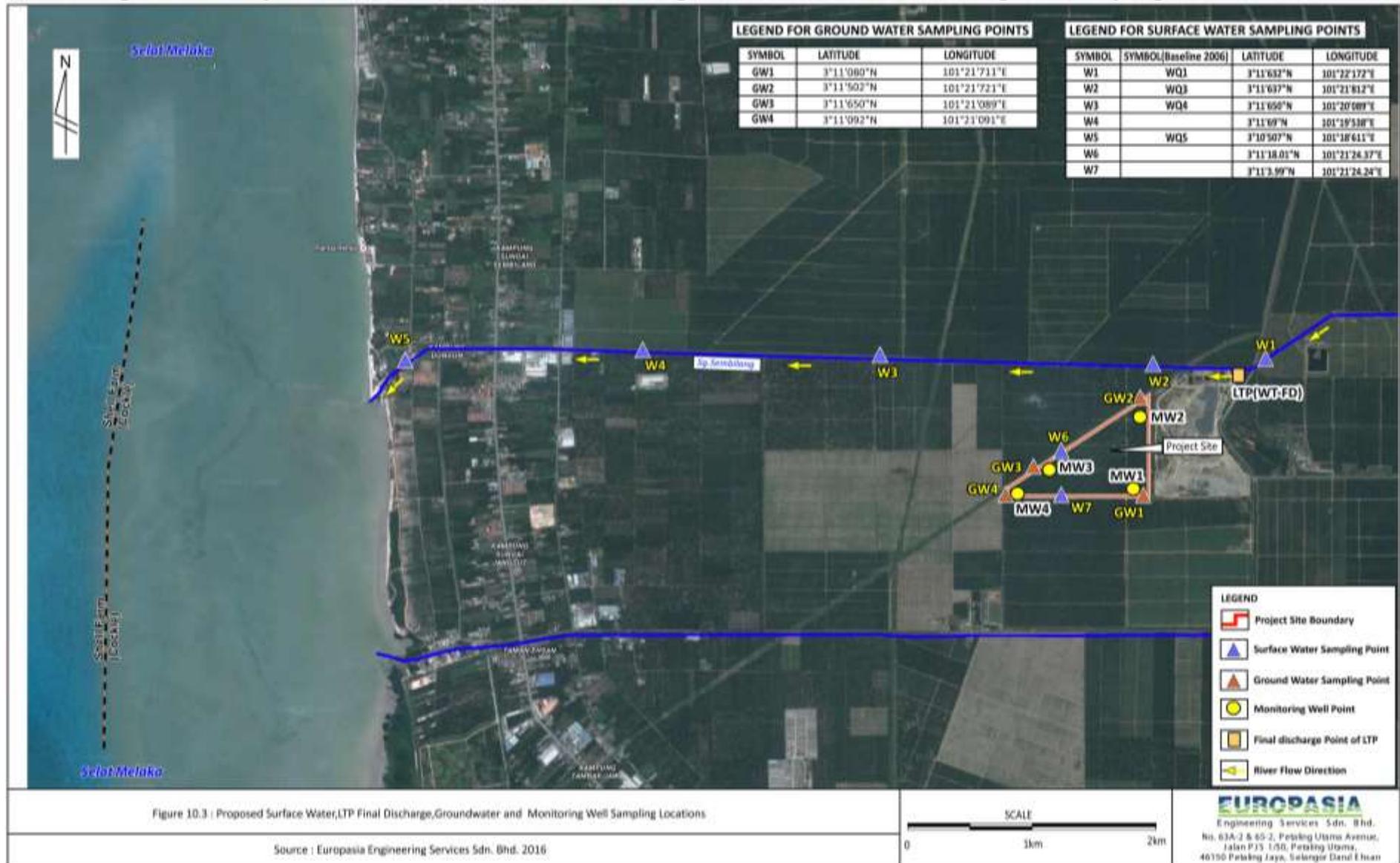


Figure 10.4: Proposed Location of Air Quality and Noise Quality Monitoring

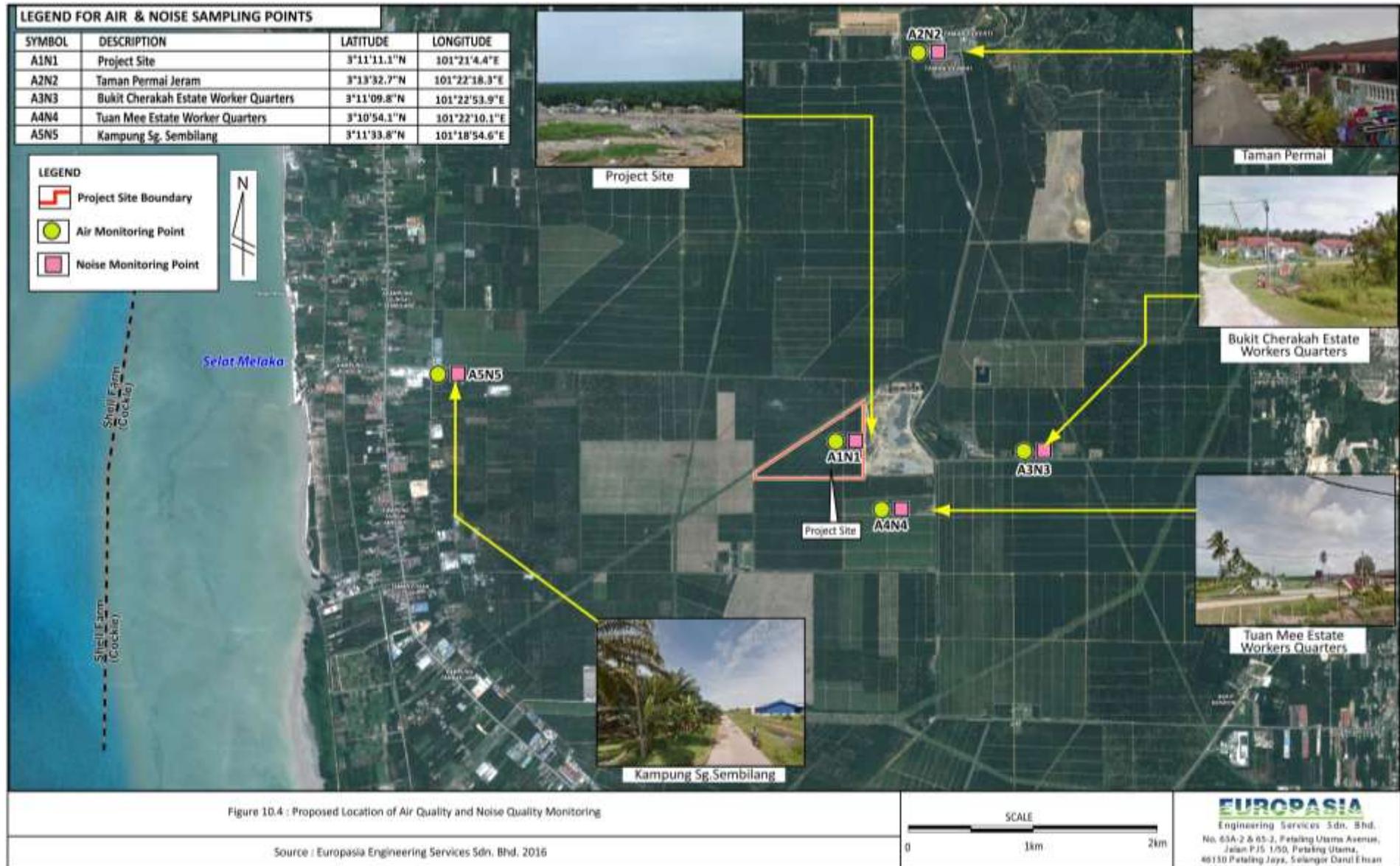


Table 10.2: Summary of Impact Monitoring, Compliance Monitoring and Performance Monitoring

Impact/ Monitoring Aspect	Monitoring Location	Monitoring Parameter	Compliance Limit#	Monitoring Frequency	Personnel In Charge	Instrumentation/ Method	Impact Monitoring (IM)	Compliance Monitoring (CM)	Performance Monitoring (PM)
Water Quality	Refer to Figure 10.3 W1, W2, W3, W4, W5 (Sg. Sembilang), and W6, W7 (Project Site earth drain)	(i) pH (ii) Temperature (iii) Dissolve Oxygen (DO) (iv) Chemical Oxygen Demand (COD) (v) Biological oxygen demand (BOD ₅) (vi) Total Suspended Solid (TSS) (vii) Oil & Grease (viii) Ammoniacal Nitrogen (NH ₃ -N) (ix) <i>E.coli</i> Count (CFU/100mL) (x) Turbidity	6.0-9.0 - 5mg/L – 7mg/L 25mg/L 3mg/L 50mg/L 0.04;N 0.3mg/L 100 50 NTU	Monthly	Department of Standards accredited laboratory	APHA	√	√	Not Applicable
Sediment Basin	Refer to Figure 8.8 to Figure 8.11 (at the discharge outlet of Sediment Basin)	(i) Total Suspended Solid (TSS) (ii) Turbidity	50mg/L 250NTU	(i) Monthly (ii) Per rainfall event of 12.5mm and above.	(i) Department of Standards accredited laboratory (monthly) (ii) Environmental Officer (EO) (Per rainfall event)	(i) APHA (monthly) (ii) TSS & turbidity meter (per rainfall event)	Not Applicable	√	√
Erosion Control (Turving/ hydroseeding)	Slopes and Platforms which work have been completed	Not Applicable	Not Applicable	(i) Biweekly (ii) Per rainfall event of 12.5mm and above.	Environmental Officer (EO)	Not Applicable	Not Applicable	Not Applicable	√
Drainage Inlet and Outlet Protection	Refer to Figure 8.8 to Figure 8.11 for the proposed location								
Check Dam									
Sediment Fence and Sand Bag									
Temporary Earth Drain									
Swale Earth Drain									
Earth Bund									
Temporary Waterway Crossing									
Hoarding									
Stabilized Construction Access									
Wash trough									

Source: Europasia Engineering Services Sdn. Bhd, 2016

Remarks: APHA- Standard Methods for the Examination of Water & Wastewater, 21st Edition, 2015; American Public Health Association, American Waterworks Association (AWWA) & Water Environment Federation (WEF);

means Standards means National Water Quality Standards (NWQS) for Malaysia, Class IIB.

Noted: Monitoring frequency will be based on EIA approval conditions (COAs)

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Impact/ Monitoring Aspect	Monitoring Location	Monitoring Parameter	Compliance Limit#	Monitoring Frequency	Personnel In Charge	Instrumentation/ Method	Impact Monitoring (IM)	Compliance Monitoring (CM)	Performance Monitoring (PM)		
Leachate Treatment Plant (LTP) Coordinate: N 03°11.618' E 101°22.020'	Refer to Figure 10.3 (Existing Final discharge point of LTP – WT-FD)	pH @25°C	6 – 9								
		Temperature (°C)	-								
		BOD, mg/L	20 (6)								
		COD, mg/L	400								
		TSS, mg/l	50 (15)								
		Ammoniacal Nitrogen, mg/l	5.0 (0.3)								
		Mercury as Hg, mg/l	0.005 (0.001)								
		Cadmium as Cd, mg/l	0.01								
		Chromium (Cr ⁶⁺), mg/l	0.05								
		Chromium (Cr ³⁺), mg/l	0.20								
		Arsenic as As, mg/l	0.05								
		Cyanide as CN, mg/l	0.05								
		Lead as Pb, mg/l	0.10 (0.007)								
		Copper as Cu, mg/l	0.20			(i) Weekly	(i) Department of Standards accredited laboratory (monthly) (ii) Environmental Officer (EO) or Certified Competent Person	APHA	√	√	√
		Manganese as Mn, mg/l	0.20			(ii) Biweekly					
		Nickel as Ni, mg/l	0.20 (0.007)			(iii) Monthly					
		Tin as Sn, mg/l	0.20								
		Zinc as Zn, mg/l	2								
		Boron as B, mg/l	1								
		Iron as Fe, mg/l	5								
Silver as Ag, mg/l	0.10										
Selenium, mg/l	0.02										
Barium, mg/l	1.0										
Fluoride as F, mg/l	2.0										
Phenol, mg/l	0.001										
Formaldehyde	1.0										
Sulphide as S ²⁻ , mg/l	0.5										
Oil & Grease, mg/l	5.0										
Colour, ADMI	100										

Source: Europasia Engineering Services Sdn. Bhd, 2016

Remarks: APHA- Standard Methods for the Examination of Water & Wastewater, 21st Edition, 2015; American Public Health Association, American Waterworks Association (AWWA) & Water Environment Federation (WEF);

means Standards means Second Schedule (Regulation 13) of Environmental Quality (Control of Pollution from Solid Waste Transfer Station and Landfill) Reg. 2009: Acceptable Conditions for discharge of Leachate.

Noted: Monitoring frequency will be based on EIA approval conditions (COAs)

*LTP Effluent Discharge Limits derived from the Waste Load Allocation based on DEIA's Water Quality Modeling Exercise.

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Impact/ Monitoring Aspect	Monitoring Location	Monitoring Parameter	Compliance Limit#	Monitoring Frequency	Personnel In Charge	Instrumentation/ Method	Impact Monitoring (IM)	Compliance Monitoring (CM)	Performance Monitoring (PM)
Ambient Air Quality	Refer to Figure 10.4 (A1N1, A2N2, A3N3, A4N4 and A5N5)	(i) PM ₁₀ (ii) PM _{2.5} (iii) NO ₂ (iv) SO ₂ (v) CO (vi) Ozone	120µg/m ³ 50µg/m ³ 300µg/m ³ 90µg/m ³ 10mg/m ³ 200µg/m ³	Quarterly	Department of Standards accredited laboratory	High Volume Sampler, MiniVol Portable Air Sampler	√	√	Not Applicable
Noise Level		(i) L ₁₀ (ii) L ₉₀ (iii) L _{min} (iv) L _{max} (v) L _{eq}	For L _{eq} , Day time- 55.0dBA Night time- 45.0dBA			ACE Sound Level Meter type 6270 with microphone and tripod/ outdoor gear			
Ground Water Quality	Refer to Figure 10.3 (GW1, GW2, GW3 and GW4)	*Sulphate (SO ₄) *Hardness (CaCO ₃) *Nitrate (NO ₃) *Coliform *Manganese (Mn) *Chromium (Cr) *Zinc (Zn) *Arsenic (As) *Selenium (Se) *Chloride (Cl) *Phenolics *Total Dissolved Solids (TDS) *Iron (Fe) *Copper (Cu) *Lead (Pb) *Cadmium (Cd) *Mercury (Hg)	250 mg/l 500 mg/l 10 mg/l Must not be detected in any 100 ml sample 0.1 mg/l 0.05 mg/l 3 mg/l 0.01 mg/l 0.01 mg/l 250 mg/l 0.002 mg/l 1000 mg/l 0.3 mg/l 1.0 mg/l 0.01 mg/l 0.003 mg/l 0.001 mg/l	Monthly	Department of Standards accredited laboratory	APHA	√	√	Not Applicable
Ground Water Level	Refer to Figure 10.3 (MW1, MW2, MW3 and MW4)	Not Applicable	Not Applicable	Monthly	Environmental Officer (EO) or Certified Competent Person	Not Applicable	Not Applicable	Not Applicable	√

Source: Europasia Engineering Services Sdn. Bhd, 2016

Remarks: APHA- Standard Methods for the Examination of Water & Wastewater, 21st Edition, 2015; American Public Health Association, American Waterworks Association (AWWA) & Water Environment Federation (WEF);

means 1. National Drinking Water Quality Standards, 2004 (Ministry of Health) for Groundwater Quality

2. Malaysian Ambient Air Quality Limits

3. Maximum Permissible Sound Level (L_{Aeq}) by Receiving Land Use For Planning and New Development, Schedule 1; Annex A: Schedule of Permissible Sound Levels; The Planning Guidelines for Environmental Noise Limits & Control, Department of Environment

Noted: Monitoring frequency will be based on EIA approval conditions (COAs)

10.6.4 Compliance Report on Control and Mitigation Measures

This report is required by the DOE, which should address all control and mitigation measures for the following:-

- Land clearing of site;
- All activities during the Landfill Platform preparation stage;
- All activities during the operational stage.

10.7 Compliance Reporting

Working in tandem with the quantitative feedback mechanism is the compliance program which serves as a qualitative checks and review for on-site environmental management. As such, it shall also be formulated for the EMP and mainly entails site investigation and field survey to evaluate presence and efficiency of mitigating measures. Conducted by the appointed environmental consultant, the procedures shall establish the level of on-site compliance to environmental requirements. As a norm, DoE recommends a yearly audit cycle during the construction phase.

The main agenda of the compliance program is to verify that the on-site Management Plans have been implemented effectively to attain the required level of environmental protection. To achieve this goal two main mechanisms are employed i.e. regular surveillance and evaluation of the required good environmental practices. These two strategies and their respective procedure of operation in brief are as follows:-

- a) Surveillance of on-site practices: Periodical on-site observations verify the contractors implementation of the required mitigation measures within each recommended management plan i.e. erosion and sedimentation control, runoff control (flood abatement), generated wastewater and solid waste; air and noise quality, traffic network. This survey will ascertain the degree of compliance to the stipulated environmental requirements;
- b) Evaluation of on-site practices: The performance of the good environmental practices adopted on-site is evaluated by employing quantifiable environmental conditions determined in the monitoring study coupled with evaluation of the contractor's records pertaining to on-site practices. Additionally the adequacy of the efforts towards maintaining the proposed mitigation measures at optimum efficiency will also be assessed.

The above procedures would provide the basis for proposing improvement (if applicable) on the existing mitigating measures that have been ascertained as inadequate. These audit protocols would be employed to verify conformity to the audit criteria (i.e., compliance of the on-site practices to their respective environmental requirements) during both the construction and operational phases of development. There would be more emphasis on auditing the spectrum of Project activities conducted during the construction phase.

The compliance program is to be conducted quarterly by the appointed environmental consultant upon the commencement of earthworks. The itinerary of items for inspection and verification includes all the stipulated on-site practices outlined within each Management Plan (Section 10.6). Once the implementation of the mitigating feature has been validated, their efficiency in mitigating against the negative impacts associated with Project development would be evaluated. A wider scope of area is adopted in the audit procedure, since some of the identified impacts may significantly extend beyond the Project site boundary. This includes the sediment washout into the water pollution downstream. The items in the evaluation protocol for each of the requisite management plans are described in the subsequent text.

i) Soil Erosion Control Plan

- Evaluation of the TSS level from the sediment basin outlets whereby a negative trend would suggest deterioration in efficiency. This would prompt a closer supervision on the part of the site supervisor to ensure that regular maintenance is practiced;
- Assessment of the desilting procedure implemented by the contractor or subcontractor i.e. the handling and disposal of the excavated silt;
- Evaluation of all the records on the sediment basin maintenance works that have been carried out. Examples of major discrepancies such as a reported desilting event that is not substantiated by visual observation should be noted and the corresponding action undertaken;
- Visual evaluation of the silt intercepting mechanism's physical structure, i.e. observation of debris and silt deposit around the sediment basin outlet and gabion wall would imply that the capacity of the sediment basin during heavy downpour is of suspect and needs to be investigated;
- The height of sediments entrapped within the basin should be within permitted level specified in the sediment basin design criteria (in the contracts of works).

ii) Surface Runoff Control Plan

- Evidences of fresh soil drained out from the work areas especially after incidences of heavy rainfall would indicate that there is a deficiency in the surface runoff control measures;
- Evaluation of the drainage structures (i.e. the walls of the stone pitched drains) for signs of fissures is important to safeguard against collapse of the structure that would further impair the capacity of the drainage network. Maintenance works such as additional plastering with mortar to close up the fissures should be carried out and confirmed in the audit.

iii) Regulation of the Landfill Development Activities

- Progress of works on-site documented should correspond to on-site observations;
- The implementation of works on-site would be assessed for its level of coordination. Proper records of works e.g. daily construction from start till closing; transport, handling and storage of material would assist the evaluation;
- Evaluation of the record of on-site activities by the contractors is imperative towards assisting the investigation of non-compliance and identification of problematic areas that contribute negatively towards the environment.

iv) Management Plan for oil & grease and solid waste

- The implementation of a proper disposal plan for the generated solid waste and spent oil & grease material can be evaluated by inspecting the documentation of all dispatch to treatment facilities and disposal sites in terms of frequency, type of containment and route of dispatch.

v) Air and Noise Quality Management Plan

- Efficiency of the maintenance program for the vehicles and generators are evaluated in terms of visual observation of dark smoke emission and the nuisance towards verbal communication on-site.

vi) Traffic Management Plan

- Evaluation of all records on the traffic movements to and from the site (i.e. incoming lorries and trucks);
- Observation of smooth traffic flows and absence of congestion at parking bays and unloading/loading points on-site would confirm the adequacy of traffic facilities allocated on site.

10.8 Reporting Framework

Besides establishing the various on-site environmental management procedures, the EMP shall also include the reporting format which specifies for both the monitoring and compliance program to ensure an effective and complete EMP. By defining the form of documentation, one can ensure clear and comprehensive dissemination of the monitoring works and audit findings to all relevant parties (i.e., EMU). The responsibility of documentation lies with the appointed auditor (i.e., environmental consultant) and the format of presentation along with its schedule of reporting is given in the following discussion.

10.8.1 Reporting Outline

The following description is presented according to the type of monitoring works and compliance program respectively. The description itself is basically an outline of what each document should include.

- a) Monthly TSS Monitoring Reports for Rivers and Sediment Basin Discharge
 - i. Details of sampling time and methods of analysis;
 - ii. Results of the TSS level monitored (if any);
 - iii. Discussion of results in terms of compliance to the stipulated 50 mg/L limit;
 - iv. Correlation of the results to site activities in terms of silt discharges unto the river;
 - v. Discussions on the observed trends of TSS levels throughout development;
 - vi. Conclusion: documentation of TSS level on rivers involves and the efficiency and performance of the sediment basins.

- b) Monthly Leachate Treatment Plant Discharge (WT-FD)
 - i. Details of sampling time and methods of analysis;
 - ii. Results of the specify parameters level monitored (if any);
 - iii. Discussion of results in terms of compliance to the stipulated limit;

- c) Quarterly Air and Noise Quality Monitoring Report
 - i. Details of sampling points, sampling time, parameters monitored and methods of analysis;
 - ii. The air and noise quality indicators monitored and their respective results would be presented in tabulated format;

- iii. Comparison to baseline and compliance standards to observe trends of changes;
 - iv. Interpretation of the observation would also be documented, whereby the results are correlated to on-site conditions. Visual observations would have to be documented in the form of photographs, if necessary;
 - v. Conclusion of the monitoring results i.e. noting the level of compliance.
- d) Quarterly Compliance Report
- i. Proper verification of on-site implementation of management plans, in the form of a checklist;
 - ii. Clear documentation of analysis, review, investigation, and inspection of on-site practices in terms of compliance level. Photographs may be employed to visually depict on-site conditions and support discussion to on-site compliance;
 - iii. Presentation of main issues and findings in a systematic and comprehensive manner;
 - iv. Additional remedial measures to counter the exceedence detected would be necessary;
 - v. Concise and clear conclusion on status of compliance with the corresponding remedial measures.
- e) On line Reporting
- i. Inspection of all the BMPs provided shall be carried out when the rainfall reading is more than 12.5mm. The inspection report as per DOE's format needs to be submitted to DOE within 24 hours after the inspection.
 - ii. BMPs corrective action report (where necessary) must be submitted within 7 days from the day of the incident.

10.8.2 Reporting Schedule

At this stage of EMP formulation, the reporting schedule basically represents the sequence of documentation that comes with each management programs throughout the different phases of development. In other words, it is essentially a guide as to the number and type of reporting that would take place at various stages of development. As such, the description for the time of reporting mainly concerns with developments allocated for entire proposed development.

10.9 Environmental Training

There is a serious need for environmental training in terms of environmental awareness for contractors and their sub-contractors who will be involved in the construction phase of the Project. Ideally, the environmental measures proposed in this report should be implemented by the contractors. However, in general, there is a lack of understanding or concern for environmental matters by the contractors. Thus in normal case scenarios environmental control measures are simply implemented but used ineffectively and in worst case scenarios, environmental control measures are simply ignored.

Provision of environmental training and awareness building by the EMU with the help of consultants can greatly help resolve this problem. Such measures are further enhanced when the DoE is involved during the implementation of the EMP whereby presence of the DoE officers generally receives the attention of contractors. While environmental training will not instantly solve all environmental problems on site, this can be an initial effort by the developers to improve the environmental management within the Project site.