Chapter 9 Environment Management Plan

9.1 Introduction

Impact assessments presented in **Chapter 7** of this EIA report have indicated the possibility of some residual impacts associated with Project activities during the construction and operation stages, even after the full implementation of planned and recommended mitigation measures.

This chapter discusses environmental management through the concept of environmental mainstreaming which is expected to enhance the control of potential environmental impact and minimise the risk of those residual impacts. Post-EIA monitoring programme is recommended to ensure the performance of the implementation of mitigation measures and compliance with the environmental requirements.

9.2 Environmental Mainstreaming and Self- Regulation

In the spirit of cultivating environmental excellence, DOE has embarked on a Guided Self-Regulation programme. The programme will guide and require the Project Proponent and his competent team to self-regulate in ensuring environmental performances and compliances in all of its Project activities. In order to assist the regulated community to achieve the state of self-regulation, DOE has formulated a set of environmental mainstreaming tools (EMT) as described in the following section.

9.2.1 Environmental Mainstreaming Tools

Seven environmental mainstreaming tools are identified as follows.

Environmental Policy

Environmental policy (EP) of a successful organization uses strong and unequivocal statements to convey their environmental commitments to their employees, clients, stakeholders and the public. EP is disseminated to all relevant parties and translated into action in the organization's work procedures, materials, purchasing policy, business decision making process and cascades down to the supply chain. Following is the environmental policy of Muhibbah Engineering (M) Berhad.

MUHIBBAH
ENGINEERING (M) BHD

ENVIRONMENTAL POLICY STATEMENT

MUHIBBAH ENGINEERING (M) BHD having recognized the importance of environment for sustainability of future generation has committed to pursue, implement and continuously improve the Environmental Management System in accordance with the requirements of ISO 14001: 2004 for each and every project undertaken.

The MUHIBBAH's concept of Environmental Management involves optimization usage of natural resources, preserving the environment through prevention of pollution and minimizing environmental impacts.

This is achieved through,

- Establishing, implementing and maintaining the Environmental Management System by continuously improving its processes by setting up Specific, Measurable, Achievable, Realistic and Time bound (SMART) objectives, targets and Environmental Management Programme (EMP).
- Training all the employees of MUHIBBAH to understand their role and responsibility in establishing environmental management system that meet and excels client / statutory requirements.
- Ensuring conformance to relevant environmental legislations and other requirement.
- Encouraging environmental sustainable concept through all MUHIBBAH activities.
- Communicating the company's Environmental Policy to all persons working for or on behalf of the organization, interested parties and made available to the public.

"LET'S PROTECT OUR ENVIRONMENT"

Mac Ngan Boon	Ooi Sen Eng	Mac Chung Jin
Managing Director	Director	Deputy Chief Executive Officer

Date of revised: 9th November 2015

Figure 9.2.1: Muhibbah Engineering (M) Berhad's Environmental Policy

Environmental Budgeting

Sufficient budget must be set aside solely for the purpose of taking measures to comply with the environmental regulatory requirements and other environmental-related efforts. During design and development stage, budget shall be made available for the design and installation of the relevant control facilities, while during the operational stage, budget shall also be allocated for proper operation and maintenance of the control systems and management of waste generated by the project. Environmental budget should also include the cost of setting up laboratory facility where applicable, provision of personnel and purchase of performance monitoring equipment.

Environmental Monitoring Committee

The success of an organization to comply with the environmental requirements is contingent upon the relevant personnel in different departments in the organization playing their role in an effective manner. In order to promote collective responsibility to be environmentally compliant, two monitoring committees are recommended: one at the working level and the other at the policy level. Following is the organization chart of MEB's health, safety and environment team. During the actual construction and operational stage of the Project, a team will be specifically assembled and assigned to overlook and manage the Project with the supervision of the MEB's headquarter. The following organization chart showcase that MEB is an established investor that appreciate the need and value in conserving the well-being of the environment.

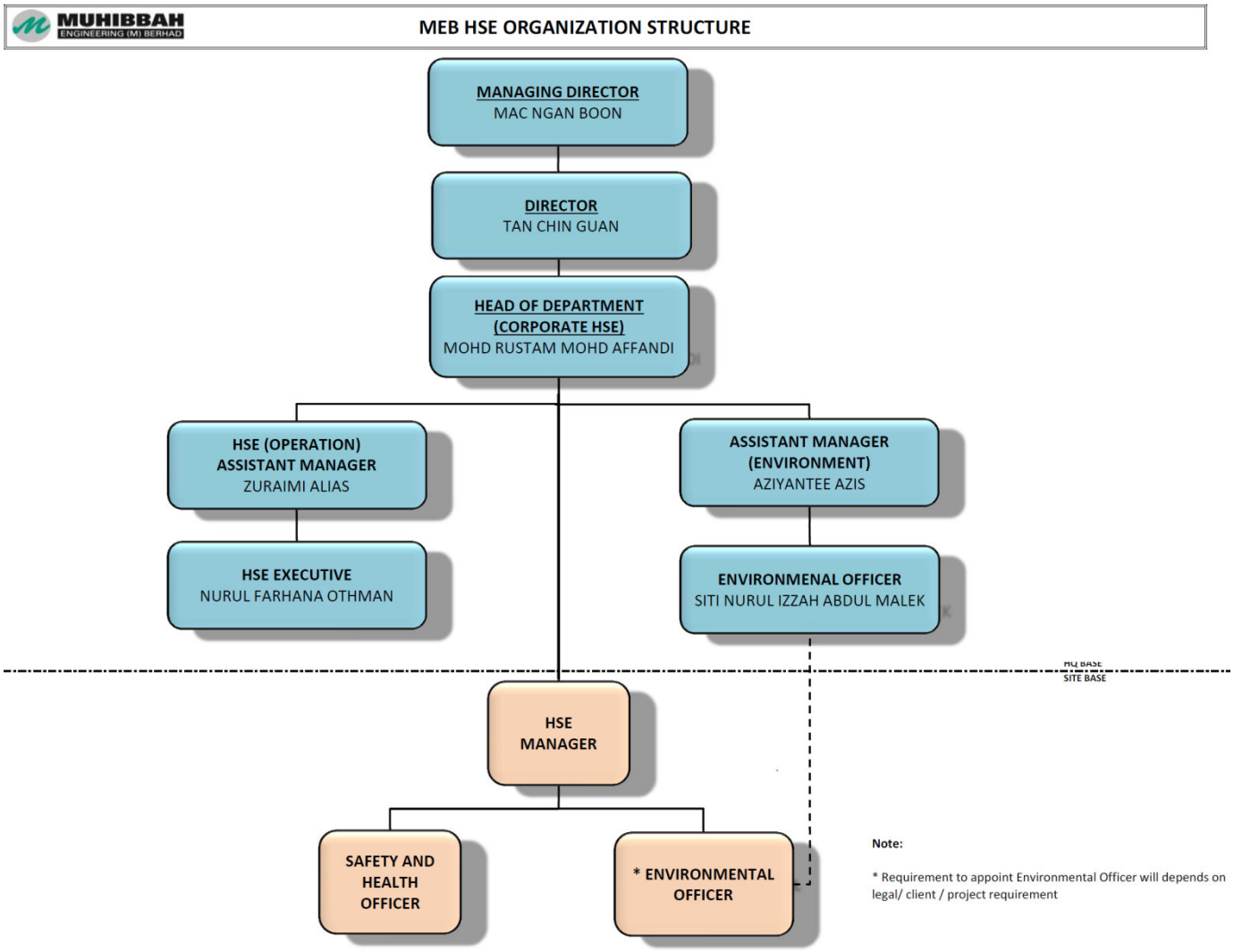

Figure 9.2.2: MEB's HSE Organizational Chart

Environmental Facility

The primary components of the environmental facilities (EFs) include industrial effluent treatment system, air pollution control system, best management practices, and associated support facilities such as laboratory, performance monitoring equipment, online instrumentation system, and waste management infrastructure. The above form an integral part of the company's overall infrastructural planning, which cannot be compromised.

Environmental Competency

The relevant personnel involved in discharging various environmental responsibilities within an organization need to possess the required competencies. These personnel include those who have been assigned the task to perform DOE-regulated functions: to manage waste and supervise the operation of best management practices, air pollution control and effluent treatment systems. The organization is required to draw up a comprehensive training programme to produce competent persons and trained support staff to ensure full compliance with the DOE requirements in the regulated activities.

Environmental Reporting and Communication

A formal communication channel must be established for reporting on environmental concerns and system upsets which warrant prompt actions to be instituted. Internal reporting can be initiated to report on a regular basis the regulatory compliance status of the organization to the head of organisation (Chief Executive Officer or Chairman) and various heads of department within the organization. Updates of new environmental requirements and their implications can be disseminated to the relevant company personnel through such communication channel. This environmental reporting and communication requires systematic analysis of performance monitoring data, which must be summarized in appropriate format for easy understanding and communication and maintained for management review purposes.

Environmental Transparency

To foster rapport with the immediate neighbours, promote green image, and improve public confidence, companies are encouraged to be more transparent in their environmental compliance and achievement. Compliance status can be displayed on company website or billboard located at the boundary or entrance to the company's premise, or communicated to be the immediate neighbours through issuance of fliers on a scheduled basis. An Environmental Sustainability Report (ESR) can be prepared for the company to showcase its success in managing the environmental concerns of the company and minimizing the environmental footprint of its business. The corporate image of the organization is markedly enhanced through environmental transparency.

9.2.2 Environmental Mainstreaming Tools Compliance Report

EMT Compliance Report is a new requirement set by DOE for the Project Owner to include an effective and thorough environmental self-regulation culture in the company's policy. EMT Compliance Report shall be submitted to the DOE at least thirty days before the Project commences operation.

9.3 Environmental Management Plan

An Environmental Management Plan (EMP) is recommended to ensure that the environmental impacts predicted are properly monitored and managed. This plan shall be reviewed and updated regularly to include changes or other impacts that may be identified in the course of the Project development or operation.

An EMP provides order and consistency for the organisation to address environmental concerns through the allocation of resources, assignment of responsibilities and on-going evaluation of practices, procedures and processes. The main objectives of this EMP are as follows:

- Integrate environmental factors and its management at various stages of the Project.
- Provide a documented system for proper management and enhancement of the environmental management.
- Identify the key potential environmental impacts and establish proper mitigation response procedures.
- Set monitoring programme to check and report on the performances of mitigation measures.
- Set standards that meet or exceed the relevant statutory requirements for the environment including requirements of DOE.

Based on the plan, implement, check and review framework, DOE has a basic required format for an EMP. The EMP to be developed for the proposed Project should include the following fundamental components:

- Introduction;
- Environmental Policy;
- Organisation chart, responsibility and implementation budget;
- Environmental requirements;
- Monitoring programmes;
- Management plans
- Environmental contingency plan; and
- Conclusion.

Effectiveness of the EMP implementation is largely demonstrated by the compliances recorded during the environmental monitoring and auditing exercises.

An EMP for the construction stage of the proposed Project will be prepared before the initiation of any construction works, while the EMP for operational stage of the Project shall be established before the commencement of the operation stage.

9.4 Monitoring Programme

Periodical monitoring is important to check on the performance of control measures initiated to control and minimise the impact to the environment. This is also to ensure that the potential residue impact remains insignificant.

9.4.1 Environmental Monitoring Programme

The proposed environmental monitoring programme can be grouped into three types, namely:

- Performance Monitoring
- Compliance Monitoring
- Impact Monitoring

Performance monitoring is a proactive and preventive monitoring of processes to ensure that the pollution control systems are optimally operated and maintained. Performance monitoring should be incorporated to the Standard Operation Procedure (SOP) for the pollution control systems and implemented.

Meanwhile compliance monitoring is required per environmental legislative requirement to check on the compliance of the emission / discharge quality from regulated sources whereas impact monitoring is necessary to verify the extend of potential impact identified in the EIA study.

Environmental aspects and associated parameters and frequencies are recommended for implementation during the construction and operation stages of the proposed Project. These programmes are presented in **Tables 9.4.1** and **9.4.2** respectively.

In order to ensure reliability of the test results, the field sampling and testing shall be conducted using relevant standard methods and performed by accredited laboratory.

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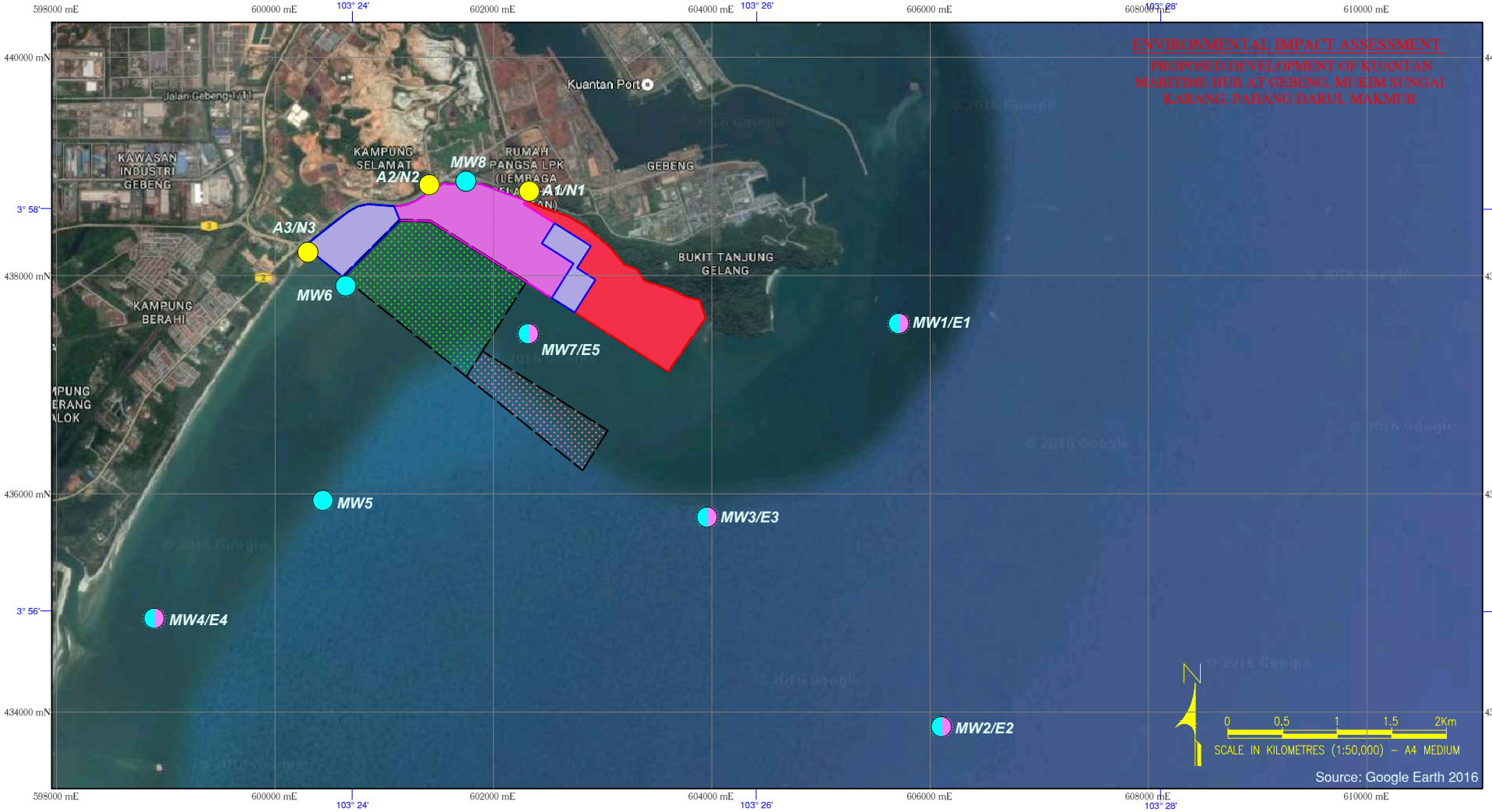

LEGEND:

- PROJECT SITE
- PHASE 1a
- PHASE 1b
- PHASE 1c
- PHASE 2 (FUTURE DEVELOPMENT)
- PHASE 3 (FUTURE DEVELOPMENT)
- MARINE ECOLOGY (ME1 - ME5)
- AIR AND NOISE MONITORING (A1/N1 - A3/N3)
- MARINE WATER (MW1 - MW8)

PROPOSED MONITORING POINTS DURING CONSTRUCTION STAGE (PHASE1 , 2 AND 3)

FIGURE: 8.4.1

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Table 9.4.1: Proposed Monitoring Programme during Construction Stage (Phases 1, 2 and3)

Types of Monitoring / Proposed Parameters	Proposed Monitoring Point (refer Figure 8.4.1)		Compliance Requirement / Reference	Proposed Frequency
Impact Monitoring				
Marine Water Turbidity, Total Suspended Solids	MW1	3° 57' 25.83"N; 103° 26' 42.26"E (Baseline W2) Between Kuantan Port and proposed Project site	Baseline established during the EIA study	Weekly during reclamation and dredging works Sampling to be done during ebb tide at surface
	MW2	3° 55' 25.57"N; 103° 26' 54.95"E (Baseline W3) Near proposed navigation channel about 4km from proposed Project site		
	MW3	3° 56' 28.09"N; 103° 25 45.34"E (Baseline W4) Near proposed navigation channel about 1km from proposed Project site		
	MW4	3° 56' 02.24"N; 103° 23' 5.62"E (Baseline W1) Near estuary of Sg Balok		
	MW5	3° 56' 32.93"N; 103° 23' 51.32"E (Baseline W10) About 1.5km south of the proposed Project site		
	MW6	3° 57' 40.27"N; 103° 24' 02.07"E (Baseline W9) West side of proposed Project site.		
	MW7	3° 57' 35.79"N; 103° 24' 45.79"E (Baseline W5) At proposed Project berthing basin		
	MW8	3° 58' 08.01"N; 103° 24' 36.69"E (Baseline W8) Estuary of Sg Pengorak		
Marine Water Temperature, pH, Salinity, Dissolved Oxygen, Total Suspended Solid, Oil and Grease, Mercury, Cadmium, Phenol,	MW1	3° 57' 25.83"N; 103° 26' 42.26"E (Baseline W2) Between Kuantan Port and proposed Project site	Class 3 of Malaysia Marine Water Quality Criteria and Standard	Monthly during marine construction works (reclamation, dredging, shoreline protection)
	MW2	3° 55' 25.57"N; 103° 26' 54.95"E (Baseline W3) Near proposed navigation channel about 4km from		

Types of Monitoring / Proposed Parameters	**Proposed Monitoring Point (refer Figure 8.4.1)**		**Compliance Requirement / Reference**	**Proposed Frequency**
Copper, Nitrate (NO_3), Nitrite (NO_2), Arsenic, Ammonia (unionized), Lead, Chromium VI, Zinc, Cyanide, Phosphate, Tributyltin (TBT), Polycyclic Aromatic Hydrocarbon (PAHs), Faecal Coliform		proposed Project site		Quarterly during construction of project components on reclaimed land
	MW3	3° 56' 28.09"N; 103° 25 45.34"E (Baseline W4) Near proposed navigation channel about 1km from proposed Project site		
	MW4	3° 56' 02.24"N; 103° 23' 5.62"E (Baseline W1) Near estuary of Sg Balok		
	MW5	3° 56' 32.93"N; 103° 23' 51.32"E (Baseline W10) About 1.5km south of the proposed Project site		
	MW6	3° 57' 40.27"N; 103° 24' 02.07"E (Baseline W9) West side of proposed Project site.		
	MW7	3° 57' 35.79"N; 103° 24' 45.79"E (Baseline W5) At proposed Project berthing basin		
	MW8	3° 58' 08.01"N; 103° 24' 36.69"E (Baseline W8) Estuary of Sg Pengorak		
Marine Ecology Zooplankton, Phytoplankton and Macro benthos	E1	3° 57' 25.83"N; 103° 26' 42.26"E (Baseline ME2) Between Kuantan Port and proposed Project site	Baseline established during the EIA study	Quarterly
	E2	3° 55' 25.57"N; 103° 26' 54.95"E (Baseline ME3) Near proposed navigation channel about 4km from proposed Project site		
	E3	3° 56' 28.09"N; 103° 25 45.34"E (Baseline ME4) Near proposed navigation channel about 1km from proposed Project site		
	E4	3° 56' 02.24"N; 103° 23' 5.62"E (Baseline ME1) Near estuary of Sg Balok		

Types of Monitoring / Proposed Parameters	**Proposed Monitoring Point (refer Figure 8.4.1)**		**Compliance Requirement / Reference**	**Proposed Frequency**
	E5	3° 57' 35.79"N; 103° 24' 45.79"E (Baseline ME5) At proposed Project berthing basin		
Ambient Air PM_{10}	A1	3°58'5.21"N; 103°24'52.53" LPK Apartment	Malaysian Ambient Air Quality Standard 2020: PM_{10}: 100 µg/m^3 (24 hour average)	Quarterly
	A2	3°58'7.16"N; 103°24'22.86"E Surau of Kampung Selamat		
	A3	3^o57'51.12"N; 103^o23'50.36" E Northwest corner of the Proposed Project		
Noise Leq, Lmax, Lmin, L10, L90	N1	3°58'5.21"N; 103°24'52.53" LPK Apartment	Baseline established during the EIA study Planning Guidelines for Environmental Noise Limits and Control	Quarterly
	N2	3°58'7.16"N; 103°24'22.86"E Surau of Kampung Selamat		
	N3	3^o57'51.12"N; 103^o23'50.36" E Northwest corner of the Proposed Project		
Shoreline Monitoring Topography / Bathymetry measured levels	Profile 1 to Profile 7 shown in **Section 9.4.2**		Baseline established prior to the commencement of work	Refer **Section 9.4.2**
Compliance Monitoring				
Inspection on Control Measures Photographic report by site's Environmental Officer	Silt traps, weir box, silt curtains, any other ESCP's BMPs		-	Daily inspection during reclamation and dredging, and after a storm event
Discharge from Silt traps / Weir Box / outside of silt curtain Turbidity, Total Suspended Solids	Sampling at discharge point of silt traps / weir box / outside of silt curtains		Total Suspended Solids: 50mg/l Turbidity: 250NTU	Monthly or after rainfall event of ≥ 12.5mm.

Table 9.4.2: Proposed Monitoring Programme during Operation Stage

Types of Monitoring / Proposed Parameters	Proposed Monitoring Point (Actual monitoring location to be determined in EMP for Respective Project Components)	Compliance Requirement / Reference	Proposed Frequency
Impact Monitoring			
Ambient Air PM_{10}	At proposed fabrication yard	Malaysian Ambient Air Quality Standard 2020: PM_{10}: 100 µg/m^3 (24 hour average)	Quarterly
Noise Leq, Lmax, Lmin, L10, L90	At the boundary of proposed fabrication yard	Day time: 70 dB(A) Night time: 60 dB(A)	Quarterly
Marine Water Temperature, pH, Salinity, Dissolved Oxygen, Total Suspended Solid, Oil and Grease, Mercury, Cadmium, Phenol, Copper, Nitrate (NO_3), Nitrite (NO_2), Arsenic, Ammonia (unionized), Lead, Chromium VI, Zinc, Cyanide, Phosphate, Tributyltin (TBT), Polycyclic Aromatic Hydrocarbon (PAHs), Faecal Coliform	Marine water near designated final storm water discharge points from shipyard and fabrication yard	Class 3 of Malaysia Marine Water Quality Criteria and Standard	Quarterly
Shoreline Monitoring Topography / Bathymetry measured levels	Profile 1 to Profile 7 shown in **Section 9.4.2**	Baseline established prior to the commencement of work	Refer **Section 9.4.2**
Compliance Monitoring			
Effluent Temperature, pH, COD, BOD, Total Suspended Solid, Oil and Grease, Ammoniacal Nitrogen, Nitrate Nitrogen	Discharge points from Sewage Treatment Plant	Environmental Quality (Sewage) Regulations 2009	Monthly

9.4.2 Shoreline Monitoring Programme

One of the residue impact associated with the proposed Project are changes to the coastal morphology, especially coastline immediately south of the Project site. It is recommended that shoreline monitoring be conducted periodically to tract and evaluate the changes along the nearby coastline and such data and information could be used to justify specific mitigation measures later, if required and relevant. The proposed shoreline monitoring plan is elaborated in the following sections.

9.4.2.1 ***Beach Monitoring Profiles***

Monitoring of the coastal morphology is to be carried out through periodical surveys of permanent monitoring profiles. Seven (7) profiles have been defined for this Project as presented in **Figure 8.4.2** and the coordinates of the proposed profile locations are tabulated in **Table 9.4.3**. The profiles should extend to approximately -2 m CD depth contour.

Table 9.4.3: Coordinates of proposed profile locations for shoreline monitoring

Profile	Start (WGS 1984)		End (WGS 1984)	
	Longitude	Latitude	Longitude	Latitude
1	103.394000	3.960120	103.405000	3.951230
2	103.391000	3.956050	103.400000	3.948730
3	103.388000	3.952070	103.397000	3.945620
4	103.386000	3.948010	103.393000	3.941720
5	103.383000	3.943700	103.390000	3.938340
6	103.380000	3.939220	103.387000	3.934130
7	103.374000	3.928360	103.381000	3.922930

9.4.2.2 ***Monitoring Procedure***

The data of shoreline monitoring programme need to be collected for both above water line of the coastal profile (land survey) and the below water line coastal profile (sea survey). The combined land and sea data will be analysed and interpreted.

Surveying of profiles on the seaside shall be carried out during high tide to include as much of the coastal (sea) morphology as possible. While the land survey shall be carried out as a landward extension of the monitoring profiles defined above, and should be monitored during low tide to include as much of the beach profile as possible and preferable down to chart datum. All monitoring data is to be prepared in a spreadsheet and should contain information on date and time, profile locations, and profile depths and datum. The spreadsheet should contain both the sea survey and the land survey (upper beach profile) and both should refer to the same datum.

The monitoring profiles shall be setup with a permanent benchmark and surveyed prior to the start of works to provide baseline data.

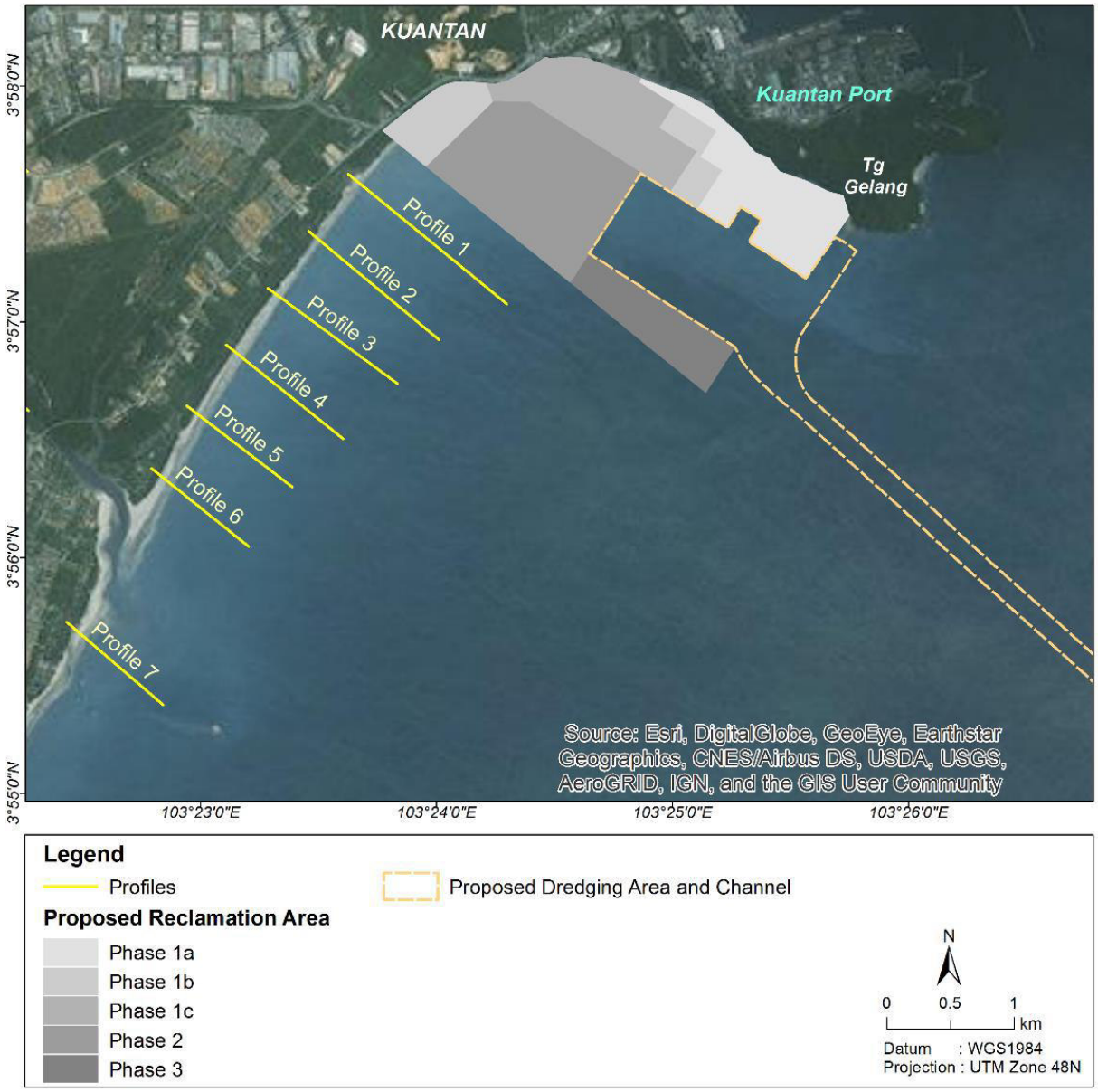

Figure 8.4.2: Proposed profiles for shoreline monitoring

*9.4.2.3 **Frequency of Monitoring***

The recommended frequencies of monitoring are as described in the following.

- Once every six (6) months for a period of three (3) years or until completion of Phase 1. When the construction of Phase 1 is completed, surveys are to be done every six (6) months for a period of three (3) years or until the next phase of the construction works is initiated (whichever comes first).
- Once every six (6) months for a period of three (3) years or until completion of Phase 2. When the construction of Phase 2 is completed, surveys are to be done every six (6) months for a period of three (3) years or until the next phase of the construction works is initiated (whichever comes first).

- Once every six (6) months for a period of three (3) years or until completion of Phase 3. When the construction of Phase 3 is completed, surveys are to be done every six (6) months for a period of three (3) years.

The bi-annual coastal profiles measurements should be conducted on the back of the two monsoon seasons, i.e. right after the NE and SW monsoons.

Photographs of the beach at each proposed profile should be taken during each campaign. The GPS position of the benchmarks should be recorded to allow for re-location and exact repeat of the photographic data.

9.5 Environmental Auditing

An environmental audit is a verification mechanism to determine the performances of mitigation measures, and to measure compliances with the EMP and other associated environmental requirements. It is recommended that a periodical environmental audit is to be carried out by an experienced auditor registered with DOE.

Various approaches may be used in the audit exercise; these include site inspection, site demonstration, interviews and document review. Observations and findings will be documented and objective evidence will be recorded with photographs. Environmental auditing is deemed necessary for both the construction and operational stages of the proposed Project as each stage will have different activities. Environmental auditing is set to record compliances achieved and should any non-compliance be found, necessary corrective and/or preventative actions will need to be taken by Project Owner for their rectification. All observations and findings with status of non-compliance report, where applicable, and recommendations for improvement shall be compiled in an audit report.

9.6 Environmental Contingency Plan

Environmental Contingency Plan describes the potential of environmental related incidents and emergency situations, communication and response/combat systems, synergy with local entities and communities, including structure, human and material resources.

The main aim of the Environmental Contingency Plan is to assist in effectively coordination of resources to contain and minimise any potentially detrimental effect on the surrounding environment and health and well-being of employees and/or the general public, as a result of unexpected or unintended incidents. The plan shall incorporate the following:

- Identification of potential environmental related emergency situations. Potential environmental emergencies for this proposed Project include oil spill or chemical spill at the shipyard and fabrication yard and oil spill in the marine water due to incidents associated with marine vessels;

- Allocation of resources (manpower and containment facilities) to enable timely and efficient response to emergency situations;
- Measures to minimise impacts inclusive of risk to workers, public and the environment as a result of such emergency situations; and
- Exploration of measures to prevent the occurrence and reoccurrence of such emergency situations.

An Emergency Response Team is usually formed and lead by an Emergency Commander with assistance of Emergency Coordinator. The Emergency Commander is overall in-charge during emergency. Emergency Coordinator shall coordinate with first line response team, first aider and other agencies such as fire brigade (BOMBA), hospital and police. Classification of emergency incident will facilitate in decision making of the type and level of action to be taken. This will also allow a co-ordinated, efficient and effective response. Effective communication network between the Project's management and the neighbouring communities and local authorities is to be set-up to ensure emergency response is efficient.