2018

FINAL REPORT

Environmental Management Plan (EMP)

For

INITIAL PHASE POWER PLANT

DAWEI SEZ INITIAL PHASE DEVELOPMENT

Volume II

TEAM GROUP

IBS

DPC DAWEI POWER COMPANY LIMITED

Prepared by

TEAM Consulting Engineering and Management Public Company Limited

TOTAL Business Solution Co., Ltd.

April 2018

REVISED DRAFT FINAL REPORT
ENVIRONMENTAL MANAGEMENT PLAN FOR INITIAL PHASE POWER PLANT OF DAWEI SEZ

TABLE OF CONTENT

PAGE

PAGE

PAGE

CHAPTER 6 : CONSTRUCTION PHASE EMP (CONT'D)

CHAPTER 7 : OPERATIONAL PHASE EMP

PAGE

CHAPTER 7 : OPERATIONAL PHASE EMP (CONT'D)

CHAPTER 8 : IMPLEMENTATION BUDGET AND SCHEDULE

APPENDICES

LIST OF FIGURES

FIGURE **PAGE**

LIST OF TABLES

TABLE **PAGE**

LIST OF ABBREVIATION

AEMR	Annual Environmental Management Report
CAR	Corrective Action Request
CCEMP	Contractor-CEMP
CEMS	Continuous Emission Monitoring System
CPMO	Contractor Project Management Office
DOEP	Department of Electric Power
ECC	Environmental Compliance Certificate
ECD	Environmental Conservation Department
EHS	Environmental, Health and Safety
EIF	Environmental Incident Form
EIR	Environmental Incident Register
EMP	Environmental Management Plan
EMS	Social Management System
EPC	Engineering Procurement Construction
ERR	Environmental Risk Management
ES	Environmental and Social
IFC	International Finance Corporation
LTIFR	Lost Time Injury Frequency Rate
MOEP	Ministry of Electric Power
MONREC	Ministry of Natural Resources and Environmental Conservation
MTIFR	Medical Treatment Injury Frequency Rate
NOx	Nitrogen Oxide
OCEMP	Owner-CEMP
OSH	Occupational, Safety and Health
O&M	Operation and Maintenance
PDCA	Plan-Do-Check-Act
PMO	Project Management Office
TRIFR	Total Recordable Injury Frequency Rate

CHAPTER 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 NEED FOR ENVIRONMENTAL MANAGEMENT PLANS

Results of an EIA study for a proposed development project will not lead to any practical outcomes if the proposed mitigation measures and monitoring program are not implemented in the construction and operational phases of the proposed project. Therefore, an EIA study will need to extend beyond impact assessment to planning for implementation of the proposed mitigation measures and monitoring program. In this regard, the results of the EIA study will need to cover preparation of two environmental management plans (EMPs): (i) one EMP for implementation by the contractor in the pre-construction and construction phases; and (ii) one EMP for implementation by the project proponent in the operational and decommissioning phases. Recognizing this fact, the EIA Procedure requires the EIA study to include preparation of a construction phase EMP (CEMP) and an operational phase EMP (OEMP). The two EMPs are presented in ***Volume II-EMPs*** while results of the EIA study are to be presented as ***Volume I-Main ESIA Report***.

The two EMPs are defined in the EIA Procedure as follows:

Construction Phase EMP *means a detailed and comprehensive Environmental Management Plan (EMP) for the construction phase of a Project. Such plan shall present all relevant commitments, Emission Limit Values, Environmental Quality Standards and other environmental requirements and include a description of the construction works, present an overview of Adverse Impacts, present mitigation measures and monitoring programs together with time schedules, overview maps, images, aerial photos, satellite images, site layout plans, cross-sections, transects, environmental management and monitoring sub-plans for each construction site, thematic sub-plans, and management procedures as appropriate.*

Operational Phase EMP *means a detailed and comprehensive EMP for the operational phase of a Project. Such plan shall present all relevant commitments, Emission Limit Values, Environmental Quality Standards and other environmental requirements. The plan shall include a description of the Project operations, installations, and infrastructure, and shall present an overview of Adverse Impacts, present mitigation measures together with time schedules, overview maps, images, aerial photos, satellite images, site layout plans, cross-sections, transects, environmental management and monitoring sub-plans for each Project site, thematic sub-plans, and management procedures as appropriate.*

The above definitions clearly indicate that the two EMPs required by Ministry of Natural Resources and Environmental Conservation (MONREC) will be comprehensive and have more details than conventional EMPs presented in EIA reports of the past. This requirement of MONREC is in line with current good EIA practices.

It should be noted that the CEMP also covers pre-construction phase, and decommissioning phase environmental management plan (DEMP) has been prepared in addition.

1.2 GENERIC SCOPE OF AN EMP

Environmental management is based on the basic principle of management known as the PDCA cycle (see ***Figure 1.2-1***). Environmental management thus consists of four related tasks:

(i) Plan (P)-what need to be done;

(ii) Do (D)-implement the plan;

(iii) Check (C)-monitor and evaluate the results of implementation

(iv) Act (A)-taking corrective actions to improve the results, if found inadequate

FIGURE 1.2-1 : PDCA CYCLE FOR ENVIRONMENTAL MANAGEMENT

Therefore, an EMP will need to cover the following subjects: (i) mitigation measures to be implemented; (ii) arrangements for the implementation of mitigation measures; (iii) monitoring, evaluating and reporting of the implementation of mitigation measures to provide feedback information on whether the environmental performance deviates from the prescribed benchmarks; (iv) corrective actions process if the environmental performance below the benchmarks, environmental incident response, and emergency plan; (v) arrangements for operating the Social Management System (EMS), including organizational structure, responsibilities, documentation, training, communication, and management review; and (vi) involvement of stakeholders or affected people in environmental management, including public grievance redress mechanism.

It should be noted that the context of the six elements of environmental management during project construction will be different from those during project operation and decommissioning. Therefore, it is preferable to present a CEMP separate from an OEMP to facilitate their use and reference.

1.3 ORGANIZATION OF THIS EMP DOCUMENT

The EIA Guideline 2014 recommends an outline of the EMP in Section 5.2 Generic Content of an EMP and also in Appendix 10-EMP-Table of Contents. The two outlines are different, thus causing confusion as to which outline should be adopted. This EMP document is structured to follow the two outlines as appropriate within the environmental management context of this Project. The essence of each chapter following this introductory chapter is as follows:

Chapter 2 - Project Proponent's Environmental and Social Policy and Commitments

Chapter 3 - Institutional Arrangements

Chapter 4 - Legal Requirements

Chapter 5 - Summary of Impacts and Mitigation Measures

Chapter 6 - Construction Phase EMP

Chapter 7 - Operational Phase EMP

Chapter 8 - Implementation Budget and Schedule

1.4 NEED FOR UPDATING THE EMPs

The CEMP, OEMP and DEMP presented in this Document are based on preliminary project designs and initial construction plans and schedules. Therefore, the two EMPs should be considered as framework plans. They are intended to provide framework and prescribe requirements for the preparation of detailed CEMP, OEMP and DEMP by the Engineering Procurement Construction (EPC Contractor). In this regard, the Project Proponent will require the EPC Contractor to prepare a detailed CEMP in due course before commencing the construction, and a detailed OEMP in due course before commercial operation of the hydropower plant.

The Contractor will use the CEMP presented in this Document as the basis to prepare a detailed CEMP based on the Contractor's final designs, construction plan and methods, and construction schedule. The scope and content of the Contractor's CEMP will not be less than the scope and content of the CEMP in this Document. The Contractor's CEMP shall be contractually binding. During the construction, the Contractor will implement the Contractor CEMP under the supervision of the Project Manager to be appointed by the Project Proponent (Owner).

As the Contractor will be responsible for the design, supply, installation, testing, and commissioning of the power plant and its associated facilities, the Contractor will use the OEMP presented in this Document as the basis for preparing a detailed OEMP based on the actual construction, results of plant commissioning, and final operational procedures. The Power Plant Management Team of the Project Proponent or Owner will review and revise the Contractor's OEMP as appropriate to prepare the Owner's OEMP and DEMP for implementation in the operational and decommissioning phases.

For clarity, the application of the EIA's EMPs as above described is shown as a diagram in ***Figure 1.4-1***.

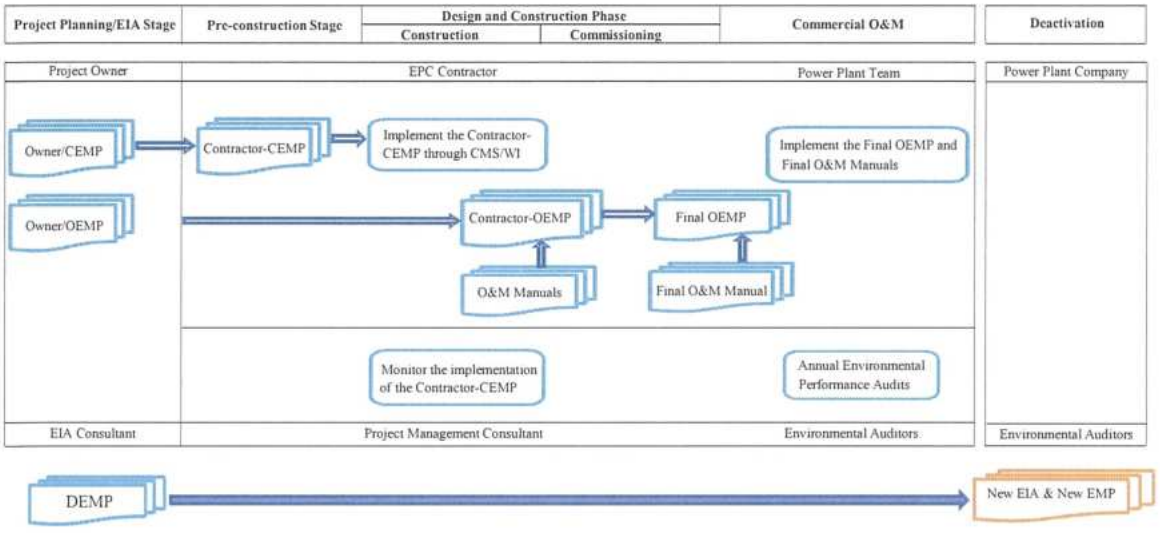


FIGURE 1.4-1 : APPLICATION OF THE EIA'S EMPS

CHAPTER 2

PROJECT PROPONENT'S ENVIRONMENTAL AND SOCIAL POLICY AND COMMITMENTS

CHAPTER 2

PROJECT PROPONENT'S ENVIRONMENTAL AND SOCIAL POLICY AND COMMITMENTS

2.1 CORPORATE ENVIRONMENTAL AND SOCIAL POLICIES

The Project Proponent - Dawei Power Company Limited (DPC) will formulate an environmental and social management policy to guide its environmental and social management during the construction phase and the operation phase of the Project. The policy will be similar to the one of the developer (The Electricity Generating Public Company Limited or EGCO as the potential strategic partner), which adopts for its existing power plants in Thailand as shown below:

Environmental Policy

- Comply with relevant environmental laws and regulations
- Manage our business with the goal to alleviate the adverse effects on the environment, undertake appropriate reviews and evaluations of our performance to measure and to ensure compliance with this environmental policy
- Encourage employees to have strong concern and be responsible for the clean environment
- Educate the employees on the environment including exchanging the knowledge with other agencies in order to continuously and regularly maintain good environment and to improve the working practice appropriate to the environment

Safety and Health Policy

- Strive to prevent accident, injury and occupational illnesses through the active participation of every employee
- Commit to continuous efforts to identify and eliminate or manage safety risks associated with our activities
- Strictly comply with all applicable laws and regulations. In case that no enforceable body of law exists, we will apply reliable standards of our own
- Arrange for the proper design of tool and equipment, regulations, training and the control tools in a manner that safeguards workers, property and the communities in which we operate from machine, working procedures and occupational illnesses

Employees who report to work with illegal drugs in their system or report with level of alcohol or other chemical substances that could impair performance are subject to disciplinary action.

In line with this policy, the Project will commit to the following:

During Pre-construction and Construction: The Project will endeavor to minimize environmental impacts and meet all Environmental, Health and Safety (EHS) requirements during the pre-construction and construction. This will be achieved through adopting designs, construction methods, construction management practices, and impact mitigation measures. The Project's EHS performance will be measured and evaluated against applicable national or international standards and guidelines prescribed by Ministry of Natural Resources and Environmental Conservation (MONREC) or proposed in the CEMP. In addition, the Project will establish an environmental management system (EMS) for the Project construction including pre-construction.

During Operation and Decommissioning: The Project will endeavor to minimize environmental impacts and meet all EHS requirements of the power plant's operation and maintenance (O&M). This will be achieved through adopting: (i) appropriate technologies in the power plant design and operation; and (ii) effective impact mitigation measures proposed in the EIA OEMP and DEMP. The Project's EHS performance will be measured and evaluated against applicable national or international standards and guidelines prescribed by MONREC or proposed in the OEMP and DEMP. The Project will also establish an EMS specific to the power plant operation, which will follow principles and good practices in environmental management of power plants.

2.2 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

The Project Proponent will establish an environmental and social management system (ESMS) to support the implementation of the CEMP and the OEMP. The ESMS for the pre-construction and construction phases is described in the CEMP while that for the operational phase and decommissioning phase are described in the OEMP and DEMP respectively.

In addition, the Project Proponent will require the EPC Contractor to establish its own ESMS to support its implementation of the detailed CEMP.

2.3 ENVIRONMENTAL AND SOCIAL PROCEDURES AND GUIDELINES

Health, Safety, Environmental Management General Guidelines, and Health, Safety and Environmental Risk Assessment for Site Activities will be established in accordance with the policy stated in ***Section 2.1***.

2.4 ENVIRONMENTAL AND SOCIAL COMMITMENTS

DPC's environmental and social commitments are clearly indicated in its policy statement in ***Section 2.1***. In this Project, DPC and its partners will make utmost efforts to minimize environmental and social impacts that the Project may cause in its construction and operation, DPC and its partners recognize the need for the Project to exist in harmony with all stakeholders, particularly the communities surrounding the Project site.

CHAPTER 3

INSTITUTIONAL ARRANGEMENTS

CHAPTER 3

INSTITUTIONAL ARRANGEMENTS

3.1 RESPONSIBILITIES OF THE PROJECT PROPONENT

The Project Proponent is legally responsible for environmental performance of the Project as prescribed in the Environmental Compliance Certificate (ECC) and other permits. The Project Proponent will report to Ministry of Natural Resources and Environmental Conservation (MONREC) on the Project's environmental and social performance, and also to other authorities responsible for specific environmental and social issues relevant to the Project.

Specifically, the Project Proponent will have the following responsibilities:

Pre-construction and Construction Phases

1) Ensure that the Contractor will update the CEMP presented in this document to prepare a detailed CEMP based on the results of detailed design, construction plan, and construction schedule.

2) Establish and operate an environmental and social management system (ESMS) containing elements outlined in this EMP.

3) Supervise the Contractor closely in implementing the Contractor CEMP as an integral part of its project implementation management and construction supervision.

4) Submit periodic monitoring and audit reports to MONREC as required in the EIA Procedure.

5) Notwithstanding the periodic monitoring reports to be submitted to MONREC, keep MONREC and other concerned authorities informed of any serious environmental events and responses to the events.

6) Conducting periodic audit of environmental and social performances of the Contractor.

Operational and Decommissioning Phases

1) Ensure that the Contractor will update the OEMP and DEMP presented in this document to prepare a detailed OEMP based on the results of detailed design, results of commissioning, and operational manuals.

2) Establish and operate an environmental and social management system (ESMS) containing elements outlined in this EMP. The ESMS will be part of the management system of the power plant.

3) Establish an environmental, health and safety (EHS) unit within the organization for operation and maintenance of the power plant. The EHS unit will be adequately staffed with qualified personnel.

4) Ensure that the Power Plant Manager will operate the ESH unit to comply with all ESH requirements prescribed in the ECC.

5) Submit periodic monitoring and audit reports to MONREC as required in the EIA Procedure.

6) Notwithstanding the periodic monitoring reports to be submitted to MONREC, keep MONREC and other concerned authorities informed of any serious environmental events and responses to the events.

7) Conducting annual audit of environmental and social performances of the power plant.

3.2 RESPONSIBILITY OF THE CONTRACTOR

The Contractor, including its approved sub-contractors, is contractually responsible to the Project Proponent for environmental performance of the project construction as prescribed in the Contract.

Specifically, the Contractor will have the following responsibilities:

1) Prepare a detailed Contractor CEMP for review and approval by the Project Proponent. The Contractor CEMP should follow the outline prescribed by the Project Proponent as proposed in ***Appendix 6C***.

2) Implement the mitigation measures during the construction through construction method statements and work instructions in strict conformance with environmental conducts prescribed in the Contract.

3) Ensure that all process and environmental control equipment meet all technical specifications related to their environmental performance.

4) Conduct periodic monitoring and reporting of its compliance with the environmental and social performance prescribed in the Contract.

5) Ensure that its sub-contractors shall comply with the Contractor CEMP.

6) Consistently update the Contractor CEMP and submit the updated version to the Project Proponent for approval.

3.3 RESPONSIBILITY OF MONREC

MONREC is the key agency to monitor and evaluate environmental performance of the construction and operation. Other agencies concerned will support MONREC in the monitoring and evaluation of environmental performance of the Project during construction and operation.

3.4 RESPONSIBILITY OF STATE/REGION AND DISTRICT AUTHORITIES

Local government authorities are the regulator to monitor and evaluate environmental performance of the construction and operation.

3.5 RESPONSIBILITY OF THE ESH UNITS

In the pre-construction and construction phases, the Project Proponent will establish an ESH unit within its project management organization. In the operational and decommissioning phases, the Project Proponent will establish an ESH unit within the organization for Operation and Maintenance of the power plant and its associated facilities. Functions and responsibilities of the two EMS units are described in the CEMP and OEMP.

Arrangements for Operating the EMS

There are three key groups with responsibility for environmental management of the Project:

- Project Proponent or Project Owner who manages the Project through a Project Manager.
- Contractor as the party undertaking the construction.
- MONREC through Environmental Conservation Department (ECD) and other government agencies at the regional, township and community levels.

CHAPTER 4

LEGAL REQUIREMENTS

CHAPTER 4

LEGAL REQUIREMENTS

4.1 SUMMARY OF KEY LEGAL REQUIREMENTS

Environmental management of the Project will comply with legal requirements pertinent to the Environmental Management Plan (EMP) prescribed in the Electricity Law (2014), the Environmental Conservation Rule (2014), the EIA Procedure (2015) and National Environmental Quality (Emission) Guidelines (2015).

4.1.1 Electricity Law 2014

The Electricity Law 2014 aims at the development of the power sector in harmony with environmental conservation and development (Article 3 (a) and (b)). To realize this, the Electricity Law 2014 authorizes the relevant ministry to conduct EIA, implement the activities with minimal environment impact, compensate for the negative impacts and provide funds for environmental conservation in accordance with the Environmental Conservation Law (Article 10 (b)). It requires the permit holders of the electricity businesses to abide by the current rules, regulations, orders and directives of the relevant ministry in implementing the electricity works (Article 20). Therefore, the draft Electricity Law supports the Environmental Conservation Law, its rule and the related EIA Procedure.

4.1.2 The Environmental Conservation Rules 2014

Chapter IX, Articles 41 to 46 prescribes the tasks regarding waste management under the control of Ministry of Natural Resources and Environmental Conservation (MONREC) and the Environmental Conservation Department (ECD). Waste management covers hazardous wastes, solid wastes, wastewater and emissions.

4.1.3 Environmental Impact Assessment Procedure 2015 (29/12/2015)

Articles in the EIA Procedure relevant to the preparation and implementation of the EMPs are summarized in ***Table 4.1-1***. Preparation and implementation of the two EMPs will need to comply with relevant articles in the table.

TABLE 4.1-1

CONTENT OF THE EIA PROCEDURE RELEVANT TO THE EMPS

Subject	Relevant Articles
Content of the EMPs	63
Project Approval Requirements	
- Issuance of an ECC[1]	70
- Conditions of the ECC[1]	87, 89, 90, 91, 92, 93, 94, 96, 97, 98
- Submission of an CEMP and OEMP	91, 94
Revision and updating the EMPs	94, 97, 98, 99
Implementing the EMPs	102, 103, 104
Monitoring and Reporting	
- Responsibility for Monitoring	106, 107
- Submission of Monitoring Report	108
- Content of Monitoring Report	109
- Disclosure of Monitoring Report	110
- Inspection by MONREC	111-122

Note: [1/] Environmental Compliance Certificate

4.1.4 National Environmental Quality (Emission) Guidelines (2015)

MONREC issued the National Environmental Quality (Emission) Guidelines on 29th December 2015. The objectives are to provide the basis for regulation and control of noise and vibration, air emissions, and liquid discharges from various sources in order to prevent pollution for purposes of protection of human and ecosystem health.

4.2 PROJECT STANDARDS

Environmental management of the Project during construction and operation will comply with the national or international environmental guidelines and standards as appropriate. The international guidelines and standards will be adopted as appropriate only when the national guidelines and standards do not exist.

Table 4.2-1 presents international ambient environmental quality standards to be adopted as the national ambient environmental quality standards have not yet been issued. ***Table 4.2-2*** presents national quality standards for emission. ***Table 4.2-3*** presents national quality standards for effluents to be discharged from construction activities.

TABLE 4.2-1
RELEVANT ENVIRONMENTAL GUIDELINES AND STANDARDS

Subjects	Parameters	Values	References
Ambient Air Quality			
24-hour average	TSP	230 µg/m^3 [a]	[a] Thermal Power: Guidelines for New Plant, Pollution Prevention and Abatement Handbook WORLD BANK GROUP, 1998 [b] Environmental, Health, and Safety Guidelines: Environment Air Emissions and Ambient Air Quality of International Finance Corporation, 2007 [c] National Environmental Quality (Emission) Guidelines, Myanmar, 2015
	NO_2	150 µg/m^3 [a]	
	PM_{10}	150 µg/m^3 [a,b]	
		50 µg/m^3 [c]	
	SO_2	150 µg/m^3 [a]	
		125 µg/m^3 [b]	
		20 µg/m^3 [c]	
1-hour average	NO_2	200 µg/m^3 [b]	
Ambient Noise Levels			
- Industrial and commercial area	Leq (24 hrs)	70 dB(A) [a,b]	[a] Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, U.S. EPA (U.S. Environmental Protection Agency), 1974. [b] Notification of Guidelines for Community Noise, World Health Organization (WHO), 1999. [c] Environmental, Health, and Safety Guidelines: General EHS GUIDELINES: ENVIRONMENTAL NOISE MANAGEMENT of International Finance Corporation, 2007 [d] National Environmental Quality (Emission) Guidelines, Myanmar, 2015
	Leq (1 hr)	70 dB(A) daytime [d]	
		70 dB(A) nighttime [d]	
- Residential areas	Leq (1 hr)	55 dB(A) daytime [c,d]	
		45 dB(A) nighttime [c,d]	
	Lmax	110 dB(A) [b]	
Vibration			
Industrial buildings and residential buildings	Peak Particle Velocity	5 mm/s	DIN4150
Coastal Water Quality	DO	Not less than 4 mg/L	ASEAN MARINE WATER QUALITY Management Guidelines and Monitoring Manual, 2008
	pH	5.0-9.0	
	Nitrate Nitrogen	60 µg/L	
	Phosphates as P	15 µg/L for coastal	
		45 µg/L for estuarine	
	Lead	8.5 µg/L	
	Cadmium	10 µg/L	
	Mercury	0.16 µg/L	
	Oil and grease	0.14 mg/L	
	Total suspended solids	Permissible 10% maximum increase over seasonal average concentration.	
Sediment Quality		Maximum limits	International Association for Impact Assessment (IAIA) NOAA Screen Quick Reference Table, 2004
	Total Chromium	81 mg/kg	
	Total Arsenic	8.2 mg/kg	
	Total Lead	46.7 mg/kg	
	Total Cadmium	1.2 mg/kg	
	Total Zinc	150 mg/kg	
	Total Copper	34 mg/kg	
	Total Mercury	0.15 mg/kg	

TABLE 4.2-1

RELEVANT ENVIRONMENTAL GUIDELINES AND STANDARDS (CONT'D)

Subjects	Parameters	Values	References
Groundwater Quality	pH at 25° C Nitrate Nitrite Cadmium Lead Arsenic Cyanide Chloride	6.5-8.5 50 mg/L 3 mg/L 0.003 mg/L 0.01 mg/L 0.01 mg/L 0.17 mg/L 250 mg/L	WHO's Guidelines for Drinking Water Quality, 2011
Thermal Heat Flux	Safe level of exposure at the property line of LNG storage facility	5 kW/m^2 (1,600 Btu/hr ft^2)	NFPA 59A (standards for the production facility)

TABLE 4.2-2

NATIONAL EMISSION STANDARDS

Parameter	Standard	Note
Combustion turbine/ Natural Gas		
Particulate matter, PM_{10}	-	
SO_2	-	
NO_X	100 mg/Nm^3	For natural gas (all turbine types; unit >50 MW)
Reciprocation engine/ Natural Gas		
Particulate matter, PM_{10}	-	
SO_2	-	
NO_X	200 mg/Nm^3	

Source: National Environmental Quality (Emission) Guidelines, Myanmar, 25 December, 2015.

TABLE 4.2-3

NATIONAL EFFLUENT STANDARDS

Subjects	Parameters	Maximum Concentration
Effluent Quality (Thermal Power)	Arsenic	0.5 mg/l
	Cadmium	0.1 mg/l
	Chromium (total)	0.5 mg/l
	Copper	0.5 mg/l
	Iron	1 mg/l
	Lead	0.5 mg/l
	Mercury	0.005 mg/l
	Oil and grease	10 mg/l
	pH	6-9 S.U.[a]
	Temperature increase	<3° C[b]
	Total residual chlorine	0.2 mg/l
	Total suspended solids	50 mg/l
	Zinc	1 mg/l
Site Runoff and Wastewater Discharges (Construction Phase)	Biological Oxygen Demand	30 mg/l
	Chemical Oxygen Demand	125 mg/l
	Oil and grease	10 mg/l
	pH	6-9
	Total coliform bacteria	400 cell/100 ml
	Total nitrogen	10 mg/l
	Total phosphorus	2 mg/l
	Total suspended solids	50 mg/l

Note: [a] Standard unit

[b] Temperature increase due to discharge of once-through cooling water

Source: National Environmental Quality (Emission) Guidelines. Myanmar, 25 December, 2015.

CHAPTER 5

SUMMARY OF IMPACTS AND MITIGATION MEASURES

CHAPTER 5
SUMMARY OF IMPACTS AND MITIGATION MEASURES

5.1 PROJECT DESCRIPTION

The Project will involve physical development in the energy sector, power or electricity generation subsector.

The Project will have a net generation capacity of 420 MW, and occupy a land area of about 37.19 acres or 150,500 m^2. The Project will construct a natural gas-fired power plant and associated facilities to supply electricity to industrial consumers in the industrial estate, to be developed in in Dawei Special Economic Zone (DSEZ). Project facilities to be constructed are: (i) a 420-MW (net) combination of gas engine power plant and combined cycle power plant using natural gas as primary fuel; (ii) an once-through cooling water system using sea water as coolant; (iii) a switchyard; (iv) a short access road connecting the power plant site with the existing road in DSEZ; (v) a gas-regulating station; (vi) office and control buildings; and (vii) utility systems inside the power plant premise.

Salient information on the project facilities and infrastructure are summarized in ***Table 5.1-1***. The layout of project facilities is presented in ***Figure 5.1-1***.

TABLE 5.1-1

SUMMARY OF PROJECT FACILITIES

Facilities	Key Information
Site access	Length 550 m and width 110 m consisting of a two-lane access road of asphaltic surface and vacant area
Gas regulating station	Equipped with gas pressure reducer, flare system, and control system
Gas pressure booster	Equipped with gas compressor, gas filter, and control system
Gas engines	Nine units of gas engine
Gas turbines	Five units of combustion gas turbine. Each unit to be equipped with dry low NO_x burners to minimize NO_x emission and its auxiliary systems
Heat recovery steam generators (HRSG)	Five units, one for each combustion gas turbine
Steam turbines	Three unit of steam turbine. Each unit is equipped with surface condenser, main steam stop and control valves with associated bypass and attemperator, emergency load rejection, control system and its auxiliary system.
Cooling water system	– Once-through seawater cooling system, capacity 675,210 m^3/day, using sea water as coolant – Intake pipe inner diameter 2.2 m, 2.3 km long – Intake pump and structure – Outfall pipe inner diameter 2.2 m, 1.7 km long, to be partially laid on the sea bed and tunneled toward inland
Switchyard	Air insulated switchyard with total 14 bays for 115 kV transmission
Water treatment plant	Seawater reverse osmosis, capacity 75.5 m^3/hr
Demineralization plant	Reverse osmosis plus electro-deionization, capacity 31 m^3/hr
Gas turbine stack	– Individual stack for each gas turbine – Main: Diameter 3 m and height 35 m. – HRSG by-pass, Diameter 3 m and height 30 m.
Gas engine stack	Common stack but separate flue for multiple gas engines, equivalent diameter 3 m and height 30 m.

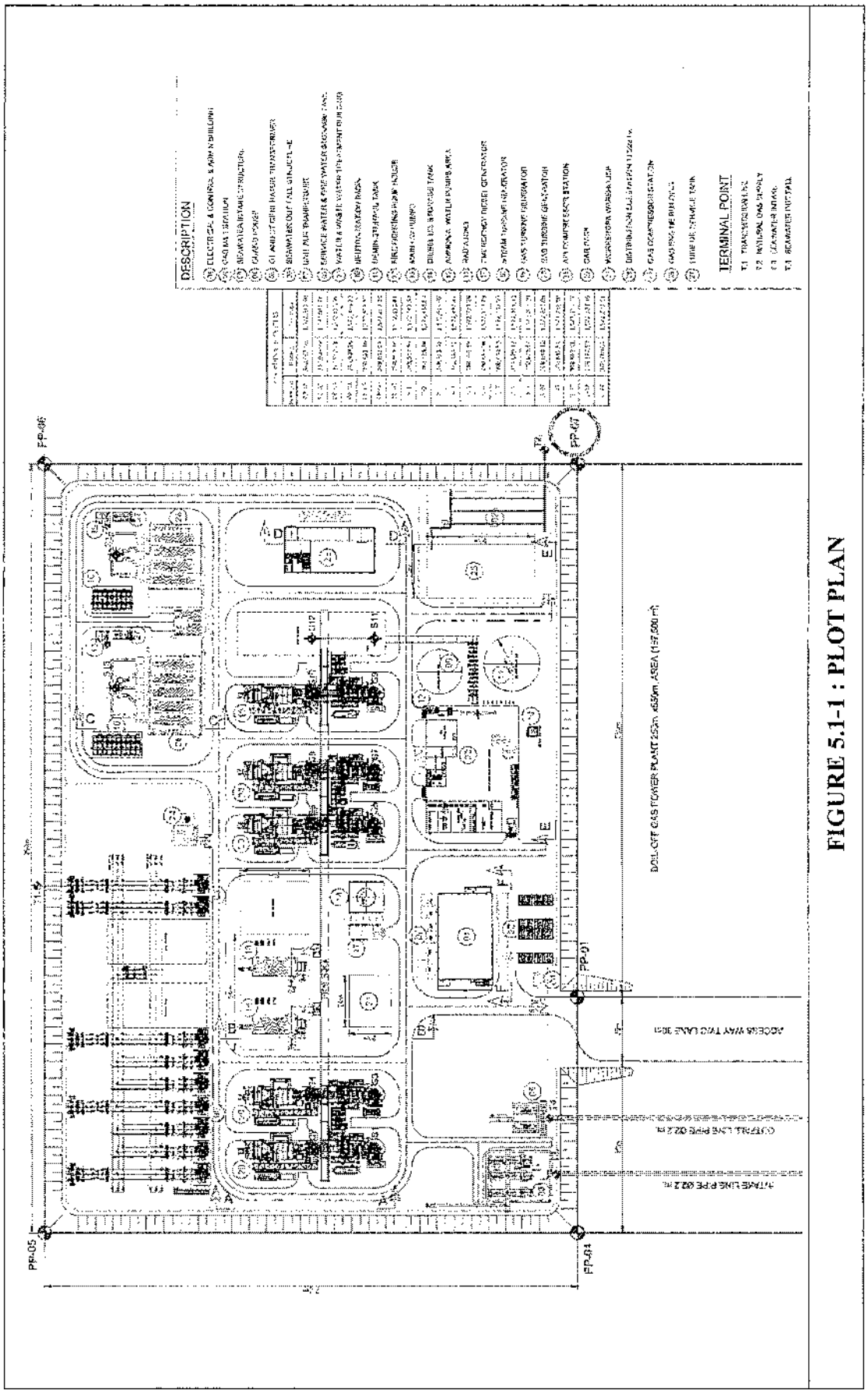


FIGURE 5.1-1 : PLOT PLAN

5.2 IMPACTS DURING PRE-CONSTRUCTION AND MITIGATION MEASURES

Major project activities during the pre-construction phase will be land acquisition, clearing of vegetation cover, excavation, filling and compaction. These activities are to prepare the site ready for construction of the power plant and its associated facilities. The identified environmental disturbances and mitigation measures during pre-construction phase will include (i) biomass waste; (ii) air quality; (iii) noise; (iv) road traffic; (v) archaeological site; (vi) loss of Britney Creek; and (vii) occupational health and safety. ***Table 5.2-1*** present brief information on the impacts and mitigation measures of pre-construction phase. However the Contractor will use this mitigation measures as the basis to prepare the Contractor's final detailed designs and pre-construction plan and schedule under the supervision of the Project Proponent.

5.3 IMPACTS DURING CONSTRUCTION AND MITIGATION MEASURES

Major project activities during the construction phase will be transport of construction materials and process equipment, construction of concrete foundation and structure, and erection and installation of gas engine, stream turbines, cooling water system, and process instrument, etc. The main environmental issues are (i) air quality; (ii) noise; (iii) seawater quality and marine resources; (iv) wastewater; (v) construction wastes; (vi) road traffic; (vii) archaeological site; (viii) social management and CSR Program; (ix) occupational health and safety. ***Table 5.3-1*** present brief information on the impacts and mitigation measures of construction phase. The mitigation measures are well-established conventional measures.

The activities of this phase is closely connected and overlap with pre-construction phase, details of mitigation measures and monitoring activities are presented in individual management plans which combine these two phase together, under the Construction EMP (CEMP), ***Appendix 6A***.

The Contractor will use this CEMP as the basis to prepare the detailed Contractor CEMP based on the Contractor's final designs, and construction plan, methods, and schedule. The scope and content of the Contractor CEMP will not be less than the scope and content of this CEMP. The Contractor CEMP shall be contractually binding. During the pre-construction and construction, the Contractor will implement the Contractor CEMP under the supervision of the Project Manager to be appointed by the Project Proponent.

5.4 IMPACTS DURING OPERATION AND MITIGATION MEASURES

During operation of the power plant, gaseous emission, affected on marine ecology will be the key environmental impacts which will related to social impacts. The mitigation measures will include: (i) air quality; (ii) noise; (iii) wastewater, (iv) marine resources; (v) seawater quality; (vi) occupational health and safety; (vii) CSR program; and (viii) mangrove management program. ***Table 5.4-1*** presents brief information on the impacts and mitigation measures. Details are presented in individual management plans under the Operation EMP (OEMP), ***Appendix 7A***.

However the Contractor will be responsible for the design, supply, installation, testing, and commissioning of the power plant and its associated facilities, the Contractor will use this OEMP presented in this Document as the basis for preparing the detailed Contractor OEMP based on the actual construction, results of plan commissioning and final operational procedures. The Power Plant Management Team to be established by the Project Proponent will review and revise the Contractor OEMP as appropriate to prepare the Power Plant OEMP for implementation in the operational phase.

5.5 IMPACTS DURING DECOMMISSIONING AND MITIGATION MEASURES

The decommissioning of the Project will be carried out at the end of power plant's useful life if the Power Plant Company decides that its retrofitting will be uneconomical. At that time, the demolition and removal of the power plant and its facilities would require and EIA and an EMP. As the power plant, legal framework, technologies, and environmental and socioeconomic settings of the project area could significantly change over the working life of the power plant, the DEMP prepared at this EIA stage will not be applicable and will be replaced by the new DEMP based on the new EIA. Therefore, the DEMP is invariably conceptual in nature as its details would not serve any practical purposes.

During plant commissioning, key impacts will be related to health and safety of workers and the public, and waste contamination. The mitigation measures will include: (i) air quality; (ii) noise; (iii) decommissioning waste; (iv) road traffic; (v) occupational health and safety; and (vi) social management. ***Table 5.5-1*** presents brief information on the impacts and mitigation measures. Details are presented in individual management plans as shown in ***Appendix 7B.***

TABLE 5.2-1
IMPACTS DURING PRE-CONSTRUCTION PHASE AND MITIGATION MEASURES

Environmental and Social Issue	Impacts	Mitigation Measures
Biomass Waste	Loss of vegetation cover and habitat of wildlife	• The contractor will first conduct a detailed biomass survey of the 37.19 acres construction site to delineate vegetated areas and classified according to tree species, age, crown closure, height and site quality characteristics. The survey results will be used to prepare estimates of volumes of various categories of biomass broken down into: (i) biomass that could be used for economic purposes; (ii) biomass that would have no economic use and would have to be disposed. The estimates should categorize usable biomass based on sizes and potential uses. • The contractor will prepare a biomass removal plan based on the results of surveys that will meet the objectives of biomass waste management. The plan will need to cover: (i) schedule of clearing clearly indicated on the site map; (ii) clearing method; (iii) proposed use of timbers and woods or merchantable biomass; (iv) involvement of local villagers for their use of biomass; and (v) proposed method of disposal of debris and soft vegetation wastes. • The harvesting / biomass removal approach will take into consideration the physical and environmental factors of the site. • Arrangements should be made to enable local villagers to harvest woods for timber or charcoal making before the site clearing operation. Alternatively, the vegetation wastes should be separated into usable timber and woods, and small boughs, twig, and leaves that will need to be disposed. The separated timbers and woods could be sold or given to villagers. The unusable wastes will be disposed off in a landfill site to be selected by the contractor with approval of the concerned authority. • Alternatively, chipping and mulching of unusable vegetation wastes should be carried out. The mulched materials could be later used for landscaping purposes. • The recommended clearance method for the Project is manual cutting (as opposed to mechanical clearing via bulldozer). Chemical defoliants will not be used. Manual clearing (i.e. chainsaw, pruning shears, etc.) will reduce soil disturbance and subsequent sediment transport, leave rooting structures in place as erosion control, and will create social benefit if local residents are engaged to undertake clearance activities. • If clear felling is undertaken, harvesting must be undertaken manually, and the herbaceous / shrub layer should be left behind for moderately steep slopes to minimize erosion. • Areas with steep slopes of greater than 30 degrees will not be logged or cleared for safety and environmental reasons (i.e. slope stability, prevention of erosion and sediment transport into the sea. • Areas designated for landfill or composting are to be clearly indicated in the biomass removal plan.

TABLE 5.2-1
IMPACTS DURING PRE-CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Biomass Waste (Cont'd)		• Open burning of debris and biomass residues will need permission of the Owner Project Manager. If burning is necessary, burning in clear felled areas will be restricted to pile-and-burn techniques, with no broadcast burns conducted to minimize erosion potential. • Cutting and stockpiling at a designated area within the construction site is recommended. Provisions must be made to minimize fire risk of the stockpiles. • After felling of commercial timber, local residents will be given a limited time period to extract non-timber forest products and lesser value biomass from the priority biomass removal areas. Lesser value biomass can be used for building materials, firewood, charcoal / biochar production and other recycle products. • Biomass that needs to be disposed will be mechanically reduced in sizes or shredded into small chips to facilitate disposal by landfill or composting.
Air Quality	Increase in air pollutants caused by fugitive dust from site excavation, site filling, compacting and emission from operation of trucks.	• Spray water at and around the construction areas and access roads during site preparation and grading. • Enforce a speed limit for vehicles and trucks in the construction sites not to exceed 40 km/h. • Construction activities shall be kept as planned so that the disturbed areas will be minimized at any time. • Enforce speed limit for trucks not to exceed 40 km/h when passing the communities. • Cover construction materials with canvas or equivalent during transportation, materials should be dampened, if necessary, before transportation. • Restore, resurface, and rehabilitate the disturbed areas as soon as practicable after completion of construction or disturbance. • Prohibit open burning of waste in the construction area. • Establish a vehicle washing facilities to minimize the quantity of material deposited on the roads. • Establish a checkpoint at project gate to ensure the vehicles leaving the project site are following the measures prescribed to reduce dust emissions. • Adopt procedures to avoid construction vehicles idling for excessive periods (e.g. more than 5 minutes) if required to queue to enter the construction sites. • Maintain all equipment and vehicles in proper working conditions according to the manufacturer's specifications. The engines of construction equipment fleet must be routinely maintained by qualified mechanics to ensure their proper conditions during operations. • Take measure to avoid congestion of trucks in areas near communities along the transport routes. A good traffic management plan will be required. • Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).

TABLE 5.2-1
IMPACTS DURING PRE-CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Noise	Increase ambient noise level at the pre-construction site and communities near the material transport routes.	• The noise reduction at the perimeter could be achieved using temporary metal sheet fence at least 3 m high with adequate length to block the noise emanating to the receptor. • Provide ear plugs or ear muffs to workers operating in the excessive noise areas. • Major construction activities which generate loud noise should be limited to only during the day time. Activities that are necessary to be carried out at nighttime will need approval of the site engineers, and will need to have adequate noise control equipment or measures. • Speeds of vehicles in the construction site will not be more than 40 km/h. • Noise performance requirements of construction equipment will need to be clearly stated in contract specifications. • The EPC contractor will be required to regularly monitor ambient noise levels at the receptors, particularly during the noise generation period such as piling. • The construction environmental management plan will need to include an efficient complaints redress procedure and an efficient corrective action procedure to address the noncompliance of noise performance.
Road Traffic	• Traffic loads will be increased on existing roads within the study area, small port coastal road and Nga Pitat road, the access road to the power plant construction site. • The pre-construction phase would be congestion of local roads and increase risk of accidents	**Truck routes and construction site access** • In consultation with the concerned authorities at the national, regional, and township levels, develop and implement a Construction Traffic Management Plan to address the following issues: - Use of established truck routes and arterial roads for the haulage of construction materials and spoil. - Where practicable, provide direct access from worksites to arterial roads to minimize truck traffic in local streets. - Avoid haulage tasks during peak traffic periods as far as practicable. Where haulage in peak periods is unavoidable, such activities are to be managed in accordance with specific traffic management sub-plans provided to the relevant agencies in advance. - Control heavy vehicle movements on small port coastal road to avoid interference with major events, if any. - Investigate the capacity of intersections on haulage routes to minimize impact on intersection operations by heavy vehicles servicing the construction worksites. - Prepare and implement a comprehensive construction traffic management plan to control truck movements to avoid, or mitigate and manage the impacts of heavy vehicle traffic on the road network. - Exceptional circumstances would arise when no suitable alternative routes are available for specific construction tasks.

TABLE 5.2-1
IMPACTS DURING PRE-CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Road Traffic (Cont'd)		• Measures to manage the operation of the construction truck fleet for incorporation into a Construction Vehicle Management sub-plan to include: - Monitoring of truck position, speed, route and performance in relation of traffic conditions and schedule requirements. - Management of truck speed and position to avoid queuing on the approaches to the spoil handling and loading facilities. - Management of traffic signals on nominated spoil haulage routes in night-time hours to achieve optimum performance of the truck fleet and to minimize impacts on communities along the routes. - Maintain all vehicles transporting material to and from the construction sites to a high standard (ADR28/01) with regards noise emissions, exhaust emissions, traffic safety and operational safety. - Ensure all vehicles leaving a construction site pass over or through devices designed and maintained to remove soil and other materials. **Construction Traffic Hazards** • Heavy trailer trucks transporting heavy and large plant equipment will have to be directed by a traffic police car or by other vehicle specially designated to handle a guidance of this kind of transportation. • Post warning signs along the right of way where the transmission line construction takes place. **Local Traffic** • Implement management measures to avoid, or minimize increase in traffic caused by the project works in local streets as practicable. • Notify the local community about proposed changes to local traffic access arising from construction activities, and provide clear signage of changed traffic conditions and take other measures to ensure safe traffic movement. • Prepare and implement an employee parking policy for the construction worksites to manage the impacts on car parking in the vicinity of worksites and help avoid project parking in local streets. **Traffic Management at the Intersection of Small Port Coastal Road and Nga Pitat Road** • Provide a traffic police or relevant officer to control traffic at the intersection during the transport period.

TABLE 5.2-1
IMPACTS DURING PRE-CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Road Traffic (Cont'd)		**Pedestrians and Cyclists** • Maintain safe pedestrian and cycle access near construction works (particularly for elderly and children), including to community facilities, such as schools, monastery, open space, and particularly. • Notify the local community, and in particular, local schools, about changes to pedestrian and cycle access during construction near construction works. • Provide traffic controls designed for the safe movement of pedestrians and cyclists near the worksites.
Archaeological Site	The site clearing and excavation works may have some impact on artifacts which potentially could have archaeological and culture value.	• Site supervisor/foreman shall order construction workers to stop immediately the construction activities in the area of the chance find. • Inform concerned authority (Fine Arts Department), including head of village and township, for proper management if historic or archaeological is found. • Delineate and mark clearly the discovered site or area and prohibit physical activities in the area without prior approval of the concerned authority. • Install temporary site protection measures (warning tape and stakes, avoiding signs). • Strictly enforce any no-go area needed to protect the site. • Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible local authorities and the responsible Ministry take over. • If it is necessary to relocate a cemetery and grave yard, cultural ceremony should be arranged prior to the relocation.
Loss of Britney Creek	Loss of villager's navigation	• MIE will develop alternative dockyard/boatyard at Chi Oo Creek area. The alternative dockyard/boatyard will be of similar kind or quality to the existing dockyard/boatyard at Britney Creek. • MIE will dredge Chi Oo Creek and upgrade the route to the dockyard/boatyard. • MIE will organize public hearing and clarification for villagers and ship owners who are potentially affected.
Occupational Health and Safety	Pre-construction activities may have some impacts on worker health, safety and security.	• The Contractor will prepare an OHS management plan and implementation procedures specific to this Project and in line with its corporate OHS policy and procedures. • The Contractor will conduct necessary orientation and training to all construction personnel to ensure that the pre-construction personnel clearly understand the OHS plan and implementation procedures. • The OHS management plan and implementation procedures will cover but not limited to the following subjects:

TABLE 5.2-1
IMPACTS DURING PRE-CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Occupational Health and Safety (Cont'd)		- Organization and responsibilities of OHS management - Training plan - Communication plan - Contractor responsibilities - Job-specific work requirements - Compliance monitoring and evaluation plan - Audit plan - Reporting system - Documentation system • Develop and implement safety measures for the pre-construction works including treatment strategies that address, accidents, communications, access for emergency services, response coordination and management. • Develop emergency response procedures, and implement in the event of accidents and emergencies. • Provide first aid for the duration of the pre-construction phase.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES

Environmental and Social Issue	Impacts	Mitigation Measures

Air Quality	Increases in air pollutants caused by fugitive dust from site excavation, site filling, compacting and emissions from operation of trucks and heavy construction equipment.	**Fugitive Dust Control**
		• For construction site including spoil placement sites:
		  - Use watering or other effective techniques on unsealed areas to minimize wheel generated or wind-generated dust
		  - As soon as the land becomes available, engage in the progressive rehabilitation of construction sites and spoil placement sites with landscaping
		• Take measures (e.g. rumble bars and wheel wash bays) to ensure dust-creating material (earth or similar material) is not transported from the construction sites to roads or other areas in the public domain.
		• Ensure all trucks carrying spoil or other loose material are covered, and if necessary, treated (e.g. mist sprays) prior to leaving the construction sites.
		• Ensure all loose earth and similar material spilled or otherwise deposited within the construction sites and the transport routes is cleared and removed from trafficked areas as soon as practicable.
		• At the construction sites and spoil placement sites, monitor meteorological conditions, particularly wind speed and direction and where necessary take measures to avoid impacts of dust on adjacent properties. Such measures may include:
		  - Modification of construction methods
		  - Increase in dust suppression measures
		  - Cessation of work when no other reasonable or practical measure is available
		• Spray water at and around the construction areas and access roads.
		• Enforce a speed limit for vehicles and trucks in the construction site not to exceed 40 km/h. Construction activities shall be kept as planned so that the disturbed areas will be minimized at any time.
		• Enforce a speed limit for trucks not to exceed 40 km/h when passing the communities.
		• Restore, resurface, and rehabilitate the disturbed areas as soon as practicable after completion of construction or disturbance.
		• Prohibit open burning of waste in the construction area.
		• Cover construction material with canvas or equivalent during transportation, materials should be dampened, if necessary, before transportation.
		• Establish a vehicle washing facilities to minimize the quantity of material deposition on public roads.
		• Establish a check point at project gate to ensure the vehicles leaving the project site are following the measures prescribed to reduce dust emissions.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Air Quality (Cont'd)		**Diesel Exhaust Emissions** • Take measures to manage the movement of construction vehicles entering and leaving the construction sites to avoid, or mitigate and manage the potential for vehicle emissions impacting on adjacent properties, except where such residential or sensitive activities in front an arterial road to be used for access to or from the construction site. Measures for construction fleet management are to be provided in the construction vehicle management plan and the construction traffic management plan. Such measures may include avoiding or minimizing queuing on streets approaching the worksites or adjacent to other sensitive activities. • Adopt procedures to avoid construction vehicles idling for excessive periods (e.g. more than 5 minutes) if required to queue to enter the construction sites. • For stationary plant and equipment powered by diesel motors, take measures to avoid or mitigate and manage the potential impacts of exhaust emissions on adjacent residential or other sensitive activities. For example, ensure all construction vehicles and stationary plant and equipment powered by diesel motors are fitted with emission control measures, and are regularly maintained to manufacturers' specifications. • Maintain all construction equipment in proper working conditions according to the manufacturer's specifications. The engines of the construction equipment fleet must be routinely maintained by qualified mechanics to ensure their proper conditions during operations. • Provide adequate training to the equipment operators in the proper use of equipment. • Use the proper site of equipment for the job. • Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines). • Encourage and provide carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes. • Take measures to avoid congestion of trucks in areas near communities along the transport routes. A good traffic management plan will be required.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Noise	Increase ambient noise level and vibration at the construction site and communities near the material transport routes.	**Design** • The Contract will require the Contractor and his sub-contractors to use construction equipment that generate low level of noise. The Contractor will present alternative construction equipment to demonstrate that the selected equipment adopts best available technologies to minimize noise level. • Before commencing the construction, the Contractor will conduct a noise survey covering the identified sensitive receptors to update the existing baseline data in the Final EIA Report. The noise survey will be manually conducted using a sound level meter following Noise Standard stated on Environmental, Health, and Safety Guidelines for Thermal Power Plant: Noise of International Finance Corporation (December 19, 2008). • Demonstrate through predictive modelling of the proposed construction techniques and monitoring ambient noise readings prior to construction to establish pre-disturbance levels, the likely noise level due to construction works throughout the construction period. • The noise reduction at the perimeter could be achieved using temporary metal sheet fence at least 3 m high with adequate length to block the noise emanating to the receptor. **Construction Noise** • The Contractor will be allowed to carry out construction works, which generate excessive noise level, only during the period between 6.30 a.m. to 6.30 p.m. Mondays to Saturdays. Such construction works on Sundays or public holidays will need approval from the Resident Engineer of the Project Proponent. • For construction works beyond standard construction hours, the Contractor shall take reasonable and practical measures to protect the affected sensitive receptors. For example, acoustic screens or noise barriers would be required. • Reasonable and practicable measures to achieve the construction noise targets may include, for example: - Commence advanced notification of works and undertake on-going consultation with potentially affected property owners and occupants - Establishing temporary noise barriers between construction worksites and sensitive receptors (e.g. residential, schools, community facilities) - Fitting noise-reduction measures to all plant and equipment engaged in the construction works - Designing worksites to minimize potential noise impacts on nearby sensitive places - With the consent of owners and occupants of potentially-affected premises, undertake mitigation actions such as temporary modifications to nearby buildings, temporary relocation during construction or other measures to achieve reasonable environmental conditions

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Noise (Cont'd)		• For the power plant construction site, the duration of construction works with excessive noise will be 68 month in total for all phases. The Contractor will undertake predictive modelling of potential construction noise impacts based on the proposed construction methods, the proximity of sensitive places, and the applicable standards. • Major construction activities which generated loud noise should be limited to only during the day time. Activities that are necessary to be carried out at night time will need approval of the site engineers, and will need to have adequate noise control equipment or measures. • Where construction noise impacts are predicted due to specific construction activities, reasonable and practicable mitigation and management measures must be adopted and notified in advance to potentially affected owners and occupants of adjacent properties. If such activities are to occur often during the construction works, a program for a regular, scheduled occurrence should be devised and implemented in consultation with the owners and occupants of nearby properties. • Potentially affected property owners and occupants are to be notified well in advance (7 days or more) as to the scale, extent and duration of construction works, as required by the consultation and communications program. • Provide ear plugs or ear muffs to worker operating in the excessive noise areas. • Speed of vehicles in the construction site will not be more than 40 km/h. • Noise performance requirements of construction equipment will need to be clearly stated in contract specifications. • The EPC contractor will be required to regularly monitor ambient noise levels at the receptors, particularly during the noise generation period such as piling. • The construction environmental management plan will need to include an efficient complaints redress procedure and an efficient corrective action procedure to address the noncompliance of noise performance.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Seawater Quality and Marine Resources	• Increased turbidity of seawater due to pipe laying and sea bed trenching or excavation. • The increase in turbidity will affect marine organisms such as plankton, benthic organisms and fish at the area related to pipe laying.	The EPC Contractor will be required to implement best management practices in reducing the impacts on seawater quality caused by pipe laying and sea bed trenching or excavation.
Wastewater	Wastewater generate from domestic sewage, wash water in construction site and surface runoff	• **Storm Water/Surface Runoff** - To prevent contamination of the surface runoff, potential contamination sources will be covered with roof. The surface runoff would contain only suspended solids washed out from the open area. - Construct a temporary drainage system to collect the surfaced runoff from the construction area to avoid the discharge of surface runoff directly into the open sea. - A drainage system will be constructed to collect and drain the storm water or surface runoff directly into the sea. To prevent contamination of storm water, potential contamination sources will be covered with roof. The storm water would contain solids washed out from unpaved surface. - The collected storm water will be drained into a retention pond for removal of suspended solids before discharging into the sea. After the construction, the retention pond will be used for wastewater management during the operation phase. - Establish temporary fence surrounded in order to limit the distribution of sediment washed from construction area. • **Domestic Wastewater** - Toilet wastes will be separated from grey water or sullage. - Kitchen and canteen wastewater will be discharged into oil and grease trap tank before draining into the retention pond. - Toilet wastes will be discharged into a septic tank (or more than one septic tanks) with a hydraulic retention time of about 5 days. The volume of toilet wastes is estimated at about 20% of the total volume of domestic wastewater, or about 7.6 m^3/d. The septic tank effluent will be discharged into the retention pond. Alternatively, toilet wastes will be treated in a package treatment plant using anaerobic process. - Grey water will be discharged into the retention pond. - The retention pond will be designed as an oxidation pond.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Wastewater (Cont'd)		• **Wash Water** - The concrete wash water and the wheel wash water will be discharged into a concrete settling basin. The effluent will be treated to adjust the pH, if necessary, and reused. The remaining effluent will be discharged into the retention pond. • **Construction Wastewater** - Construction wastewater will be mainly wash water. It may contain oil and grease and chemicals. The wash water that contains oil will be treated in a simple oil removal tank before combining with wash water from other sources. The wash water will be discharged into the retention pond. - Water in the retention pond will be used for dust suppression on unpaved areas in the construction site, and also for watering of the green area. - The remaining volume will be discharged through a sewer pipe into the sea.
Construction Waste	Waste generated from construction activities and workers	• Design for reuse and recovery: Design for reuse of material components and/or entire buildings have considerable potential to reduce the environmental burdens from construction. Much of this is common sense as, with reuse, the effective life of the materials is extended and thus annualized burdens are spread over a greater number of years. Reuse, in the waste hierarchy is generally preferable to recycling, where additional processes are involved, some of which will have their own environmental burdens. Design for off-site construction: The benefits of off-site factory production in the construction industry are well documented and include the potential to considerably reduce waste especially when factory manufactured elements and components are used extensively. Its application also has the potential to significantly change operations on site, reducing the amount of trades and site activities and changing the construction process into one of a rapid assembly of parts that can yield many benefits including: Off-site construction is one of a group of approaches to more efficient construction sometimes called Modern Methods of Construction (MMC) that also include prefabrication and improved supply chain management. Technologies used for off-site manufacture and prefabrication include light gauge steel framing systems and modular and volumetric forms of construction which offer great potential for improvements to the efficiency and effectiveness of construction. To assess the suitability of off-site construction, design teams should consider the following questions: – Can the design or any part of the design be manufactured off site? – Can site activities become a process of assembly rather than construction?

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Construction Waste (Cont'd)		• Design for materials optimization: Good practice in this context means adopting a design approach that focuses on materials resource efficiency so that less material is used in the design, i.e. lean design, and/or less waste is produced in the construction process, without compromising the design concept. Three main areas offer significant potential for waste reduction. They are: – Minimization of excavation – Simplification and standardization of materials and component choices – Dimensional coordination • Design for waste efficient procurement: Designers have considerable influence on the construction process itself, both through specification as well as setting contractual targets, prior to the formal appointment of a contractor/constructor. Designers need to consider how work sequences affect the generation of construction waste and work with the contractor and other specialist subcontractors to understand and minimize these. Once work sequences that cause site waste are identified and understood, they can often be 'designed out'. • Design for deconstruction and flexibility: Designers need to consider how materials can be recovered effectively during the life of the building when maintenance and refurbishment is undertaken or when the building comes to the end of its life. • An efficient construction waste management system should be established and implemented. Construction waste will need to be classified and sorted out at source for disposal. The disposal methods will depend on the types of wastes: direct reuse in the construction, sale and recycling of materials, landfilling for inert materials and specific treatment method for each type of hazardous materials. • The Contractor will design and implement a waste segregation system and procedure and communicate it to all construction personnel to strictly adhere to the segregation procedure. • An appropriate number of containers with adequate volume and appropriate materials will be provided at strategic locations to support the segregation. Each waste category will be segregated into recycling, reuse and disposal sub-categories. • Daily collection and transport will be organized and carried out for each sub-category of segregated wastes. • A roofed storage area with adequate space will be provided for storing the segregated wastes waiting for the on-site or off-site reuse or recycling. • The storage area for hazardous waste will need to be specially designed to prevent spills or leaks onto the soil. • Reuse of excavated material as fill at approved fill sites.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Construction Waste (Cont'd)		• Collection and return of packaging materials (e.g. pallets) to suppliers wherever practicable. • Use of recycled materials to the limits of design in concrete, road base, asphalt and other construction materials. • Remove any contamination inadvertently deposited in recyclable waste material containers. Provide cleanup of excessive contamination at recycling vendor locations when such contamination is not controlled at the project site. • Collection and recycling of used oils by a licensed contractor. • Collection by a licensed contractor of empty oil and fuel drums and other containers for return to recycling facilities. • If applicable, collection and recycling of used oils by a licensed contractor. • If applicable, collection by a licensed contractor of empty oil and fuel drums and other containers for return to recycling facilities. • Disposal of the remaining wastes that are unable to be reused or recycled in the approved landfill site(s). • Preferably, inert wastes such as broken tiles, bricks, plastics should be used for filling the site in areas planned to be vacant space. • Haphazard disposal of construction waste in or off the construction site will be prohibited. • Provide adequate number of refuse bins or containers with tight covers, daily collection of disposal. • No burning of wastes will be allowed. • Non-construction wastes will be contracted to the existing municipal services, if possible. If not, they will need to be disposed off in a small sanitary landfill to be located within the power plant site in designated green areas. • Decomposable wastes such as food wastes and vegetation may be disposed off by composting. • A Hazardous Waste Management System covering waste classification, separation, collection, storage, transfer and disposal should be set up and operated. The waste management system will comply with applicable regulation of the government, if any. • Hazardous wastes will be handled by a licensed hazardous waste contractor. If this service is not available, the Contractor will need to find safe permanent storage, or other appropriate methods of disposal.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Construction Waste (Cont'd)		• Tracking collections of waste materials at the sites and deliveries to recycling, reuse, salvage, and landfill facilities. • Maintaining on-site logs that include for each load of materials removed from the site: type of material, load weight, recycling/hauling service, and date accepted by recycling service or landfill. • Accessibility to the EHS Manager of the Project Proponent for verification of construction waste recycling. Legible copies of on-site logs, manifests, weight tickets, and receipts. Manifests shall be from recycling and disposal site operators that can legally accept the materials for the purpose of recycling, reuse, salvage, or disposal.
Road Traffic	• Traffic loads will be increased on existing roads within the study area, small port coastal road and Nga Pitat road, the access road to the power plant construction site. • The construction phase would be congestion of local roads and increase risk of accidents.	**Truck Routes and Construction Site Access** • In consultation with the concerned authorities at the regional, and township levels, develop and implement a Construction Traffic Management Plan to address the following issues: - Avoid haulage tasks during peak traffic periods as far as practicable. Where haulage in peak periods is unavoidable, such activities are to be managed in accordance with specific traffic management sub-plans provided to the relevant agencies in advance. - Control heavy vehicle movements on project related road to avoid interference with major events, if any. - Investigate the capacity of intersections on haulage routes to minimize impact on intersection operations by heavy vehicles servicing the construction worksites. - Prepare and implement a comprehensive construction traffic management plan to control truck movements to avoid, or mitigate and manage the impacts of heavy vehicle traffic on the road network. • Measures to manage the operation of the construction truck fleet for incorporation into a Construction Vehicle management sub-plan to include: - Monitoring of truck position, speed, route and performance in relation of traffic conditions and schedule requirements. - Management of truck speed and position to avoid queuing on the approaches to the spoil handling and loading facilities. - Management of traffic signals on nominated spoil haulage along the routes. - Maintain all vehicles transporting material to and from the construction sites to a high standard (ADR28/01) with regards noise emissions, exhaust emissions, traffic safety and operational safety. - Ensure all vehicles leaving a construction site pass over or through devices designed and maintained to remove soil and other materials.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Road Traffic (Cont'd)		**Construction Traffic Hazards** • Heavy trailer trucks transporting heavy and large plant equipment will have to be directed by a traffic police car. **Local Traffic** • Implement management measures to avoid, or minimize increase in traffic caused by the project works in local streets as practicable. • Notify the local community about proposed changes to local traffic access arising from construction activities, and provide clear signage of changed traffic conditions and take other measures to ensure safe traffic movement. • Prepare and implement an employee parking policy for the construction worksites. **Traffic Management at the Intersection of Small Port Coastal Road and Nga Pitat Road** • Provide a traffic police or relevant officer to control traffic at the intersection during the transport period. **Pedestrians and Cyclists** • Maintain safe pedestrian and cycle access near construction works (particularly for elderly and children), including to community facilities, such as schools, monastery, open space and particularly. • Notify the local community, and in particular, local schools, about changes to pedestrian and cycle access during construction near construction works. • Provide traffic controls designed for the safe movement of cyclists near the worksites.
Archaeological Site	The site clearing and excavation works may have some impact on artifacts which potentially could have archaeological and culture value.	• Site supervisor/foreman shall order construction workers to stop immediately the construction activities in the area of the chance find. • Inform concerned authority (Fine Arts Department), including head of village and township, for proper management if historic or archaeological is found. • Delineate and mark clearly the discovered site or area and prohibit physical activities in the area without prior approval of the concerned authority. • Install temporary site protection measures (warning tape and stakes, avoiding signs). • Strictly enforce any no-go area needed to protect the site. • Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible local authorities and the responsible Ministry take over. • If it is necessary to relocate a cemetery and grave yard, cultural ceremony should be arranged prior to the relocation.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Social Management and CSR Program	**Positive Impacts** • Employment opportunities for the locals and cash flow into the village economy through project spending and employment of the locals. **Negative Impacts** • Exposure of the affected communities to new social norms, value, traditions, practices, and new economic brought by an influx of external workers and cash inflow, • Loss of Britney Creek will obstruct Nga Pitat villagers to their dockyard. • Pipe laying would cause inconvenient of navigation and fishing along the coast. • Loss of some mangrove forest area which is a main protein and income sources of source of Nga Pitat villagers.	**Measures to Enhance Local Economy** • Priority should be given to hiring local people, especially residents of the villages close to the construction site; e.g. Nga Pitat, Nyaung Bin Seik and Mudu (including Ka Myaing swea). • The recruitment process should be fair and transparent and wage rates will need to be commensurate with experiences and qualifications. • Employment terms and conditions will need to comply with the requirements in the national labor law, the social security law and standard wage rate, and other applicable laws and regulations. • Skill training should be provided to local people to be employed in the project construction. • The Project Proponent and the Contractor will contact the Labour Directorate and prepare training program for employees with reference to the laws and regulation of Labour Directorate before commencement of the Project construction. **Measures to Mitigate Negative Impacts** <u>Toward the Influx of Workers</u> • The Contractor will inform villagers, especially Nga Pitat about the construction period and schedule. • Use the construction methods that could minimize the inconveniences to the affected people. <u>Security Risks</u> • All workers should be cleared with the local security authorities regarding criminal record before employment. • The EPC Contractor will be required to establish and implement a site security system and appropriate measures, including prevention of drug abuse. <u>Culture and Tradition</u> • Give priority to hiring local people. • All project personnel should be made aware of local cultures, traditions and norms. • A code of conduct should be put in place for workers to strictly observe when interacting with the locals, including restriction to movement outside of the campsite after designated time. • The Project Proponent should establish good relationship with the locals and actively support and participate in traditional and cultural events. <u>Stakeholders' Negative Attitudes toward the Project</u> • Establishment of a community participatory committee • Establishment of channel for public relation and information disclosure through several public channels such as local media, notice board, placement of leaflet, meeting, participation in local activities, visit the communities, and open house of the Project.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Social Management and CSR Program (Cont'd)		• Involvement in grievance redress to make appropriate response to complaints related to the Project impacts. • Establishment good relationship with communities by supporting communities' activities through its annual CSR program such as formal education, health care and sanitation, and religions and culture. • Support socio-economic development via priority given to local employment opportunity, occupation promotion and gender development. • Regular meeting with communities to foresee problems that would arise from the Project implementation, and build up mutual understandings in the area. • Reporting on results the project implementation, mitigation measures and monitoring to concerned authorities and communities. <u>Reducing Impacts from Loss of Britney Creek</u> • MIE will develop alternative dockyard nearby Nga Pitat villager and upgrade its accessible route. • Clearly demarcate the alignments of the intake and outfall pipes and construction schedule. • The Contractor will install pipelines within short period. <u>Minimizing Impacts on Mangrove Resources</u> • The Project Proponent will provide 30 hectares of mangrove area to implement a mangrove resource management program (MGRMP), aiming to ensure sustainable use of mangrove resource and minimizing coastal erosion. • As the MGRMP will be on implemented based on participatory approach, the Core Mangrove Management Group will be established to mobilize the local participation. • Local people, expertise and local authorities will involve in planning and implementing various activities, comprising: - Survey and zoning for preservation and utilization, - Seed and stock collection for mangrove propagation, - Reforestation of mangrove, - Formulate regulations for sustainable utilization. • The locals will be a major actors while the Project Proponent and officials of Department of Fisheries and Forestry will provide financial and technical support, respectively.

TABLE 5.3-1
IMPACTS DURING CONSTRUCTION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Occupational Health and Safety	The construction activities may have some impacts on worker health, safety and security.	• All recruited workers should receive health examinations for screening of major communicable diseases before employment. Subsequently, annual check-ups should be provided. • Symptoms of major communicable disease, if noted, should be immediately reported to the district medical officer for proper treatment. • Provide health awareness training to workers on hygiene and sanitation, communicable and infectious diseases. • The EPC Contractor should provide first-aid service and medical treatment for common illnesses. • Arrangements should be made with a hospital in Dawei for admitting the project personnel with serious medical cases. • Develop and implement safety measures for the construction works including treatment strategies that address fire and chemical hazard, communications, access for emergency services, response coordination and management. • Develop emergency response procedures, and implement in the event of accidents and emergencies. • Provide fire and life safety measures, including ventilation, smoke extraction and firefighting systems for the duration of the construction phase. • The implementation of the OHS plan will be integrated with construction supervision. • The Contractor will implement the OHS plan and procedures as part of its construction supervision. The Contractor's EHS Manager will monitor the OHS performance.

TABLE 5.4-1

IMPACTS DURING OPERATION PHASE AND MITIGATION MEASURES

Environmental and Social Issue	Impacts	Mitigation Measures
Air Quality	Increases gaseous emission from gas combustion.	• The gas turbine facility has been modelled and designed so as to ensure stack emission will meet prescribed technical specifications. • Low NOx burners will be used to minimize thermal NO_x emissions. • The Contractor and his supplier will complete the testing and tuning program on the turbines before operational handover to ensure efficient operation of plant. • Ensure that the power plant personnel will be suitably qualified for their assigned tasks. • The Contractor with support of the equipment suppliers shall provide appropriate training to plant operation personnel to enhance their competency in operation and control of turbines using low NOx burners. The Contractor will propose a training program for plant operators not later than three months before the commissioning, and conduct the training as part of the overall training in parallel with the commissioning. • Regular periodic review of air quality monitoring data (monthly) with comparison of monitoring data with that assumed and predicted in the documents listed under Condition of the Project Approval. • All equipment will be maintained according to Plant Operating Maintenance and Calibration Manuals, Procedures and Schedules. • Each of the exhaust stacks will be fitted with in-stack monitoring equipment linked to the Continuous Emission Monitoring System (CEMS) in order to measure NOx. • The gaseous emission control will be complied with IFC Environmental, Health, and Safety Guidelines Thermal Power Plant (2008) and National Environmental Quality (Emission) Guidelines (2015).
Noise	Increase ambient noise level from water intake, gas turbine/ generator, HRSG noise radiated form the enclosure and duct noise from the exhaust stack.	• To confirm that the power plant meets the specified noise criteria, the Contractor will ensure that the process equipment to be used will have minimum noise level at source. The Contractor will have minimum noise level at source. The Contractor will review the noise emission data and noise predictions during the detailed design phase, where actual plant specifications and characteristics were known. • Plant layout and siting of process equipment with consideration of distances from the receptors. • Post commissioning noise source emissions and ambient noise monitoring levels will be measured on a periodic basis to confirm the noise levels received at the nearest residential locations are consistent with the noise predictions stipulated in the Project EIA. • The Contractor with support of the equipment suppliers shall provide appropriate training to plant operation personnel to enhance their competency in noise control of equipment. The Contractor will propose a training program for plant operators not later than three months before the commissioning, and conduct the training in as part of the overall training in parallel with the commissioning.

TABLE 5.4-1
IMPACTS DURING OPERATION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Noise (Cont'd)		• The Contractor shall provide Plant Operation, Maintenance and Calibration Manuals, Procedures and Schedules to ensure all site plant is maintained for optimal performance and reduced noise levels. • Site induction to cover site noise management issues and procedures. • The power plant will operate under specific Operational Procedures developed on-site specifically to manage noise emission from the site. These procedures include operating checklists, and ensuring all doors, vents, louvers and closed as required during operation to limit the releases of noise from the generator/turbine enclosures. • Running all plant as per Operational Procedures. • All plant and equipment, including vehicles, will be properly maintained in order to minimize noise generation. • Conduct routine noise monitoring at sensitive receptors, and adopt appropriate measures to reduce noise levels if it exceeds the standard. • Grow tree along the boundary facing the receptors. • Ensuring all operators or contracted maintenance personnel working on plant on weekends, during evenings or at nighttime understand the noise management issues on-site and complete their work with no noise impacts on the sites near neighbors. • The Site Manager/Community Relations Advisor communicating to the local community through the Community Participation Program any upcoming major outages or maintenance programs that may mean new on-site activities, increased transport to site or any additional planned noise sources.
Wastewater	Wastewater generated from domestic use of workers.	• The Contractor will prepare detailed design of water cooling system to meet the IFC standard. • The Contractor will prepare detailed design of wastewater treatment facilities based on the following design concept: a) The process wash water contaminated with oil will be segregated for oil removal in an oil separator. The oil-free wash water will then be combined with other wastewater streams for further treatment. b) Wastewater from the demineralization unit and the boiler blow down mixed with quenching water will be combined and neutralized in a neutralization basin before combining with other wastewater streams for further treatment. c) Domestic sewage will be treated in a small treatment plant. The treated effluent will be combined with the effluents from a) and b). • The combined effluent will be discharged into a pond before disposal through a sewer pipe into the sea, about 1 km away. Water in the pond will be used for landscaping.

TABLE 5.4-1
IMPACTS DURING OPERATION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Wastewater (Cont'd)		• A drainage system will be provided to collect surface runoff and discharged into the retention pond or directly into the river through the effluent outfall. Surface runoff from open areas contaminated by oil will be separately drained into an oil separator before discharging into the main drainage system. • The Contractor will be required to prepare an operational manual for the wastewater treatment system. The manual will be submitted at least two weeks before the training for wastewater treatment plant operators. • Ensure that the cooling water system and wastewater treatment facilities will be operated by suitably qualified personnel. • The Contractor with support of the equipment suppliers shall provide appropriate training to cooling water system and wastewater treatment plant operators to enhance their competency in operation and control their facilities. The Contractor will propose a training program for plant operators not later than three months before the commissioning, and conduct the training as part of the overall training in parallel with the commissioning. • The wastewater treatment system will be efficiently managed. Daily volume of each wastewater stream will be measured and the data kept for monitoring purpose. • Scheduled collection and analysis of wastewater samples from each wastewater stream will be routinely carried out before and after the treatment to provide feedback for the wastewater management and operational controls. • All equipment will be maintained according to Plan Operating, Maintenance and Calibration Manuals, Procedures and Schedules. Adequate number of parts and spares of equipment will be stored to ensure minimum stoppage time of the wastewater treatment facilities. • The operation and control of cooling water system and wastewater treatment facilities will strictly adhere to the procedures in the operational manual.
Marine Resources	• Pumping a large volume of seawater could cause impingement and entrainment of marine organisms. • Increases in water temperature caused by discharge of warm spent cooling water impacts on marine organisms.	• Install the pumping pipe from about 1 meter above the sea bed. • Install screen with 10 cm spacing to block the passage of large marine lives, and travelling screens with 10 mm mesh size to prevent entrainment of small marine organisms. • Regularly check and clean the screen of pumping pipe at least 2 times/year. • The temperature of spent cooling water will be controlled by the design, to be within IFC standard and National Environmental Quality (Emission) Guidelines, 25 December 2015.

TABLE 5.4-1
IMPACTS DURING OPERATION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Seawater Quality	Increases in water temperature caused by discharge of warm spent cooling water.	• The outfall design adopts best practices for minimizing impacts of thermal discharge on ambient water. • The discharge from the sea bed through diffusers will enhance vertical mixing, thus eliminating thermal stratification. • The temperature of spent cooling water will be controlled by the design, to be within International Finance Corporation (IFC) standard and National Environmental Quality (Emission) Guidelines, 25 December 2015.
Occupational Health and Safety	Impacts on health and safety of operational personnel from excessive noise and temperature inside the power plant, fire, explosion risks and accidents.	• The contractor will design the power plant and associated facilities using equipment that will meet occupational health and safety (OHS) guidelines and standards prescribed in the contract. • Incorporate in the EPC contract, all OHS requirements will be in the design of the power plant and associated facilities, including equipment selection; give due consideration to, but not limited to, the following OHS requirements: (i) integrity of workplace structures; (ii) standard operating procedures for process shutdown, including evacuation plan; (iii) work space and exit; (iv) fire precautions; (v) toilets and showers; (vi) potable water supply; (vii) clean eating area; (viii) lighting; (ix) safe access; (x) first aid; (xi) air supply and ventilation; (xii) work environment temperature; (xiii) noise and vibration; (xiv) electrical safety; (xv) fire and explosions; and (xvi) confined working space. • The Contractor will prepare an OHS management plan and implementation procedures specific to the power plant of this Project and in line with the Owner's OHS policy and procedures. The plan will be submitted not later than one month before commissioning of the power plant and associated facilities. • The contractor will conduct necessary orientation and training to the Owner's power plant operational team to ensure that the operational team clearly understands the OHS plan and implementation procedures. • The OHS management plan and implementation procedures will cover but not limited to the following subjects: - Organization and responsibilities of OHS management - Training plan - Contractor responsibilities - Safety measures for the power plant's Operation and Maintenance (O&M), including safety in turbine operations, fire, explosion, accidents and chemical hazards - Emergency response procedures

TABLE 5.4-1
IMPACTS DURING OPERATION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Occupational Health and Safety (Cont'd)		- Task-specific work requirements Compliance monitoring and evaluation plan - Audit plan - Reporting system - Documentation system • The implementation of the OHS plan will be integrated with operational control. • The Plant Manager will implement the OHS plan and procedures as part of his operational management. • The EHS Manager will monitor the implementation of OHS procedures to comply with relevant requirements.
CSR Program	• Daily living of the people in the surrounding communities may be disturbed or inconvenienced by environmental disturbances caused by the operation such as noise, air quality, not satisfaction with marine resources utilization. • The stakeholders, especially local communities, may have negative attitudes toward the Project which could lead to conflicts, opposition and delay the project implementation.	• The Project Proponent should continue implementation of the CSR program which has been started at the construction phase • Establish a good mutual understanding between the Project and stakeholders, particularly the local communities through following measures: - Establishment of channel for public relation and information disclosure through various public channels. - Involvement in grievance redress in order to response to complaints related to the Project impact. - Establishment good relationship with communities by supporting communities' activities such as formal education, health care and sanitation, and religions and culture. - Support socio-economic development via priority given to local employment opportunity, occupation promotion on agriculture, value added on agricultural, fishery and handicraft products, and gender development. - Regular meeting with communities to foresee problems that would arise from the Project implementation, and build up mutual understandings in the area. - Reporting on results the project implementation, mitigation measures and monitoring to concerned authorities and communities. - Involvement in solving problem as promise to the communities. - Continuation of activities by improvement and adjustment activities as necessary for better efficiency of implementation.

TABLE 5.4-1
IMPACTS DURING OPERATION PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Mangrove Management Program	Impact from loss of some mangrove area during pre-construction phase is irreversible. Its area is a main source of protein and income of the locals.	• The Project will support to continue implementation of mangrove resource management program (MGRMP) to ensure sustainable use of mangrove resources and minimizing coastal erosion. The MGRMP will be on participatory approach. Local people, expertise and local authorities will involve in planning and implementing various activities. Details are the same as mitigation measures during construction phase. • Core mangrove management group can be rotated among the members in the communities.

TABLE 5.5-1
IMPACTS DURING DECOMMISSIONING PHASE AND MITIGATION MEASURES

Environmental and Social Issue	Impacts	Mitigation Measures
Air Quality	Increases in air pollutants caused by fugitive dust from structure decommissioning and emissions from operation of trucks and heavy equipment.	**Fugitive Dust Control** • For construction site including spoil placement sites: – Use watering or other effective techniques on unsealed areas to minimize wheel generated or wind-generated dust. – As soon as the land becomes available, engage in the progressive rehabilitation of the progressive rehabilitation of the Project site and spoil placement sites with landscaping. • Take measures (e.g. rumble bars and wheel wash bays) to ensure dust-creating material (earth or similar material) is not transported from the Project site to roads or other areas in the public domain. • Ensure all trucks carrying spoil or other loose material are covered, and if necessary, treated (e.g. mist sprays) prior to leaving the Project sites. • Ensure all loose earth and similar material spilled or otherwise deposited within the Project site and the transport routes is cleared and removed from trafficked areas as soon as practicable. • At the Project site and spoil placement sites, monitor meteorological conditions, particularly wind speed and direction and where necessary take measures to avoid impacts of dust on adjacent properties. Such measures may include: – Modification of demolishing methods – Increase in dust suppression measures – Cessation of work when no other reasonable or practical measure is available • Spray water at and around the working areas and access roads during works. • Enforce a speed limit for vehicles and trucks in the Project site not to exceed 40 km/h when passing the communities. Decommissioning activities shall be kept as planned so that the disturbed areas will be minimized at any time. • Cover material debris and removal structures with canvas or equivalent during transportation. Some materials should be dampened, if necessary, before transportation. • Establish a vehicle washing facilities to minimize the quantity of material deposition on public roads. • Establish a checkpoint at project gate to ensure the vehicles leaving the project site are following the measures prescribed to reduce dust emissions. • Restore, resurface, and rehabilitate the disturbed areas as soon as practicable after completion of demolition.

TABLE 5.5-1

IMPACTS DURING DECOMMISSIONING PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Air Quality (Cont'd)		• Prohibit the open burning of waste in the Project area. • Dust masks should be provided (where applicable) to all workers. **Diesel Exhaust Emission** • Take measures to manage the movement of vehicles entering and leaving the Project site to avoid, or mitigate and manage the potential for vehicle emissions impacting on adjacent properties, except where such residential or sensitive activities in front an arterial road to be used for access to or from the Project site. Measures for management are to be provided in the vehicle management plan and the traffic management plan. Such measures may include avoiding or minimizing queuing on streets approaching the worksites or adjacent to other sensitive activities. • Adopt procedures to avoid vehicles idling for excessive periods (e.g. more than 5 minutes) if required to queue to enter the Project site. • For equipment powered by diesel motors, take measures to avoid or mitigate and manage the potential impacts of exhaust emissions on adjacent residential or other sensitive activities. For example, ensure all vehicles and equipment powered by diesel motors are fitted with emission control measures, and are regularly maintained to manufacturers' specifications. • Maintain all equipment in proper working conditions according to the manufacturer's specification. The engines of the decommissioning equipment must be routinely maintained by qualified mechanics to ensure their proper condition during operation. • Provide adequate training to the equipment operators in the proper use of equipment. • Use the proper size of equipment for the job. • Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).
Noise	Increase ambient noise level at the Project site and communities near the material transport routes.	• The Contract will require the Contractor to use decommissioning equipment that generate low levels of noise. The Contractor will present alternative decommissioning equipment to demonstrate that the selected equipment adopts best available technologies to minimize noise level. • The Contractor will be allowed to carry out decommissioning works, which generate excessive noise levels, only during the period between 6.30 a.m. to 6.30 p.m. Mondays to Saturdays. Such construction works on Sunday or public holidays will need approval from the Resident Engineer of the Project Proponent.

TABLE 5.5-1
IMPACTS DURING DECOMMISSIONING PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Noise (Cont'd)	Increase ambient noise level at the Project site and communities near the material transport routes.	• For decommissioning works beyond standard decommissioning hours, the Contractor shall take reasonable and practical measures to protect the affected sensitive receptors. For example, acoustic screens or noise barriers would be required. • Reasonable and practicable measures to achieve the decommissioning noise targets may include, for example: – Commence advanced notification of workers and undertake on-going consultation with potentially affected property owners and occupants. – Establishing temporary noise barriers between decommissioning worksites and sensitive receptors (e.g. residential, schools, community facilities). – Fitting noise-reduction measures to all plant and equipment engaged in the decommissioning works. • Potentially affected property owners and occupants are to be notified well in advance (7 days or more) as to the scale, extent and duration of decommissioning works, as required by the consultation and communications program. • Provide ear plugs or ear muffs to workers operating in the excessive noise areas. • Major decommissioning activities which generate loud noise should be limited to only during the day time. Activities that are necessary to be carried out at nighttime will need approval of the site engineers, and will need to have adequate noise control equipment or measures. • Speed of vehicles in the construction site will not be more than 40 km/h. • The Contractor will be required to regularly monitor ambient noise levels at the receptors.

TABLE 5.5-1
IMPACTS DURING DECOMMISSIONING PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Decommissioning Waste	Waste generated from decommissioning operation and workers	**Design and Planning** • The Contractor will consult with the EHS Manager of the Project Proponent, ECD, SWB and the township governments the possibility of using existing waste disposal facilities managed by the regional or local governments. If this not possible, the Contractor will need to develop its own disposal facility preferably within the Project site, if possible. • The Contractor will ensure that the design and the proposed decommissioning methods will generate the least amount of wastes. • The Contractor will propose methods for waste reuse and recycling and prepare estimates of the remaining quality of each waste category that will be disposed off. • The Contractor will propose methods of waste transport and disposal. • The Contractor will then prepare and action plan for waste management. The action plan will be submitted to the EHS Manager of the Project Proponent not later than two weeks before commencing the decommissioning. **During Decommissioning Operation** • An efficient decommissioning waste management system should be established and implemented. Decommissioning waste will need to be classified and sorted out at source for disposal. The disposal methods will depend on the types of wastes: direct reuse as desire, sale and recycling of materials, landfilling for inert materials and specific treatment method for each type of hazardous materials. • Haphazard disposal of decommissioning waste in or off the Project site will be prohibited. • No burning of wastes will be allowed. • Decommissioning wastes should be handled by the existing municipal solid waste collection and disposal services. If such service is not possible, the decommissioning wastes would need to be disposed off in the Project site. They may be buried in areas designated for green areas. • Non-decommissioning wastes will be disposed off with the decommissioning wastes. • Provide adequate number of refuse binds or containers with tight covers, daily collection of disposal. • Hazardous wastes will be handled by a licensed hazardous waste contractor. If this service is not available, the subcontractor will need to find safe permanent storage, or other appropriate methods of disposal. • A Hazardous Waste Management System covering waste classification, separation, collection, storage, transfer and disposal should be set up and operated. The waste management system will comply with applicable regulation of the government.

TABLE 5.5-1
IMPACTS DURING DECOMMISSIONING PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Decommissioning Waste (Cont'd)		• The Contractor will design and implement a waste segregation system and procedure and communicate it to all workers strictly adhere to the segregation procedure. • An appropriate number of containers with adequate volume and appropriate materials will be provided at strategic locations to support the segregation. Each waste category will be segregated into recycling, reuse and disposal sub-categories. • Daily collection and transport will be organized and carried out for each sub-category of segregated wastes. • A roofed storage area with adequate space will be provided for storing the segregated wastes waiting for the on-site or off-site reuse or recycling. • The storage area for hazardous waste will need to be specially designed to prevent spills or leaks onto the soil. • Disposal of the remaining wastes that are unable to be reused or recycled in the approved landfill site(s). • Decomposable wastes such as food wastes and vegetation may be disposed off by composting. • Remove any contamination inadvertently deposited in recyclable waste material containers. Provide cleanup of excessive contamination at recycling vendor locations when such contamination is not controlled at the project site. • If applicable, collection and recycling of used oils by a licensed contractor. • If applicable, collection by a licensed contractor of empty oil and fuel drums and other containers for return to recycling facilities.
Road Traffic	• Traffic loads will be increased on existing roads within the study area, small port coastal road and Nga Pitat road, the access road to the power plant decommissioning site. • The decommissioning phase would be congestion of local roads and increase risk of accidents.	**Truck Routes and Site Access** • In consultation with the concerned authorities at the regional, and township levels, develop and implement a Decommissioning Traffic Management Plan to address the following issues: – Avoid haulage tasks during peak traffic periods as far as practicable. Where haulage in peak periods is unavoidable, such activities are to be managed in accordance with specific traffic management sub-plans provided to the relevant agencies in advance. – Control heavy vehicle movements on project related road to avoid interference with major events, if any. – Investigate the capacity of intersections on haulage routes to minimize impact on intersection operations by heavy vehicles servicing the decommissioning worksites. – Prepare and implement a comprehensive decommissioning traffic management plan to control truck movements to avoid, or mitigate and manage the impacts of heavy vehicle traffic on the road network.

TABLE 5.5-1
IMPACTS DURING DECOMMISSIONING PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Road Traffic (Cont'd)		• Measures to manage the operation of the truck fleet for incorporation into a vehicle management sub-plan to include: – Monitoring of truck position, speed, route and performance in relation of traffic conditions and schedule requirements. – Management of truck speed and position to avoid queuing on the approaches to the spoil handling and loading facilities. – Management of traffic signals on nominated spoil haulage along the routes. – Ensure all vehicles leaving a construction site pass over or through devices designed and maintained to remove soil and other materials. **Traffic Hazards** • Heavy trailer trucks transporting heavy and large equipment will have to be directed by a traffic police car or by other vehicle specially designated to handle a guidance of this kind of transportation. **Local Traffic** • Implement management measures to avoid, or minimize increase in traffic caused by the project works in local streets as practicable. • Notify the local community about proposed changes to local traffic access arising from decommissioning activities, and provide clear signage of changed traffic conditions and take other measures to ensure safe traffic movement. • Prepare and implement an employee parking policy for the construction worksites. **Traffic Management at the Intersection of Small Port Coastal Road and Nga Pitat Road** • Provide a traffic police or relevant officer to control traffic at the intersection during the transport period. **Pedestrians and Cyclists** • Maintain safe pedestrian and cycle access near decommissioning work (particularly for elderly and children), including to community facilities, such as schools, monastery, open space and particularly. • Notify the local community, and in particular, local schools, about changes to pedestrian and cycle access during decommissioning near decommissioning works. • Provide traffic controls designed for the safe movement of cyclists near the worksites.

TABLE 5.5-1
IMPACTS DURING DECOMMISSIONING PHASE AND MITIGATION MEASURES (CONT'D)

Environmental and Social Issue	Impacts	Mitigation Measures
Occupational Health and Safety	Impact on health and safety of personnel from excessive noise and accidents.	• The Contractor will design the power plant and associated facilities using equipment that will meet occupational health and safety (OHS) guidelines and standards prescribe in the contract. • The Contractor will prepare an OHS management plan and implementation procedures specific to the decommissioning operation and in line with the Owner's OHS policy and procedures. The plan will be submitted not later than one month before decommissioning operation. • Develop emergency response procedure, implement in the event of accidents and emergency. • The contractor will conduct necessary orientation and training to the Owner's power plant team to ensure that they clearly understands the OHS plan and implementation procedures of decommissioning. • Full surveillance and maintenance during the decommissioning operations shall be carried out.
Social Management	Daily living of people in the surrounding communities, especially Nga Pitat may be disturbed or inconvenienced by environmental disturbances caused by the decommissioning such as dust, traffic inconveniences and noise and vibration.	• To keep a good mutual understanding between the Project and stakeholders, the Project will continue to solve problems cause by decommissioning activities to the communities.

CHAPTER 6

CONSTRUCTION PHASE EMP

CHAPTER 6
CONSTRUCTION PHASE EMP

6.1 OBJECTIVES OF THE CEMP

For the Project Proponent, the objective of environmental management of Project construction is to ensure that the construction will not create significant impacts and will meet all applicable standards and guidelines and requirements prescribed as conditions for issuing an Environmental Compliance Certificate (ECC). The standards, guidelines and requirements will be prescribed in the Contract.

The key objective of the Owner-CEMP (OCEMP) is to establish a clear operational framework and requirements for environmental management during the construction phase of the Project. Based on the OCEMP, the Contractor will prepare a Contractor-CEMP (CCEMP) which will have operational details based on the detailed designs, construction methods, and construction schedule. The CCEMP will therefore be part of the Contract.

6.2 MAPS

Project construction will take place at one site. ***Figure 6.2-1*** is a base map of the main construction site and villages within 5 km radius. The site layout plan is shown in ***Figure 5.1-1*** of ***Chapter 5***.

6.3 IMPACTS AND MANAGEMENT PLANS

Types, magnitudes, durations, and locations of environmental impacts during construction vary as the construction progresses. ***Table 6.3-1*** shows anticipated environmental impacts at various months of the construction period.

The following issues will be managed during the short period of pre-construction and construction phases: (i) general construction; (ii) biomass waste; (iii) mangrove management; (iv) air quality; (v) noise; (vi) wastewater; (vii) construction waste; (viii) road traffic; (ix) Occupational, Health and Safety (OHS); (x) resource management; (xi) Cooperate Social Responsibility (CSR); (xii) emergency management. The sub plans are presented in ***Appendix 6A***. Each sub-plan will be a working document and as such it will be reviewed and amended or updated as deemed necessary to reflect changes in construction schedule and management review changes.

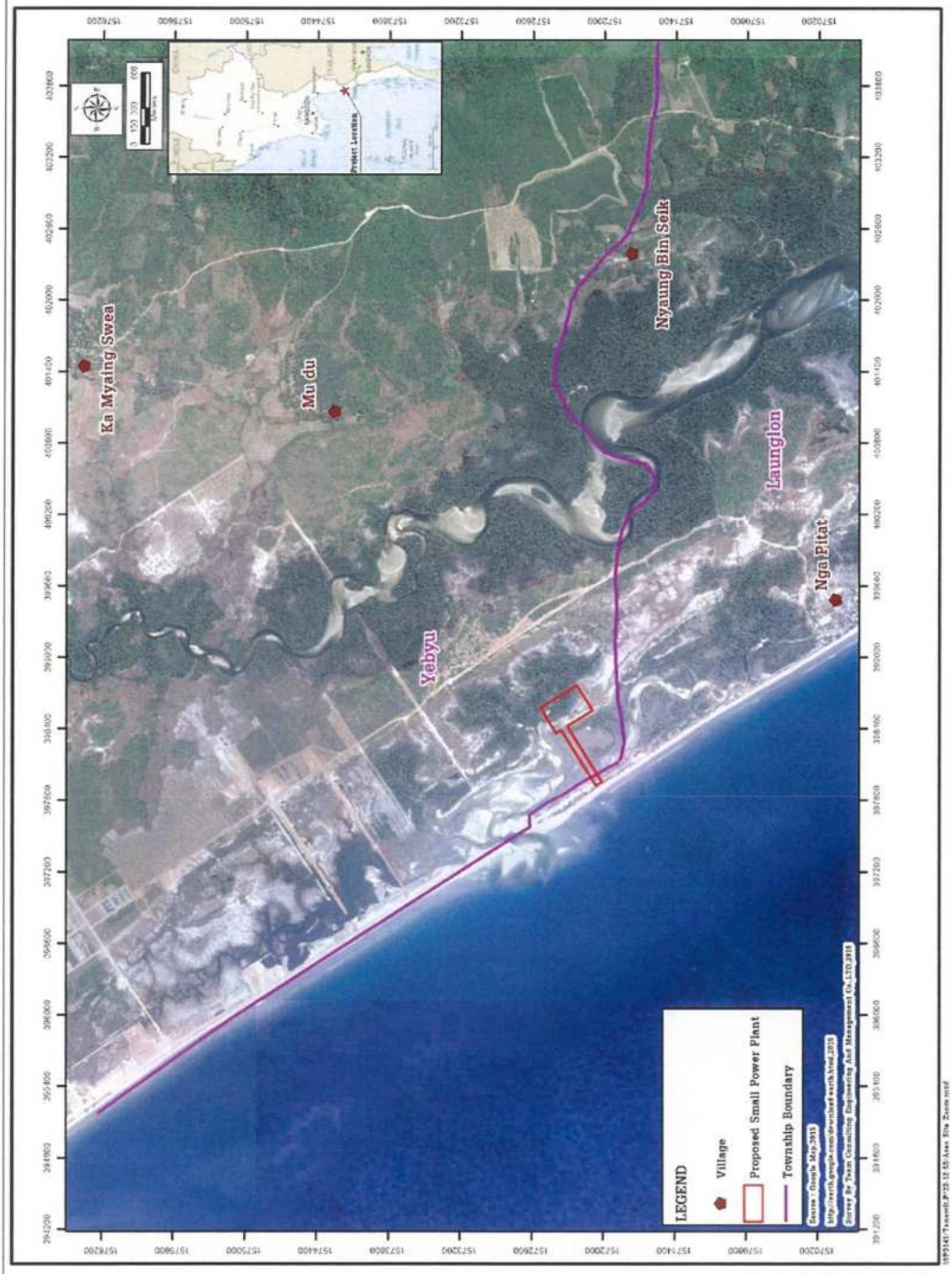


FIGURE 6.2-1 : THE PROJECT CONSTRUCTION SITE AND SURROUNDING VILLAGES

TABLE 6.3-1

ANTICIPATED IMPACTS AT VARIOUS MONTHS OF THE CONSTRUCTION

Activities	Duration (Months)	Impacts
Phase 1: Installation of Multiple Gas Engines	12	Fugitive dust, Noise, Wastewater, Construction waste, Road traffic, Impacts on archaeological site, Loss of Britney Creek Occupational health and safety, Livelihood, Infrastructure and services, Culture and tradition, Community health, safety and security, Community development support and corporate social responsibility, Risk management
Phase 2: 2 on 1 Combined cycle	24	Ambient air, Noise, Wastewater, Seawater and marine ecology, Construction waste, Road traffic, Infrastructure and services, Culture and tradition, Occupational health and safety, Community health, safety and security, Community development support and corporate social responsibility, Risk management
Phase 3: Installation of Multiple Gas Engines	12	Fugitive dust, Noise, Wastewater, Construction waste, Road traffic, Impacts on archaeological site, Occupational health and safety, Livelihood, Infrastructure and services, Culture and tradition, Community health, safety and security, Community development support and corporate social responsibility, Risk management
Phase 4: 2 on 1 Combined cycle	24	Ambient air, Noise, Wastewater, Construction waste, Road traffic, Infrastructure and services, Culture and tradition, Occupational health and safety, Community health, safety and security, Community development support and corporate social responsibility, Risk management
Phase 5: 1 on 1 Combined cycle	24	Ambient air, Noise, Wastewater, Construction waste, Road traffic, Infrastructure and services, Culture and tradition, Occupational health and safety, Community health, safety and security, Community development support and corporate social responsibility, Risk management

Note: Duration of activities based on tentative project implementation schedule in ***Figure 4.1-6, Chapter 4*** in main text.

6.4 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

The Project Proponent and the Contractor will both be involved in environmental management of the Project construction. The Contractor will select construction methods or practices that have least environmental impacts, thus meeting environmental performance targets prescribed in the Contract. During the construction, the Contractor will implement, under supervision of the Project Proponent, impact mitigation measures prescribed in the Contract.

The Project Proponent and the Contractor will have to establish and operate their own environmental management systems (EMS) for the Project construction. The two EMSs will be related and based on the same information base. The Project Proponent's EMS will be focused on monitoring and reviewing environmental compliance at the Project level as part of the Project management. The Contractor's EMS will be focused on environmental management at the task level as part of the construction management. The two EMSs will therefore be complementary and will enable the Contractor and the Project Proponent to complete the Project construction with no significant environmental impacts.

The EMS of the Project Proponent will adopt the following procedures:

6.4.1 Monitoring, Evaluation and Reporting

6.4.1.1 Scheduled Environmental Monitoring and Evaluation

Before commencing the construction, the Contractor will review and update existing data on relevant baseline environmental condition, particularly at locations expected to be affected by the construction.

Scheduled monitoring of environmental performance is required throughout the construction phase of the Project to evaluate compliance with legal requirements, the environmental management objectives, and relevant policies, standards and guidelines. The monitoring and evaluation will enable the overall effectiveness of the environmental controls to be determined and allow areas of non-compliance to be identified so corrective actions can be taken. The environmental monitoring plan for each issue to be managed is also presented in each sub-plan.

Environmental monitoring will be undertaken according to the following:

- The Contractor's Environmental, Health and Safety (EHS) Manager is responsible for implementing the monitoring plans, and arranging training and specialist consultants for the monitoring as required.
- The monitoring will be conducted by the Contractor using the approved methods stated in the Contract.
- Environmental results not meeting the required standards will be managed as per the corrective action process and issued with a non-compliance report.
- The EHS Manager will advise the Contractor Project Manager of any non-compliance from monitoring and will report these to the Owner's EHS Manager as required.

6.4.1.2 Site Inspections

In addition to scheduled environmental monitoring, the Contractor's EHS Manager will conduct daily, weekly, and monthly general inspections at the construction site. The objectives are to early identify or detect factors which, if unattended to, could result in major environmental events and/or non-compliance. A general scope of inspections is outlined below in ***Table 6.4-1*** and it will need to be updated when the detailed construction plan is made.

The daily inspections will be informal visual inspections to observe conditions of the construction sites. The focus will be on the power plant construction site where construction activities are concentrated.

The weekly inspections will be formal visual inspections in more details than the daily inspections.

The Contractor's EHS Manager will be responsible for the daily and weekly site inspections. The Owner's EHS Manager will participate in the weekly site inspections, and occasionally in the daily site inspections.

The monthly inspections will be conducted in more detail than the weekly inspections. The monthly inspections will also include risk triggers identified in the environmental risk management plan. The monthly inspections will be conducted jointly by personnel from both sides, including the Project Managers, the Construction Manager and the EHS Managers.

TABLE 6.4-1

OUTLINE OF SITE INSPECTION PLAN FOR CONSTRUCTION

Inspection Focuses	Daily Inspections	Weekly Inspections	Monthly Inspections
Cleanliness	✓	✓	✓
Tidiness	✓	✓	✓
Sanitation conditions of worker camps, canteen, kitchen		✓	✓
Storage of hazardous materials		✓	✓
Fugitive dust	✓	✓	✓
Ambient noise level	✓	✓	✓
Safety in work places	✓	✓	✓
Refuse disposal	✓	✓	✓
Drainage	✓	✓	✓
Wastewater disposal	✓	✓	✓
Risk triggers			✓

6.4.2 Environmental Incidents

6.4.2.1 Definition of an Environmental Incident

In addition to scheduled environmental monitoring, the monitoring will also cover environmental incidents. An environmental incident during Project construction is an occurrence which has (or potentially could have had) a negative or adverse effect on the environment. An adverse effect is something that causes (or could have caused) environmental harm. An environmental incident can also be a deviation from a requirement or practice prescribed in this CEMP and the Contractor CEMP. This means there has been a failure to follow the established process or procedures that help the Project achieve best practice (e.g. failure to report a spill). Some environmental incident could create an emergency, i.e. its impact is so serious that it has to be promptly dealt with. Potential environmental incidents and emergencies are identified in the environmental risk assessment for the construction phase in ***Chapter 5***.

6.4.2.2 Environmental Incident Form

An environmental incident, once noted, has to be recorded in an Environmental Incident Form (EIF). A standard Environmental Incident Form (EIF) template will be used for all site specific activities throughout the construction of the Project. An Environmental Incident Form is proposed in ***Appendix 6B***.

6.4.2.3 Environmental Incident Register

The Contractor's EHS Manager will input all data from completed EIFs as soon as possible to generate an Environmental Incident Register (EIR). A standard Environmental Incident Register (EIR) will be controlled by the Contractor's EHS Manager. It will contain all environmental incidents occurring on the construction sites of

the power plant, transmission line, gas pipeline, and access road. The EIR will be discussed regularly at the project environmental performance review meetings. These meetings will discuss the corrective actions taken, and the preventative measures that have been put in place.

6.4.3 Monitoring Reports

Two types of monitoring reports will be generated in the environmental monitoring and site inspections. The first type is reports generated for internal use to provide feedback to the EMS. The second type is reports generated for submission to Ministry of Natural Resources and Environmental Conservation (MONREC), which will be disclosed to public as prescribed in Chapter VII of the EIA Procedure.

6.4.3.1 Internal Monitoring Reports

Site Inspection Reports

The Contractor's EHS Manager will record results of the daily inspections in daily site inspection notes. The Contractor's EHS Manager and Construction Manager will review the daily site inspection notes on a weekly basis to confirm that the checks and subsequent required works are being carried out, and additional inspections are included as per construction progress.

For weekly inspections, the Contractor's EHS Manager will present results of the inspections in weekly site inspection reports for discussion in the weekly project review meetings. Both the daily inspection notes and weekly inspection reports will highlight factors or events that could lead to non-compliance and will need attention of the Contractor's Project Manager.

The Contractor's EHS Manager will prepare monthly site inspection reports as part of the monthly environmental monitoring reports.

Environmental Monitoring Reports

The Contractor's EHS Manager will prepare monthly environmental performance reports for submission to the Owner's Project Manager. The monthly environmental monitoring report will concisely present: (i) results of scheduled environmental monitoring and site inspections carried out during the month; (ii) identified non-compliance, if any, and causes of the non-compliance; (iii) complaints received; (iv) environmental incidents; (v) associated investigations and corrective actions taken; (vi) proposed changes to the monitoring plan, if any; and (vii) work program for the following month.

The monthly environmental performance reports will be discussed in the monthly project status review meetings or in separate monthly environmental performance meetings as appropriate.

6.4.3.2 Monitoring Reports for Submission to MONREC

Based on the monthly internal monitoring reports and results of the monthly review meetings, the Owner's EHS Manager will prepare a project environmental monitoring report every six months for submission to MONREC. This report as prescribed in the EIA Procedure (Article 109) will contain the following:

- Documentation of compliance with all Conditions
- Progress made to date on implementation of the EMP against the submitted implementation schedule
- Difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties
- Number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation
- Accidents or incidents relating to the occupational and community health and safety, and the environment
- Monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required

The monitoring reports should also present the construction progress over the report period.

6.4.4 Corrective Actions

The Contractor will be instructed by the Owner Project Manager to take corrective actions for any identified non-compliance. Taking corrective actions in managing EHS aspect of the Project will have to be a part of project management and use the same procedure for taking corrective actions in managing other aspects of the Project. The procedure proposed in this CEMP will therefore have to be reviewed and revised as necessary to make it similar to the procedure for other aspects of the Project. A single procedure for taking corrective actions should be used in project management.

The Contractor is required to establish own procedure for corrective actions related to EHS non-compliances.

A. Categories of Non-Compliances

Non- compliances cover non- compliance with legal requirements, non-conformance with internal requirements of the Project, inadequate environmental performance, environmental incident, and complaints or grievances received from the public. Non-compliances could be identified from the following:

- External EHS audits
- Internal EHS audits
- Site inspection notes and reports
- Schedule environmental monitoring
- Complaints, grievance or inquiries registers
- Environmental incident registers
- Specific environmental studies and reports
- Directives from MONREC/ECD or other government authorities
- Review meetings

- Recommendations from any project staff member, Contractor or visitors, which are considered by the EHS Manager and the Project Manager to warrant investigation.

EHS non-compliances can be identified, ranked and recorded at two levels. Once the level of a non- compliance has been established the appropriate tool shall automatically be selected for closing out the non-compliance. The actions required for each are detailed below; also a temporary work suspension for cause may be enforced in case of Level A or B Non- compliance.

Level A: A critical non- compliance situation, typically including material damage to or a reasonable expectation of impending material damage to an ecologically or socially sensitive resource or has the potential for an extreme health and safety incident. Intentional disregard of project standards which may lead to a serious EHS incident is also classified as Level A.

Level B: A non- compliance situation not consistent with the original requirements but not believed to present an immediate threat to an identified important resource, community or employee health and safety.

The non- compliance may also be of a procedural nature where the Contractor has failed to implement specified requirements and actions. In this case, the Contractor may need to take actions to ensure the procedural requirements are effectively implemented.

B. Responsibilities and Process

The Owner's EHS Manager will be responsible for identifying and ranking EHS non-compliances. However, all Project management personnel are encouraged to help identify EHS non-conformance.

The Owner's EHS Manager will take actions according to the category of non-compliances.

For Level A Non- Compliance: The Owner's EHS Manager will report the identified non- conformances to the Project Manager with recommendations on corrective actions and instructions for the Contractor.

For Level B Non-Compliance: The Owner's EHS Manager will instruct the Contractor to take appropriate corrective actions.

The Project Manager will be responsible for:

- Issuing instructions to the Contractor to take corrective actions within a given timeframe
- Follow up on corrective actions taken by the Contractor
- Evaluate the results of taking corrective actions
- Prepare a non-compliance report to close the case

The Contractor will be required to conduct an investigation of the non-compliance to determine its root causes and formulate effective actions to correct the root causes.

For Level B Non- compliance, the Contractor will submit a brief note on corrective actions to be taken to the EHS Manager and the Resident Engineer, if the corrective actions are related to change in construction practices.

For Level A Non-compliance, the Contractor will submit a brief report on the results of investigation and proposed corrective actions to the Project Manager through the EHS Manager and the Resident Engineer, if the corrective actions are related to change in construction method.

C. Corrective Action Request

Instructions to the Contractor will be in the form of Corrective Action Request (CAR). The CAR will contain: (i) information sources of non-compliance; (ii) description of non-compliance; (iii) category of non-compliance; (iv) originator; and (v) time frame for corrective actions.

The corrective action requirements will be included in the requirement tracking system of the project management information system.

D. Non-Compliance Report

The EHS Manager will prepare a brief non-compliance report based on the CAR and reports from the Contractor. The non-compliance report will contain: (i) information in the CAR; (ii) corrective actions taken by the Contractor; (iii) implementation period; (iv) results; and (v) recommendation for further actions, if any. The non-compliance report should be in one or two pages in a Form to be designed.

Each and every non-compliance report will be closed out on a progressive basis, until construction is completed.

Non Compliance Report Forms will be verified and closed out by the originator or his designee. Correspondence referring to a proposed course of action shall be referenced and attached to the Non Compliance Report Form as appropriate and stored within the Project Documentation System.

6.5 EMERGENCY RESPONSE PLAN

Before the Project implementation, the Project Proponent and the Contractor will prepare Disaster Preparedness Plan & Emergency Response Plan for pre-construction and construction phases of the Project. The plan will be submitted to Natural Disaster Management Committee of Division/State Government and for approval.

The Contractor will be required to prepare an emergency response plan to efficiently and effectively cope with accidents and emergencies which may occur during the construction period. Considering the nature and magnitude of the construction and the construction site, the emergency response plan would deal with work accidents and accidental fires. Natural emergency events such as earthquakes and floods would be very unlikely. Consequently, the emergency response plan during the construction would focus on procedures and facilities to deal with work accidents and accidental fires to minimize injuries and loss of lives, damage to properties, and construction delay. The emergency response plan will be a part of the OHS system. Facilities to be provided on site will contain at minimum the following: fully equipped first aid station, fire-fighting equipment, arranged access to emergency services of the local hospital, and direct communication link with local fire brigades and other relevant government authorities and the local police station.

6.5.1 Incidents Considered Emergencies

Emergency incidents are:

- Risk events or incidents that still occur despite the implementation of risk mitigation measures.
- Risk events that cannot be managed such as natural calamities.

Incidents that are considered emergencies are those that demand quick response as they are causing serious consequences or are certain to escalate and cause serious consequences.

In the construction of this Project, the following incidents are considered emergencies:

- Man-made i.e. fire and explosion, electric leakage, accidents resulting in serious injuries or fatalities of construction personnel, hazardous chemical/oil spill on water or land, vehicle/equipment accident.
- Technical disaster i.e. structure failure, faulty design and defects in the equipment, equipment installation, and construction.
- Natural disasters i.e. tsunami, storm, flood, and earthquake.

6.5.2 Organization for Emergency Response

The EPC Contractor has set up an Emergency Response Team (ERT) led by the EPC Project Manager. The ERT is not a regular functional unit. It is a standby unit and will be activated and function only when there is an emergency incident that triggers the CERP implementation. The ERT structure is shown in ***Figure 6.5-1***.

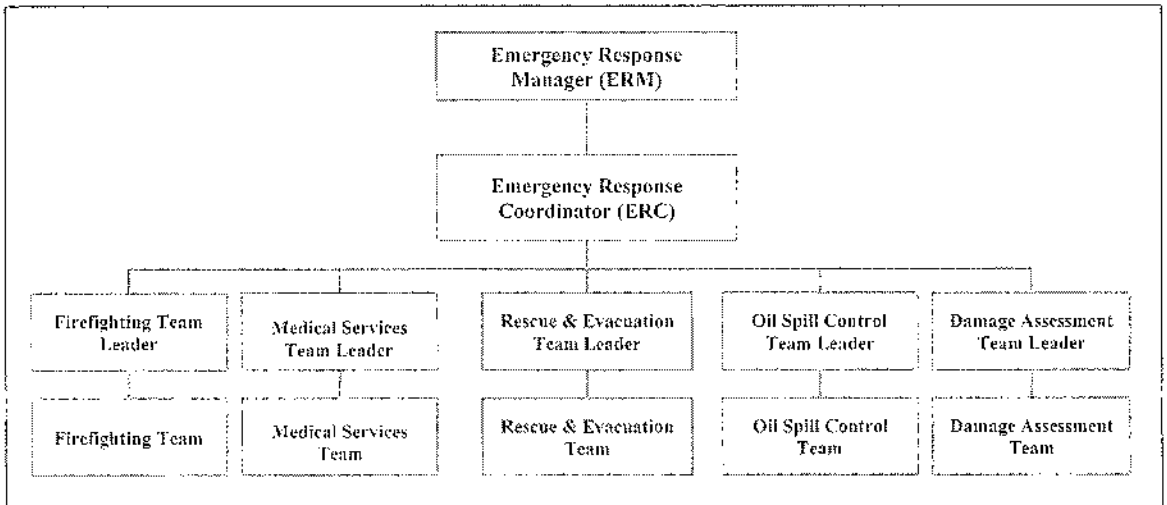


FIGURE 6.5-1: STRUCTURE OF EMERGENCY RESPONSE TEAM (ERT)

(To be finalized by the Contractor and approved by the Project Proponent)

The ERT consists of 5 teams. Functions of key personnel and leader are as summarized in ***Table 6.5-1***.

TABLE 6.5-1

FUNCTIONS OF KEY PERSONNEL AND TEAM LEADER IN THE ERT

Position	ERT Position	Responsibilities
EPC Project Manager	Emergency Response Manager (ERM)	• Be the issuing authority for this CERP • Ensure effective implementation of this Plan, including provision of adequate resources • Scheduled review and updating the CERP
Office Manager	Emergency Response Coordinator (ERC)	• Ensure sufficiently trained resources are available onsite to deal with potential and actual emergency situations • Communicate with ERT member and/or Site member • Implement the CERP and capture all information relating to the situation • Undertake and/or manage investigations into emergency situations or remedial works • Provide training to ERT members • Provide summary of incidents, actions and responses to the ERM • Scheduled review and updating the CERP
Construction Manager (CW)	Firefighting Team Leader	• Be the leader of firefighting team • Communicate with ERC • Scheduled review and updating the CERP
Site Engineer (CW)	Rescue & Evacuation Team Leader	• Be the leader of rescue & evacuation team • Communicate with ERC • Scheduled review and updating the CERP
EHS Officer	Medical Services Team Leader	• Be the leader of first-aid team • Ensuring sufficiently first aid services are available to treat injuries/illnesses • Communicate with ERC • Scheduled review and updating the CERP
EHS Officer	Oil Spill Control Team Leader	• Be the leader of first-aid team • Ensuring sufficiently first aid services are available to treat injuries/illnesses • Communicate with ERC • Scheduled review and updating the CERP
Procurement & Supply Manager	Damage Assessment Team Leader	• Be the leader of damage assessment team • Communicate with ERC • Scheduled review and updating the CERP
	Firefighting Team	• First response coordinator to capture emergency and/or commence response
	Medical Services Team	• Provide immediate first aid and medical assistance to injured or ill personnel • Provide information to local emergency services as required
	Rescue & Evacuation Team	• Responsible for all personnel's safety during rescue & evacuation • Keep an updated list of employees and visitors on site and carry the name list with them during evacuation • Ensure all personnel have evacuated to the Muster point
	Oil Spill Control Team	• Responsible for oil spill control
	Damage Assessment Team	• Responsible for assessments of the extent of damage, estimation of its cost.

6.5.3 Procedures

6.5.3.1 Emergency Communications

Emergency communication will generally be through Ultra High Frequency (UHF) radio using a dedicated emergency channel as nominated by the Project Owner. However, manually activated alarm systems will be installed at various high risk areas in the construction site.

6.5.3.2 Notification Procedure

In case of Emergency incidents, the person discovered the incident must promptly activate the manual alarm system, and notify the Area Supervisors or raise alarm on emergency UHF channel.

For Employee Notification, the alarm warning to evacuate the location and assemble at Muster Point or safe location will be delivered through an audible, intermittent sound signal alarm. When the evacuation signal is given, all personnel will evacuate the location and proceed to the designated assembly areas. An internal network of communications has been developed to alert workers to danger, convey safety information, and maintain site control. Any effective system or combination of systems is to be employed.

During emergency action and response training, employees are made aware of the various types of notification systems.

After the emergency incident is verified and its nature is defined, the EHS Manager will immediately inform the Emergency Response Manager (ERM). The ERM will activate the ERT for implementation of the CERP. All teams under the ERT will be immediately deployed to take appropriate actions as prescribed in the Response Procedures.

6.5.3.3 Emergency Response Actions

Emergency response actions have been predetermined to facilitate the management of incidents at the Project. Incidents may include one or more response plans and they should be used in unison as required.

6.5.3.4 Emergency Evacuation

In the event of an emergency and evacuation is determined necessary, all personnel are to be evacuated to the muster point. The evacuation procedures are as follows:

1. Should close doors behind, but do not lock unless otherwise instructed.
2. Should switch off or unplug the electrically operated machines or equipment prior to leaving the work area.

3. Leave lights on for Emergency personnel.
4. Should walk, remain quiet, and follow all other emergency instructions.
5. All personnel will assemble at the muster point.
6. The evacuation team will account for all personnel at the muster point.
7. The evacuation will follow the incident reporting procedures.

6.5.3.5 Documentation Procedure

The emergency response team dispatched to the site shall record necessary information which will be later used for preparing documentation and an Emergency Response Report (ERR). The required information includes but is not limited to:

Rescue and Medical Response (Accidents resulting in serious injuries / fatality / Rescue from height/depth or confined space /Vehicle/equipment accident)

1. Date and time of being notified of the incident
2. Date and time of arrival at the site
3. Exact location of the incident (including GPS coordinates)
4. Description of the incident scene
5. Number of person injuries/fatality or illness
6. Nature of injuries/fatality or illness
7. Description of the medial action taken/intended
8. Cause of the incident

Fire Response

1. Date and time of being notified of the incident
2. Date and time of arrival at the site
3. Exact location of the incident (including GPS coordinates)
4. Magnitude and Location of the fire
5. The extent of smoke observed and direction
6. Activities taken to control the fire
7. Time that the fire is successfully put under control
8. Time cleanup completed and description of cleanup activities
9. Time the team left site
10. Time, name, and nature of other regulatory agencies that have been notified by the fire response team or that have participated in the fire control
11. The area impacted by the smoke
12. Cause of the fire
13. Interviews with residents or businesses in the area impacted by the smoke

14. Impact on the pipeline operation

Hazardous Chemical/Oil Spill Response

1. Date and time of being notified of the incident
2. Date and time of arrival at the site
3. Exact location of the incident (including GPS coordinates)
4. Location of the leakage
5. Estimated rate of the leakage
6. Activities taken to contain and fix the leakage
7. Time that the leakage is successfully put under control
8. Time cleanup completed and description of cleanup activities
9. Time the team left site
10. Time, name, and nature of other regulatory agencies that have been notified by the Oil Spill Containment Team or that have participated in the oil spill control
11. Cause of the leakage

6.5.4 Resources

The Contractor has procured or leased all equipment and materials deemed adequate for effective emergency response during the construction. The ERM shall ensure orderly and systematically storage or installation of the provided resources ready for immediate use in time of emergency. Emergency equipment must be maintained through preventive maintenance procedures (inspection and testing) in accordance with the manufacturer's recommendations to ensure that equipment is in ready condition for use. The inspection shall be documented in a field logbook or similar means to be kept in the project files. Emergency equipment is to include, but not limited to the following:

1. Class A, B, C fire extinguisher based on construction site and construction activities
2. First aid kit
3. Eye wash
4. Emergency shower
5. Potable water
6. Appropriate vehicles for transporting injured person

It is recognized that emergency response resources, such as fire control resources, of local authorities are very limited. Therefore, the EPC Contractor has a fire-truck on a 24-hour standby basis to effectively respond to emergency situations. In addition, a clinic with a medical officer and two nurses is established to provide initial medical treatment to construction workers as well as to respond to medical aid needs during emergencies.

6.5.5 Training Program

Effective training is essential for members of the ERT to enable them to efficiently and effectively respond to emergency incidents. The EPC Contractor will identify key personnel to receive training which will be conducted annually focusing on new members of the ERT. The training is to include, but not limited to the following:

- Firefighting
- First Aid
- Emergency Evacuation
- Medical and Environmental Emergencies
- Other subjects as required

6.5.6 Drilling

The ERM will ensure that the emergency operations must be rehearsed once every six months.

6.5.7 Review and Updating the CERP

The CERP shall be reviewed and amended annually or any time to:

- Correct deficiencies or inadequacies that are found.
- Reflect changes in the organizational structure of the ERT, contact lists, telephone numbers, and e-mail addresses. The ERM and ERT members will be responsible for the review and amendment process.

6.5.8 Operational Manuals

Members of the ERT will refer to the relevant operational manuals in their implementation of the response procedures in this CERP. The reference operational manuals include, but not limited to, the following:

- Operational Manual on Safety in Power Plant Construction
- Operational Manual on Specific Works (work at height, work in confined space, and work in places exposed to heat, etc.)
- Operational Manual on Firefighting and Evacuation at Construction Sites
- Operational Manual on First-aid and Initial Medical Treatment in Construction Site
- Operational Manual on Hazardous and Oil Spills Management

6.6 ARRANGEMENTS FOR OPERATING THE EMS

6.6.1 Responsibilities

There are two key groups with responsibility for environmental management of the Project:

- Project Proponent or Project Owner who manages the Project through a Project Manager.
- Contractor as the party undertaking the construction.

Responsibilities of each party in environmental management are as follows:

Project Proponent

The Project Proponent is legally responsible to MONREC and other line organizations responsible for specific environmental issues for environmental performance of the Project as prescribed as conditions in the ECC and other permits.

Specifically, the Project Proponent will have the following responsibilities:

- Supervise closely the Contractor in implementing the Contractor CEMP as an integral part of its project implementation management and construction supervision.
- Submit periodic monitoring reports to MONREC as required in the EIA Procedure.
- Notwithstanding the periodic monitoring reports to be submitted to MONREC, keep MONREC and other concerned authorities informed of any serious environmental events and responses to the events.
- Conducting periodic audit of environmental and social performances of the Contractor.

Contractor

The Contractor, including its approved sub-contractors, is contractually responsible to the Project Proponent for environmental performance of the construction as prescribed in the construction Contract.

Specifically, the Contractor will have the following responsibilities:

- Prepare a detailed Contractor CEMP for review and approval by the Project Proponent. The Contractor CEMP should follow the outline prescribed by the Project Proponent as proposed in ***Outline of Contractor's Environmental Management Plan***.
- Implement the mitigation measures during the construction through construction method statements and work instructions in strict conformance with environmental conducts prescribed in the Contract.
- Ensure that all process and environmental control equipment meet all technical specifications related to their environmental performance.

- Conduct periodic monitoring and reporting of its compliance with the environmental and social performance prescribed in the Contract.
- Ensure that its sub-contractors shall comply with the Contractor CEMP.
- Consistently update the Contractor CEMP and submit the updated version to the Project Proponent for approval.

6.6.2 Organizational Structure

As environmental management will be carried out as part of the Project management, it will be a functional unit in the project management organization. ***Figure 6.6-1*** shows a tentative organizational structure for Project construction consisting of an organizational structure of the Project Proponent and an organizational structure of the Contractor. The two organizational structures will need to be revised as appropriate as the Project moves from the planning stage to the design stage.

(1) Organizational Structure of the Project Proponent

The Project Proponent will establish a Project Management Office (PMO), headed by a Project Manager. The Project Manager will be responsible for the overall Project management to ensure that the Project construction will be completed on time and fully meet the requirements on scope, quality, budget and environmental performance of the Project construction. The PMO will have seven functional units: (i) contract management and administration; (ii) construction quality control (civil works); (iii) quality control (mechanical and electrical works); (iv) system performance control; (v) environmental, health and safety management; (vi) stakeholder management; and (vii) administrative support.

The EHS management and the stakeholder management functions are directly related to the implementation of the Project CEMP. The two functions cover the following tasks or activities:

EHS Management Function:

- Review the Contractor CEMP and environmentally-related construction method statements and work instructions prepared by the Contractor.
- Ensure that environmental monitoring activities of the Contractor are properly carried out and will generate reliable data.
- Inspect sites where environmental mitigation measures are implemented.
- Review periodic EHS reports submitted by the Contractor.
- Evaluate the Contractor's environmental performance.
- Prepare Project EHS performance reports.
- In consultation with the relevant quality control functional unit, prepare recommendations to the Project Manager on corrective actions related to environmental performance.
- Coordinating with government agencies concerned regarding monitoring environmental compliance of the Project.

- Make arrangements to facilitate site inspection by other agencies concerned.

Stakeholder Management Function:

- Design and implement an appropriate Corporate Social Responsibility (CSR) program for the Project.
- Process public complaints in accordance with the public grievance redress process.
- Carry out community and public relation activities to ensure acceptance of the Project by all key stakeholders of the Project.
- Coordinate with the EHS Manager in making arrangements for site visit or inspection by the Project stakeholders.

(2) Organizational Structure of the Contractor

The Contractor will establish a Contractor Project Management Office (CPMO), headed by a Contractor Project Manager. The Contractor Project Manager will be responsible for the overall management of Project construction, testing and commissioning of the power plant and associated facilities to ensure that the Project construction will be completed on time and fully meet the requirements on scope, quality, budget and environmental performance. The Contractor may have a certain organizational structure but the EHS function is required.

The construction management and the EHS management functions are directly related to the implementation of the Contract-specific or Contractor CEMP. The two functions cover the following tasks or activities:

(a) Construction Management Function

- Translate environmental mitigation measures into construction method statements and work instructions for engineers and foremen to carry out.
- Closely supervise construction activities with environmental impacts and implementation of mitigation measures to ensure residual environmental impacts will be within permissible limits.
- Ensure full compliance with all environmental management covenants in the Contract.
- Coordinate and facilitate environmental monitoring activities of the EHS personnel.

(b) EHS Management Function:

- Review the Project CEMP and prepare a Contract specific CEMP.
- Update the Contractor-specific CEMP as needed to reflect the latest changes in construction plan or schedules.
- Prepare environmentally-related construction method statements and work instructions in consultation with the construction management functional unit.

- Carry out environmental monitoring of construction activities as prescribed in the monitoring schedules in the Contract-specific CEMP.
- Closely supervise the implementation of environmental mitigation measures in collaboration with the construction management functional unit.
- Prepare periodic EHS performance reports for submitting to the Project Proponent.
- Coordinate with the EHS management functional unit of the Project Proponent to facilitate site inspection or visits of officials from government agencies, and representatives of communities in the vicinities.
- Cooperate with the Project Proponent in investigations related to public complaints.
- In consultation with the construction management functional unit, prepare recommendations to the Contractor Project Manager on corrective actions related to environmental performance.
- Carry out environmental monitoring during the commissioning of power plant system and prepare an environmental performance report of the power plant.

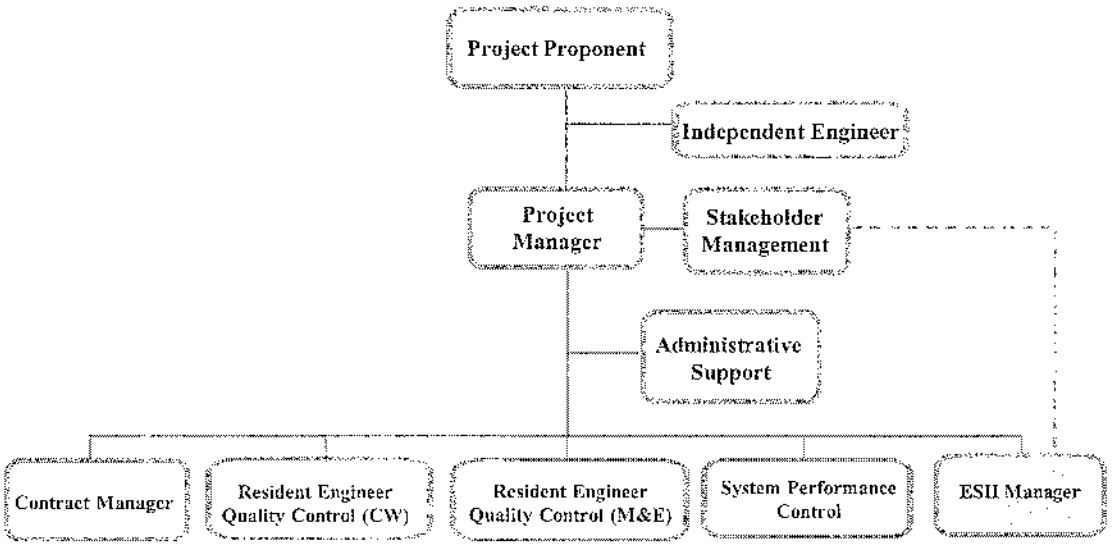
It should be noted that environmental management during the system commissioning will be included in the OEMP. The power plant operation and maintenance team will participate in the commissioning and will take over the power plant and associated facilities once the technical and environmental performance of the power plant is accepted.

The Project Management team will support the power plant O&M team during the transition phase between construction and operational phases. In particular, the Project Management team is responsible for the sign off construction and post construction resource consent and designation conditions, handover of environmental monitoring data and reports and compliance and audit reports before the Project is handed to the O&M team.

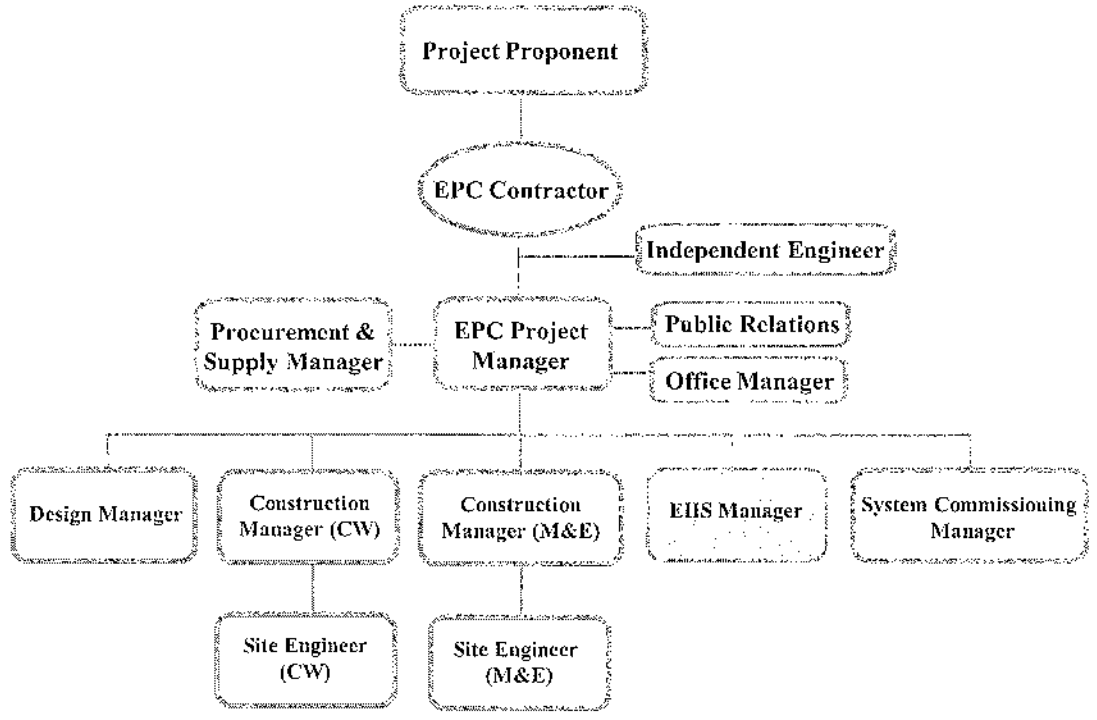
6.6.3 Documentation

All documents generated in environmental management and references used will be systematically filed and maintained as part of the Project documentation system. The Contractor is required to design and establish an appropriate documentation system for environmental management as an element of its project documentation system which is an integral element of its project management information system. The documentation system will include an appropriate document control procedure.

The Contractor will ensure that the Project Proponent will have a convenient access to its documentation system for environmental management. The documentation system will provide information for environmental audit of the Contractor. Details on the access to the documentation system and documentation control related to the Project Proponent will be worked out by the Contractor and presented in its CEMP.



Project Management Structure



EPC Contractor's Project Management Structure

FIGURE 6.6-1: ORGANIZATION FOR PROJECT CONSTRUCTION

6.6.4 Communication Plan

Environmental management of the Project construction will involve communication, both internally and externally. Clear, concise and timely communications are important to the achievement of the objectives of environmental management.

Internal communication will involve: (i) communications within PMO; (ii) communications within CPMO; and (iii) communications between PMO and CPMO. External communication will involve communications between PMO and stakeholders and the public. Communications between CPMO and stakeholders will need to receive prior concurrence of PMO.

Communications relevant to environmental management of the Project construction will clearly be a part of the project communication.

(1) Objectives of Communication

Internal Communication

The objective of internal communication within PMO and CPMO is to ensure efficiency of environmental management of the Project construction.

The objective of internal communication between PMO and CPMO is to ensure efficiency in monitoring and control environmental management performance of the Contractor, which leads to efficient environmental management of the Project construction.

External Communication

The objective of external communication between PMO and MONREC and other concerned government authorities is to comply with the reporting requirements prescribed in the EIA Procedure.

The objectives of external communication between PMO and communities around the Project site as well as mass media and Non-Governmental Organizations (NGOs), if any, are to: (i) ensure adequate and correct understanding of environmental impacts of the Project; and (ii) keep the stakeholders closely informed of the Project's efforts in environmental management and environmental performance of the Project construction. The bottom line is to create trust among the stakeholders in the Project's determination and commitment to environmental management to enable the Project to exist in harmony with the environment and communities.

(2) Topics of Communication

Major topics of communication include:

- Scope of construction
- Construction schedule
- Environmental impacts and mitigation measures
- Environmental policy, objectives, and targets
- Environmental management roles and responsibilities
- Legal requirements and environmental quality standards

- OCEMP
- CCEMP
- Results of environmental monitoring and performance evaluation
- Hazards and emergency situation
- Mechanisms for grievance redress, queries, comments, or complaints from stakeholders

As communication involves providing information, information requirements related to the above communication topics for various communicating parties will need to be identified. Internal and external communications will have different information requirements as they have different objectives. ***Table 6.6-1*** presents a tentative information requirements for the internal and external communications.

(3) Methods of Communication

The internal communication will use informal communication, formal communication through meetings, and formal correspondence in writing through e-mail or letters, notice boards, and formal notifications or instructions. The methods of communication will follow the methods of project communication.

The external communication will use a variety of methods depending on the purpose of communication and the stakeholders. The methods of communication will follow the methods of project communication.

TABLE 6.6-1

INFORMATION REQUIREMENTS FOR INTERNAL AND EXTERNAL COMMUNICATIONS IN ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION

Information	Communications	
	Internal	External
Basic Information		
Corporate's environmental policy on project construction	√	√
EIA Report	√	√
Owner-CEMP	√	√
MONREC's EHS requirements or conditions attached to the issuance of ECC	√	√
Contractor-CEMP	√	√
EHS's specification and clauses in the EPC contract	√	
Construction schedule	√	√
Project EMS	√	
Project management organization-Owner	√	√
Construction management organization-Contractor	√	√
Information Generated in EHS Management		
Daily, weekly and monthly site inspection reports	√	
Environmental monitoring results	√	√
Minutes of project review meetings-EHS	√	
Monthly monitoring reports	√	
Minutes of Tripartite Committee's meetings	√	√
Complaints register and response	√	√
Reports on visits by media and stakeholders for environmental purposes	√	
Environmental incident reports	√	√
Corrective action reports	√	√
Biannual monitoring reports submitted to MONREC	√	√

(4) Responsibilities

Project Proponent

The EMS Manager of the Project Proponent is responsible for:

- Communicating the Project's environmental policy, commitments and procedures to all project management staff

- Communicating roles and responsibilities for environmental management and the results of monitoring activities carried out by the Contractor

- External communications with stakeholders under the supervision of the Project Manager

- Preparing a list of information to be provided in external communication and persons with authority to release the information

- Recording the external communication on an External Communication Log and tracking any pending matters

- Supporting the Project's public relation activities through providing environmentally related information

The Contractor

The EMS Manager of the Contractor has the following responsibilities:

- Communicating the Project's environmental policy, commitments and procedures to all project management and construction personnel

- Communicating roles and responsibilities for environmental management and the results of monitoring activities to all personnel

- Providing information support to the Project Proponent's EMS Manager for use in external communication with stakeholders as well as in internal communication

(5) Management Review

This CEMP will be consistently reviewed and updated by the EMS Manager or the Project Manager to ensure that it adequately responds to the construction progress and changes in the construction schedule and methods, if any.

6.7 REVIEW OF THE CONTRACTOR CEMP

The Contractor CEMP will be consistently reviewed and updated or amended to ensure that it remains adequately responsive to the construction progress and changes in the construction schedule and methods, if any.

The amendment of the Contractor CEMP could be initiated by the Contractor EHS Manager or Project Manager, or could be requested by the Owner Project Manager. The need for amending the Contractor CEMP will be triggered by the following:

- Environmental performance falls much below the benchmarks
- Construction methods will be changed
- Environmental quality standards and requirements have been upgraded by NDPCEI
- There will be changes in the scope of construction, design, or site

The review and updating or amendment of the Contractor CEMP will follow the following procedure:

A. The amendment is initiated by the Contractor

1) The Contractor will submit the proposed changes to the Owner Project Manager for review and approval. The Owner EHS Manager will support the Owner Project Manager in reviewing the proposed changes and their implications on environmental performance of the construction.

2) The proposed amendments will be recorded in accordance with the established document control system. The Owner Project Manager will undergo the contract variation procedure to effect the changes in the Contractor CEMP.

B. The amendment is initiated by the Owner

1) The Owner ESH Manger or the Owner Project Manager could see the need for amending the Contractor CEMP. The EHS Manager will recommend the needed changes to the Project Manager.

2) The Power Plant Manager will review the recommendations and assess their implications on environmental performance of the construction. The Power Plant Manager will make a decision on the recommended revisions.

3) If the proposed amendment is approved, the Owner Project Manager will request the Contractor to amend the Contractor CEMP. The changes will be recorded in accordance with the document control system.

4) A contract variation will be issued, if necessary. For minor changes, contract variation would not be necessary. An addendum signed by the owner and the contractor project managers will be added to the amended Contractor CEMP.

6.8 PUBLIC CONSULTATION AND DISCLOSURE

6.8.1 Organization for Public Consultation

Establishment of Grievance Redress Mechanism

The Project proposes to establish grievance redress process as the main mechanism for public consultation and disclosure to ensure that public complaints and concerns related to the construction will be effectively addressed as soon as possible.

Structure

The key persons to mechanize grievance redress will be the same group as the Community Participatory Committee (CPC), comprising 15 members of:

- Five Representatives of government sectors, one from each agency, comprising MONREC/ECD, Department of Electric Power (DOEP) of Tanintharyi Region, Dawei District, Yebyu Township and Launglon Township.
- Eight representatives of four communities of Nga Pitat, Nyaun Bin Seik, Mudu and Ka Myaing swea, 2 from each community.

- Two representatives of the Project Proponent. They have authority to make a decision on behalf of the Project Proponent and power plant.

Roles and Responsibilities

Roles and responsibilities of the CPC [1] has been defined as majority on cooperation with the Project Proponent in following activities:

- Public relations for the Project
- Building understandings and good relationship between the Project and the surrounding communities
- Participation in monitoring of the Project impacts and mitigation measures
- Receiving and addressing complaints arisen from the project impacts
- Resolving conflicts between the Project and the locals
- Coordinate among government sectors, the Project, communities and other stakeholders

6.8.2 Information Disclosure

Information to be disclosed during the Project construction phase will be monitoring reports as required in Article 110 of the EIA Procedure shown below.

The Project Owner shall within ten (10) days of completing a monitoring report contemplated in Articles 108 and 109 in accordance with EMP schedule make the report publicly available on the Project's website, at a designated public office as agreed with the Ministry and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor.

The Owner PMO will make arrangements for the disclosure of monitoring reports in compliance with the above legal requirements. In addition, information on environmental management will be disclosed to the proposed tripartite committee.

6.8.3 Grievance Redress

A grievance redress process will be established and implemented as part of project management by the PMO. The process is shown in a diagram in ***Figure 6.8-1***. Each step of the process is clearly explained in the diagram. The process will enable efficient management of grievance redress or response to complaint related to EHS of the Project construction.

[1] Refers to Establishment of a Community Participatory Committee in Section 6.4.7 Stakeholders' Negative Attitudes toward the Project of Chapter 6 of ESIA Report.

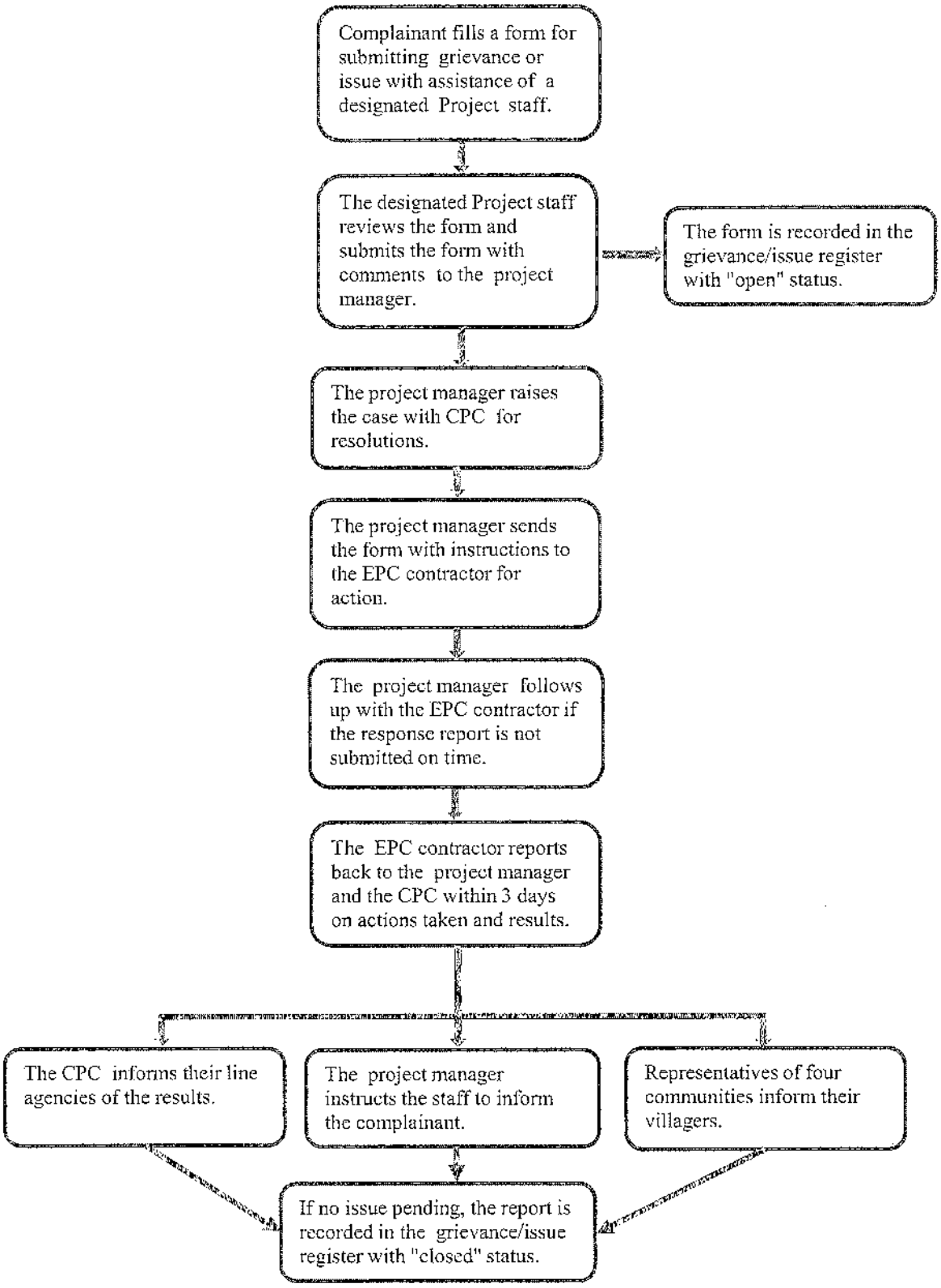


FIGURE 6.8-1 : GRIEVANCE MANAGEMENT PROCESS

6.9 CORPORATE SOCIAL RESPONSIBILITY

Corporate Social Responsibility (CSR) will be established and implemented by the Project Proponent, aiming to cooperate with the stakeholders for mutual understanding.

6.9.1 Objectives

The main objectives are as follows:

- To disseminate the project information to the stakeholders throughout the Project life
- To monitor the Project impacts which may affect to the locals continuously
- To be communication channel for the others to the Project
- To support and promote communities' activities, including local authorities

6.9.2 Approach

CSR will be implemented throughout the Project life, covering pre-construction, construction, operation and decommissioning phases. In principle, the Project Proponent will put all efforts to determine CSR program to match requests of the stakeholder, especially local communities. The following is a list of activities which could be included in the CSR program.

(1) Establishment of Channel for Public Relation and Information Disclosure

Public Relation and Information Disclosure will be developed and undertaken through several channels such as:

- Local media
- Notice board at visible locations
- Placement of leaflet at various places
- Meeting
- Participate local activities such as traditional festival
- Visit the communities
- Open house of the Project
- etc.

(2) Involvement in Grievance Redress

A grievance redress process is illustrated in a diagram in ***Figure 6.8-1***. CSR will assist to manage the grievance redress or response to complaint related to the Project impacts.

(3) Establishment Good Relationship with Communities

The Project will establish good relationship with communities by supporting communities' activities, comprising:

1) Education

The Project will provide appropriate educational supports to the schools, particular in the responsible area of 5 km radius from the Project site, namely Nga Pitat, Nyaung Bin Seik, and Mudu including Ka Myaing swea. The support will be designed to meet the needs to the locals.

2) Health Care and Sanitation

The Project will promote and support communities on environmental care, health care, sanitation system.

3) Religions and Culture

The Project will cooperate with local authorities, communities' leaders and villagers in the responsible area to support on religious, traditional and cultural festivals as identified by the locals.

4) Socio-Economic Condition

Support on socio-economic condition will be in form of:

Employment Opportunity

The Project will hire the qualified locals as many as possible. This aims to support the locals and boost up local economy.

Occupation Promotion

The Project will support on occupational trainings which are suitable to local circumstances. Therefore, agricultural training such as crop and livestock production will be organized for villagers in Mudu and Ka Myaing swea. Nyaung Bin Seik will be included as villagers also practice cultivation.

For handicraft promotion, the Project will organize training to scale up the skill of bamboo and rattan weaving as these already exist in the villages.

As occupation of Nga Pitat and Nyaung Bin Seik are mainly fisheries, the support will be on creating value added of fishery products. It will be in form of processing and preservation of fisheries by utilization and adaptation from local resources.

Gender Development

The Project will support particular skill training to women and girls in the responsible area. Emphasis will be on food processing, food preservation and food preparation from local products, natural resources, agriculture and fishery. Hygiene and sanitation will be included in the training. These will not only assist them to have better

nutrient value of the food, but also generate income by mean of selling processed and preserved food.

(4) Regular Meeting with Communities

Regular visit to the locals will provide opportunity to acknowledge problems arisen from the Project implementation, and build up mutual understandings in the responsible area.

(5) Reporting on Results the Project Implementation, Mitigation Measures and Monitoring

The Project will report these results to concerned authorities and communities.

(6) Involvement in Solving Problems As Promise to the Communities

This will encourage the stakeholders to have confidence in the Project.

(7) Continuation of Activities

The Project will review CSR plan and activities annually. Improvement and adjustment will be carried out as necessary for better efficiency of implementation.

6.9.3 Budget

The proposed budget for social environmental management (CSR Program) will be officially carried out for disclosure the project information to the public, communication channel, including receiving complaints and setting the solutions, and support community activities; e.g. education, health, religious, culture, occupation promotion, and gender development over the construction period. Total cost of CSR Program is provisionally estimated, as shown in ***Table 6.9-1***.

TABLE 6.9-1

BUDGET ESTIMATE FOR SOCIAL ENVIRONMENTAL MANAGEMENT (CSR PROGRAM) DURING SIX YEARS OF CONSTRUCTION PHASE

Cost Items	Monitoring Activities	Unit Cost		Annual Budget (US$)	Total Budget for 6 Years (US$)
		US$	Unit		
Social Environmental Management Plan	- Disclosure the project information to the public - To be communication channel, including receiving complaints and setting the solutions - Community activities; e.g. education, health, religious, culture, occupation promotion, and gender development	10,000	Lump sum	10,000	60,000

6.10 ENVIRONMENTAL RISK MANAGEMENT

Environmental risk management is to be carried out as part of the Project risk management. ***Chapter 6, Section 6.7*** of ***ESIA Report*** on environmental risk assessment identifies and assesses environmental risks during the construction phase. Each major environmental risk will be documented in an Environmental Risk Register (ERR). The ERR is to be maintained and regularly updated and reassessed to allow all significant aspects to be identified. The Risk Register will allow the Project team to monitor risk factors, update the risk assessment, and make changes to the risk mitigation measures and controls accordingly to ensure efficient risk management. It should be noted that an emergency plan is essentially a risk mitigation measure.

6.11 AUDIT

External EHS audits will be undertaken at the end of first year of the construction period and at physical completion of the construction. These two audits will be undertaken by external Environmental Auditing Consultants to review the overall implementation and effectiveness of the CEMP, related site specific plans, procedures and associated documentation and overall standard of onsite compliance with legislative requirements.

Audit reports, action plans and any other documentation stemming from the audit process shall be kept for a minimum of five years. The EHS Manager will be responsible for site filing of these documents.

CHAPTER 7

OPERATIONAL PHASE EMP

CHAPTER 7

OPERATIONAL PHASE EMP

7.1 OBJECTIVES OF THE OEMP AND DEMP

Environmental management in the operational phase and decommissioning will be carried out by a power plant Operation and Maintenance (O&M) organization to be established by the Project Proponent. The objective of environmental management of Project operation is to ensure that O&M of the power plant and its associated facilities will not create significant impacts and will meet all applicable standards and guidelines and requirements prescribed as conditions for issuing an Environmental Compliance Certificate (ECC) and the operation permit.

In order to ensure that the Project will not create and impacts during decommissioning operation, the decommissioning EMP is prepared in addition.

The key objective of the Operation EMP (OEMP) and decommissioning EMP (DEMP) presented in this section is to establish a clear operational framework for environmental management during these two phases of the Project. The Engineering Procurement Construction (EPC) Contractor will then use this OEMP and DEMP to prepare a more detailed OEMP and DEMP which will be based on the detailed designs of the power plant, results of the commissioning, and O&M details. The detailed OEMP and DEMP will be reviewed and revised as appropriate by the power plant O&M team to reflect actual conditions during commercial operation.

7.2 MITIGATION MEASURES AND PLANS

The EIA study (***Volume I-ESIA Report*** in ***Chapter 6***) confirms that O&M of the power plant and its associated facilities will not create any significant environmental impacts. Environmental management in the operational phase will cover the following tasks: (i) scheduled monitoring of air quality, noise, wastewater management; (ii) OHS management; (iii) Corporate Social Responsibility (CSR); (iv) mangrove management; and (v) emergency management. ***Appendix 7A*** presents sub-plans of the seven tasks.

Environmental management in the decommissioning phase will cover the following tasks: (i) scheduled monitoring of air quality, noise, waste management; (ii) traffic management; (iii) OHS management; and (iv) social environmental management. ***Appendix 7B*** presents sub-plans of the six tasks.

The sub-plans will be working documents and as such they will be reviewed and amended or updated as deemed necessary.

7.3 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

The power plant O&M organization will set up an EMS for its O&M activities. The final OEMP and DEMP will therefore be the core document of the EMS. The OEMP and DEMP will be implemented by the power plant O&M team as part of the O&M of the power plant. During the operational and decommissioning phases, environmental management activities will be routine and the power plant organization will be responsible for environmental performance of the power plant.

7.3.1 Monitoring, Evaluation and Reporting

7.3.1.1 Scheduled Environmental Monitoring and Evaluation

Before commencing the commissioning of Project facilities, the Contractor will review and update existing data on relevant baseline environmental condition, particularly at locations expected to be affected by the power plant operation and decommissioning.

Scheduled monitoring of environmental performance is required throughout these two phases of the Project, including the commissioning, to evaluate compliance with legal requirements, the environmental management objectives, and relevant policies, standards and guidelines. The monitoring and evaluation will enable the overall effectiveness of the environmental controls to be determined and allow areas of non-compliance to be identified so that corrective actions can be taken. The environmental monitoring plan is included in each sub-plan.

Environmental monitoring will be undertaken according to the following:

- The power plant's EHS Manager will be responsible for implementing the monitoring plans, and arranging training and specialist consultants for the monitoring as required.
- The monitoring will be conducted by the power plant's EHS Manager using the generally accepted methods shown in the monitoring plan.
- Environmental results not meeting the required standards will be managed as per the corrective action process.
- The Power Plant's EHS Manager will report the non-compliances to the Power Plant Manager and will advise the Power Plant Manager corrective actions to eliminate the non-compliances.

7.3.1.2 Site Inspections

In addition to scheduled environmental monitoring, the EHS Manager will conduct daily, weekly and monthly general inspections of the power plant site and facilities, including the gas pipeline. The objectives are to early identify or detect factors which, if unattended to, could result in major environmental events and/or non-compliances. A general scope of inspections is outlined in ***Table 7.3-1*** and ***Table 7.3-2***, and it will need to be updated by the EHS Manager before commencing the commercial operation.

TABLE 7.3-1

OUTLINE OF SITE INSPECTION PLAN IN OPERATION PHASE

Inspection Focuses	Daily Inspections	Weekly Inspections	Monthly Inspections
Cleanliness	√	√	√
Tidiness	√	√	√
Sanitation conditions of canteen and toilets	√	√	√
Condition of wastewater treatment facilities	√	√	√
Condition of green areas		√	√
Condition of CEMS	√	√	√
Condition of drainage system		√	√
Condition of gas leak detection system	√	√	√
Storage of hazardous materials	√	√	√
Noise level in the working areas	√	√	√
Temperature in the working areas	√	√	√
Operator's use of protective equipment	√	√	√
Conditions of emergency response equipment	√	√	√
Compliance with OHS requirements			√
Risk Triggers	√	√	√

TABLE 7.3-2

OUTLINE OF SITE INSPECTION PLAN IN DECOMMISSIONING PHASE

Inspection Focuses	Daily Inspections	Weekly Inspections	Monthly Inspections
Cleanliness	√	√	√
Tidiness	√	√	√
Sanitation conditions of worker accommodation (if any)		√	√
Storage of hazardous materials		√	√
Fugitive dust	√	√	√
Ambient noise level	√	√	√
Safety in work places	√	√	√
Operator's use of protective equipment	√	√	√
Compliance with OHS requirements			√
Refuse disposal	√	√	√
Drainage	√	√	√
Waste disposal	√	√	√
Risk triggers			√

The daily inspections will be informal visual inspections to observe conditions of the power plant and its associated facilities. For operational phase, the focus will be on the noise and temperature in the working areas, functioning of the wastewater treatment facilities, and conditions of fire and safety equipment. For decommissioning phase, the focus will be on the air quality, noise, waste and traffic in the working areas, including conditions of safety equipment.

The weekly inspections will be formal visual inspections in more details than the daily inspections.

The EHS Manager will be responsible for the daily and weekly site inspections. The Operation Manager will participate in the weekly site inspections, and occasionally in the daily site inspections.

The monthly inspections will be conducted in more detail than the weekly inspections. The monthly inspections will also include risk triggers identified in the environmental risk management plan. The monthly inspections will be conducted jointly by the EHS Manager and the Operation Manager.

7.3.2 Environmental Incidents

7.3.2.1 Definition of an Environmental Incident

In addition to scheduled environmental monitoring, the monitoring will also need to include environmental incidents. An environmental incident during Project operation and decommissioning is an occurrence which has (or potentially could have had) a negative or adverse effect on the environment. An adverse effect is something that causes (or could have caused) environmental harm. An environmental incident can also be a deviation from a requirement or practice prescribed in the operation manual or the detailed OEMP and DEMP. The occurrence of an environmental incident indicates a failure to follow the established process or procedures that help the Project achieve best practice (e.g. failure to report a spill). Some environmental incident could create an emergency, i.e. its impact is so serious that it has to be promptly dealt with. Potential environmental incidents and emergencies are identified in the environmental risk assessment for the operational and decommissioning phases in ***Chapter 6 of ESIA Report.***

7.3.2.2 Environmental Incident Form

An environmental incident, once noted, has to be recorded in an Environmental Incident Form (EIF). A standard Environmental Incident Form (EIF) template will be used for all site specific activities throughout the operation of the Project. An Environmental Incident Form is proposed in ***Appendix 7C.***

7.3.2.3 Environmental Incident Register

The EHS Manager will input all data from completed EIFs as soon as possible to generate an Environmental Incident Register (EIR). A standard Environmental Incident Register (EIR) will be controlled by the EHS Manager. It will contain all environmental incidents occurring during the operations and decommissioning of the power plant, and gas pipeline. The EIR will be discussed regularly at the monthly environmental performance review meetings. The meetings will discuss the corrective actions taken and the preventative measures that have been put in place.

7.3.3 Monitoring Reports

Two types of monitoring reports will be generated in the environmental monitoring and site inspections. The first type is reports generated for internal use to provide feedback to the EMS. The second type is reports generated for submission to MONREC.

7.3.3.1 Internal Monitoring Reports

Site Inspection Reports

The EHS Manager will record results of the daily inspections in daily site inspection notes. The EHS Manager and the Operation Manager will review the daily site inspection notes on a weekly basis to confirm that the checks and subsequent required works are being carried out, and additional inspections are included.

For weekly inspections, the EHS Manager will present results of the inspections in weekly site inspection reports for discussion in the weekly operation review meetings. Both the daily inspection notes and weekly inspection reports will highlight factors or events that could lead to non-compliance and will need attention of the Plant Manager.

The EHS Manager will prepare monthly site inspection reports as part of the monthly environmental monitoring reports.

Environmental Monitoring Reports

The EHS Manager will prepare monthly environmental performance reports for submission to the Plant Manager. The monthly environmental monitoring report will concisely present (i) results of scheduled environmental monitoring and site inspections carried out during the month; (ii) identified non-compliance, if any, and causes of the non-compliance; (iii) complaints received; (iv) environmental incidents; (v) associated investigations and corrective actions taken; (vi) proposed changes to the monitoring plan, if any; and (vii) work program for the following month.

The monthly environmental performance reports will be discussed in the monthly operation review meetings.

7.3.3.2 Monitoring Reports for Submission to MONREC

Based on the monthly internal monitoring reports and results of the monthly review meetings, the EHS Manager will prepare a project environmental monitoring report of OEMP every six months for submission to MONREC while only once for DEMP when completion of the decommissioning. This report as prescribed in the EIA Procedure (Article 109) will contain the following:

- Documentation of compliance with all Conditions
- Progress made to date on implementation of the EMP against the submitted implementation schedule
- Difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties
- Number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation
- Accidents or incidents relating to the occupational and community health and safety, and the environment
- Monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required

7.3.4 Corrective Actions

The Operational Manager or the EHS Manager will be instructed by the Plant Manager to take corrective actions if EHS non-compliances are identified. Taking corrective actions in managing EHS aspect of the power plant operation will be a part of power plant operation management and use the same procedure for taking corrective actions in managing other aspects of the power plant operation. The procedure proposed in these OEMP and DEMP will therefore have to be reviewed and revised as necessary to make it similar to the procedure for other aspects of the power plant management. A single procedure for taking corrective actions should be used in the power plant management.

A. Categories of Non-Compliances

Non-compliances cover non-compliance with legal requirements, non-conformance with internal requirements of the Project, inadequate environmental performance, environmental incident, and complaints or grievances received from the public. Non-compliances could be identified from the following:

- External EHS audits
- Internal EHS audits
- Site inspection notes and reports
- Scheduled environmental monitoring
- Complaints, grievance or inquiries registers
- Environmental incident registers

- Specific environmental studies and reports
- Directives from MONREC/ECD or other government authorities
- Review meetings
- Recommendations from any power plant personnel and stakeholders, which are considered by the EHS Manager and the Plant Manager to warrant investigation.

EHS non-compliances can be identified, ranked and recorded at three levels. Once the level of a non-compliance has been established the appropriate tool shall automatically be selected for closing out the non-compliance. The actions required for each are detailed below; also a temporary work suspension for cause may be enforced in case of Level A or B non- compliances.

Level A: A critical non-compliance situation which has the potential for an extreme health and safety incident, significant impacts on ambient air quality and water quality, and disregard of conditions attached to the operation permit. Intentional disregard of plant operation and maintenance procedures and standards which may lead to a serious ESHS incident is also classified as Level A.

Level B: A non-compliance situation not consistent with the original requirements but not believed to present an immediate threat to an identified important resource, community or employee health and safety.

The non-compliance may also be of a procedural nature where the operational personnel have failed to implement specified requirements and actions. In this case, the Plant Manager, the Operation Manager, or the EHS Manager, depending on the nature of non-compliance, may need to take actions to ensure the procedural requirements are effectively implemented.

B. Responsibilities and Process

The EHS Manager will be responsible for identifying and ranking EHS non-compliances. However, all plant personnel are encouraged to help identify EHS non-conformance.

The EHS Manager will take actions according to the category of non-compliances.

For Level A Non-Compliance: The EHS Manager will report the identified non-conformances to the Plant Manager with recommendations on corrective actions and instructions for taking the corrective actions.

For Level B Non-Compliance: The EHS Manager or the Operation Manager will take appropriate corrective actions.

The Plant Manager will be responsible for:

- Issuing instructions to the EHS Manager or the Operation Manager to take corrective actions within a given timeframe
- Follow up on the progress of corrective actions
- Evaluate the results of corrective actions

The EHS Manager or the Operation Manager will conduct an investigation of the non-compliance under their responsibility to determine its root causes and formulate effective actions to correct the root causes.

For Level B Non-compliance, the EHS Manager or the Operation Manager will submit a brief note on corrective actions to be taken to the Plant Manager.

For Level A Non-compliance, the EHS Manager and the Operation Manager will submit a brief report on the results of investigation and proposed corrective actions to the Plant Manager.

The EHS Manager will prepare a non-compliance report to close the case.

C. Corrective Action Request

Instructions to the EMS Manager or the Operation Manager will be in the form of Corrective Action Request (CAR). The CAR will contain: (i) information sources on non-compliance; (ii) description of non-compliance; (iii) category of non-compliance; (iv) originator; and (v) time frame for corrective actions.

The corrective action requirements will be included in the requirement tracking system of the power plant management information system.

D. Non-Compliance Report

The EHS Manager will prepare a brief non-compliance report based on the CAR and results of taking corrective actions. The non-compliance report will contain: (i) information in the CAR; (ii) corrective actions taken; (iii) implementation period; (iv) results; and (v) recommendation for further actions, if any. The non-compliance report should be in one or two pages in a Form to be designed.

Each and every non-compliance report will be closed out on a case by case basis.

Non Compliance Report Forms will be verified and closed out by the EHS Manager or his designee. Correspondence referring to a proposed course of action shall be referenced and attached to the Non Compliance Report Form as appropriate and stored within the power plant documentation system.

7.4 EMERGENCY RESPONSE PLAN

Although the power plant O&M is considered safe, it is probable that emergency situations could occur such as fast spreading fires, explosions, bursting of gas or steam pipes, gas leakage, including natural disaster of storm, flood or even tsunami. These emergency situations could seriously affect the power plant's operation, and could result in damages to properties and injuries of plant personnel. The emergency situations therefore need prompt and effective response to return the power plant to normal operation as early as possible and minimize damages to properties and injuries of personnel.

The Project Proponent has already prepared the Emergency Response Plan since an early stage of the Project, at pre-construction and construction phases. The plan will be

submitted to Natural Disaster Management Committee of Division/State Government and for approval. The plan also covers the operational and decommissioning phases. Details are shown in ***Section 6.5*** of ***Chapter 6*** of ***EMP Report***.

7.4.1 Prevention Plan and Fire Restrain Causing by Natural Gas

(1) Objectives

- To prevent fire and explosion due to natural gas leaked and explosion
- To effectively prepare and operate during fire

(2) Basic Data should be Known

To secure safe natural gas operation, gas properties which may cause danger should be known. They are:

- Property of natural gas which cause danger
- Danger causing by natural gas
- Practices when entering into danger zone
- Precaution for a case of gas leakage
- Examination of probable gas leaking position
- Repairing and maintenance of gas flowing equipment and pipe

7.4.2 Fire Fighting Plan

The gas leaked could cause fire and/or explosion. Precise firefighting plan including regular practice of fire escape will be necessary and helpful to control and resolve the situation back to normal. These include:

(1) Practice during Working Hours

The power plant manager will determine the level of emergency whether it is level 1 or level 2. Emergency cause is classified into two levels as follows:

Emergency Level 1

A case occurs in the areas of the Project site that the Project can control the situation and limit the damage with support of employees and workers, available fire extinguisher devices until the situation turns to normal stage. Fire Fighting Plan Level 1 is shown in ***Figure 7.4-1***.

Emergency Level 2

A case occurs both inside and outside the Project site. In case the Project manager determines that supporting plan of emergency level 1 cannot be used. He must request support both manpower and equipment from other agencies to control the situation. Fire Fighting Plan Level 2 is shown in ***Figure 7.4-2***.

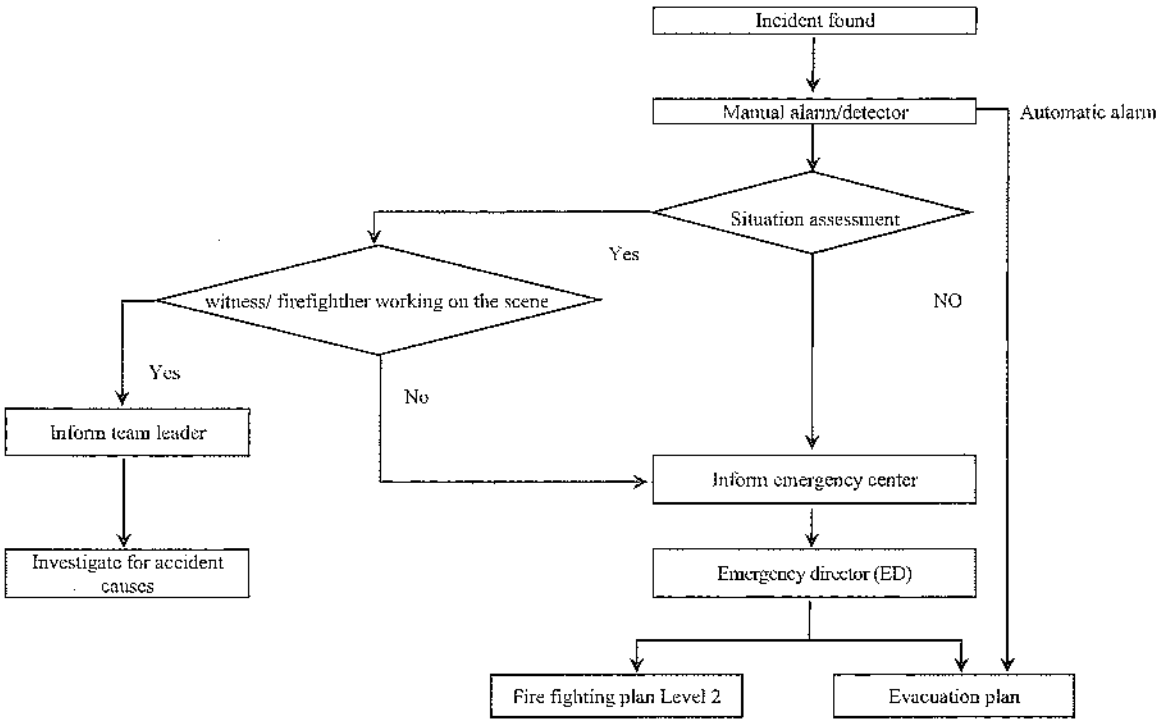


FIGURE 7.4-1: FIRE FIGHTING PLAN LEVEL 1

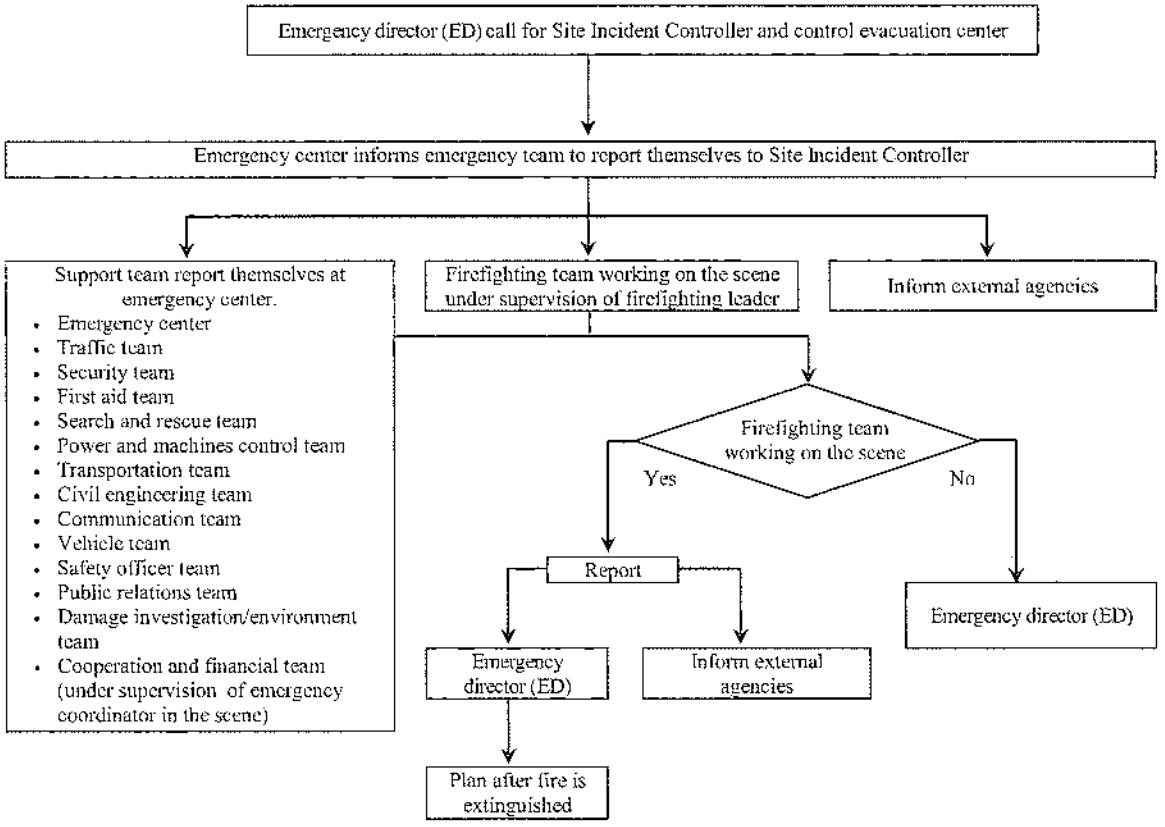


FIGURE 7.4-2: FIRE FIGHTING PLAN LEVEL 2

The manager will instruct to control the situation and protect equipment, machinery including evacuate people to safety zone. Official instructions which are frequently used include contacting fire brigade station, prepare to transport injured persons to the hospital, operation firefighting team, evacuation people from accident to assembly point, closing of traffic, closing entrance-exit of the power plant, etc. In addition, trained employees of each team will work together as follows:

- **Standby Employee**

Employee working during working hours will be responsible for maintaining fire extinguishing devices and preparing firefighting fire when instruction announce.

- **Fire Fighting Chief**

Firefighting chief will be responsible for controlling and instructing firefighting team to practice effectively. Therefore, the chief must report fire situation to an emergency director to request for support and coordinate with standby employees. However, an assigned staff must inform an emergency director to request manpower support or announce when situation becomes at Emergency Level 2.

- **Fire Fighting Team**

Firefighting Team consists of employees who are well trained on using fire hydrant and chemical fire extinguishing tank. The team will be responsible for squirting water or chemicals after receiving an instruction from an assigned staff. The team will take function to support firefighting officer in the area where fire arises severely.

- **Fire Fighting Device Team**

Firefighting device team consists of employees who are trained on using fire extinguisher devices such as opening fire hose cabinet, releasing fire hose, connecting fire hose with fire hydrant, preparing chemical extinguisher and firefighting materials such as helmet, shirt, gloves, shoes and communicating devices. Therefore, this team will be responsible for examining fire extinguishing device to be ready for use during working hours.

- **Water Fire Extinguishing Team**

Water fire extinguisher team consists of employees who are trained on using fire pump such as pump controller, electric motor fire pump and engine fire pump.

- **Survey and Evacuation Team**

Evacuation team consists of employees responsible for counting number of employees, taking them to safety zone (an assembly point), surveying injuries and taking the injuries to first aid team.

- **First Aid Team**

First aid team consists of employees responsible for first aid treatment, first aid device preparation, spinal board preparation, preparing to transport injured persons

to the hospital, contact the hospital, moving patient by using spinal board, conducting temporary splint first aid treatment for patient before taking to hospital.

- **Security Team**

The security team during fire will control traffic within the power plant site by setting barriers, managing route for fire trucks approaching accidental place by clearing obstructing vehicles, preventing property of the power plant, prohibiting unauthorized people to enter into accidental area, and managing obstructing vehicles.

(2) Practice during Off-Hour

Workers or employees facing an accident must determine whether he himself can resolve the accident or not. If not, the workers or employees must inform a central controlling building and emergency director to request for support immediately. A periodic chief will be an emergency director determining the accident when low number of employee works during off-hour. In case an accident is determined at Emergency Level 2, the director must immediately inform fire brigade station. Then, the director will also inform employees who are working, firefighting team and first aid team. He will instruct to perform the same as practicing. If there are injuries, the director must inform the hospital and transport them there. In addition, the director will cut off electricity around water squirting areas. Then, the director will report the situation of accident to a power plant manager and employees concerned as follows:

- **Standby Employee**

An employee working in irregular hours will be responsible for maintaining fire extinguishing devices and preparing for firefighting when a periodic chief gives instruction to him.

- **Fire Fighting Chief**

Firefighting chief will be responsible for receiving instruction from emergency director and collaborating with firefighting team. In addition, the chief will report fire situation to the emergency director for requesting support and coordinating with standby employee. In case fire is expanded and unable control, an assigned staff will inform the emergency director for requesting manpower support or announcing the situation become Emergency Level 2.

- **Fire Fighting Team**

Firefighting team consists of employees who are well trained on using fire pump, chemical fire extinguishing tank. The team will receive instruction from an assigned person and assume a function to support firefighting officer in the area.

- **Security Team**

Normally, the mission of security team is controlling entrance-exit door, preventing violators, protecting property of the power plant. In case fire occurs at night time, security team will prepare fire extinguishing devices such as opening fire hose cabinet, releasing fire hose, connecting fire hose to fire hydrant, preparing gloves,

communicative devices and supporting fire extinguishing activities of the local fire extinguishing officer.

- **Emergency Supporting Team**

Emergency supporting team consists of employees who are trained on controlling fire at night time. They will coordinate with firefighting team and security team after both teams arrive at the accidental area. Therefore, the emergency supporting team must have telephone numbers of all employees, officers and agency concerned in hand.

- **Communication**

When emergency takes place in the power plant, the manager has to control a situation. In case it is beyond the ability, the manager has to call for assistance from other agencies. These will include, but not limit to

- Local authority of Launglon Township
- Police station in Launglon
- Maungmagan station hospital and Dawei hospital to prepare and support for injuries

7.4.3 Pipeline Monitoring Measure

Safety and impact mitigation measures for natural gas pipeline under responsibility of the power plant will cover natural gas pipeline laid in the project area from gas metering station. The proposed measures consist of an inspection of gas leakage at the possible leaking point on the pipeline, such as connecting point laid on ground near gas metering station and gas compressor, at least once a week.

7.4.4 Emergency Evacuation

In the event of an emergency and evacuation is determined necessary, all personnel are to be evacuated to the muster point. The evacuation procedures are as follows:

1. Should close doors behind, but do not lock unless otherwise instructed.
2. Should switch off or unplug the electrically operated machines or equipment prior to leaving the work area.
3. Leave lights on for Emergency personnel.
4. Should walk, remain quiet, and follow all other emergency instructions.
5. All personnel will assemble at the muster point.
6. The evacuation team will account for all personnel at the muster point.
7. The evacuation will follow the incident reporting procedures.

7.4.5 Documentation Procedure

The emergency response team dispatched to the site shall record necessary information which will be later used for preparing documentation and an Emergency Response Report (ERR). The required information includes but is not limited to:

Fire Incident

1. Date and time of the fire incident
2. Exact location of the incident in the power plant area
3. Magnitude
4. The extent of smoke observed and direction
5. Activities taken to control the fire
6. Time that the fire is successfully put under control
7. Time cleanup completed and description of cleanup activities
8. Time the Fire/Vapor Control Team left the site
9. Causes of the fire
10. Interviews with operational staff who was the first to note the fire incident
11. Impact on the power plant operation

Release of Flammable/Toxic Gases Incident

1. Date and time of the incident
2. Exact location of the incident in the power plant area
3. Magnitude
4. The extent of gas leak and direction of dispersion
5. Activities taken to control the gas
6. Time that the incident is successfully put under control
7. Time cleanup completed and description of cleanup activities
8. Time the Fire/Vapor Control Team left the site
9. Causes of the gas release
10. Interviews with operational staff who saw the gas release incident
11. Impact on the power plant operation

7.4.6 Training Program

Effective training is essential for members of the ERT to enable them to efficiently and effectively respond to emergency incidents. The EPC Contractor will identify key personnel to receive training which will be conducted annually focusing on new members of the ERT. The training is to include, but not limited to the following:

- Firefighting
- First Aid
- Emergency Evacuation
- Medical and Environmental Emergencies
- Other subjects as required

7.4.7 Review and Updating the ERP

The ERP shall be reviewed and amended as appropriate. The EHS Manager will be responsible for coordinating the review and amendment process. The distribution of the recommended changes to the ERP holders will be delegated to support staff. The EHS Management Department will:

- Conduct five-year review of the ERP and update it with the issuance of a revised or new ERP.
- Conduct annual training on the use of the ERP with new personnel designated to be a member of the response teams of the ERTF.
- Review and update annually the various contact lists and telephone and e-mail addresses included in the ERP for response personnel, regulatory agencies, and public media.

7.4.8 Operational Manuals

In their implementation of the response procedures in this ERP, members of the ERTF must refer to the relevant operational manuals prepared by the EPC Contractor. The reference operational manuals include:

- Operational Manual on Power Plant Fire Control
- Operational Manual on Gas and Vapor Control in Power Plant
- Operational Manual on Environmental and Site Clean Up after Fire Incident
- Operational Manual on Personnel Safety Management during Power Plant Emergencies

7.5 ARRANGEMENTS FOR OPERATING THE EMS

7.5.1 Responsibilities

Environmental management will be part of the power plant management. Environmental management measures will be implemented by the plant operation team.

The Operation Manager will be primarily responsible for operation of environmental management facilities and implementing mitigation measures. He will therefore be responsible for EHS performance of the power plant.

The EHS Manager will be responsible for monitoring, evaluating, and reporting EHS performance of the power plant. He will work closely with the Operation Manager in formulating corrective actions to resolve non-compliance issues.

The Project Manager will supervise the Operation Manager and the EHS Manager in environmental management of the power plant operation.

7.5.2 Organizational Structure

As environmental management will be carried out as part of the power plant management, it is a functional unit in the power plant management organization. ***Figure 7.5-1*** shows a tentative organizational structure for power plant management, including the EHS unit. The organizational structure will be revised as appropriate in due course by the Project Proponent before the commissioning.

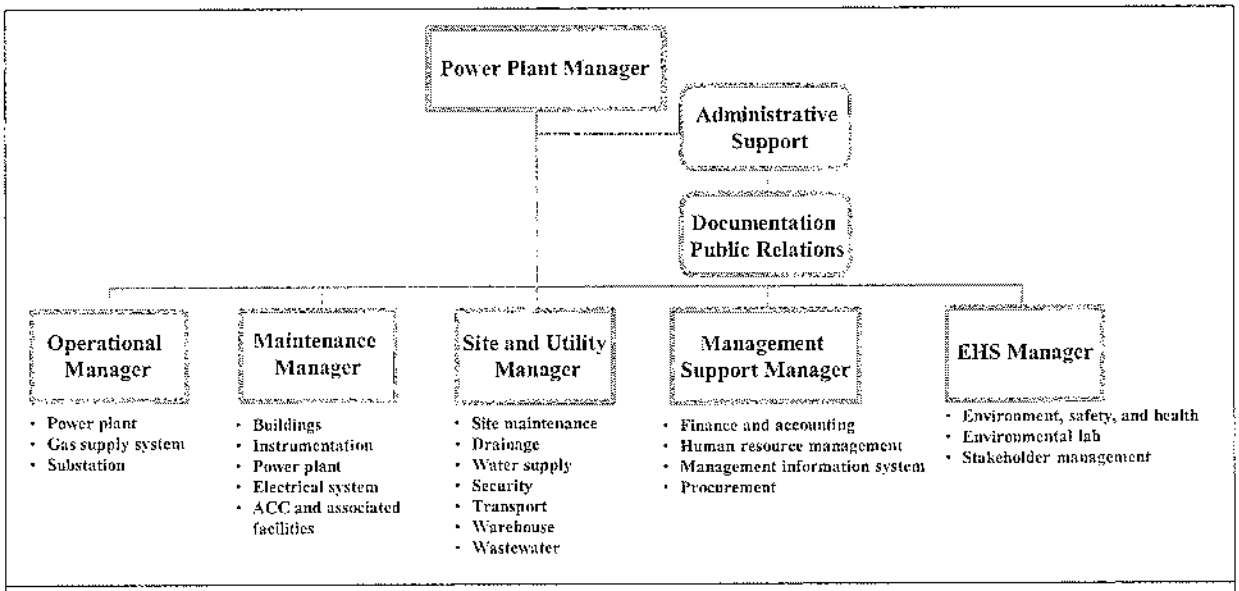


FIGURE 7.5-1 : TENTATIVE ORGANIZATION FOR POWER PLANT O&M AND ENVIRONMENTAL MANAGEMENT

The EHS management function will involve the following activities:

- Prepare the operation manuals for the wastewater treatment system, continuous emission management system (CEMS), and all scheduled environmental monitoring.

- Operate the CEMS and analyze the data generated by the CEMS for emission monitoring.

- Carry out scheduled monitoring as prescribed in the monitoring plan.

- Collaborate with the Operation Manager to ensure efficient operation of environmental management facilities and implementation of impact mitigation measures.

- Prepare periodic EHS performance reports for submitting to the Plant Manager.

- Coordinate with the Plant Manager and the Construction Manager to facilitate site inspection or visits of officials from MONREC/ECD, other government agencies, and representatives of communities in the vicinities.

- Cooperate with the Operation Manager in investigations related to public complaints.

- In consultation with the Operation Manager, prepare recommendations to the Plant Manager on corrective actions related to environmental performance.

- Prepare monthly monitoring reports for internal use as feedback to the EMS.

- Prepare bi-annual monitoring reports for submitting to MONREC.

- Supervising environmental management during the commissioning period.

7.5.3 Documentation

All documents generated in environmental management and references used will be systematically filed and maintained as part of the power plant documentation system. The environmental management documentation system will provide information for environmental audit of the power plant operation.

The Power Plant Manager will design and establish an appropriate documentation system for environmental management as an element of the documentation system for the power plant operation which is an integral element of the power plant management information system. The documentation system will include an appropriate document control procedure.

7.5.4 Communication Plan

Environmental management of the power plant operation will involve communication, both internally and externally. Clear, concise and timely communications are important to the achievement of the objectives of environmental management.

Internal communication will involve: (i) communications within the EMS unit; and (ii) communications within the power plant organization. External communication will involve communications between power plant organization and MONREC as well as other stakeholders. Public communications between the EMS unit and stakeholders will need to receive prior concurrence of Power Plant Manager.

(1) Objectives of Communication

Internal Communication: The objective of internal communication is to ensure efficient environmental management of the power plant operation.

External Communication: The objective of external communication between the power plant organization and MONREC and other concerned government authorities is to comply with the reporting requirements prescribed in the EIA Procedure. The objectives of external communication with other stakeholders, especially communities around the power plant as well as mass media and NGOs, if any, are to: (i) ensure adequate

and correct understanding of environmental aspect of the power plant operation; and (ii) keep the stakeholders closely informed of the power plant's efforts in environmental management and environmental performance. The bottom line is to create trust among the stakeholders in the power plant's determination and commitment to environmental management to enable the power plant to exist in harmony with the environment and communities.

(2) Topics of Communication

Major topics of communication include:

- Power plant operation
- Environmental impacts and mitigation measures
- Environmental policy, objectives, and targets
- Environmental management roles and responsibilities
- Legal requirements and environmental quality standards
- OEMP, DEMP and EMS
- Results of environmental monitoring and performance evaluation
- Hazards and emergency situation
- Mechanisms for grievance redress, queries, comments, or complaints from stakeholders

As communication involves providing information, information requirements related to the above communication topics for various communicating parties will need to be identified. Internal and external communications will have different information requirements as they have different objectives. ***Table 7.5-1*** presents a tentative information requirements for the internal and external communications.

(3) Methods of Communication

The internal communication will use informal communication, formal communication through meetings, and formal correspondence in writing through e-mail or letters, notice boards, and formal notifications or instructions. The methods of communication will follow the methods used in communication in the power plant organization.

The external communication will use a variety of methods depending on the purpose of communication and the stakeholders. The methods of communication will follow the methods of project communication.

TABLE 7.5-1

INFORMATION REQUIREMENTS FOR INTERNAL AND EXTERNAL COMMUNICATIONS IN ENVIRONMENTAL MANAGEMENT DURING OPERATION AND DECOMMISSIONING

Information	Communications	
	Internal	External
Basic Information		
Corporate EHS policy on power plant operation	√	√
EIA Report	√	√
MOEP	√	√
MONREC's EHS requirements or conditions attached to the Issuance of ECC	√	√
Operation manuals	√	
EMS	√	√
Power plant management organization	√	√
Various operational procedures related to EHS/OHS	√	
Information Generated in EHS Management		
Daily, weekly and monthly site inspection reports	√	
Environmental monitoring results	√	√
Minutes of EHS review meetings	√	
Monthly monitoring reports	√	√
Minutes of Tripartite Committee's meetings	√	√
Complaints register and response	√	√
Reports on visits by media and stakeholders for environmental purposes	√	√
Environmental incident reports	√	√
Corrective action reports	√	√
Biannual monitoring reports submitted to MONREC	√	√

(4) Responsibilities

The EMS Manager is responsible for:

- Communicating the environmental policy, commitments and procedures to all power plant operational personnel
- Communicating results of monitoring activities
- External communications with stakeholders under the supervision of the Power Plant Manager
- Preparing a list of information to be provided in external communication and persons with authority to release the information
- Recording the external communication on an External Communication Log and tracking any pending matters
- Supporting the public relation activities through providing environmentally related information
- Providing information support to the Power Plant Manager for use in external communications with stakeholders as well as in internal communications

The Power Plant Manager is responsible for:

- Communicating with MONREC and other government agencies
- Communicating roles and responsibilities for environmental management to all personnel
- Communicating with public and other stakeholders as authorized by the company

(5) Management Review

This OEMP will be consistently reviewed and updated by the EMS Manager or the Power Plant Manager to ensure that it adequately responds to the actual operation of the power plant.

7.6 REVIEW OF THE OEMP

This OEMP will be reviewed and updated by the EPC Contractor to become the Contractor OEMP. The Contractor OEMP should be completed during the commissioning of the power plant. The ESH Manager will review and update the Contractor OEMP during the initial months of the power plant operations to become the power plant OEMP.

The power plant OEMP will be consistently reviewed and updated to ensure it remains effective and responsive to changes in environmental requirements. The review of OEMP will be triggered by the following:

- Environmental performance falls much below the benchmarks.
- Power plant capacity will be increased.
- Power plant process will be changed or more unit processes will be added.
- Emission standards will be raised by MONREC.

- Waste management facilities will use new or upgraded technologies.

The review and updating of the Power plant OEMP will follow the following procedure:

- The ESH Manager will review the Power plant OEMP and submit recommendations to the Power Plant Manager for revising the power plant OEMP in accordance with the document control system.
- The Power Plant Manager in consultation with the Operation Manager and the ESH Manager will review the recommendations and assess their implications on the power plant operation, budget and training requirements. The Power Plant Manager will make a decision on the recommended revisions.
- For minor revision of the OEMP, the Power Plant Manager will authorize the ESH Manager to make the revisions in accordance with the documentation control system.
- For major revisions of the Power Plant OEMP, the Power Plant Manager will seek approval at the corporate level.
- The EMS will be adjusted to accommodate the changes in the OEMP.

7.7 PUBLIC CONSULTATION AND DISCLOSURE

7.7.1 Organization for Public Consultation

Establishment of Grievance Redress Mechanism

The Project proposes to establish grievance redress process as the main mechanism for public consultation and disclosure to ensure that public complaints and concerns related to the construction will be effectively addressed as soon as possible.

Structure

The key persons to mechanize grievance redress will be the Community Participatory Committee (CPC), comprising 15 members of:

- Five representatives of government sectors, one from each agency, comprising MONREC/ ECD, Department of Electric Power (DOEP) of Tanintharyi Region, Dawei District, Yebyu Township and Launglon Township.
- Eight representatives of four communities of Nga Pitat, Nyaun Bin Seik, Mudu and Ka Myaing swea, 2 from each community.
- Two representatives of the Project Proponent. They have authority to make a decision on behalf of the Project Proponent and power plant.

***Roles and Responsibilities*:**

Roles and responsibilities of the CPC [1] has been defined as majority on cooperation with the Project Proponent in following activities:

- Public relations for the Project
- Building understandings and good relationship between the Project and the surrounding communities
- Participation in monitoring of the Project impacts and mitigation measures
- Receiving and addressing complaints arisen from the project impacts
- Resolving conflicts between the Project and the locals
- Coordinate among government sectors, the Project, communities and other stakeholders

7.7.2 Information Disclosure

Information to be disclosed during the Project operation phase will be monitoring reports as required in Article 110 of the EIA Procedure shown below.

The Project Owner shall within ten (10) days of completing a monitoring report contemplated in Articles 108 and 109 in accordance with EMP schedule make the report publicly available on the Project's website, at a designated public office as agreed with the Ministry and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor.

The Owner PMO will make arrangements for the disclosure of monitoring reports in compliance with the above legal requirements. In addition, information on environmental management will be disclosed to the proposed tripartite committee.

7.7.3 Grievance Redress

A grievance redress process will be established and implemented as part of project management by the PMO. The process is shown in a diagram in ***Figure 7.7-1***. Each step of the process is clearly explained in the diagram. The process will enable efficient management of grievance redress or response to complaint related to EHS of the Project operation.

[1] Refers to Establishment of a Community Participatory Committee in Section 6.4.7 Stakeholders' Negative Attitudes toward the Project of Chapter 6 of ESIA Report.

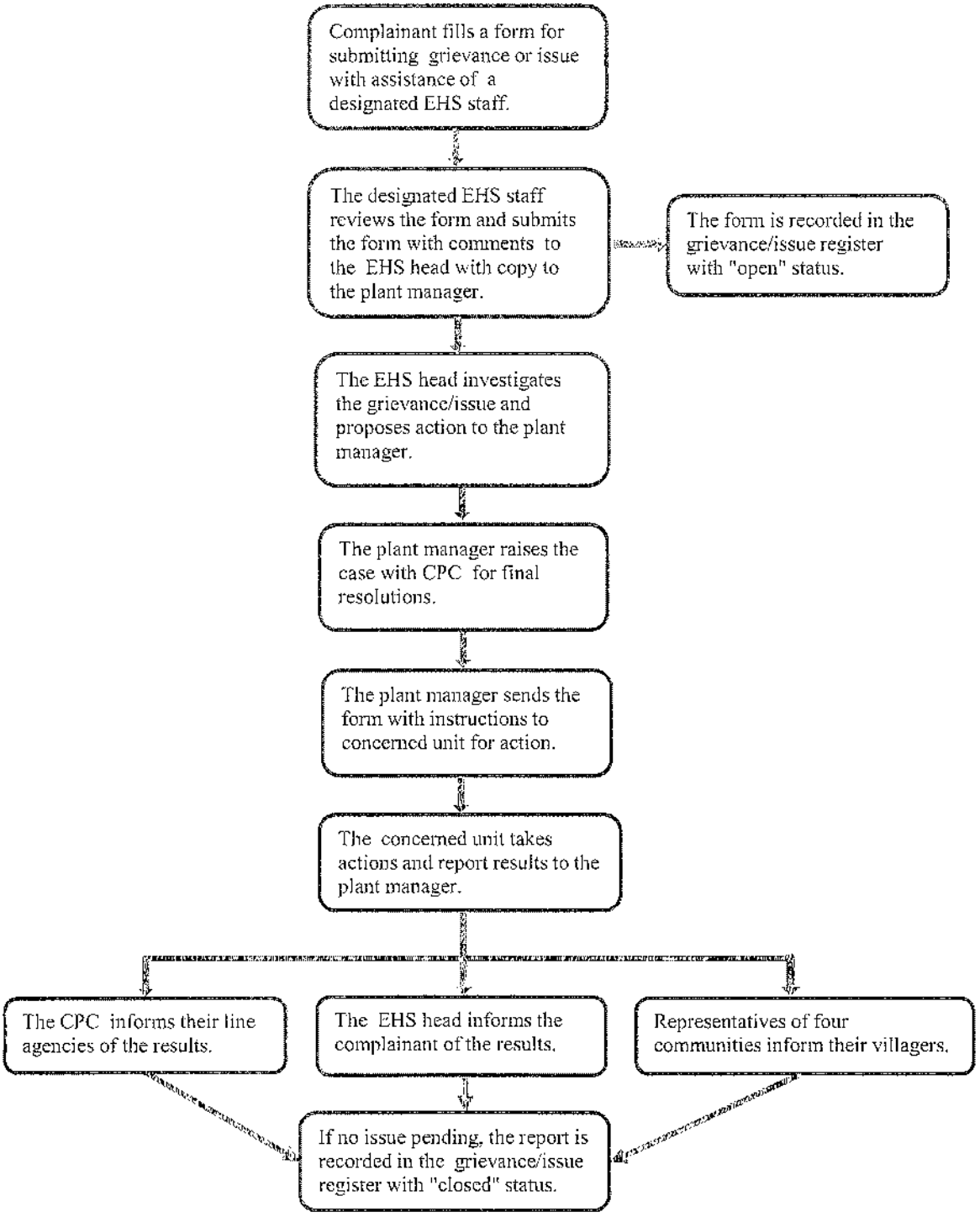


FIGURE 7.7-1 : GRIEVANCE MANAGEMENT PROCESS

7.7.4 Corporate Social Responsibility

As Corporate Social Responsibility (CSR) will be implemented throughout all phases of the Project, the CSR program has to be prepared since an early stage of pre-construction and construction phases.

Its preparation has been carried out in line with needs/request of stakeholder, especially the local communities. Details are shown in ***Section 6.9*** of ***Chapter 6*** of ***EMP Report***. The activities to be implemented include:

- Establishment of various channels for public relation and information disclosure such as local media, notice board, leaflet, meeting and visit the communities, participate local activities; e.g. traditional festival, open house of the Project, etc.
- Involvement in Grievance Redress in order to response the complaints related to the Project impacts.
- Establishment good relationship with local communities by supporting activities such as education, health care and sanitation, religions and culture, socio-economic condition by means of offering employment opportunity, occupation promotion on agriculture production, value added on agricultural and fishery products, handicraft including activities related to gender development.
- Regular meeting with communities in order to acknowledge problems arisen from the Project implementation and build up mutual understandings in the responsible area.
- Reporting results of the Project implementation, mitigation measures and monitoring to concerned authorities and communities.
- Involvement in solving problems as promise to the communities, aiming to encourage the stakeholders to have confidence in the Project.
- Continuation of activities by improvement and adjustment activities as necessary for better efficiency of implementation.

For this phase, the proposed budget for social environmental management (CSR Program) will be officially carried out for disclosure the project information to the public, communication channel, including receiving complaints and setting the solutions, and support community activities; e.g. education, health, religious, culture, occupation promotion, and gender development over the operation period. Total cost of CSR Program is provisionally estimated, as shown in ***Table 7.7-1***.

TABLE 7.7-1
BUDGET ESTIMATE FOR SOCIAL ENVIRONMENTAL MANAGEMENT (CSR PROGRAM) DURING OPERATION PHASE

Cost Items	Monitoring Activities	Unit Cost		Annual Budget		Total Budget of 30 Year Operation
		US$	Unit	Year 1 to Year 5	Year 6 to Year 30	
Social Environmental Management Plan	- Disclosure the project information to the public - To be communication channel, including receiving complaints and setting the solutions - Community activities; e.g. education, health, religious, culture, occupation promotion, and gender development	10,000	Lump sum	10,000	10,000	300,000

7.8 ENVIRONMENTAL RISK MANAGEMENT

The Project is critically linked to the small port and liquefied natural gas (LNG) terminal project which will be developed and implemented in parallel to the Project for supplying natural gas to the Project. Therefore, risk assessment of the Project will focus on accidental fires and explosions from LNG storage tank of LNG terminal project. ***Appendix 7D***. Presents the estimates of accidental fires from LNG storage tank and the affected radius at specified levels of thermal radiation for the fire incidents.

The flammable vapor dispersion distance is about 68 m within the LNG terminal properties line. The impact of LNG-BLEVE on the initial power plant's assets and personnel will not be catastrophic as they will be located about 960 m from the LNG storage tank and would be exposed to a thermal level of 30 kW/m^2. Extensive damage to the power plant and death of all personnel would not occur. The thermal radiation distance at the level of 5, 9, and 30 kW/m^2 can be summarized as ***Table 7.8-1***.

7.9 AUDIT

External EHS audits will be undertaken every three years. These audits will be undertaken by external Environmental Auditing Consultants to review the overall implementation and effectiveness of the OEMP and DEMP, related site specific plans, procedures and associated documentation and overall standard of onsite compliance with legislative requirements.

Audit reports, action plans and any other documentation stemming from the audit process shall be kept for a minimum of five years to demonstrate ongoing OHS monitoring and improvement. The EHS Manager will be responsible for site filing of these documents.

TABLE 7.8-1
THERMAL RADIATION DISTANCE

Thermal Radiation Flux (kW/m^2)	Distance (m.)	Details of Affected Area
5	1,382	- Andaman Sea - Nga Pitat Village - Nga Pitat School - Road in Nga Pitat Village - Mangrove forest - Coconut plantation - Cashew/Perennial plant - Cashew plantation - Agricultural land - Open area - Beach forest - Sand beach - Initial phase power plant - Boil-off gas power plant - LNG terminal plant
9	1,030	- Andaman Sea - Nga Pitat Village - Road in Nga Pitat Village - Mangrove forest - Cashew plantation - Open area - Beach forest - Sand beach - Initial phase power plant - Boil-off gas power plant - LNG terminal plant
30	564	- Andaman Sea - Cashew plantation - Mangrove forest - Sand beach - LNG terminal plant

Environmental risk management is to be carried out as part of the power plant risk management. ***Chapter 6, Section 6.7*** of ***ESIA Report*** on environmental risk assessment identifies and assesses environmental risks during the operational and decommissioning phases. Each major environmental risk will be documented in an Environmental Risk Register (ERR). The ERR is to be maintained and regularly updated and reassessed to allow all significant aspects to be identified. The Risk Register will allow the Environmental, Health and Safety (EHS) Manager to monitor risk factors, update the risk assessment, and make changes to the risk mitigation measures and controls accordingly to ensure efficient environmental risk management. It should be noted that an emergency plan is essentially a risk mitigation measure.

CHAPTER 8

IMPLEMENTATION BUDGET AND SCHEDULE

CHAPTER 8

IMPLEMENTATION BUDGET AND SCHEDULE

8.1 BUDGET

8.1.1 Cost of Mitigation Measures

Implementation of mitigation measures for some issues are not required as including in the contract cost. It detail of each phase is described as follows:

Pre-Construction and Construction Phases

The proposed measures for mitigation of environmental impacts on biomass waste, air quality, noise level, wastewater, construction wastes, marine resources, road traffic, occupation health and safety, archeological site and some social issues such as priority for local employment during the pre-construction and construction phases will not require capital investment in permanent facilities. Most of the measures are established good construction management practices and temporary facilities. The EPC Contractor normally includes these costs in the Contract cost as they are too small to be presented as separate cost items. In overall, expenses or costs in implementing the measures during the pre-construction and construction phases would be only a very small percentage of the total construction contract cost.

Cost of Mitigation Measures

Budget allocation for implementation of mitigation measures during this periods will be related to social issues and auditing. They are Corporate Social Responsibility (CSR), Mangrove Management Plan, Emergency Response Plan and External Audit. The annual allocation of this six year period of each plan is 10,000, 6,000, 15,000, and 1,500 US$ (2016 price) respectively (see ***Appendix 8A***).

Operational Phase

Mitigation measures to be implemented in the operation will be included in the EPC contract cost are air quality, noise level, seawater quality, wastewater, marine resources, and occupation health and safety. As most mitigation measures are operational control measures, it is not possible to estimate their costs.

Cost of Mitigation Measures

Budget allocation for implementation of mitigation measures during this periods will be related to social issues and auditing, continuation from construction phase. They are Corporate Social Responsibility (CSR), Mangrove Management Plan, Emergency Response Plan and External Audit. The annual allocation of this six year period of each plan is 10,000, 5,500, 15,000 and 1,500 US$ (2016 price) respectively (see ***Appendix 8A***).

Decommissioning Phase

All mitigation measures to be implemented in the demolition will be included in the EPC contract cost. As most mitigation measures are operational control measures, it is not possible to estimate their costs.

8.1.2 Costs of Monitoring Program

Pre-construction and Construction Phases

Scheduled monitoring of environmental performance is required throughout the pre-construction and construction phases of the Project to evaluate compliance with legal requirements, the environmental management objectives, and relevant policies, standards and guidelines. The monitoring and evaluation will enable the overall effectiveness of the environmental controls to be determined and allow areas of non-compliance to be identified so corrective actions can be taken.

Therefore, the monitoring will be linked to the work schedule. The Contractor will be required to prepare environmental monitoring program based on the latest construction schedule before commencing the construction.

Monitoring by the third party will be officially carried out for air quality, noise, wastewater, marine resources and traffic twice a year over the construction period. During the construction period, the compliance monitoring should focus on the peak construction period will be carried out. This aims to check correctness of mitigation measures compliance and impacts which might be occurred.

Internal monitoring will be included in the construction cost. A budget will be allocated for the third party who carry out monitoring. Annual cost of monitoring and evaluation of the Project's environmental and performance during this period is provisionally estimated at about 19,800 US$ (2016 prices). Its total amount of this six years is 118,800 US$ (2016 prices). The actual amount of budget will have to be determined each year in line with the actual annual monitoring program to be implemented in that year.

Operation Phase

Monitoring of environmental performance will be carried out through the project life. Internal monitoring will be performed frequently as required. Monitoring by the third party will be officially undertaken within 2 period separations. The first period will be for the first five year after commissioning and the second period will be from the 6^{th} year onwards throughout the project life. Social support program will be activated throughout the year.

A budget will be allocated for monitoring and evaluation carried out by the third party, covering air quality, noise, wastewater and marine resources. Annual cost of monitoring and evaluation of the Project's environmental and performance during year 1 to year 5 and year 6 to year 30 of operation phase is estimated at about 15,400 and 7,700 US$ (2016 prices) respectively. Its total amount of this thirty years is 269,500 US$ (2016 prices). The actual amount of budget will have to be determined each year in line with the actual annual monitoring program to be implemented in that year.

Implementation budget and schedule are shown in ***Appendix 8A***.

Environmental monitoring stations during pre-construction/construction and operation phases are presented in ***Figure 1*** and ***Figure 2*** in ***Appendix 8A***, respectively.

8.2 SCHEDULE

The schedule for implementing the Construction EMP (CEMP) and Operation EMP (OEMP) and Decommissioning EMP (DEMP) will be linked to the project schedule. After the Contractor completes the detailed designs and detailed construction plan and schedule, the Contractor should prepare a detailed CEMP within one month.

The Contractor should prepare a detailed OEMP within two weeks after commissioning of the power plant and its associated facilities.

The Contractor should prepare a detailed DEMP a month before decommissioning.

The prepared emergency response plan will be a guideline for the contractor to imply.

APPENDICES

APPENDIX 6A

SUB-PLAN OF CEMP

(PRE-CONSTRUCTION AND CONSTRUCTION PHASES)

APPENDIX 6A-1

GENERAL-CONSTRUCTION

APPENDIX 6A-1

GENERAL-CONSTRUCTION

Element	Content
Objective	Manage construction in accordance with the Construction EMP and CEMP sub-plans to avoid or minimize impacts on the environment and the community.
Performance Indicators	• Worksites prepared in accordance with designs providing for the management and mitigation of construction impacts. • Construction works are managed to avoid, or mitigate and manage impacts on the amenity and environmental conditions prevailing in the vicinity of the worksites. • Non-compliance with guidelines and standards established in this EMP are avoided or minimized. • Maintain safe and efficient access near worksites for emergency vehicles. • Take reasonable measures to minimize potential construction risks to construction workers, to the general public in adjacent areas and to the environment.
Mitigation Measures	**Hours of work:** • Works which may generate excessive levels of noise, vibration, dust or traffic movements should only be undertaken between 6.30 a.m. and 6.30 p.m. Monday to Saturday and at no time on Sundays or Public Holidays except for special circumstances where the works should be conducted outside these days and hours. • Special circumstances include works on transport of heavy and large process equipment to the construction sites, transport of materials for site filling, and transport of large construction equipment to the construction sites. • Collection, loading and haulage of spoil from construction worksites by truck would be undertaken between 6.30 a.m. Mondays and 6.30 p.m. Saturdays. • Notify local communities of duration and timing of works to be conducted outside of usual working hours. **Construction worksites:** • To be designed and constructed for the minimization, management and mitigation of construction impacts. • The main construction site will include canteen with adequate space and facilities for eating and washing, decent worker accommodation, adequate number of hygienic toilets and baths, adequate clean piped water supply, drainage, wastewater disposal facilities, solid waste disposal facilities, material storage, equipment sheds, vehicle washing areas and project management offices.

Element	Content
	• To conduct spoil handling, storage and loading at all times within enclosures designed and constructed to achieve environmental objectives and performance criteria for noise and air quality as set out in the CEMP. • To have night lighting, including security lighting and avoid light spill onto adjoining premises, in excess of 8 lux measured at the common boundary. • To include fencing to worksite boundaries to ensure site security and public safety.
Monitoring	Site inspections will be conducted as outlined in this CEMP.
Reporting	Results of site inspections will be included in the environmental monitoring reports.
Responsible Agency	• Contractor • Project Proponent
Budget Allocation	Including in the construction cost

APPENDIX 6A-2

BIOMASS WASTE MANAGEMENT PLAN

APPENDIX 6A-2

BIOMASS WASTE MANAGEMENT PLAN

Element	Content
Objectives	• Maximize the use of biomass wastes generated in the site clearing. • Minimize environmental impacts of the disposal of unusable biomass wastes. • Local villagers can benefit from the biomass.
Performance Indicators	• Site clearance completed within the given timeframe with no debris on site. • No visible environmental pollution caused by the disposal of biomass. • Economic uses of a sizable portion of the biomass.
Mitigation Measures	**Biomass Survey** • The contractor will first conduct a detailed biomass survey of the 37.19 acres construction site to delineate vegetated areas and classified according to tree species, age, crown closure, height and site quality characteristics. The survey results will be used to prepare estimates of volumes of various categories of biomass broken down into: (i) biomass that could be used for economic purposes; and (ii) biomass that would have no economic use and would have to be disposed. The estimates should categorize usable biomass based on sizes and potential uses. **Biomass Removal Plan** • The contractor will prepare a biomass removal plan based on the results of surveys that will meet the objectives of biomass waste management. The plan will need to cover: (i) schedule of clearing clearly indicated on the site map; (ii) clearing method; (iii) proposed use of timbers and woods or merchantable biomass; (iv) involvement of local villagers for their use of biomass; and (v) proposed method of disposal of debris and soft vegetation wastes. • The harvesting / biomass removal approach will take into consideration the physical and environmental factors of the site. • Arrangements should be made to enable local villagers to harvest woods for timber or charcoal making before the site clearing operation. Alternatively, the vegetation wastes should be separated into usable timber and woods, and small boughs, twig, and leaves that will need to be disposed. The separated timber and woods could be sold or given to villagers. The unusable wastes will be disposed off in a landfill site to be selected by the contractor with approval of the concerned authority. • Alternative, chipping and mulching of unusable vegetation wastes should be carried out. The mulched materials could be later used for landscaping purposes.

Element	Content
	• The recommended clearance method for the Project is manual cutting (as opposed to mechanical clearing via bulldozer). Chemical defoliants will not be used. Manual clearing (i.e. chainsaw, pruning shears, etc.) will reduce soil disturbance and subsequent sediment transport, leave rooting structures in place as erosion control, and will create social benefit if local residents are engaged to undertake clearance activities. • If clear felling is undertaken, harvesting must be undertaken manually, and the herbaceous/shrub layer should be left behind for moderately steep slopes to minimize erosion. • Areas with steep slopes of greater than 30 degrees will not be logged or cleared for safety and environmental reasons (i.e. slope stability, prevention of erosion and sediment transport into the sea. • Open burning of debris and biomass residues will need permission of the Owner Project Manager. If burning is necessary, burning in clear felled areas will be restricted to pile-and-burn techniques, with no broadcast burns conducted to minimize erosion potential. • Cutting and stockpiling at a designated area within the construction site is recommended. Provisions must be made to minimize fire risk of the stockpiles. • After felling of commercial timber, local residents will be given a limited time period to extract non-timber forest products and lesser value biomass from the priority biomass removal areas. Lesser value biomass can be used for building materials, firewood, charcoal / biochar production and other recycle products. • Biomass that needs to be disposed will be mechanically reduced in sizes or shredded into small chips to facilitate disposal by landfill or composting. • Areas designated for landfill or composting are to be clearly indicated in the biomass removal plan.
Monitoring	The Project Manager or his representative will occasionally carry out site inspections to monitor the work progress.
Reporting	The contractor will submit the following reports to the Project Manager: • Weekly progress note • Monthly progress reports • Completion reports
Responsible Agency	• Contractor • Project Proponent
Budget Allocation	Including in the construction cost

APPENDIX 6A-3

MANGROVE MANAGEMENT PLAN

APPENDIX 6A-3

MANGROVE MANAGEMENT PLAN

Element	Content
Objective	• To reduce impact on loss mangrove resources caused by the Project • To manage and rehabilitate mangrove forest resources
Performance Indicators	• Size of managed mangrove forest • Establishment and implementation of Mangrove Resource Management Program (MGRMP)
Mitigation Measures	The Project Proponent will design and implement a mangrove resource management program (MGRMP) to ensure sustainable use of mangrove resources and minimizing coastal erosion. The MGRMP will be on participatory approach. Local people, expertise and local authorities will involve in planning and implementing various activities. Details are: • **Establishment of the Core Mangrove Management Group:** the Project will support to form the core mangrove management group. The seven members will compose of representatives of: Nga Pitat villager, Department of Fisheries and Forest Department of Launglon Township and one from the Project Proponent. • **Define Mangrove Management Area:** at this stage, the Project Proponent proposes an area of about 30 hectare in Chi Oo Creek area for this program (***Figure 1***). • **Mangrove Zoning:** the Core Group will define preservation and utilization zones of the managed mangrove area. • **Reforestation:** the Core Group will also define valuable local mangroves which could be used for seed and stock selection for the use of reforestation. • **Local Mobilization:** the core group will invite more villagers to collect identified seeds and stocks for reproduction in the simple nursery, under supervision of officials from Department of Fisheries and Forestry. They will also be invited for more participation to plant mangroves at suitable time. • **Formulate Regulations for Sustainable Utilization:** the core group will discuss to issue local regulations for types, size and volume of resources that villagers can collect and use, aiming at effective management especially for local utilization.
Monitoring	• Monitor mangrove area allocated for participatory management • Monitor activities related to mangrove zoning, seed and stock collection, reforestation and utilization of mangrove resources • Monitoring will be carried out by Nga Pitat community
Reporting	Results of site and activities inspections will be included in the environmental monitoring reports and submitted to MONREC.
Area	Mangrove management area (30 ha in Chi Oo Creek area)
Responsible Agency	• Project Proponent • Nga Pitat community • Supervision by officials from Department of Fisheries and Forestry
Budget Allocation	6,000 US$/Year to support on:

Element	Content
	• 2,000 US$/Year for Nga Pitat community to implement and monitor activities related to mangrove resource management • 2,000 US$/Year for officials of Department of Fisheries and Forestry to supervise the community • 2,000 US$/Year for materials and other expenses may require for the program implementation

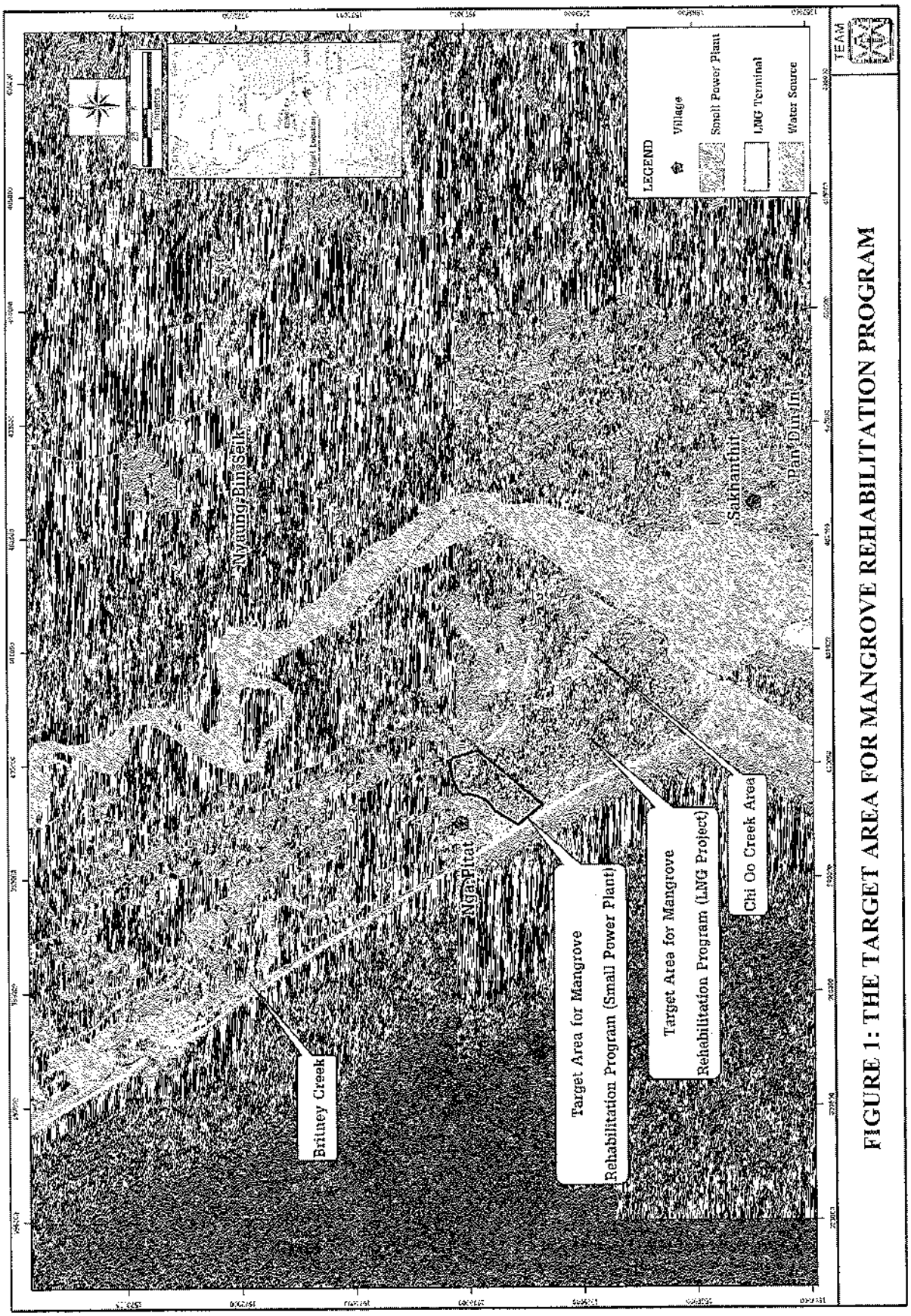


FIGURE 1: THE TARGET AREA FOR MANGROVE REHABILITATION PROGRAM

APPENDIX 6A-4

AIR QUALITY MANAGEMENT PLAN

APPENDIX 6A-4

AIR QUALITY MANAGEMENT PLAN

<table>
<tr><th>Element</th><th>Content</th></tr>
<tr><td>Objective</td><td>• Ambient air quality in the construction sites and at the identified sensitive receptors meets the prescribed standards throughout the construction period.
• Community concerns and complaints about air quality are addressed quickly and effectively.</td></tr>
<tr><td>Performance Indicators</td><td>• Number of complaints filed through the complaint response channel.
• Number of times that the local ambient air quality is below the prescribed standards related to dust and exhaust emissions.</td></tr>
<tr><td>Sources</td><td>The construction could adversely affect local air quality in and near the construction sites. The issues will be:
• Fugitive dust generated in soil compaction, and vehicle movements in the construction sites and along the transport routes
• Exhaust emissions from trucks and heavy construction equipment powered by diesel engines</td></tr>
<tr><td>Applicable Standards</td><td>Applicable ambient air quality standards related to fugitive dust and exhaust emissions are as follows:
Table 1 – Construction Air Quality Goals
<table>
<tr><th>Pollutant</th><th>Not to be Exceeded</th></tr>
<tr><td rowspan="3">Particulate as PM_{10}</td><td>150 $\mu g/m^3$ (24 hr average)[a/,b/]</td></tr>
<tr><td>50 $\mu g/m^3$ (24 hr average)[c/]</td></tr>
<tr><td>20 $\mu g/m^3$ (annual average)</td></tr>
<tr><td>Total Solid Particulates</td><td>230 $\mu g/m^3$ (24 hr average)</td></tr>
</table>
Remark: [a/] Ambient Air Quality in Power Plant "Thermal Power: Guidelines for New Plant", Pollution Prevention and Abatement Handbook WORLD BANK GROUP, Effective July 1998
[b/] WHO Ambient Air Quality Guidelines stated on Environmental, Health, and Safety Guidelines: Environmental Air Emission and Ambient Air Quality of International Finance Corporation, April 30, 2007
[c/] National Environmental Quality (Emission) Guidelines, December 29, 2015</td></tr>
<tr><td>Mitigation Measures</td><td>The Contractor will conduct air quality surveys at the construction sites and identified sensitive receptors to update the baseline data established in the Final EIA Report.
Fugitive Dust Control
• For construction site including spoil placement sites:
- Use watering or other effective techniques on unsealed areas to minimize wheel generated or wind-generated dust
- As soon as the land becomes available, engage in the progressive rehabilitation of construction sites and spoil placement sites with landscaping
• Take measures (e.g. rumble bars and wheel wash bays) to ensure dust-creating material (earth or similar material) is not transported from the construction sites to roads or other areas in the public domain.</td></tr>
</table>

Element	Content
	• Ensure all trucks carrying spoil or other loose material are covered, and if necessary, treated (e.g. mist sprays) prior to leaving the construction sites. • Ensure all loose earth and similar material spilled or otherwise deposited within the construction sites and the transport routes is cleared and removed from trafficked areas as soon as practicable. • At the construction sites and spoil placement sites, monitor meteorological conditions, particularly wind speed and direction and where necessary take measures to avoid impacts of dust on adjacent properties. Such measures may include: - Modification of construction methods - Increase in dust suppression measures - Cessation of work when no other reasonable or practical measure is available. • Spray water at and around the construction areas and access roads during site preparation and grading. • Enforce a speed limit for vehicles and trucks in the construction sites not to exceed 40 km/h. • Construction activities shall be kept as planned so that the disturbed areas will be minimized at any time. • Enforce speed limit for trucks not to exceed 40 km/h when passing the communities. • Cover construction materials with canvas or equivalent during transportation, materials should be dampened, if necessary, before transportation. • Restore, resurface, and rehabilitate the disturbed areas as soon as practicable after completion of construction or disturbance. • Prohibit open burning of waste in the construction area. • Establish a vehicle washing facilities to minimize the quantity of material deposited on the roads. • Establish a checkpoint at project gate to ensure the vehicles leaving the project site are following the measures prescribed to reduce dust emissions. **Diesel Exhaust Emissions** • Take measures to manage the movement of construction vehicles entering and leaving the construction sites to avoid, or mitigate and manage the potential for vehicle emissions impacting on adjacent properties, except where such residential or sensitive activities in front an arterial road to be used for access to or from the construction site. Measures for construction fleet management are to be provided in the construction vehicle management plan and the construction traffic management plan. Such measures may include avoiding or minimizing queuing on streets approaching the worksites or adjacent to other sensitive activities. • Adopt procedures to avoid construction vehicles idling for excessive periods (e.g. more than 5 minutes) if required to queue to enter the construction sites.

Element	Content
	• For stationary plant and equipment powered by diesel motors, take measures to avoid or mitigate and manage the potential impacts of exhaust emissions on adjacent residential or other sensitive activities. For example, ensure all construction vehicles and stationary plant and equipment powered by diesel motors are fitted with emission control measures, and are regularly maintained to manufacturers' specifications. • Maintain all equipment and vehicles in proper working conditions according to the manufacturer's specifications. The engines of construction equipment fleet must be routinely maintained by qualified mechanics to ensure their proper conditions during operations. • Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines). • Take measure to avoid congestion of trucks in areas near communities along the transport routes. A good traffic management plan will be required. • Provide adequate training to the equipment operators in the proper use of equipment. • Use the proper site of equipment for the job. • Encourage and provide carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes.
Monitoring	**Ambient Air Quality** • Undertake routine periodic ambient air quality monitoring (AQM) at locations in the construction site and in sensitive areas over the duration of construction works. Additional monitoring will need to be carried out if complaints are received from affected persons. The AQM during construction will cover at least 24 hour continuous sampling and will cover: - Total suspended particulates - Particulates (PM_{10}) • Monitor and manage the incidence of dust deposition and manage construction vehicle emissions in relation to ambient air quality • Third party will be included in monitoring program. **Fugitive Dust** • Monitor regularly (weekly minimum) by inspection or other effective sampling • The performance of dust filtration systems on construction shed ventilation systems • Spillage or deposition of loose material on roads leaving a construction site • Monitor performance of mitigation measures in relation to the construction air quality goals in the above table • Monitor twice a year or more frequently by a third party if weather conditions required, construction sites, stockpiles, vehicles and roads leaving the construction sites for evidence of dust generation or loose, unstable material with potential for dust

Element	Content
	Vehicle Emissions • Monitor construction vehicle management with regards to: - Queuing in streets other than those in which arrangements have been made for such action in the construction traffic management plan (on-going) - Vehicle motors idling for periods exceeding 5 minutes while in queues to access construction sites (on-going) • Inspect the position of stationary plant and equipment powered by diesel motors to ensure exhaust emissions are directed away from sensitive activities and neighboring properties (initially on establishment)
Reporting	• Twice a year. If more than one complaint is received in the preceding more frequently. • Twice a year reports for submission to MONREC
Responsible Agency	• Contractor • Project Proponent • Third Party
Budget Allocation	4,800 US$/Year

APPENDIX 6A-5

NOISE MANAGEMENT PLAN

APPENDIX 6A-5
NOISE MANAGEMENT PLAN

<table>
<tr><th>Element</th><th>Content</th></tr>
<tr><td>Objective</td><td>• To minimize noise and vibration of construction activities.
• To ensure that the noise and vibration levels at the identified sensitive receptors will not exceed the maximum limits prescribed by MONREC as a condition of the ECC and will be acceptable to the sensitive receptors.</td></tr>
<tr><td>Performance Indicators</td><td>• The incremental increases in noise and vibration levels during the construction works compared to the targets.
• Net ambient noise and vibration levels compared to the applicable ambient noise and vibration standards.</td></tr>
<tr><td>Sources</td><td>Noise and vibration will be managed at the power plant sites. The power plant construction site will be where construction activities causing noise and vibration will be most intensive and concentrated.
Construction activities creating noise and vibration at the power plant site are shown in the table below:
<table>
<tr><th>Construction Activities</th><th>Power Plant Site</th></tr>
<tr><td>Percussive piling</td><td>Most intensive</td></tr>
<tr><td>Operation of heavy construction equipment</td><td>Removal of vegetation, site compaction</td></tr>
<tr><td>Erection and installation of equipment (only noise)</td><td>Most intensive</td></tr>
</table></td></tr>
<tr><td>Applicable Standards</td><td>Noise and vibration performance will be evaluated against the following standards:
• National Ambient Noise Level Standards: Ambient noise level standard, Myanmar National Environment Quality (Emission) Guidelines, December 2015
• Noise Standards: World Health Organization (WHO), 1999: Guidelines for Community Noise, World Health Organization (WHO), 1999</td></tr>
<tr><td>Mitigation Measures</td><td>Design
• The Contract will require the Contractor and his sub-contractors to use construction equipment that generate low level of noise. The Contractor will present alternative construction equipment to demonstrate that the selected equipment adopts best available technologies to minimize noise level.
• Before commencing the construction, the Contractor will conduct a noise survey covering the identified sensitive receptors to update the existing baseline data in the Final EIA Report. The noise survey will be manually conducted using a sound level meter following Noise Standard stated on Environmental, Health, and Safety Guidelines for Thermal Power Plant: Noise of International Finance Corporation (December 19, 2008).</td></tr>
</table>

Element	Content
	• Demonstrate through predictive modelling of the proposed construction techniques and monitoring ambient noise readings prior to construction to establish pre-disturbance levels, the likely noise level due to construction works throughout the construction period. **Construction Noise** • The Contractor will be allowed to carry out construction works, which generate excessive levels of noise and vibration, only during the period between 6.30 a.m. to 6.30 p.m. Mondays to Saturdays. Such construction works on Sundays or public holidays will need approval from the Resident Engineer of the Project Proponent. • For construction works beyond standard construction hours, the Contractor shall take reasonable and practical measures to protect the affected sensitive receptors. For example, acoustic screens or noise barriers would be required. • Reasonable and practicable measures to achieve the construction noise targets may include, for example: – Commence advanced notification of works and undertake on-going consultation with potentially affected property owners and occupants. – Establishing temporary noise barriers between construction worksites and sensitive receptors (e.g. residential, schools, community facilities). – Fitting noise-reduction measures to all plant and equipment engaged in the construction works. – Designing worksites to minimize potential noise impacts on nearby sensitive places. – With the consent of owners and occupants of potentially-affected premises, undertake mitigation actions such as temporary modifications to nearby buildings, temporary relocation during construction or other measures to achieve reasonable environmental conditions. • For the power plant construction site, the duration of construction works with excessive noise will be 68 months in total for all phases. The Contractor will undertake predictive modelling of potential construction noise impacts based on the proposed construction methods, the proximity of sensitive places, and the applicable standards. • Where construction noise impacts are predicted due to specific construction activities, reasonable and practicable mitigation and management measures must be adopted and notified in advance to potentially affected owners and occupants of adjacent properties. If such activities are to occur often during the construction works, a program for a regular, scheduled occurrence should be devised and implemented in consultation with the owners and occupants of nearby properties.

Element	Content
	• Potentially affected property owners and occupants are to be notified well in advance (7 days or more) as to the scale, extent and duration of construction works, as required by the consultation and communications program. • The noise reduction at the perimeter could be achieved using temporary metal sheet fence at least 3 m high with adequate length to block the noise emanating to the receptor. • Provide ear plugs or ear muffs to workers operating in the excessive noise areas. • Major construction activities which generate loud noise should be limited to only during the day time. Activities that are necessary to be carried out at nighttime will need approval of the site engineers, and will need to have adequate noise control equipment or measures. • Speed of vehicles in the construction site will not be more than 40 km/h. • Noise performance requirements of construction equipment will need to be clearly stated in contract specifications. • The EPC contractor will be required to regularly monitor ambient noise levels at the receptors, particularly during the noise generation period such as piling. The construction environmental management plan will need to include an efficient complaints redress procedure and an efficient corrective action procedure to address the noncompliance of noise performance.
Monitoring	**Construction Noise Monitoring** • Noise and vibration monitoring will be carried out during the construction works identified as noise sources are taking place. Therefore, the monitoring will be linked to the work schedule. The Contractor will be required to prepare a noise monitoring program based on the latest construction schedule before commencing the construction. • Noise monitoring will be carried out manually using a sound level meter following Noise Standard stated on Environmental, Health, and Safety Guidelines for Thermal Power Plant : Noise of International Finance Corporation (December 19, 2008). • The monitoring locations will be at the construction site and the identified sensitive receptors. • In addition, compliance monitoring by a third party will be carried out at least twice a year over the construction period. During the construction period, the compliance monitoring should focus on the day on which the construction activities with maximum noise will be carried out.

Element	Content
	Noise Monitoring of Construction Equipment and Trucks • Before commencing the construction, the Contractor will conduct noise testing of trucks to be used in the construction. Subsequently, the Contract will conduct noise testing of the trucks every six months. The Contractor will ensure that the trucks that did not pass the noise test will be replaced by new trucks with less noise, or will be fixed as soon as possible. The Contractor will submit reports of the noise testing to the EHS Manager of the Project Proponent. **Monitoring in Response to Noise/Vibration Complaint** • The Contractor is to implement measures to receive and respond to complaints about construction noise and vibration made at any time during the construction phase of the Project. Such measures may include a complaints management and correction action system developed and incorporated in this CEMP. Key requirements for the system include: - On receipt of a complaint, implement a complaint response procedure for tracking and responding to the issue(s) and the complaint - Identify the relevant construction activity at which the complaint is directed - As soon as practicable, investigate and measure the level of noise and/or vibration from that activity - Respond to the complainant as soon as practicable upon completion of the investigation and describe the corrective action taken • Report to the Proponent on the complaint, the activity, the corrective action and the response
Reporting	• Twice a year reporting on noise performance and complaints • Twice a year reports for submission to MONREC
Responsible Agency	• Contractor • Project Proponent • Third Party
Budget Allocation	4,200 US$/Year

APPENDIX 6A-6

WASTEWATER MANAGEMENT PLAN

APPENDIX 6A-6

WASTEWATER MANAGEMENT PLAN

Element	Content
Objective	To ensure that all wastewaters generated during the construction will be adequately treated before discharging into the sea about 800 m away.
Performance Indicators	Qualities of the treated effluent compared with the applicable effluent quality standards.
Sources	• Domestic wastewater generated by living activities of about 600 persons at peak of construction, estimated volume about 90 m^3/d. • Construction wastewater, estimated volume about 42 m^3/d. • Storm water with a return period of 5 years.
Applicable Standards	**Effluent quality standards:** • Wastewater treatment standard, Myanmar National Environment Quality (Emission) Guidelines (December 25, 2015). • International Finance Corporation (IFC) Environmental, Health and Safety Guidelines for Thermal Plant, (December 19, 2008).
Mitigation Measures	**Design Concept** The Contractor will prepare detailed design of a wastewater management system for the power plant construction site. The wastewater management system will consist of a collection system and a simple treatment system. The proposed design concept is based on the principle of wastewater segregation, treatment and reuse as briefly described below: **Storm Water/Surface Runoff** - A drainage system will be constructed to collect and drain the storm water or surface runoff directly into the sea. To prevent contamination of storm water, potential contamination sources will be covered with roof. The storm water would contain solids washed out from unpaved surface. - The collected storm water will be drained into a retention pond for removal of suspended solids before discharging into the sea. After the construction, the retention pond will be used for wastewater management during the operational phase. - To prevent contamination of the surface runoff, potential contamination sources will be covered with roof. The surface runoff would contain only suspended solids washed out from the open area. - Construct a temporary drainage system to collect the surfaced runoff from the construction area to avoid the discharge of surface runoff directly into the open sea. **Domestic Wastewater** - Toilet wastes will be separated from grey water or sullage. - Toilet wastes will be discharged into a septic tank (or more than one septic tanks) with a hydraulic retention time of about 5 days. The volume of toilet wastes is estimated at about 20% of the total volume of domestic wastewater, or about 30 m^3/d. The septic tank effluent will be discharged into the retention pond. Alternatively, toilet wastes will be treated in a package treatment plant using anaerobic process. - Grey water will be discharged into the retention pond. - The retention pond will be designed as an oxidation pond.

Element	Content
	- Kitchen and canteen wastewater will be discharged into oil and grease trap tank before draining into the retention pond. **Wash Water** - The concrete wash water and the wheel wash water will be discharged into a concrete settling basin. The effluent will be treated to adjust the pH, if necessary, and reused. The remaining effluent will be discharged into the retention pond. **Construction Wastewater** - Construction wastewater will be mainly wash water. It may contain oil and grease and chemicals. The wash water that contains oil will be treated in a simple oil removal tank before combining with wash water from other sources. The wash water will be discharged into the retention pond. **During Construction** - Water in the retention pond will be used for dust suppression on unpaved areas in the construction site, and also for watering of the green area. - The remaining volume will be discharged through a sewer pipe into the sea. - Construction activities should be carried out during the dry season to avoid the problem of surface runoff with high turbidity discharging into the sea or nearby drainage channels, if exist. - Toilet wastes will be discharged into a septic tank (or more than one septic tank) with a hydraulic retention time of about 5 days.
Monitoring	• Monitoring of effluent to be discharged from the construction site will be weekly carried out by the contractor over the construction period. Two grab water samples, one sample at the inlet and the outlet of the wastewater treatment facility or the retention pond. The samples will be analyzed to determine magnitudes of various quality parameters prescribed in the effluent standards. The wastewater treatment performance of the contractor will be assessed from the monitoring data. If the final effluent does not meet the quality standards, the treatment efficiency of the retention pond could be raised using a floating aeration system. • Compliance monitoring of wastewater management will also be carried out by a third party every six months.
Reporting	• The results of monitoring will be presented in the monitoring reports • Twice a year reporting on wastewater performance, and submit to MONREC
Responsible Agency	• Contractor CEMP • Project Proponent • Third Party
Budget Allocation	2,400 US$/Year

APPENDIX 6A-7

WASTE MANAGEMENT PLAN

APPENDIX 6A-7

WASTE MANAGEMENT PLAN

Element	Content
Objective	• To minimize all types of wastes generated at the construction sites, particularly the power plant construction site, that will have to be disposed. • To minimize environmental impacts of waste disposal.
Performance Indicators	Number of complaints related to waste disposal.
Sources	Wastes will be divided into three categories: • Construction, demolition, and land-clearing (CDL) waste: Includes all non-hazardous solid wastes resulting from site clearing, excavation, concrete works, steel works, piping works, installation of equipment, and construction of buildings. CDL wastes for this Project will consist of vegetation removed from the site before site preparation works, excavated materials particularly top soil, construction debris, remnants of steel bars and beams, packaging materials, broken roofing materials and tiles, and remnants of pipes, glasses, and other inert building materials. • Non-construction waste: Includes wastes generated in worker camps, canteens and offices such as paper, food and beverage containers, food wastes, and other domestic items. • Hazardous waste: Includes such wastes as spent lubricating oil, paints, and chemicals used in the construction. Most of the hazardous wastes are in liquid form.
Applicable Standards	Applicable guidelines and standards regarding the management and disposal of the three categories of wastes as prescribed by MONREC or enforced by the local government, whichever are more stringent.
Mitigation Measures	**Design and Planning** There are five key principles that design teams can use during the design process to reduce waste. They are summarized below together with questions the design team should address to design out waste. • Design for reuse and recovery: Design for reuse of material components and/or entire buildings have considerable potential to reduce the environmental burdens from construction. Much of this is common sense as, with reuse, the effective life of the materials is extended and thus annualized burdens are spread over a greater number of years. Reuse, in the waste hierarchy is generally preferable to recycling, where additional processes are involved, some of which will have their own environmental burdens.

Element	Content
	• Design for off-site construction: The benefits of off-site factory production in the construction industry are well documented and include the potential to considerably reduce waste especially when factory manufactured elements and components are used extensively. Its application also has the potential to significantly change operations on site, reducing the amount of trades and site activities and changing the construction process into one of a rapid assembly of parts that can yield many benefits including: Off-site construction is one of a group of approaches to more efficient construction sometimes called Modern Methods of Construction (MMC) that also include prefabrication and improved supply chain management. Technologies used for off-site manufacture and prefabrication include light gauge steel framing systems and modular and volumetric forms of construction which offer great potential for improvements to the efficiency and effectiveness of construction. To assess the suitability of off-site construction, design teams should consider the following questions: - Can the design or any part of the design be manufactured off site? - Can site activities become a process of assembly rather than construction? • Design for materials optimization: Good practice in this context means adopting a design approach that focuses on materials resource efficiency so that less material is used in the design, i.e. lean design, and/or less waste is produced in the construction process, without compromising the design concept. Three main areas offer significant potential for waste reduction. They are: - Minimization of excavation - Simplification and standardization of materials and component choices - Dimensional coordination • Design for waste efficient procurement: Designers have considerable influence on the construction process itself, both through specification as well as setting contractual targets, prior to the formal appointment of a contractor/constructor. Designers need to consider how work sequences affect the generation of construction waste and work with the contractor and other specialist subcontractors to understand and minimize these. Once work sequences that cause site waste are identified and understood, they can often be 'designed out'. • Design for deconstruction and flexibility: Designers need to consider how materials can be recovered effectively during the life of the building when maintenance and refurbishment is undertaken or when the building comes to the end of its life. The Contractor will adopt the design and planning to minimize waste quantities as follows:

Element	Content
	• The Contractor will consult with the EHS Manager of the Project Proponent, ECD, SWB and the township governments the possibility of using existing waste disposal facilities managed by the regional or local governments. If this not possible, the Contractor will need to develop its own disposal facility preferably within the construction site, if possible. • The Contractor will ensure that the design and the proposed construction methods will generate the least amount of wastes. • Based on the construction plan, methods, and schedule, The Contractor will prepare estimates of the quantity of each waste category to be generated in each quarter of the construction period. The estimates will be monthly updated. • The Contractor will propose methods for waste reuse and recycling and prepare estimates of the remaining quantity of each waste category that will be disposed off. • The Contractor will propose methods of waste transport and disposal. • The Contractor will then prepare an action plan for waste management for the first quarter of the construction period containing all the above estimates and proposals. The action plan will be submitted to the EHS Manager of the Project Proponent not later than three weeks before commencing the construction. • The subsequent quarterly action plans will be prepared by updating or revising the preceding plans as appropriate to reflect cumulative results of the previous quarters. The next quarterly action plan will be submitted to the EHS Manager not later than two weeks before the end of the current quarter. • Consider using materials and products that have a recycled content wherever cost/performance competitive, and where environmentally preferable to the non-recycled alternative; • Arrangements with suppliers to return any unused construction materials; • Where possible, goods to be ordered in bulk to minimize packaging waste and packaging material returned to the supplier wherever practicable; and **During Construction** **Waste Segregation** • The Contractor will design and implement a waste segregation system and procedure and communicate it to all construction personnel to strictly adhere to the segregation procedure. • An appropriate number of containers with adequate volume and appropriate materials will be provided at strategic locations to support the segregation. Each waste category will be segregated into recycling, reuse and disposal sub-categories. **Waste Collection and Storage** • Daily collection and transport will be organized and carried out for each sub-category of segregated wastes.

Element	Content
	• A roofed storage area with adequate space will be provided for storing the segregated wastes waiting for the on-site or off-site reuse or recycling. • The storage area for hazardous waste will need to be specially designed to prevent spills or leaks onto the soil. **Waste Reuse and Recycling** • Chipping and mulching of vegetation cleared during construction and reuse of mulched material for landscaping purposes. • Reuse of excavated material as fill at approved fill sites. • Topsoil free of weeds to be stockpiled and stored for re-use, if possible. • Collection and return of packaging materials (e.g. pallets) to suppliers wherever practicable. • Use of recycled materials to the limits of design in concrete, road base, asphalt and other construction materials. • Remove any contamination inadvertently deposited in recyclable waste material containers. Provide cleanup of excessive contamination at recycling vendor locations when such contamination is not controlled at the project site. • Collection and recycling of used oils by a licensed contractor. • Collection by a licensed contractor of empty oil and fuel drums and other containers for return to recycling facilities. The remaining wastes that cannot be reused or recycled will have to be properly disposed off properly to minimize environmental impacts. The following approach should be considered: **General Requirements** • An efficient construction waste management system should be established and implemented. Construction waste will need to be classified and sorted out at source for disposal. The disposal methods will depend on the types of wastes: direct reuse in the construction, sale and recycling of materials, land filling for inert materials and specific treatment method for each type of hazardous materials. • Haphazard disposal of construction waste in or off the construction site will be prohibited. • No burning of wastes will be allowed. **Construction and Land Clearing Wastes** • Construction wastes should be handled by the existing municipal solid waste collection and disposal services. If such service is not possible, the construction wastes would need to be disposed off in the Project site. They may be buried in areas designated for green areas. **Non-construction Wastes** • Provide adequate number of refuse bins or containers with tight covers, daily collection of disposal. **Hazardous Wastes Management** • Hazardous wastes will be handled by a licensed hazardous waste contractor. If this service is not available, the Contractor will need to find safe permanent storage, or other appropriate methods of disposal.

Element	Content
	• A Hazardous Waste Management System covering waste classification, separation, collection, storage, transfer and disposal should be set up and operated. The waste management system will comply with applicable regulation of the government, if any. **Waste Disposal** • Disposal of the remaining wastes that are unable to be reused or recycled in the approved land fill site(s). • Preferably, inert wastes such as broken tiles, bricks, plastics should be used for filling the site in areas planned to be vacant space. • No burning of wastes will be allowed. • Non-construction wastes will be contracted to the existing municipal services, if possible. If not, they will need to be disposed of in a small sanitary land fill to be located within the power plant site in designated green areas. • Decomposable wastes such as food wastes and vegetation may be disposed of by composting. • Hazardous wastes will be handled by a licensed hazardous waste contractor. If this service is not available, the Contractor will need to find appropriate arrangements for incineration, safe permanent storage, or other appropriate methods of disposal. **On-site Record Keeping** The Contractor will design and maintain record keeping procedures with provisions for: • Tracking collections of waste materials at the sites and deliveries to recycling, reuse, salvage, and landfill facilities. • Maintaining on-site logs that include for each load of materials removed from the site: type of material, load weight, recycling/hauling service, and date accepted by recycling service or landfill. Accessibility to the EHS Manager of the Project Proponent for verification of construction waste recycling. Legible copies of on-site logs, manifests, weight tickets, and receipts. Manifests shall be from recycling and disposal site operators that can legally accept the materials for the purpose of recycling, reuse, salvage, or disposal.
Monitoring	Monitoring of the waste management performance will be carried out through quick daily site inspections and detailed weekly site inspections: • Daily site inspections will include observation of the collection and storage of waste materials in the construction sites and waste disposal areas, and reviewing the daily records. The focusses will be on efficiency of the collection, storage, and disposal; and on the quality of the records. The EHS Managers of the Project Proponent and the Contractor will jointly inspect the sites. • Weekly site inspections, the EHS Manager will be participated by the Resident Engineer of the Project Proponent and the Construction Manager of the Contractor. The inspection will cover verification of the records, disposal activities, discussion on the performance of the past week, and identification of problems, if any, that affect the waste management performance.

Element	Content
Reporting	• Report immediately to the relevant authorities any incident where harmful waste material is accidentally released to the environment. • In the event of an environmental incident, take such corrective or remedial action as is required to render the area safe and avoid or minimize environmental harm. • Monthly reports on the waste management results as part of the monthly monitoring reports. • In addition, compliance monitoring by a third party will be carried out at least twice a year over the construction period. • Twice a year reports for submission to MONREC
Responsible Agency	• Contractor • Project Proponent • Third Party
Budget Allocation	Including in the construction cost

APPENDIX 6A-8

TRAFFIC MANAGEMENT PLAN

APPENDIX 6A-8
TRAFFIC MANAGEMENT PLAN

Element	Content
Objective	Manage construction traffic and transport issues to minimize potential impacts on the communities and the operation of the road network
Performance indicators	• Number of traffic accidents in the identified impact areas • Number of traffic on Nga Pitat Road during the construction period
Sources	• Traffic disturbances could be caused by haulage of spoil, fill materials, construction materials and plant equipment. • Potential impact areas: - Small Port Coastal Road - Nga Pitat Road
Management guidelines	• Take reasonable and practicable measures to avoid, or mitigate and manage the potential construction traffic impacts on communities near the worksites. • Minimize as far as reasonably practicable, potential traffic disruptions to the operation of the road network and the public transport network due to the transport of materials to and from the construction sites. • Maintain safe access near all project work areas for road users, including pedestrians and cyclists. In particular, develop local access strategies in consultation with stakeholder groups to maintain safe, convenient and efficient access to community facilities such as schools and monastery, if any. • Implement traffic management measures near worksites and other project works to avoid conflicts between construction traffic, and pedestrians and cyclists. • Take reasonable and practicable measures to inform the local and broader communities about the timing and scale of changes to traffic conditions on roads in the vicinity of worksites and construction works. • Monitor traffic flows near construction works and take corrective action in response to traffic impacts as a consequence of construction works.
Mitigation Measures	**Truck Routes and Construction Site Access** • In consultation with the concerned authorities at the regional, and township levels, develop and implement a Construction Traffic Management Plan to address the following issues: - Avoid haulage tasks during peak traffic periods as far as practicable. Where haulage in peak periods is unavoidable, such activities are to be managed in accordance with specific traffic management sub-plans provided to the relevant agencies in advance. - Control heavy vehicle movements on project related road to avoid interference with major events, if any. - Investigate the capacity of intersections on haulage routes to minimize impact on intersection operations by heavy vehicles servicing the construction worksites. - Prepare and implement a comprehensive construction traffic management plan to control truck movements to avoid, or mitigate and manage the impacts of heavy vehicle traffic on the road network.

Element	Content
	- Use of established truck routes and arterial roads for the haulage of construction materials and spoil. - Where practicable, provide direct access from worksites to arterial roads to minimize truck traffic in local streets. - Exceptional circumstances would arise when no suitable alternative routes are available for specific construction tasks. • Measures to manage the operation of the construction truck fleet for incorporation into a Construction Vehicle management sub-plan to include: - Monitoring of truck position, speed, route and performance in relation of traffic conditions and schedule requirements. - Management of truck speed and position to avoid queuing on the approaches to the spoil handling and loading facilities. - Management of traffic signals on nominated spoil haulage along the routes. - Maintain all vehicles transporting material to and from the construction sites to a high standard (ADR28/01) with regards noise emissions, exhaust emissions, traffic safety and operational safety. - Ensure all vehicles leaving a construction site pass over or through devices designed and maintained to remove soil and other materials. **Construction Traffic Hazards** • Heavy trailer trucks transporting heavy and large plant equipment will have to be directed by a traffic police car or by other vehicle specially designated to handle a guidance of this kind of transportation. • Post warning signs along the right of way where the transmission line construction takes place. **Local Traffic** • Implement management measures to avoid, or minimize increase in traffic caused by the project works in local streets as practicable. • Notify the local community about proposed changes to local traffic access arising from construction activities, and provide clear signage of changed traffic conditions and take other measures to ensure safe traffic movement. • Prepare and implement an employee parking policy for the construction worksites to manage the impacts on car parking in the vicinity of worksites and help avoid project parking in local streets. **Traffic Management at the Intersection of Small Port Coastal Road and Nga Pitat Road** • Provide a traffic police or relevant officer to control traffic at the intersection during the transport period. **Pedestrians and Cyclists** • Maintain safe pedestrian and cycle access near construction works (particularly for elderly and children), including to community facilities, such as schools, monastery, open space and particularly. • Notify the local community, and in particular, local schools, about changes to pedestrian and cycle access during construction near construction works.

Element	Content
	• Provide traffic controls designed for the safe movement of cyclists near the worksites.
Monitoring	• Traffic monitoring will be carried out during transportation activities of the construction works. Therefore, the monitoring will be linked to the work schedule. The Contractor will be required to prepare a traffic monitoring program based on the latest construction schedule before commencing the construction. • Record and report number of traffic accidents in the identified impact areas. • Monitor number of traffic on Nga Pitat Road. Review the adequacy of construction traffic management plan if traffic congestion is observed. • In general, monitoring traffic flows by a third party will be carried out twice a year during peaks of construction-related transportation.
Reporting	• Monthly report on local traffic conditions, including any accidents involving construction traffic • Twice a year reporting on traffic performance, and submission to MONREC
Responsible Agency	• Contractor • Project Proponent • Third Party
Budget Allocation	2,000 US$/Year

APPENDIX 6A-9

OCCUPATIONAL HEALTH AND SAFETY (OHS) MANAGEMENT PLAN

APPENDIX 6A-9
OCCUPATIONAL HEALTH AND SAFETY (OHS) MANAGEMENT PLAN

Element	Content
Objective	To establish best practicable OHS conditions to ensure work related health and safety of construction personnel.
Performance Indicators	• Total Recordable Injury Frequency Rate (TRIFR) • Lost Time Injury Frequency Rate (LTIFR) • Medical Treatment Injury Frequency Rate (MTIFR) • Duration rate • Incident rate
Sources	Public safety related to construction traffic will be managed in the traffic management plan. The issues of concern in this OHS plan are worker safety in construction site.
Applicable Standards	OHS guidelines and standards enforced by the Ministry of Health and proposed for this Project as follows: "*To safeguard public health and to take necessary measure and respect of environmental health*"
Mitigation Measures	**Design and Planning before Commencing the Construction** • The Contractor will prepare an OHS management plan and implementation procedures specific to this Project and in line with its corporate OHS policy and procedures. The OHS management plan and implementation procedures will be submitted not later than one month before commencing the construction for approval of the Project Manager of the Project Proponent and relevant authorities, if so required. • The Contractor will conduct necessary orientation and training to all construction personnel to ensure that the construction personnel clearly understand the OHS plan and implementation procedures. • The OHS management plan and implementation procedures will cover but not limited to the following subjects: - Organization and responsibilities of OHS management - Training plan - Communication plan - Contractor responsibilities - Job-specific work requirements - Compliance monitoring and evaluation plan - Audit plan - Reporting system - Documentation system • Develop and implement safety measures for the construction works including treatment strategies that address fire and chemical hazard, communications, access for emergency services, response coordination and management. • Develop emergency response procedures, and implement in the event of accidents and emergencies. • Provide fire and life safety measures, including ventilation, smoke extraction and firefighting systems for the duration of the construction phase.

Element	Content
	During Construction • The implementation of the OHS plan will be integrated with construction supervision. • The Contractor will implement the OHS plan and procedures as part of its construction supervision. The Contractor's site engineers and foremen will supervise the implementation of OHS procedures to comply with relevant requirements. • The Contractor's EHS Manager will monitor the OHS performance.
Monitoring	• Monitoring of OHS performance of the Contractor will be made through: - Daily informal inspections (walk through of the construction sites) - Weekly formal inspections of the work place - Audits - Corrective Action Reports • The daily inspections will observe: (i) adherence of the construction workers to the OHS procedures such as wearing of protective equipment in high risk working areas; (ii) working conditions; (iii) readiness of fire and life safety systems as relevant; and (iv) potential new hazards. The daily inspections will be carried out by the Contractor's EHS Manager and Construction Manager, Site Managers, and relevant foremen. The Project EHS Manager will occasionally join the daily inspections. The Contractor's EHS Manager will prepare daily OHS inspection notes as part of the site inspection notes. • The weekly formal inspections will be carried out at weekly intervals and shall be documented using appropriate "Weekly OHS Inspection Checklists". The Contractor's Construction Manager, EHS Manager, and Site Engineers will carry out the weekly inspections. The Owner's EHS Manager will jointly undertake the weekly inspections. Subcontractors will also be required to participate in the weekly inspections. The weekly inspections will include plant, substances, equipment and temporary structures used by subcontractors. • Internal audits will be carried out annually or more frequent if the OHS performance is significantly below established targets. The internal auditor or team will be engaged by the Contractor with concurrence of the Project Proponent. • Monitoring results will be discussed in Project OHS monthly review meetings.
Reporting	• Monthly as part of the monthly monitoring reports except in case of an incident when reporting should occur immediately on completion of any investigation required to resolve the incident. • Twice a year reporting on OHS performance, and submission to MONREC.
Responsible Agency	• Contractor • Project Proponent
Budget Allocation	Including in the construction cost

APPENDIX 6A-10

RESOURCE MANAGEMENT PLAN

APPENDIX 6A-10

RESOURCE MANAGEMENT PLAN

Element	Content
Objective	To ensure that Nga Pitat villagers can still utilize marine and coastal resources sufficient to their livelihoods.
Performance Indicators	• Number of complaints related to resource management. • Type and number of aquatic resources at intake and outfall pipes in the sea.
Sources	Laying of intake and outfall pipelines from the power plant to the sea, with about 2 km distance will affect on: • Obstruct commuting and navigation route to mooring area of Nga Pitat villagers. • Obstruct navigation of local fishermen along coastline. • Reduce fishing area of small-scale fishermen.
Applicable Standards	All complaints about construction of seabed pipeline in about 7 month period are responded by the EPC and filed with the Project Management Office.
Mitigation Measures	**Before Commencing the Construction** • Clearly demarcate the alignments of the intake and outfall pipes and construction schedule. Provide the information to the affected public in due course before the construction. • The Contractor will inform villagers, especially Nga Pitat about the construction period and schedule. • The Contractor will demarcate the area of the laying intake and outfall pipelines. • The Contractor will manage not to distract the villagers of using Britney Creek. **During Construction** • The Contractor will install pipelines within short period. • The Contractor will lay pipeline in very small area. The intake pipe will be about 2.3 km long and 2.2 m in diameter. The outfall pipe will be 1.7 km long and 2.2 m in diameter. Comparing to the sea, this area is very small. That means loss of fishing area is insignificant.
Monitoring	• Report community consultation's activities and on consultation. • The inspectors will observe and collect information on the number of fishermen navigate and fishing near pipelines laid area and identify their problem, if any. • Twice a year collection samples at intake and outfall pipes laying to analyzed abundance and species of phytoplankton, zooplankton, benthos and fish larvae. This activity will be carried out by a third party. • Internal monitoring on the response to complaints by filing system of the Grievance Redress Mechanism.
Reporting	• Results of the resource management will be included in the monthly monitoring reports and the twice a year reports for submission to MONREC.

Element	Content
	• Report immediately to the relevant authorities in case of complaint from villagers.
Responsible Agency	• Contractor • Project Proponent • Third Party
Budget Allocation	4,000 US$/Year for collection and analysis of the abundance and species of phytoplankton, zooplankton, benthos and fish larvae.

APPENDIX 6A-11

CORPORATE SOCIAL RESPONSIBILITY (CSR)

APPENDIX 6A-11

CORPORATE SOCIAL RESPONSIBILITY (CSR)

Element	Content
Objective	• To disseminate the project information to the stakeholders throughout the Project life. • To monitor the Project impacts which may affect to the locals continuously. • To be communication channel for the others to the Project. • To support and promote communities' activities, including local authorities.
Performance Indicators	• Number of grievances or complaints filed with the Project Management Office of the Project Proponent • Number of complaints successfully responded
Sources	The stakeholders, especially local communities, may have negative attitudes toward the Project which could lead to conflicts, opposition and delay the project implementation.
Applicable Standards	The target for the entire pre-construction and construction period of about 72 months in total for all phases is all complaints are responded by the EPC and CSR team, and filed with the Project Management Office.
Mitigation Measures	To establish a good mutual understanding between the Project and stakeholders, particularly the local communities through following measures: • **Establishment of channel for public relation and information disclosure** through several public channels such as local media, notice board, placement of leaflet, meeting, participation in local activities, visit the communities, and open house of the Project. • **Involvement in grievance redress** to make appropriate response to complaints related to the Project impacts. • **Establishment good relationship with communities** by supporting communities' activities through its annual CSR program such as formal education, health care and sanitation, and religions and culture. • **Support socio-economic development** via priority given to local employment opportunity, occupation promotion and gender development. • **Regular meeting with communities** to foresee problems that would arise from the Project implementation, and build up mutual understandings in the area. • **Reporting on results the project implementation, mitigation measures and monitoring** to concerned authorities and communities.
Monitoring	• Report on activities undertaken under CSR and Public Relations Program. • Report on community consultation's activities with stakeholders. • Monitoring on the response to complaints caused by the Project impacts through Grievance Redress Process.

Element	Content
Reporting	• Results of the activities under CSR program will be included in the monthly monitoring reports and the twice a year reports for submission to MONREC. • Report immediately in case of complaints from the locals.
Responsible Agency	Project Proponent via CSR and Public Relations Team
Budget Allocation	Allocation of 15,000 US$/Year for • 2,000 US$/Year to CPC for coordinating and supervise the Grievance Redress Process • 3,000 US$/Year to support activities related to Grievance Redress Process • 10,000 US$/Year to support activities related to public relations and social activities

APPENDIX 6A-12

EMERGENCY MANGAGEMENT PLAN
(FLOOD, TSUNAMI, EARTHQUAKE AND CYCLONE)

APPENDIX 6A-12

EMERGENCY MANGAGEMENT PLAN

(FIRE, FLOOD, TSUNAMI, EARTHQUAKE AND CYCLONE)

Element	Content
Objective	• To minimize impacts in case of emergency during construction phase • To acknowledge and raise awareness of construction workers to evacuate, shelter or lockdown can save lives
Performance Indicators	• Number of employees/workers/staff understand about emergent situation and know how to minimize or survive from the hostile situation (fire, flood, tsunami, earthquake and cyclone) • Conduct a test (pre-test and post-test) to evaluate their understanding
Mitigation Measures	Provide training program about emergency response plan before commencing construction activities
Monitoring	Results of pre-test and post-test of construction workers
Reporting	Results of pre-test and post-test directly reporting to project proponent
Responsible Agency	• Contractor • Project Proponent
Budget Allocation	15,000 US$/Year

APPENDIX 6B

TENTATIVE ENVIRONMENTAL INCIDENT REPORT FORM CONSTRUCTION PHASE

APPENDIX 6B
TENTATIVE ENVIRONMENTAL INCIDENT REPORT FORM
CONSTRUCTION PHASE

Date of Incident			
Time of Incident			
Construction Site	☐ Power Plant	☐ Transmissin Line	☐ Gas Pipe Line

TYPE OF INCIDENT

On-sites		Off-sites	
☐ Fugitive dust	☐ Work related accidents	☐ Transport accident	☐
☐ Noise and vibration	☐ Fire	☐ Transport noise	☐
☐ Exhaust emissions	☐ Explosion	☐ Transport vibration	☐
☐ Wastewater	☐ Non-compliance with safety regulations	☐ Community's conflicts with construction workers	☐
☐ Construction wastes	☐ Non-compliance with monitoring requirements	☐ Noise and vibration	
☐ Hazardous waste storage		☐ Waste disposal	
☐ Non-compliance with complaint redress requirements			

TYPE OF IMPACT

☐ General environmental and social effects (to be used where other categories do not apply)
☐ Local air pollution
☐ Land contamination
☐ Excessive noise and vibration at sensitive receptors
☐ Pollution of the receiving waters
☐ Local insanitary condition
☐ Disturbances and discomforts to the communities
☐ Public safety risk
☐ Health and safety of construction workers
☐ Breach of conditions in the ECC
☐ Project's image
☐ Legal liabilities
☐ Financial-fine, liabilities, legal cost, construction cost

NUMBER OF PEOPLE AFECTED BY THE INCIDENT

DETAILS OF THE INCIDENT
Person who reported the incident

Place of incident and related construction activity

Area affected by the incident

Actual or Suspected Cause

Estimated cost incurred by the incident

CLASSIFICATION OF THE INCIDENT
☐ High severity level
☐ Medium severity level
☐ Low severity level

INCIDENT INVESTIGATION DETAILS

Incident investigation undertaken	☐ Yes	☐ No

Details of actions taken

COMPLETED BY

Name	Signature	Position	Date

APPENDIX 6C

OUTLINE OF CONTRACTOR'S ENVIRONMENTAL MANAGEMENT PLAN

APPENDIX 6C

OUTLINE OF CONTRACTOR'S ENVIRONMENTAL MANAGEMENT PLAN[1]

(for guidance only)

1. INTRODUCTION

The introduction of the Contractor's EMP should include:

- A brief description of the project and the contract
- The contractor's environmental objectives
- An explanation of the role of the Contractor's EMP and how it will be used during construction to achieve the project's environmental and social (ES) objectives.

2. ENVIRONMENTAL MANAGEMENT SYSTEM

The contractor shall provide details of the ES management system (ESMS) to apply during the contract.

The basic elements of the contractor's ESMS to be detailed are likely to include:

2.1 Contractor's ES policy

Include a copy of the policy document and an explanation of how the policy will apply to the project.

2.2 Project organisation chart

An organisational chart showing the reporting/responsibility relationships, position titles and personnel, including subcontractors, should be included. The personnel with specific site ES management responsibility should be highlighted.

2.3 Training, awareness and competence

Describe how the organisation training policy will apply to this contract to ensure that all employees and subcontractors are aware of and adequately trained to discharge their environmental responsibilities. A specific site briefing prior to commencement of works shall occur.

2.4 ESMS documentation

Provide documented details of the system, if available, including any manuals, standard report sheets, checklists, etc.

---

[1] Modified from Appendix A, Contractor's Environmental Management Plan Guidelines for Construction-Road, Rail and Marine Facilities, Government of South Australia Government, Revision 2 February 2009

2.5 Document control

Describe the document control system to apply to the contract.

2.6 Checking and corrective action

Describe the procedures to apply to inspection, monitoring and auditing including non-conformance and corrective action.

Procedures applicable for these basic elements should be documented. Existing quality assurance procedures may already respond to issues such as document control and corrective action.

3. CONTRACTOR'S EMP SCHEDULE

Schedules may be presented under two categories, namely:

- Specific response to the Project EMP
- Best practice response

Best practice responses should be detailed, particularly when a project-specific Project EMP is not developed.

Plans can either be issue based or activity based. The Project ESMP is issue based with headings such as construction wastes, labour and working condition, and fugitive dust.

An activity based plan would be likely to have headings such as vegetation clearance, excavation, topsoil removal, demolition, dredging and drainage works, etc.

The contractor shall include an inspection, monitoring and audit plan based on the Contractor's EMP Schedules. These are essential in order to establish if the contractor's performance has achieved the project objectives. The Contractor's EMP must be relevant to the site activities and effectively implemented and managed. Inspections, monitoring and auditing will provide the basis to implement corrective action and to ensure the environmental outcomes are achieved. Resultant action may involve upgrading the Contractor's EMP, changing procedures, training staff or providing additional or repositioning controls.

APPENDIX 7A

SUB-PLAN OF OEMP (OPERATION PHASE)

APPENDIX 7A-1

AIR QUALITY MANAGEMENT PLAN

APPENDIX 7A-1

AIR QUALITY MANAGEMENT PLAN

<table>
<tr><th>Element</th><th>Content</th></tr>
<tr><td>Objective</td><td>• To minimize the emissions from the power plant, particularly NO_x
• To ensure the emissions are within the limits prescribed as a condition of the ECC prescribed by MONREC</td></tr>
<tr><td>Performance indicators</td><td>• Concentrations of NO_x in the stack gas as percentage of the permissible maximum concentrations
• No complaint on ambient air quality in sensitive receptor areas</td></tr>
<tr><td>Sources</td><td>Stack gas</td></tr>
<tr><td>Operational level criteria</td><td>Emission characteristics at full load
<table>
<tr><th>Parameter</th><th>Units</th><th>Magnitude</th></tr>
<tr><td>Exit velocity</td><td>m/s</td><td>30.91</td></tr>
<tr><td>Temperature</td><td>°C</td><td>567.7</td></tr>
<tr><td>NOx-Concentration Emission rate</td><td>g/s</td><td>6.23 per stack (control of turbine)</td></tr>
</table></td></tr>
<tr><td>Mitigation measures</td><td>Design and Commissioning
• The gas turbine facility has been modelled and designed so as to ensure stack emissions will meet prescribed technical specifications.
• Low NO_x burners will be used to minimize thermal NO_x emissions.
• The Contractor and his supplier will complete the testing and tuning program on the turbines before operational handover to ensure efficient operation of plant.
Management Controls
• Ensure that the power plant personnel will be suitably qualified for their assigned tasks.
• The Contractor with support of the equipment suppliers shall provide appropriate training to plant operation personnel to enhance their competency in operation and control of turbines using low NO_x burners. The Contractor will propose a training program for plant operators not later than three months before the commissioning, and conduct the training as part of the overall training in parallel with the commissioning.
• Regular periodic review of air quality monitoring data (monthly) with comparison of monitoring data with that assumed and predicted in the documents listed under Condition of the Project Approval.
Operational Controls
• The gaseous emission control will be complied with IFC Environmental, Health, and Safety Guidelines Thermal Power Plants (2008) and National Environmental Quality (Emission) Guidelines (2015).</td></tr>
</table>

<table>
<tr><th>Element</th><th>Content</th></tr>
<tr><td>Monitoring</td><td>
Design & Commissioning
During commissioning, the Contractor will conduct stack monitoring to verify the stack parameter and emission estimates that were used to produce the modelled predictions and assessment of potential impacts in the Final EIA Report.
Commercial Operation
Each of the exhaust stacks will be fitted with in-stack monitoring equipment linked to the continuous emissions monitoring system (CEMS). This monitoring system will be designed to meet the regulatory requirements stipulated in the EIA Procedure and the ECC for the Project, in particular monitoring of NO_X.
Annual stack monitoring will be undertaken as per the following table:
<table>
<tr><th>Pollutant/parameter</th><th>Method</th></tr>
<tr><td>NOx</td><td>CEMs</td></tr>
<tr><td>Velocity</td><td rowspan="8">Stack sampling
(US.EPA. Method 1-4)</td></tr>
<tr><td>Volumetric flow rate</td></tr>
<tr><td>Temperature</td></tr>
<tr><td>Moisture content in stack gas</td></tr>
<tr><td>Molecular weight of stack gas</td></tr>
<tr><td>Carbon dioxide</td></tr>
<tr><td>Oxygen</td></tr>
</table>

During the first five years of operation, compliance monitoring of ambient air quality will be carried out twice a year, reduced to once a year thereafter. Each monitoring will collect air samples continuously for 24 hours at the sensitive receptors. The collected combined samples will be analyzed for NO_x. The frequency of ambient air quality monitoring could be increased to quarterly or reduced to once a year depending on the results of ambient air quality monitoring.

Monitor twice a year or more frequently by a third party if complain on ambient air quality in sensitive receptor areas.
</td></tr>
<tr><td>Maintenance</td><td>
• The turbine equipment will be performance tested, tuned and emission guarantees confirmed during the commissioning phase to ensure that the manufacturer's standard has been delivered.
• All equipment will be maintained according to Plant Operating, Maintenance and Calibration Manuals, Procedures & Schedules.
</td></tr>
<tr><td>Reporting</td><td>Air quality management and monitoring reports will be submitted to MONREC every six months in the first five year of operation, thereafter, reduced to annual report over the remaining of the Project life.</td></tr>
<tr><td>Corrective Actions</td><td>Stack Emissions – Contingency Plan
If emission limits are exceeded during plant operation the following actions will be carried out:</td></tr>
</table>

Element	Content
	• The Gas Turbine Officer will initially follow the manufacturer operating manual. This will allow operators to fault find plant issues to bring the Unit(s) back within specification. The Gas Turbine Officer will be trained in the use of the operating manual. • At the completion of working through the manufacturers operating manual, if high emission levels are still being experienced, the Gas Turbine Officers will be required to determine if the high emission level is an actual plant fault or a fault in the CEMS. a) If the fault is a plant fault, the Power Plant Manager will organize professional assistance to undertake the required work to bring the Unit(s) back within emission specification in timely manner. b) If the fault is a CEMS fault, the CEMS Unit(s) will be corrected in timely manner. c) If the correction cannot be achieved in a reasonable period, the affected unit(s) will be shut down until the correction is completed. No response mechanism has been developed for potential elevated air impacts on surrounding land uses as a consequence of meteorological conditions. Modelling undertaken as part of the air quality assessment for the EIA indicate that the gas turbine facility would have a minor effect on the existing ambient air quality levels and would readily comply with the relevant air quality goals set by MONREC. Further, emissions from the gas turbine facility would result in no exceedances of air quality goals and standards of IFC Environmental, Health, and Safety Guidelines Thermal Power Plants (2008) should an incident or failure to comply be identified in relation to point source emissions, the following corrective actions will be undertaken: • Report to MONREC or other regulating agency • Investigate exceedances and implement corrective/preventative control measures • Report corrective action to MONREC and include in follow-up incident report
Responsible Agency	• Plant Operation Team - Operation Manager - EHS Manager - Project Manager • Third Party
Budget Allocation	• Year 1 to Year 5: 4,800 US$/Year • Year 6 to Year 30: 2,400 US$/Year

APPENDIX 7A-2

NOISE MANAGEMENT PLAN

APPENDIX 7A-2

NOISE MANAGEMENT PLAN

Element	Content
Objective	• To minimize noise impacts on the surrounding community from the power station's operations • To comply with the noise standards prescribed as a condition of the ECC by MONREC
Performance indicators	• No complaints concerning noise • Compliance with noise standards to be verified by results of noise monitoring
Sources	Main noise sources associated with the power plant's operation: • Gas engine generators • Gas turbine generators • Heat recovery steam generation equipment (HRSG) • Steam turbine generators
Operational noise level criteria	• National Environmental Quality (Emission) Guidelines (25 December 2015) • International Finance Corporation (IFC) Environmental, Health, and Safety Guidelines: General EHS Guidelines: Environmental Noise Management of International Finance Corporation (30 April 2007) - LAeq 1 hr 55 dB(A) daytime - LAeq 1 hr 45 dB(A) nighttime
Mitigation measures	**Design & Commissioning** • To confirm that the power plant meets the specified noise criteria, the Contractor will ensure that the process equipment to be used will have minimum noise level at source. The Contractor will review the noise emission data and noise predictions during the detailed design phase, where actual plant specifications and characteristics were known; • Plant layout and siting of process equipment with consideration of distance from the receptors; and • Post commissioning noise source emissions and ambient noise monitoring levels will be measured on a periodic basis to confirm the noise levels received at the nearest residential locations are consistent with the noise predictions stipulated in the Project EIA. **Management Controls** • The Contractor with support of the equipment suppliers shall provide appropriate training to plant operation personnel to enhance their competency in noise control of equipment. The Contractor will propose a training program for plant operators not later than three months before the commissioning, and conduct the training in as part of the overall training in parallel with the commissioning. • The Contractor shall provide Plant Operation, Maintenance and Calibration Manuals, Procedures & Schedules to ensure all site plant is maintained for optimal performance and reduced noise levels; and • Site induction to cover site noise management issues & procedures.

Element	Content
	Operational Controls • The power plant will operate under specific Operational Procedures developed on-site specifically to manage noise emissions from the site. These procedures include operating checklists, and ensuring all doors, vents, louvers are closed as required during operation to limit the releases of noise from the generator/turbine enclosures. • Running all plants as per Operational Procedures. **Maintenance Noise** Ensuring maintenance activities noise levels are below regulatory noise emissions will be undertaken on-site by: • Ensuring all operators or contracted maintenance personnel working on plant on weekends, during evenings or at nighttime understand the noise management issues on-site and complete their work with no noise impacts on the sites near neighbors. • The Site Manager/ Community Relations Advisor communicating to the local community through the Community Participation Program any upcoming major outages or maintenance programs that may mean new on-site activities, increased transport to site or any additional planned noise sources.
Monitoring	Daily informal observation of on-site noise levels by the EHS Manager, the Operation Manager, and Gas Turbine Operators. Noise monitoring is undertaken: • Initially during the commissioning of the power station, the Contractor will carry out noise monitoring at various locations inside and outside the power plant including the perimeter. The monitoring period and the exact locations as well as the monitoring method will be proposed by the Contractor in due course not later than 30 days before commencing the commissioning. Results of the initial monitoring will be reviewed by the EMS Manager and the Power Plant Manager. • During commercial operation, compliance monitoring of ambient noise level will be carried out by a third party every six months or more frequent as necessary during the first five year after commissioning, and only once a year thereafter. The monitoring sites will be at the following sensitive receptors: Nga Pitat Village, especially Yay Wai Monastery and Nga Pitat School. • As required after a community complaint about the power station. Monitoring will occur as per the Corrective Actions section of this Management Plan. • Results of noise monitoring will be included in the monitoring reports to be submitted to MONREC.
Maintenance	• All plant and equipment, including vehicles, will be properly maintained in order to minimize noise generation. • All power plant equipment will be maintained according to Plant Operating, Maintenance and Calibration Manuals, Procedures & Schedules.

Element	Content
Reporting	• Twice a year reports will be submitted to MONREC in the first five year after commissioning. • Annual report will be submitted to MONREC throughout the Project life after that.
Corrective Actions	Corrective action is required to be undertaken immediately after a complaint is made or non-conformance identified. In the event of a complaint or failure to comply with the relevant guidelines of the Project Approval or Environment Protection License Condition the following corrective/preventative actions shall be taken: • An investigation shall be undertaken to determine the cause of the problem or non-conformance; • Investigate climatic conditions to determine contribution; • Measure sound power and pressure levels emitted from equipment identified as the likely source of the problem and review possible mitigation techniques; • Modify work practices as necessary to reduce the duration or level of noise; and • Report corrective actions to MONREC, MOEP or other regulating agency where required
Responsible Agency	• Plant Operation Team - Operation Manager - EHS Manager - Project Manager • Third Party
Budget Allocation	• Year 1 to Year 5: 4,200 US$/Year • Year 6 to Year 30: 2,100 US$/Year

APPENDIX 7A-3

WASTEWATER MANAGEMENT PLAN

APPENDIX 7A-3

WASTEWATER MANAGEMENT PLAN

<table>
<tr><th>Element</th><th>Content</th></tr>
<tr><td>Objective</td><td>To ensure that the treated effluent to be discharged from the power plant premise to the natural receiving water will meet the effluent standards prescribed by MONREC as a condition of the ECC.</td></tr>
<tr><td>Performance indicators</td><td>• Concentrations of various pollutants in the treated effluent compared with the effluent standards
• Temperature at discharged point</td></tr>
<tr><td>Sources</td><td>• Volume of wastewaters generated
<table><tr><th>Source</th><th>Average Volume, m³/d</th></tr><tr><td>Boiler blow-down and quenching water</td><td>186.96</td></tr><tr><td>Domestic sewage</td><td>2.80</td></tr><tr><td>Plant wash water and others</td><td>707.04</td></tr><tr><td>Wastewater from demineralization unit</td><td>82.56</td></tr><tr><td>Total</td><td>979.36</td></tr></table>• Temperature at about 100 m radius from the discharge point is less than 3°C in comparison to ambient water temperature.</td></tr>
<tr><td>Operational level criteria</td><td>The final effluents are expected to meet the following Myanmar National Environmental Quality Guidelines (2015).</td></tr>
<tr><td>Mitigation measures</td><td>Design and Commissioning
• The Contractor will prepare detailed design of water cooling system to meet the IFC standard.
• The Contractor will prepare detailed design of wastewater treatment facilities based on the following design concept:
a) The process wash water contaminated with oil will be segregated for oil removal in an oil separator. The oil-free wash water will then be combined with other wastewater streams for further treatment.
b) Wastewater from the demineralization unit and the boiler blow down mixed with quenching water will be combined and neutralized in a neutralization basin before combining with other wastewater streams for further treatment.
c) Domestic sewage will be treated in a small treatment plant. The treated effluent will be combined with the effluents from (a) and (b).
• The combined effluent will be discharged into a pond before disposal through a sewer pipe into the sea, about 1 km away. Water in the pond will be used for landscaping.
• A drainage system will be provided to collect surface runoff and discharged into the retention pond or directly into the river through the effluent outfall. Surface runoff from open areas contaminated by oil will be separately drained into an oil separator before discharging into the main drainage system.
• Install 517 diffuser along 1.7 meter of outfall pipe in order to lower the water temperature at discharge point.</td></tr>
</table>

Element	Content
	Management Controls • The Contractor will be required to prepare an operational manual for the wastewater treatment system. The manual will be submitted at least two weeks before the training for wastewater treatment plant operators. • Ensure that the cooling water system and wastewater treatment facilities will be operated by suitably qualified personnel; • The Contractor with support of the equipment suppliers shall provide appropriate training to cooling water system and wastewater treatment plant operators to enhance their competency in operation and control their facilities. The Contractor will propose a training program for plant operators not later than three months before the commissioning, and conduct the training as part of the overall training in parallel with the commissioning. • The wastewater treatment system will be efficiently managed. Daily volume of each wastewater stream will be measured and the data kept for monitoring purpose. • Scheduled collection and analysis of wastewater samples from each wastewater stream will be routinely carried out before and after the treatment to provide feedback for the wastewater management and operational controls. **Operational Controls** • The operation and control of cooling water system and wastewater treatment facilities will strictly adhere to the procedures in the operational manual.
Monitoring	**Design & Commissioning** About one to two weeks before the commissioning, the Contractor will carry out a sea water quality survey covering three stations, the outfall, 1 km upstream of the outfall, and 1 km downstream of the outfall, with current direction of each station. Water samples will be collected at mid-depth from these three locations at high tide slack and at low tide slack. The water samples will be analyzed for pH, temperature, oil and grease, dissolved oxygen, and BOD. During commissioning, the Contractor will conduct a wastewater sampling program to verify volume and characteristics of all wastewater streams. The Contractor will collect samples of treated effluents to determine performance of the cooling water system, oil separation unit, the neutralization unit, and the sewage treatment plant. The final combined effluent discharged from the storage pond will also be collected and analyzed to determine the overall performance of wastewater management. Seawater quality sampling will be carried at about 100 m distance from discharge point to analyze pH, nitrate, nitrogen, phosphates as P, lead, cadmium, mercury, temperature, oil and grease, dissolved oxygen, and total suspended solids.

Element	Content
	The Contractor will submit a performance evaluation report presenting results of the above monitoring and evaluation of the efficiency of wastewater treatment. The Contractor will update the operational manual based on the commissioning results, as necessary. **Commercial Operation** Routine scheduled monitoring of the discharge of spent cooling water and wastewater treatment facilities will be carried out per the operation manual to provide data for operational control and performance evaluation. The data generated will be systematically collected in a wastewater management information system. Seawater quality sampling and marine organism surveys (phytoplankton, zooplankton, fish larvae, and benthos) will be carried out every six months or more frequent as necessary during the first five year of operation, and reduced to once a year, thereafter throughout the remaining Project life. The seawater quality sampling and analysis requirements will be similar to those of the surveys conducted before the commissioning. Marine organisms sampling will be made on abundance and species. Monitor on wastewater quality, seawater quality and marine organism will be undertaken by a third party.
Maintenance	All equipment will be maintained according to Plant Operating, Maintenance and Calibration Manuals, Procedures & Schedules. Adequate number of parts and spares of equipment will be stored to ensure minimum stoppage time of the wastewater treatment facilities.
Reporting	The performance evaluation results will be reported on monthly basis. Results of wastewater and effluent monitoring will be reported to MONREC every six months during the first five years of operation, and annually thereafter throughout the Project life.
Corrective Actions	Breaking down or malfunctioning of water cooling system and wastewater treatment equipment affecting the wastewater treatment efficiency of any wastewater stream will need to be immediately reported to the EHS Manager. During the replacement or repair of the equipment, the affected wastewater stream will be diverted to the storage pond.
Responsible Agency	• Plant Operation Team - Operation Manager - EHS Manager - Project Manager • Third Party
Budget Allocation	Implementation of mitigation measures will be included in the Project operating cost. Monitoring cost of wastewater, seawater and marine resources will be distinguished into 2 periods:

Element	Content
	• Duration between Year 1 to Year 5: - Wastewater and seawater measurement: 3,600 US$/Year - Marine resource measurement: 6,000 US$/Year • Duration between Year 6 to Year 30: - Wastewater and seawater measurement: 1,800 US$/Year - Marine resource measurement: 3,000 US$/Year

APPENDIX 7A-4

OCCUPATIONAL HEALTH AND SAFETY (OHS) MANANGEMENT PALN

APPENDIX 7A-4

OCCUPATIONAL HEALTH AND SAFETY (OHS) MANANGEMENT PALN

Element	Content
Objective	To establish best practicable OHS conditions to ensure work related health and safety of operational personnel.
Performance Indicators	• Total Recordable Injury Frequency Rate (TRIFR) • Lost Time Injury Frequency Rate (LTIFR) • Medical Treatment Injury Frequency Rate (MTIFR) • Duration rate • Incident rate
Sources	Issues of concern: excessive noise and temperature inside the power plant, fire and explosion risks.
Applicable Standards	OHS guidelines and standards enforced by the Ministry of Health and proposed for this Project as follows:
Mitigation Measures	**Plant Design and Equipment Selection** • The Contractor will design the power plant and associated facilities using equipment that will meet OHS guidelines and standards prescribed in the contract. • Incorporate in the EPC contract, all OHS requirements that the EPC contractor will in the design of the power plant and associated facilities, including equipment selection; give due consideration to, but not limited to, the following OHS requirements: (i) integrity of workplace structures; (ii) standard operating procedures for process shutdown, including evacuation plan; (iii) work space and exit; (iv) fire precautions; (v) toilets and showers; (vi) potable water supply; (vii) clean eating area; (viii) lighting; (ix) safe access; (x) first aid; (xi) air supply and ventilation; (xii) work environment temperature; (xiii) noise and vibration; (xiv) electrical safety; (xv) fire and explosions; and (xvi) confined working space. • The Contractor will prepare an OHS management plan and implementation procedures specific to the power plant of this Project and in line with the Owner's OHS policy and procedures. The OHS management plan and implementation procedures will be submitted not later than one month before commissioning of the power plant and associated facilities. • The Contractor will conduct necessary orientation and training to the Owner's power plant operational team to ensure that the operational team clearly understands the OHS plan and implementation procedures. • The OHS management plan and implementation procedures will cover but not limited to the following subjects: - Organization and responsibilities of OHS management - Training plan - Communication plan - Contractor responsibilities - Safety measures for the power plant's O&M, including safety in turbine operations, fire, explosion, and chemical hazards

Element	Content
	- Emergency response procedures - Task-specific work requirements Compliance monitoring and evaluation plan - Audit plan - Reporting system - Documentation system **During Plant Commissioning** The EPC Contractor will be required to conduct necessary orientation and training to the Owner's power plant operational team to ensure that the operational team clearly understands the OHS plan and implementation procedures. **During Operation** • The implementation of the OHS plan will be integrated with operational control. • The Plant Manager will implement the OHS plan and procedures as part of his operational management. • The EHS Manager will monitor the implementation of OHS procedures to comply with relevant requirements.
Monitoring	• Monitoring of OHS performance of the Contractor will be made through: - Daily informal inspections (walk through of the construction sites) - Weekly formal inspections of the work place. - Monthly formal inspections of the work place. - Audits - Corrective Action Reports • The daily inspections will observe: (i) adherence of the operational personnel to the OHS procedures such as wearing of protective equipment in high risk working areas; (ii) working conditions; (iii) readiness of fire and life safety systems as relevant; and (iv) potential new hazards. • The daily inspections will be carried out by the EHS Manager, the Operational Manager, and relevant unit heads. The Plant Manager will occasionally join the daily inspections. The EHS Manager will prepare daily OHS inspection notes as part of the site inspection notes. • The weekly formal inspections will be carried out at weekly intervals and shall be documented using appropriate "Weekly OHS Inspection Checklists". The EHS Manager and the Operational Manager will carry out the weekly inspections. The weekly inspections will include the same issues as the daily inspections but will be in more details and quantitative. • The monthly formal inspections will review the OHS performance of the month based on results of the weekly inspections. Progress in addressing issues or problems identified in the precedent weekly inspections will be evaluated.

Element	Content
	Internal audits will be carried out annually or more frequent if the OHS performance is significantly below established targets. The internal auditor or team will be engaged by the power plant company's Board of Directors. Monitoring results will be discussed in monthly review meetings on power plant performance.
Reporting	• Monthly as part of the monthly monitoring reports except in case of an incident when reporting should occur immediately on completion of any investigation required to resolve the incident. • Results of OHS monitoring will be reported: - Twice a year reports will be submitted to MONREC in the first five year after commissioning. - Annual report will be submitted to MONREC throughout the Project life after that.
Responsible Agency	• Plant Operation Team - Operation Manager - EHS Manager - Project Manager
Budget Allocation	Including in operation cost

APPENDIX 7A-5

CORPORATE SOCIAL RESPONSIBILITY (CSR)

APPENDIX 7A-5

CORPORATE SOCIAL RESPONSIBILITY (CSR)

Element	Content
Objective	• To disseminate the project information to the stakeholders throughout the Project life. • To monitor the Project impacts which may affect to the locals continuously. • To be communication channel for the others to the Project. • To support and promote communities' activities, including local authorities.
Performance Indicators	• Number of grievances or complaints filed with the Project Management Office of the Project Proponent • Number of complaints successfully responded
Sources	The stakeholders, especially local communities, may have negative attitudes toward the Project which could lead to conflicts, opposition and delay the project implementation.
Applicable Standards	The target for the entire operation period of about 30 years in total is all complaints are responded by the CSR team, and filed with the Project Management Office.
Mitigation Measures	To establish a good mutual understanding between the Project and stakeholders, particularly the local communities through following measures: **Establishment of channel for public relation and information disclosure** through several public channels such as local media, notice board, placement of leaflet, meeting, participation in local activities, visit the communities, and open house of the Project. **Involvement in grievance redress** in order to response to complaints related to the Project impacts. **Establishment good relationship with communities** by supporting communities' activities such as formal education, health care and sanitation, and religions and culture. **Support socio-economic development** via priority given to local employment opportunity, occupation promotion on agriculture, value added on agricultural, fishery and handicraft products, and gender development. **Regular meeting with communities** to foresee problems that would arise from the Project implementation, and build up mutual understandings in the area. **Reporting on results the project implementation, mitigation measures and monitoring** to concerned authorities and communities. **Involvement in solving problems as promise** to the communities, aiming to encourage the stakeholders to have confidence in the Project. **Continuation of activities by improvement and adjustment activities** as necessary for better efficiency of implementation.
Monitoring	• Report on activities undertaken under CSR and Public Relations Program. • Report on community consultation's activities with stakeholders.

Element	Content
	• Monitoring on the response to complaints caused by the Project impacts through Grievance Redress Process.
Reporting	• Results of the activities under CSR program will be included in the monthly monitoring reports and the twice a year reports for submission to MONREC. • Report immediately in case of complaints from the locals.
Responsible Agency	Project Proponent via CSR and Public Relations team
Budget Allocation	Allocation of 10,000 US$/Year for: • 2,000 US$/Year to support activities related to Grievance Redress Process • 8,000 US$/Year to support activities related to public relations and social activities

APPENDIX 7A-6

MANGROVE MANAGEMENT PLAN

APPENDIX 7A-6

MANGROVE MANAGEMENT PLAN

Element	Content
Objective	• To reduce impact on loss mangrove resources caused by the Project • To manage and rehabilitate mangrove forest resources
Performance Indicators	• Size of managed mangrove forest • Establishment and implementation of Mangrove Resource Management Program (MGRMP)
Mitigation Measures	The Project continue implementation of mangrove resource management program (MGRMP) to ensure sustainable use of mangrove resources and minimizing coastal erosion. The MGRMP will be on participatory approach. Local people, expertise and local authorities will involve in planning and implementing various activities. Details are: • **Continuation the implementation of the Core Mangrove Management Group:** the Project will continue to support implementation of the core mangrove management group, established in construction phase. • **Define Mangrove Management Area:** mangrove management area will be the same site of about 30 hectare in Chi Oo Creek area. • **Mangrove Zoning:** preservation and utilization zones of the managed mangrove area will be maintained. • **Local Mobilization for Seed Collection and Reforestation:** the core group will continue to mobilize the villagers to collect identified seeds and stocks for reproduction in the simple nursery, under supervision of officials from Department of Fisheries and Forestry. They will also continue to invite for more participation to plant mangroves at suitable time. • **Formulate Regulations for Sustainable Utilization:** the core group will maintain application of local regulations issued in construction phase, with the aim of effective management especially for local utilization.
Monitoring	• Monitor mangrove area allocated for participatory management • Monitor activities related to mangrove zoning, seed and stock collection, reforestation and utilization of mangrove resources • Monitor on complaints toward the use of mangrove resources • Monitoring will be carried out by Nga Pitat community
Reporting	Results of site and activities inspections will be included in the environmental monitoring reports and submitted to MONREC.
Area	Mangrove management area (30 ha in Chi Oo Creek area)
Responsible Agency	• Project Proponent • Nga Pitat community • Supervision by officials from Department of Fisheries and Forestry
Budget Allocation	5,500 US$/Year to support on: • 2,000 US$/Year for Nga Pitat community to implement and monitor activities related to mangrove resource management • 2,000 US$/Year for officials of Department of Fisheries and Forestry to supervise the community

Element	Content
	• 1,500 US$/Year for materials and other expenses may require for mangrove maintenance

APPENDIX 7A-7

EMERGENCY MANGAGEMETN PLAN

(FLOOD, TSUNAMI, EARTHQUAKE AND CYCLONE)

APPENDIX 7A-7

EMERGENCY MANGAGEMETN PLAN (FIRE, FLOOD, TSUNAMI, EARTHQUAKE AND CYCLONE)

Element	Content
Objective	• To minimize impacts in case of emergency during operation phase • To acknowledge and raise awareness of operation staffs to evacuate, shelter or lockdown can save lives
Performance Indicators	• Number of staff understand about emergent situation and know how to minimize or survive from the hostile situation (fire, flood, tsunami, earthquake and cyclone) • Conduct a test (pre-test and post-test) to evaluate their understanding
Mitigation Measures	• Provide training program about emergency response plan in orientation program • Practice emergency plan every year taught by experts
Monitoring	Results of pre-test and post-test of operation staffs
Reporting	Results of pre-test and post-test/yearly emergency practice, directly reporting to project proponent
Responsible Agency	• Plant Operation Team - Operation Manager - EHS Manager - Project Manager
Budget Allocation	15,000 US$/Year

APPENDIX 7B

SUB-PLAN OF DEMP (DECOMMISSIONING PHASE)

APPENDIX 7B-1

AIR QUALITY MANAGEMENT PLAN

APPENDIX 7B-1

AIR QUALITY MANAGEMENT PLAN

Element	Content
Objective	• Ambient air quality in the Project site and at the identified sensitive receptors meets the prescribed standards throughout the decommissioning period. • Community concerns and complaints about air quality are addressed quickly and effectively.
Performance Indicators	• Number of complaints filed through the complaint response channel. • Number of times that the local ambient air quality is below the prescribed standards related to dust and exhaust emissions.
Sources	Activities related to decommissioning could adversely affect local air quality in and near the Project site. The issues will be: • Fugitive dust generated from demolition, and vehicle movements in the Project site and along the transport routes. • Exhaust emissions from trucks and heavy construction equipment powered by diesel engines.
Mitigation Measures	**Fugitive Dust Control** • For construction site including spoil placement sites: - Use watering or other effective techniques on unsealed areas to minimize wheel generated or wind-generated dust - As soon as the land becomes available, engage in the progressive rehabilitation of the Project site and spoil placement sites with landscaping • Take measures (e.g. rumble bars and wheel wash bays) to ensure dust-creating material (earth or similar material) is not transported from the Project site to roads or other areas in the public domain. • Ensure all trucks carrying spoil or other loose material are covered, and if necessary, treated (e.g. mist sprays) prior to leaving the Project sites. • Ensure all loose earth and similar material spilled or otherwise deposited within the Project site and the transport routes is cleared and removed from trafficked areas as soon as practicable. • At the Project site and spoil placement sites, monitor meteorological conditions, particularly wind speed and direction and where necessary take measures to avoid impacts of dust on adjacent properties. Such measures may include: - Modification of demolishing methods - Increase in dust suppression measures - Cessation of work when no other reasonable or practical measure is available. • Spray water at and around the working areas and access roads during works. • Enforce a speed limit for vehicles and trucks in the Project site not to exceed 40 km/h. • Enforce speed limit for trucks not to exceed 40 km/h when passing the communities.

Element	Content
	• Cover material debris and removal structures with canvas or equivalent during transportation. Some materials should be dampened, if necessary, before transportation. • Establish a vehicle washing facilities to minimize the quantity of material deposition on public roads. • Establish a checkpoint at project gate to ensure the vehicles leaving the project site are following the measures prescribed to reduce dust emissions. • Decommissioning activities shall be kept as planned so that the disturbed areas will be minimized at any time. • Restore, resurface, and rehabilitate the disturbed areas as soon as practicable after completion of demolition. • Prohibit the open burning of waste in the Project area. • Dust masks should be provided (where applicable) to all workers. **Diesel Exhaust Emissions** • Take measures to manage the movement of vehicles entering and leaving the Project site to avoid, or mitigate and manage the potential for vehicle emissions impacting on adjacent properties, except where such residential or sensitive activities in front an arterial road to be used for access to or from the Project site. Measures for management are to be provided in the vehicle management plan and the traffic management plan. Such measures may include avoiding or minimizing queuing on streets approaching the worksites or adjacent to other sensitive activities. • Adopt procedures to avoid vehicles idling for excessive periods (e.g. more than 5 minutes) if required to queue to enter the Project site. • For equipment powered by diesel motors, take measures to avoid or mitigate and manage the potential impacts of exhaust emissions on adjacent residential or other sensitive activities. For example, ensure all vehicles and equipment powered by diesel motors are fitted with emission control measures, and are regularly maintained to manufacturers' specifications. • Maintain all equipment in proper working conditions according to the manufacturer's specification. The engines of the decommissioning equipment must be routinely maintained by qualified mechanics to ensure their proper condition during operation. • Provide adequate training to the equipment operators in the proper use of equipment. • Use the proper size of equipment for the job. • Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).

Element	Content
Monitoring	**Ambient Air Quality** • Monitor and manage the incidence of dust deposition and manage vehicle emissions in relation to ambient air quality. **Dust** • Monitor regularly (weekly minimum) by inspection or other effective sampling. • The performance of dust filtration systems on decommissioning shed ventilation systems. • Spillage or deposition of loose material on roads leaving the Project site. • Monitor performance of mitigation measures in relation to the construction air quality goals in the above table. **Vehicle Emissions** • Monitor vehicle management with regards to: - Queuing in streets other than those in which arrangements have been made for such action in the traffic management plan (on-going). - Vehicle motors idling for periods exceeding 5 minutes while in queues to access the Project site (on-going). • Inspect the position equipment powered by diesel motors to ensure exhaust emissions are directed away from sensitive activities and neighboring properties.
Reporting	Report to MONREC will be submitted when completion of decommissioning operation.
Responsible Agency	• Contractor • Project Proponent
Budget Allocation	Including in decommissioning cost

APPENDIX 7B-2

NOISE MANAGEMENT PLAN

APPENDIX 7B-2

NOISE MANAGEMENT PLAN

Element	Content
Objective	• To minimize noise of decommissioning activities. • To ensure that the noise levels at the identified sensitive receptors will not exceed the maximum limits prescribed by MONREC as a condition of the ECC and will be acceptable to the sensitive receptors.
Performance Indicators	• The incremental increases in noise levels during the decommissioning works compared to the targets. • Net ambient noise levels compared to the applicable ambient noise standards.
Sources	Noise will be managed at the Project site. The Project site where decommissioning activities causing noise will be most intensive and concentrated. Decommissioning activities creating noise at the Project site will be: • Demolishing structure • Operation of heavy construction equipment
Mitigation Measures	**Design** • The Contract will require the Contractor to use decommissioning equipment that generate low level of noise. The Contractor will present alternative decommissioning equipment to demonstrate that the selected equipment adopts best available technologies to minimize noise level. **Decommissioning Noise** • The Contractor will be allowed to carry out decommissioning works, which generate excessive noise levels, only during the period between 6.30 a.m. to 6.30 p.m. Mondays to Saturdays. Such construction works on Sundays or public holidays will need approval from the Resident Engineer of the Project Proponent. • For decommissioning works beyond standard decommissioning hours, the Contractor shall take reasonable and practical measures to protect the affected sensitive receptors. For example, acoustic screens or noise barriers would be required. • Reasonable and practicable measures to achieve the decommissioning noise targets may include, for example: - Commence advanced notification of works and undertake on-going consultation with potentially affected property owners and occupants. - Establishing temporary noise barriers between decommissioning worksites and sensitive receptors (e.g. residential, schools, community facilities). - Fitting noise-reduction measures to all plant and equipment engaged in the decommissioning works. • Potentially affected property owners and occupants are to be notified well in advance (7 days or more) as to the scale, extent and duration of decommissioning works, as required by the consultation and communications program.

Element	Content
	• Provide ear plugs or ear muffs to workers operating in the excessive noise areas. • Major decommissioning activities which generate loud noise should be limited to only during the day time. Activities that are necessary to be carried out at nighttime will need approval of the site engineers, and will need to have adequate noise control equipment or measures. • Speed of vehicles in the construction site will not be more than 40 km/h. • The Contractor will be required to regularly monitor ambient noise levels at the receptors.
Monitoring	**Decommissioning Noise Monitoring** • Noise monitoring will be carried out during the decommissioning works identified as noise sources are taking place. Therefore, the monitoring will be linked to the work schedule. The Contractor will be required to prepare a noise monitoring program based on the latest decommissioning schedule before commencing the decommissioning. • The monitoring locations will be at the Project site and the identified sensitive receptors. **Noise Monitoring of Decommissioning Equipment and Trucks** • Before commencing the decommissioning, the Contractor will conduct noise testing of trucks to be used. The Contractor will ensure that the trucks that did not pass the noise test will be replaced by new trucks with less noise, or will be fixed as soon as possible. The Contractor will submit reports of the noise testing to the EHS Manager of the Project Proponent. **Monitoring in Response to Noise Complaint** • The Contractor is to implement measures to receive and respond to complaints about decommissioning noise made at any time during the decommissioning phase of the Project. Such measures may include a complaints management and correction action system developed and incorporated in this DEMP. Key requirements for the system include: - On receipt of a complaint, implement a complaint response procedure for tracking and responding to the issue(s) and the complaint; - Identify the relevant decommissioning activity at which the complaint is directed; - As soon as practicable, investigate and measure the level of noise from that activity; - Respond to the complainant as soon as practicable upon completion of the investigation and describe the corrective action taken; and - Report to the Proponent on the complaint, the activity, the corrective action and the response.
Reporting	Report to MONREC will be submitted when completion of decommissioning operation.
Responsible Agency	• Contractor • Project Proponent

Element	Content
Budget Allocation	Including in decommissioning cost

APPENDIX 7B-3

WASTE MANAGEMENT PLAN

APPENDIX 7B-3

WASTE MANAGEMENT PLAN

Element	Content
Objective	• To minimize all types of wastes generated at the Project sites, that will have to be disposed. • To minimize environmental impacts of waste disposal.
Performance Indicators	Number of complaints related to waste disposal.
Sources	Wastes will be divided into three categories: • Demolition and land-clearing waste: Includes all non-hazardous solid wastes resulting from demolishing of buildings. Wastes for this Project will consist of debris, remnants of steel bars and beams, packaging materials, broken roofing materials and tiles, and remnants of pipes, glasses, etc. • Non-demolished waste: Includes wastes generated in worker camps, canteens and offices such as paper, food and beverage containers, food wastes, and other domestic items. • Hazardous waste: Includes such wastes as spent lubricating oil, and chemicals used in the demolition. Most of the hazardous wastes are in liquid form.
Mitigation Measures	**Design and Planning** • The Contractor will consult with the EHS Manager of the Project Proponent, ECD, SWB and the township governments the possibility of using existing waste disposal facilities managed by the regional or local governments. If this not possible, the Contractor will need to develop its own disposal facility preferably within the Project site, if possible. • The Contractor will ensure that the design and the proposed decommissioning methods will generate the least amount of wastes. • The Contractor will propose methods for waste reuse and recycling and prepare estimates of the remaining quantity of each waste category that will be disposed off. • The Contractor will propose methods of waste transport and disposal. • The Contractor will then prepare an action plan for waste management. The action plan will be submitted to the EHS Manager of the Project Proponent not later than two weeks before commencing the decommissioning. **During Decommissioning Operation** • An efficient decommissioning waste management system should be established and implemented. Decommissioning waste will need to be classified and sorted out at source for disposal. The disposal methods will depend on the types of wastes: direct reuse as desire, sale and recycling of materials, land filling for inert materials and specific treatment method for each type of hazardous materials. • Haphazard disposal of decommissioning waste in or off the Project site will be prohibited. • No burning of wastes will be allowed.

Element	Content
	• Decommissioning wastes should be handled by the existing municipal solid waste collection and disposal services. If such service is not possible, the decommissioning wastes would need to be disposed off in the Project site. They may be buried in areas designated for green areas. **Non-decommissioning Wastes** • Non-decommissioning wastes will be disposed off with the decommissioning wastes. • Provide adequate number of refuse binds or containers with tight covers, daily collection of disposal. **Hazardous Wastes Management** • Hazardous wastes will be handled by a licensed hazardous waste contractor. If this service is not available, the subcontractor will need to find appropriate arrangements for incineration, safe permanent storage, or other appropriate methods of disposal. **Waste Segregation** • The Contractor will design and implement a waste segregation system and procedure and communicate it to all workers strictly adhere to the segregation procedure. • An appropriate number of containers with adequate volume and appropriate materials will be provided at strategic locations to support the segregation. Each waste category will be segregated into recycling, reuse and disposal sub-categories. **Waste Collection and Storage** • Daily collection and transport will be organized and carried out for each sub-category of segregated wastes. • A roofed storage area with adequate space will be provided for storing the segregated wastes waiting for the on-site or off-site reuse or recycling. • The storage area for hazardous waste will need to be specially designed to prevent spills or leaks onto the soil. **Waste Reuse and Recycling** • Remove any contamination inadvertently deposited in recyclable waste material containers. Provide cleanup of excessive contamination at recycling vendor locations when such contamination is not controlled at the project site. • Collection and recycling of used oils by a licensed contractor. • Collection by a licensed contractor of empty oil and fuel drums and other containers for return to recycling facilities. **Waste Disposal** • Disposal of the remaining wastes that are unable to be reused or recycled in the approved land fill site(s). • Decomposable wastes such as food wastes and vegetation may be disposed off by composting. • Hazardous wastes will be handled by a licensed hazardous waste contractor. If this service is not available, the Contractor will need to

Element	Content
	find appropriate arrangements for incineration, safe permanent storage, or other appropriate methods of disposal.
Monitoring	• Monitoring of the waste management performance will be carried out through quick daily site inspections and detailed weekly site inspections. • Daily site inspections will include observation of the collection and storage of waste materials in the Project sites and waste disposal areas, and reviewing the daily records. The focusses will be on efficiency of the collection, storage, and disposal. The EHS Managers of the Project Proponent and the Contractor will jointly inspect the sites. • In weekly site inspections, the EHS Manager will be participated by the Resident Engineer of the Project Proponent and the Contractor. The inspection will cover verification of the records, disposal activities, discussion on the performance of the past week, and identification of problems, if any, that affect the waste management performance.
Reporting	• Report immediately to the relevant authorities any incident where harmful waste material is accidentally released to the environment. • In the event of an environmental incident, take such corrective or remedial action as is required to render the area safe and avoid or minimize environmental harm. • Monthly reports on the waste management results as part of the monthly monitoring reports. • Report to MONREC will be submitted when completion of decommissioning operation.
Responsible Agency	• Contractor • Project Proponent
Budget Allocation	Including in decommissioning cost

APPENDIX 7B-4

TRAFFIC MANAGEMENT PLAN

APPENDIX 7B-4

TRAFFIC MANAGEMENT PLAN

Element	Content
Objective	Manage traffic and transport issues to minimize potential impacts on the communities and the operation of the road network during decommissioning period
Performance indicators	• Number of traffic accidents in the identified impact areas • Number of traffic on Nga Pitat Road during the construction period
Sources	• Traffic disturbances could be caused by haulage of spoil, fill materials, construction materials and plant equipment. • Potential impact areas: - Small Port Coastal Road - Nga Pitat Road
Management guidelines	• Take reasonable and practicable measures to avoid, or mitigate and manage the potential traffic impacts on communities near the worksites. • Minimize as far as reasonably practicable, potential traffic disruptions to the operation of the road network and the public transport network due to the transport of materials to and from the Project sites. • Maintain safe access near all project work areas for road users, including pedestrians and cyclists. In particular, develop local access strategies in consultation with stakeholder groups to maintain safe, convenient and efficient access to community facilities such as schools and monastery, if any. • Implement traffic management measures near worksites and other project works to avoid conflicts between decommissioning traffic, and pedestrians and cyclists. • Take reasonable and practicable measures to inform the local and broader communities about the timing and scale of changes to traffic conditions on roads in the vicinity of the Project Site. • Monitor traffic flows near decommissioning works and take corrective action in response to traffic impacts as a consequence of decommissioning works.
Mitigation Measures	**Truck routes and site access** • In consultation with the concerned authorities at the regional, and township levels, develop and implement a Decommissioning Traffic Management Plan to address the following issues: - Avoid haulage tasks during peak traffic periods as far as practicable. Where haulage in peak periods is unavoidable, such activities are to be managed in accordance with specific traffic management sub-plans provided to the relevant agencies in advance. - Control heavy vehicle movements on project related road to avoid interference with major events, if any. - Investigate the capacity of intersections on haulage routes to minimize impact on intersection operations by heavy vehicles servicing the decommissioning worksites.

	- Prepare and implement a comprehensive decommissioning traffic management plan to control truck movements to avoid, or mitigate and manage the impacts of heavy vehicle traffic on the road network. • Measures to manage the operation of the truck fleet for incorporation into a vehicle management sub-plan to include: - Monitoring of truck position, speed, route and performance in relation of traffic conditions and schedule requirements. - Management of truck speed and position to avoid queuing on the approaches to the spoil handling and loading facilities. - Management of traffic signals on nominated spoil haulage along the routes. - Ensure all vehicles leaving a construction site pass over or through devices designed and maintained to remove soil and other materials. **Traffic Hazards** • Heavy trailer trucks transporting heavy and large equipment will have to be directed by a traffic police car or by other vehicle specially designated to handle a guidance of this kind of transportation. **Local Traffic** • Implement management measures to avoid, or minimize increase in traffic caused by the project works in local streets as practicable. • Notify the local community about proposed changes to local traffic access arising from decommissioning activities, and provide clear. signage of changed traffic conditions and take other measures to ensure safe traffic movement. • Prepare and implement an employee parking policy for the construction worksites. **Traffic Management at the Intersection of Small Port Coastal Road and Nga Pitat Road** • Provide a traffic police or relevant officer to control traffic at the intersection during the transport period. **Pedestrians and Cyclists** • Maintain safe pedestrian and cycle access near decommissioning works (particularly for elderly and children), including to community facilities, such as schools, monastery, open space and particularly. • Notify the local community, and in particular, local schools, about changes to pedestrian and cycle access during decommissioning near decommissioning works. • Provide traffic controls designed for the safe movement of cyclists near the worksites.
Monitoring	• Traffic monitoring will be carried out during transportation activities of the decommissioning works. Therefore, the monitoring will be linked to the work schedule. The Contractor will be required to prepare a traffic monitoring program based on the latest decommissioning schedule before commencing the decommissioning. • Record and report number of traffic accidents in the identified impact areas.

	• Monitor number of traffic on Nga Pitat Road. Review the adequacy of decommissioning traffic management plan if traffic congestion is observed.
Reporting	• Monthly report on local traffic conditions, including any accidents involving decommissioning traffic. • Report to MONREC will be submitted when completion of decommissioning operation.
Responsible Agency	• Contractor • Project Proponent
Budget Allocation	Including in decommissioning cost

APPENDIX 7B-5

OCCUPATIONAL HEALTH AND SAFETY (OHS) MANANGEMENT PALN

APPENDIX 7B-5

OCCUPATIONAL HEALTH AND SAFETY (OHS) MANANGEMENT PALN

Element	Content
Objective	To establish best practicable OHS conditions to ensure work related health and safety of operational personnel.
Mitigation Measures	• The Contractor will conduct necessary orientation and training to the Owner's power plant team to ensure that they clearly understands the OHS plan and implementation procedures of decommissioning. • The Contractor will design the power plant and associated facilities using equipment that will meet occupational health and safety (OHS) guidelines and standards prescribe in the contract. • The Contractor will prepare an OHS management plan and implementation procedures specific to the decommissioning operation and in line with the Owner's OHS policy and procedures. The plan will be submitted not later than one month before decommissioning operation. • Full surveillance and maintenance during the decommissioning operations shall be carried out.
Monitoring	Monitoring will be made through: • Daily informal inspections (walk around of the decommissioning sites) • Weekly formal inspections of the work place • Monthly formal inspections of the work place The daily inspections will observe: (i) adherence of the workers such as wearing of protective equipment in high risk working areas; (ii) working conditions; and (iii) readiness of fire and life safety systems as relevant. The daily inspections will be carried out by the EHS Manager and the contractor. The EHS Manager will prepare daily OHS inspection notes as part of the site inspection notes. The weekly formal inspections will be carried out at weekly intervals and shall be documented using appropriate checklists. The EHS Manager will carry out the weekly inspections. The weekly inspections will include the same issues as the daily inspections but will be in more details and quantitative. The monthly formal inspections will review the OHS performance of the month based on results of the weekly inspections. Progress in addressing issues or problems identified in the precedent weekly inspections will be evaluated. Monitoring results will be discussed in monthly review meetings on power plant performance.

Element	Content
Reporting	• Monthly as part of the monthly monitoring reports except in case of an incident when reporting should occur immediately on completion of any investigation required to resolve the incident. • Report to MONREC will be submitted when completion of decommissioning operation.
Responsible Agency	• Contractor • Project Proponent
Budget Allocation	Including in decommissioning cost

APPENDIX 7B-6

SOCIAL ENVIRONMENTAL MANAGEMENT PLAN

APPENDIX 7B-6

SOCIAL ENVIRONMENTAL MANAGEMENT PLAN

Element	Content
Objective	To avoid or mitigate and manage decommissioning impacts on the social environment.
Performance Indicators	Number of complaints successfully responded
Sources	Daily living of the people in the surrounding communities may be disturbed or inconvenienced by environmental disturbances caused by the decommissioning such as dust, traffic inconveniences, noise and vibration.
Applicable Standards	The target for the short period of decommissioning phase in total is all complaints are responded by the Project.
Mitigation Measures	To keep a good mutual understanding between the Project and stakeholders, the Project will continue to solve problems cause by decommissioning activities to the communities.
Monitoring	Internal monitoring on the response to complaints caused by the Project impacts.
Reporting	• Response to problem solving will be included in the monthly monitoring reports. • Report to MONREC will be submitted when completion of decommissioning operation.
Responsible Agency	Project Proponent via EHS manager
Budget Allocation	Including in decommissioning cost

APPENDIX 7C

TENTATIVE ENVIRONMENTAL INCIENT REPORT FORM OPERATION PHASE

APPENDIX 7C

TENTATIVE ENVIRONMENTAL INCIENT REPORT FORM OPERATION PHASE

Date of Incident			
Time of Incident			
☐		☐	
TYPE OF INCIDENT			
In-Plant OHS		Environment	
☐ Noise ☐ Vibration ☐ Temperature ☐ Fire ☐ Explosion	☐ Work related accidents ☐ Gas or chemical leaks ☐ Non-compliance with safety regulations	☐ Wastewater management ☐ Non-compliance with monitoring requirements ☐ Noise and vibration at sensitive receptors	☐ Hazardous waste ☐ Non-compliance with complaint redress requirements ☐ Condition of CEMS ☐ NOx reduction
TYPE OF IMPACT			
☐ General environmental and social effects (to be used where other categories do not apply) ☐ Local air pollution ☐ Land contamination ☐ Excessive noise and vibration at sensitive receptors ☐ Pollution of the receiving waters ☐ Disturbances and discomforts to the communities ☐ Public safety risk ☐ Health and safety of operational staff ☐ Breach of conditions in the ECC ☐ Power plant company's image ☐ Legal liabilities ☐ Financial-fine, liabilities, legal cost, construction cost			
NUMBER OF PEOPLE AFECTED BY THE INCIDENT			
DETAILS OF THE INCIDENT Person who reported the incident			
Place of incident and related operational activity			
Area affected by the incident			
Actual or Suspected Cause			
Estimated cost incurred by the incident			
CLASSIFICATION OF THE INCIDENT ☐ High severity level ☐ Medium severity level ☐ Low severity level			
INCIDENT INVESTIGATION DETAILS Incident investigation undertaken		☐ Yes	☐ No
Details of actions taken			
COMPLETED BY			
Name	Signature	Position	Date

APPENDIX 7D

RISK ASSESSMENT DURING OPERATION PHASE OF THE LNG TERMINAL PROJECT

APPENDIX 7D

RISK ASSESSMENT DURING OPERATION PHASE OF THE LNG TERMINAL PROJECT

The most important operational risk of this Project, is the risk of accidental fires and explosions. Release of LNG due to spills, leaks, or intentional draining can expose facility personnel to several hazards. These hazards include oxygen deficiency and freezing injuries but the primary hazards are related to the flammability of LNG and the vapor clouds generated on release of LNG to the environment. These flammability hazards may be manifested as Fireball, if it ignites immediately. A domino effect could occur if the Fireball impinges on other process plant and then escalates to become a large conflagration. An un-ignited can quickly generate a large inflammable cloud which may drift until it finds an ignition source, and it can then yield a Vapor Cloud Explosion (VCE).

Therefore, risk assessment (RA) of the Project during the operational phase will be focused on fire and explosion risk caused by leaks. This issue is critically important and deserves utmost attention from the Project Proponent.

The objective of operational risk management of the Project is to minimize the likelihood of occurrence of accidental fires and explosions in the operation of the LNG Terminal and its associated facilities.

The RA has been undertaken to identify the potential risks associated with the project using the methodology and guidelines established by relevant agencies as the following documents:

- Techniques for Assessing Industrial Hazards a Manual, World Bank (1989)
- Handbook of Chemical Hazard Analysis Procedures, US.EPA.(1990)
- Prevention of Major Industrial Accidents, ILO (1991)
- Methodologies for Hazard Analysis and Risk Assessment in the Petroleum Refining and Storage Industry, CONCAWE (1982)
- High Integrity Systems and Safety Management in Hazardous Industries, J.R. Thomson (2015)
- Lee's Loss Prevention in the Process Industries, Hazard Identification, Assessment and Control Volume 1-3, Sam Mannan (2004)
- NFPA 59A, Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG) (2013)

1. BRIEFLY PROJECT DESCRIPTION

The LNG Terminal Project is part of the infrastructure development under the Initial Phase Development of DSEZ, this Project was conceived to supply natural gas to a proposed Initial Phase Power Plant (420 MW net) project.

The coordinates of the site at its center are 1570784.577 N and 398720.391 E. The site is about 8.3 km from the entrance of DSEZ and can be reached by the existing unpaved coastal road running from the entrance of DSEZ to the existing small port.

This Project can be divided into two major components: (i) onshore component; and (ii) offshore component. The onshore facilities will be constructed on a 124 acres, and the offshore facilities will cover about 370 acres.

2. POTENTIAL RISK AREAS

According to the secondary reviewed of Significant Incidents of the hydrocarbons storage tanks from various source; i.e., Prevention of Major Industrial Accidents (ILO, 1991), Methodologies for Hazard Analysis and Risk Assessment in the Petroleum Refining and Storage Industry (CONCAWE, 1982), High Integrity Systems and Safety Management in Hazardous Industries (J.R. Thomson, 2015), and Base Resource Documents of API Publication 581 (API, 2000). Major incidents in refineries nearly always have more than one single cause. In most cases, there is a prime cause resulting in a loss of containment of hydrocarbons which may catch fire and possibly explode. It is firmly established that all of major fire and explosion incidents can be traced back to one or more of the following causes, most of which can be controlled or their consequence mitigated.

- Design/construction failure
- Operating error
- Equipment failure which may derive from operating error
- Maintenance inadequacies
- Insufficient supervision and training
- Natural phenomena such as earthquake, lightning, flooding, subsidence, etc.
- External interference such as sabotage, acts of war, etc.

Therefore, risk management of the Project will need to cover all phases of the Project starting from planning and design to operation. Considering the project description, the potential risk areas of the project are LNG Storage Tanks. The briefly of LNG storage tank as below:

Types of Storage Tank	Horizontal
Dimension, m	10.0 × 45.5 (Diameter × Length) with capacity of 3,000 m^3
Operation Condition	
- **Temperature,°C**	-197 to 38
- **Pressure, bar(g)**	2
- **Liquid Density, kg/m^3**	441
Number of Tank	3
Total Capacity, m^3	9,000
Total LNG Quantity, ton	3,969
Connecting Pipe	Input: ø 6 inches and Output: ø 16 inches

3. SEVEITY OF CONSEQUENCE

The severity of consequence of incidents are estimated by the consequence analysis techniques according to the Techniques for Assessing Industrial Hazards a Manual, World Bank (1990) and the Base Resource Documents of API Publication 581 (API, 2000), NFPA 59A, Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG) (2013) as steps below;

1. *Representative Material:* Considering the components of LNG gas, C_1 and C_2 hydrocarbons is the majority component which 98.15 % mol.
2. *The Final Phase of Material:* The LNG in the storage tank is the Liquefied, and after it release to ambient, the final phase is Gaseous.
3. *The Design Spill:* The design spill shall be determined in accordance with section 5.2.3.5 of NFPA 59A, Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG) (2013).Assume the LNG storage tank is began leak at the connecting flange with 16 inches diameter, which below the liquid level with internal shutoff valves, and the spill duration is 10 minutes, the design spill is about 55.36m^3/min or 22.75 ton/min
4. *Types of Release:* According to API Publication 581 (API, 2000), the potential release rate of the Project is about 100 kg/sec more than 10,000 lbs. within 3 minutes. It can defined as "Instantaneous Release".
5. *The Consequence of Release:* According to API Publication 581 (API, 2000)

The consequence of release for the total rupture of LNG storage tank can be described as below:

Representative Material	C_1-C_2 Hydrocarbons
The Final Phase of Material	- Liquefied in Storage Tank - Gaseous at Ambient
Design Spill	
- **Design Spill rate**	3,969 m^3/min
- **Spill Duration**	10 minutes
Types of Release	Instantaneous Release
Operation Condition	- The process temperature is less than auto ignition temperature of LNG plus 80 °F, this condition will be defined as "Auto Ignition Not Likely"
Consequences of Released	
- **No Ignited**	0.80
- **Ignited**	0.20
Ignition Types	
- **Vapor Cloud Explosion, VCE**	0.04
- **Fireball or BLEVE**	0.01
- **Flash Fire**	0.15
- **Jet Fire**	0.00
- **Pool Fire**	0.00

4. DETERMINING THE AFFECTED AREA BY INCIDENTS

4.1 Mathematical Model

The mathematical model used in the study was BREEZE Incident Analyst model, developed by Trinity Consultants Inc., based on Quantitative Risk Assessment (QRA) as suggested by the United States of America Environmental Protection Agency (U.S.EPA).

BREEZE Incident Analyst models three hazard categories: toxic gas dispersion, fires, and explosions. It employs several different models, including neutrally buoyant and dense gas air dispersion models that estimate the movement and dispersion of chemical gas clouds, explosion models to estimate the overpressure values from a vapor cloud explosion, and fire models to determine the thermal radiation from fires. Incident Analyst is a fully integrated family of consequence models for performing offsite consequence modeling and emergency response planning for the following initiatives:

- Section 112(r) of the Clean Air Act
- Occupational Safety and Health (OSHA) & Process Safety Management (PSM)
- European Economic Community (EEC) Directive 82/501: Also known as the Seveso Directive
- National Fire Protection Agency (NFPA) 59A Standard for the Production, Storage, and Handling of Liquefied Natural Gas(LNG)
- Department of Transportation (DOT) Federal Standard 49
- CFR 193

4.2 Meteorology Data

The meteorological conditions at the time of the incident will be complied in accordance with the NFPA 59A, Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG) (2013), the meteorological conditions for analyzes the distances of thermal radiation and flammable vapor gas dispersion can be summarized as below:

Meteorology Parameters	Thermal Radiation	Flammable Vapor Gas Dispersion
Wind Speed, m/s	0.5	2.0
Wind Direction	-	135
Temperature, °C	21	21
Relative Humidity,%	50	50
Anemometer Height, m	10	10
Pressure, atm	1	1
Surface Roughness Factor, m	0.03	0.03
Atmosphere Stability Class	F	F

4.3 Thermal Exclusive Zone

The thermal radiation and vapor dispersion calculations have been prepared in compliance with the NFPA 59A, Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG) (2013).

This NFPA 59A code requires that the thermal radiation flux from a fire shall not exceed the limits listed in Table below;

Thermal Radiation Flux		Exposure
Btu/hr/ft^2	kW/m^2	
1,600	5	- A property line that can be built upon for ignition of a design spill - The nearest point located outside the owner's property line that, at the time of plant siting, is used for outdoor assembly by groups of 50 or more persons for a fire in an impounding area
3,000	9	- The nearest point of the building or structure outside the owner's property line that is in existence at the time of plant siting and used for assembly, educational, health care, detention and correction, or residential occupancies for a fire in an impounding area.
10,000	30	- A property line that can be built upon for a fire over an impounding area

4.4 Flammable Vapor Gas Dispersion

The lower flammable limit is the lower flammable limit at which natural gas will ignite and burn (approximately 5% by volume for natural gas in air) in the presence of an ignition source. Ignition can occur at concentrations between 5% and 15% in natural gas and would result in a flame front that travels to the source of the gas.

Therefore, this NFPA 59A code requires the spacing of an LNG tank impoundment to the property line to ensure that an average concentration of methane in air of 50 percent of the lower flammability limit (LFL) does not extend beyond the property line.

5. RESULTS OF RISK ASSESESSMENT

5.1 Thermal Exclusive Zone

According to the consequence of LNG storage tanks rupture as above, ignition types are VCE, Fireball or BLEVE, and Flash fire, the thermal radiation will be focused on Fireball or BLEVE due to VCE and Flash fire are the fire which generated from the inflammable cloud which may drift until it finds an ignition source. The effects of them will be discussed in term of Flammable Vapor Gas Dispersion. The thermal radiation distance at the level of 5, 9, and 30 kW/m^2, can be summarized as table below;

Thermal Radiation Flux, kW/m^2	Distance, m	Details of Affected Area
5	1,382	- Andaman Sea - Nga Pitat Village - Nga Pitat School - Road in Nga Pitat Village - Mangrove forest - Coconut - Cashew/Perennial - Cashew - Agricultural Land - Open Area - Beach Forest - Sand Beach - Initial Phase Power Plant (420 MW net) - Boil-off Gas Power Plant - Project Site
9	1,030	- Andaman Sea - Nga Pitat Village - Road in Nga Pitat Village - Mangrove forest - Cashew - Open Area - Beach Forest - Sand Beach - Initial Phase Power Plant (420 MW net) - Boil-off Gas Power Plant - Project Site
30	564	- Andaman Sea - Cashew - Mangrove forest - Sand beach - Project site

5.2 Flammable Vapor Gas Dispersion

The results of DEGADIS, the sub model in the BREEZE Incident Analyst finding show that, the flammable vapor dispersion distance is about 68 meter within the project properties line.

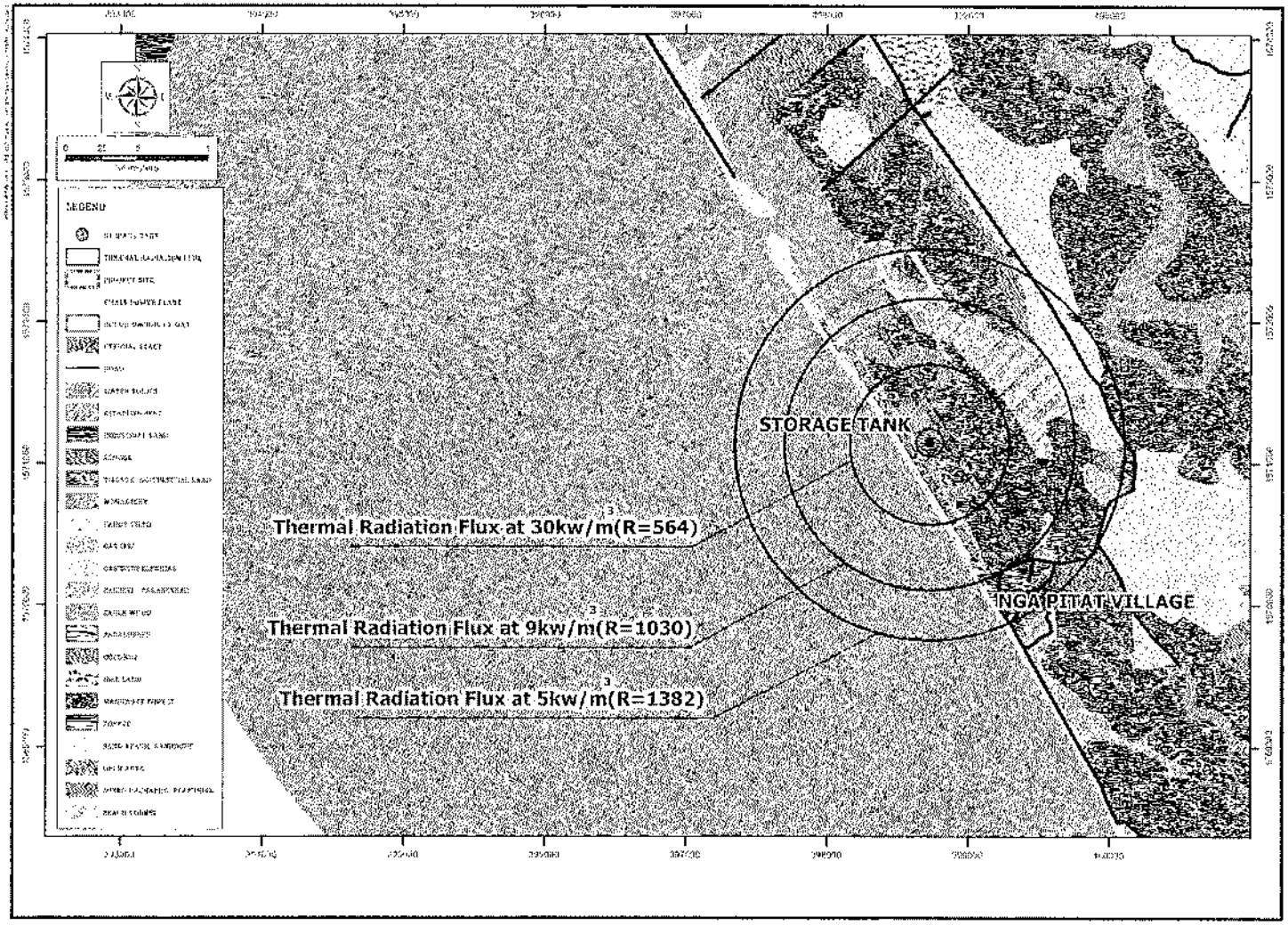


FIGURE 1 : THE THERMAL RADIATION DISTANCE RADIUS

APPENDIX 8A

PRELIMINARY ENVIRONMENTAL AND SOCIAL COST ESTIMATION

APPENDIX 8A

PRELIMINARY ENVIRONMENTAL AND SOCIAL COST ESTIMATION

A. Annual Budget during Six Years of Construction Phase

No.	COST ITEMS	Monitoring Activities	Unit Cost		Annual Budget (US$)	Total Budget for 6 Years (US$)
			US$	Units		
1	**Implementation of Mitigation Measures**					
1.1	Social Environmental Management Plan including CSR	- Disclosure th project information to the public - To be communication channel, including receiving complaints and settling the solutions - Community activities; e.g. education, health, religious, culture, occupation promotion and gender development	10,000	Lumpsum	10,000	60,000
1.2	Mangrove Management Plan	Implementation Mangrove Resource Management Program (MRMG) in 30 ha area, Implemetation will be on participatory approach: - Nga Pitat villagers will be the main actor - Officials of Department of Fishery and Forest Department will be supervisors - The Project Proponet will support the implementation	6,000	Lumpsum	6,000	36,000
1.3	Emmergency Response Plan	- Monitoring emergency situations such as accident, fire, flood, storm, tsunami etc. - Plan to restrain and recovery the situations as indicated in Emergency Response Plan	15,000	Lumpsum	15,000	90,000
1.4	External Audit	To verify the environmental management practices against established standards and check the compliance with rules and regulations to environmental management	1,500	Lumpsum	1,500	9,000
	Sub-Total of Implementation of Mitigation Measures				**32,500**	**195,000**
2	**Environmental monitoring during the construciton period**					
2.1	Air quality (3 stations)	Ambient air quality will be carried out twice a year at construction site and 2 stations at the sensitive area in Mudu and Nga Pitat, to check TSP and PM10.	800	Station	4,800	28,800
2.2	noise measurement (3 stations)	Monitoring will be carried out twice a year at construction site and 2 identified sensitive receptor to check Leq 1 hr, Leq 24 hr and Lmax	700	Station	4,200	25,200
2.3	vibration measurement (2 stations)	Monitoring will be carried out twice a year at the construction site and identified sensitive receptor to check particle velocity	600	Station	2,400	14,400
2.4	wastewater measurement (2 stations)	Twice a year collection of two grab water samples, at inlet and the outlet of retention pond, to analyzed magnitudes of various quality parameters prescribed in effluent standards.	600	Station	2,400	14,400
2.5	marine resources measurement (2 stations)	Twice a year collection at pipe laying and outlet of retention pond to analyzed for phytoplankton, zooplankton, benthos and larvae	1,000	Station	4,000	24,000
2.6	traffic flows measurement (2 stations)	Conduct traffic survey twice a year at potential impact areas of ITD Coastal and Nga Pitat Roads, and analyse the traffic flow.	500	Station	2,000	12,000
	Sub-Total of Monitoring Cost				**19,800**	**118,800**
	TOTAL BUDGET FOR ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION PHASE				**52,300**	**313,800**

B. Annual Budget during Thirty Years of Operation Phase

No.	COST ITEMS	Monitoring Activities	Unit Cost		Annual Budget During Operation Phase		Total Budget of 30 year operation
			US$	Units	Year 1 to year 5 of operaiton	Year 6 to year 30 of operaiton	
1	**Implementation of Mitigation Measures**						
1.1	Social Environmental Management Plan	- Disclosure th project information to the public - To be communication channel, including receiving complaints and settling the solutions - Community activities; e.g. education, health, religious, culture, occupation promotion and gender development	10,000	Lumpsum	10,000	10,000	300,000
1.2	Mangrove Management Plan	Continuation of Mangrove Resource Management Program (MRMG) in 30 ha area, with participatory approach: - Nga Pilat villagers will be the main actor - Officials of Department of Fishery and Forest Department will be supervisors - The Project Proponet will support the implementation	5,500	Lumpsum	5,500	5,500	165,000
1.3	Emmergency Response Plan	- Monitoring emergency situations such as accident, fire, flood, storm, tsunami etc. - Plan to restrain and recovery the situations as indicated in Emergency Response Plan	15,000	Lumpsum	15,000	15,000	450,000
1.4	External Audit	To verify the environmental management practices against established standards and check the compliance with rules and regulations to environmental management	1,500	Lumpsum	1,500	1,500	45,000
	Sub-Total of Implementation of Mitigation Measures				**32,000**	**32,000**	**960,000**
2	**Environmental monitoring during the operation period**						
2.1	air quality (3 stations)	Sampling ambient air quality at the sensitive area at project site and 2 stations of sensitive receptor in Mudu and Nga Pilat Villages to analyse NOx. Monitoring will be twice a year during five year after commissioning, and once a year from year 6 to year 30.	800	Station	4,800	2,400	84,000
2.2	noise measurement (3 stations)	Noise monitoring will be carried out every six months during the first five year after commissioning, and once a year from year 6 to year 30, at project site and two sensitive receptors of Yay Wai Monastery and Nga Pilat School in Nga Pilat Village.	700	Station	4,200	2,100	73,500
2.3	wastewater measurement (2 stations)	Water quality survey will be at 2 stations of discharged point and vicinities. Survey will be carried out every six months during the first five year after commissioning, and once a year from year 6 to year 30. The analysis will be on concentrations of various pollutants in the treated effluent compared with the effluent standards.	600	Station	2,400	1,200	42,000
2.4	marine resouce measurement (2 stations)	Seawater quality surveys will be carried out every six months during the first five year after commissioning, and once a year from year 6 to year 30, at the 2 stations of discharged points. The analysis will be on various pollutants and temperature.	1,000	Station	4,000	2,000	70,000
	Sub-Total of Monitoring Cost				**15,400**	**7,700**	**269,500**
	TOTAL BUDGET FOR ENVIRONMENTAL MANAGEMENT DURING OPERATION PHASE				**47,400**	**39,700**	**1,229,500**

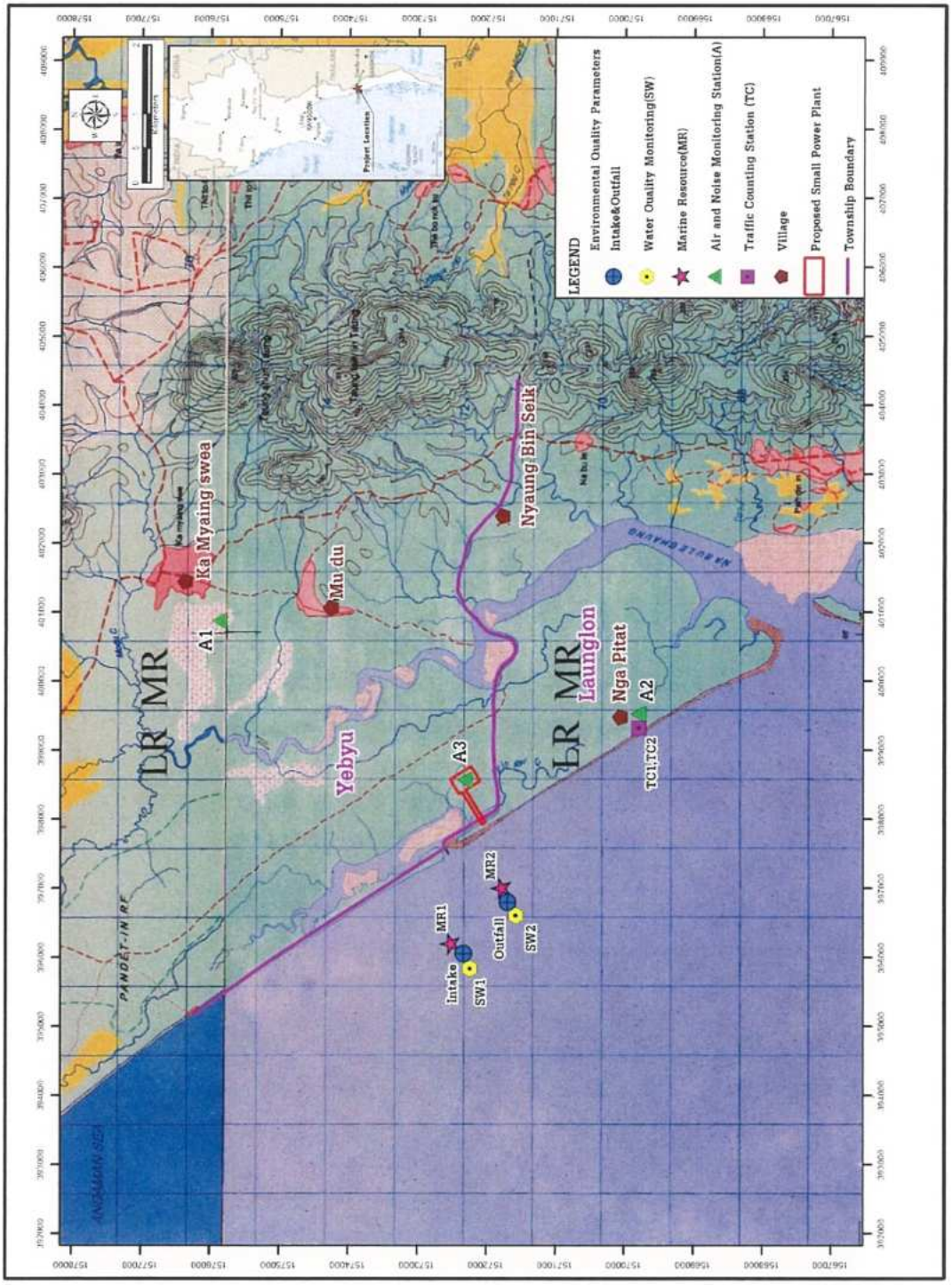


FIGURE 1: ENVIRONMENTAL MONITORING STATIONS DURING PRE-CONSTRUCTION / CONSTRUCTION PHASE

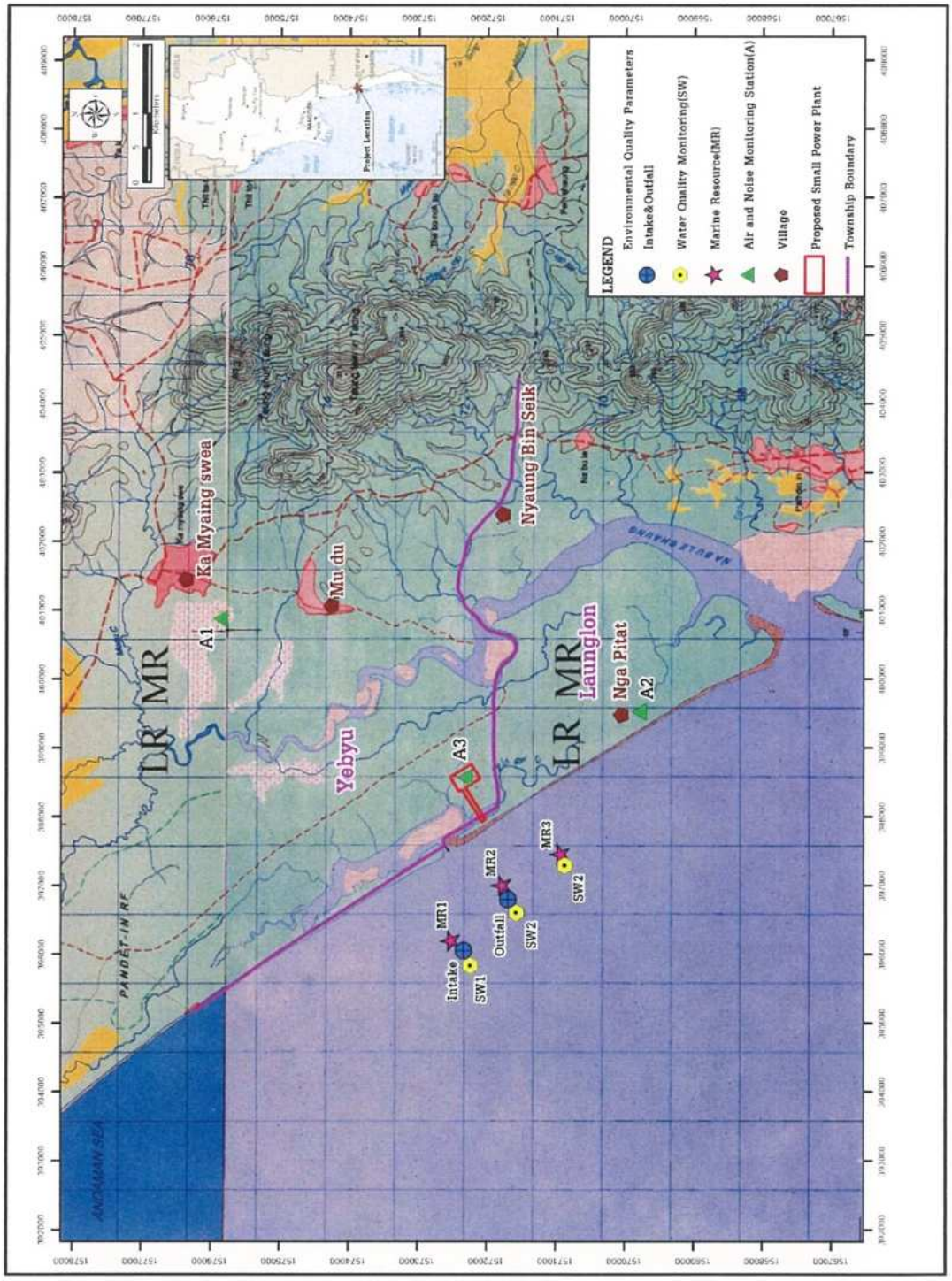


FIGURE 2: ENVIRONMENTAL MONITORING STATIONS DURING OPERATION PHASE