

EXECUTIVE SUMMARY

1. Project Proponent

The project proponent for operation of Myanmar International Terminals Thilawa limited (MITT) is Hutchison Ports which is a private holding company and a subsidiary of CK Hutchison Holdings. HPH is a world leading network offering port operations, logistics, cargo handling, container transportation, ship maintenance, and cruise terminal services throughout Asia, Middle East, Africa, Europe, America and Australia with over 30,000 employees.

Hutchison Ports MITT was officially opened in Berth 5-9, Thilawa area, Kyauktan Township, Yangon Region on 9th November 1997 and it is Myanmar's first purpose-built international container terminal at Thilawa area and one hundred percent foreign-owned enterprise.

The information of the project is briefly listed in Table 1-1 and the details of the project proponent is provided in Table 1-2.

Table 1-1 Project Information

Total land area	75 hectares (185 acres)
Type of Business	Port operation
Type of Company	Subsidiary Company of Hutchison Port Holdings, Hong Kong (One hundred percent foreign own enterprise under the foreign investment law)
Duration of investment	50 years BOT contract with Myanma Port Authority, Ministry of Transport and extension of 2 times of ten years.
Company Incorporation	Incorporated in Myanmar on 29th September 1995
Date of Official Opening	9th November 1997
Date of Commercial Run	1st March 1998

Source: MITT

Table 1-2 Information of Project Proponent

Project Proponent	Myanmar International Terminals Thilawa Ltd.
Contact Person	Mr. Khin Maung Latt Engineering Manager, Engineering Department Myanmar International Terminals Thilawa Ltd. Mr. Saw Tha Gay Assistant Operations Manager, Operations Department Myanmar International Terminals Thilawa Ltd.
Contact Details	Myanmar International Terminals Thilawa Ltd. Berth 5-9, Thilawa, Kyauktan Township, Yangon, Myanmar Email Address: khinmaunglatt@mitt.com.mm sawthagay@mitt.com.mm Website: https://www.mitt.com.mm Tel No: (95) 9 977 246 900-02 Fax: (95) 9 8617 168, 9 8618 364

Source: MITT

2. Type of Project and EMP/IEE/EIA Requirement

- 1) Type of Project : Port operation
- 2) Total container handling capacity : 450,000TEU per year at maximum operation
- 3) Total project area : 75 hectares (185acres)
- 4) IEE/ EIA Requirement:

In accordance with Article (116) in Annex A, Project Categorization for Assessment Purposes of EIA Procedures (2015) stipulated by Ministry of Environmental Conservation and Forestry (MOECF), the former name of Ministry of Natural Resources and Environmental Conservation (MONREC), the project can be categorized as “Shipping (Operation and Maintenance of ships used for the transport of cargoes and passengers)” as shown in Table 2-1.

Table 2-1 Screening for IEE/EIA Requirement

Type of Investment Projects	Size of Project which require IEE	Size of Project which require EIA	Size of the Proposed Project
Shipping (Operation and Maintenance of ships used for the transport of cargoes and passengers)	All sizes	All businesses which Ministry regards to undertake EIA	75ha (185 acres)

Source: EIA Procedures (2015), MOECF

MITT already exists prior to the issuance of Environmental Conservation Law (2012), Environmental Conservation Rules (ECR), and EIA Procedures (2015) and has been conducting port operations since 1997. However, in session (9) of EIA Procedures (2015) by MONREC, it is stated that “Any project/ business already in existence prior to the issuance of the Rules, or the construction of which has already commenced prior to the issuance of the Rules, and which, in either case, shall be required to undertake within the timeframe prescribed by the Department, an environmental compliance audit, including on-site assessment, to identify past and/or present concerns related to that project’s environmental impacts, and to:

- a) develop an EIA or IEE or EMP;
- b) obtain an ECC; and
- c) take appropriate actions to mitigate adverse impacts in accordance with the law, rules and other applicable laws.

On 19th September 2019, Myanmar Investment Commission (MIC) issued the Letter No. MaYaKa-9/Na-Htwe/2019 (6284) according to the reference letters: Letter No. EIA-2/2 (1797/2019) issued by ECD on 30th August 2019, Letter No. (Forest) 3(2)/16(Ga)/ (3859/2019) and Letter No. (Forest) 3(2)/16(Ga)/ (3863/2019) issued by Minister Office, MONREC on 4th and 5th September 2019, including the following instruction:

- To undertake Environmental Management Plan (EMP) for ongoing factories under nine prioritized sectors and factories in Thilawa Area which are approved by MIC;
- To submit EMP to ECD, MONREC within six-month timeframe starting from 29th July 2019 and not later than 28th January 2020, and
- To submit a copy of completed EMP status to MIC.

According to this MIC Letter, MITT (port operation in Thilawa with container handling capacity of 450,000 TEU at maximum operation) is one of the ongoing projects in Thilawa area under MIC approval since 1997 and needs to undertake Environmental Management Plan (EMP) in accordance with Section 76 and 77 of Environmental Impact Assessment (EIA) Procedures (2015) and submit to ECD not later than 28th January 2020 from issued date of the letter.

3. Purpose of EMP Study

EMP study for port operation of Myanmar International Terminals Thilawa Limited (MITT) intends to ensure that MITT is carrying out port operations with adequate and proper prevention and mitigation for adverse environmental and social impacts.

The specific objectives of EMP study for this project are as follows:

- To satisfy EIA Procedures (2015) and Letter No. MaYaKa-9/Na-Htwe/2019 (6284) issued by Myanmar Investment Commission on 19th September 2019;
- To identify the aspects of the project that could potentially result in significant environmental and social impacts on resources or receptors;
- To examine and evaluate potential adverse environmental and social impacts of the project;
- To develop required additional management plans and monitoring plans to ensure the effectiveness of mitigation measures.

4. Implementing Organization for EMP Study

The in-charge organization for implementation of this EMP study and EMP study team members with their responsibilities are described in Table 4-1 and Table 4-2.

Table 4-1 Organization in charge of EMP implementation

Name of Organization	MONREC Transitional Consultant Registration No.	Address	Contact Information	Responsibility
Myanmar Koei International Ltd. (MKI)	0024	No.36(A), 1 st Floor, Grand Pho Sein Condo, Pho Sein Road, Tamwe Township, Yangon, Myanmar	Tel: +95-1-548814 Fax: +95-1-8500107 Email: info@myanmar-koei.com myanmarkoei@gmail.com	Overall management, Technical aspect of EMP, Public consultation, notice and disclosure

Source: EMP Study Team

Table 4-2 Members of EMP Study Team

Name of Organization	Name	Responsibility for EMP Study	Education Background	Years of Experience	MONREC Transitional Consultant Registration No. (Individual)
Myanmar Koei International Co., Ltd.	Mr. Khin Maung Thane (Team Leader)	Overall guidance for EMP Study, Quality control and assurance, Risk Control for Health & Safety, EMP & EMoP formulation	B.Sc.(Physics), Yangon University Advanced Certificate in Workplace Safety & Health, BCA Academy, Singapore. Certificate in ISO 9001 :2015 QMS and 14001 :2015 EMS Awareness Training, Myanmar Quality Management Centre, Yangon, Myanmar.	12 years	Under application process
	Dr. Phyto Thu Aung (Deputy Team Leader)	Pollution Control, Technical guidance	Ph.D (Chemical Engineering) M.E (Chemical Engineering) B.E (Chemical Engineering)	9 years	0024
	Ms. Aye Aye Aung	Environmental Monitoring, Baseline Data Analysis,	M.E (Environmental Engineering) B.E (Chemical Engineering)	12 years	Under application process

Name of Organization	Name	Responsibility for EMP Study	Education Background	Years of Experience	MONREC Transitional Consultant Registration No. (Individual)
		Pollution Control			
	Ms. Myat Witt Yee (Environmental and Chemical Expert)	Site survey, Data Inventory, Environmental Monitoring, Analysis of surrounding baseline conditions, Project Coordination	B.E (Chemical Engineering) Dip in Geographic Information Systems (GIS), Dagon University, Myanmar	7 years	Under application process
	Ms. May Thinzar Kyaw (Environmental & Social Expert)	Site Investigation, Data Inventory, Project Description, Examining Myanmar Legislations and International Guidelines, Pollution Control, EMP & EMoP Formulation, Translation.	B.E (Port & Harbour Engineering), Myanmar Maritime University, Myanmar. Diploma in Geographic Information Systems (GIS), YU. Certificate in Advanced Environmental Management, MES.	3 years	Under application process
	Ms. Humm Kham Zan Aung (Environmental Specialist)	Site Investigation, Data Inventory, Project Description, Translation	M.S (Environmental Engineering), YTU. B.E (Civil Engineering), Technological University, Mandalay PG.Dip (Environmental Engineering), YTU.	3 years	-

Source: EMP Study Team

5. Overall Framework of EMP Study

The overall framework of EMP study for port operation of MITT is mentioned in Table 5-1.

Table 5-1 Overall Framework of EMP study of the project

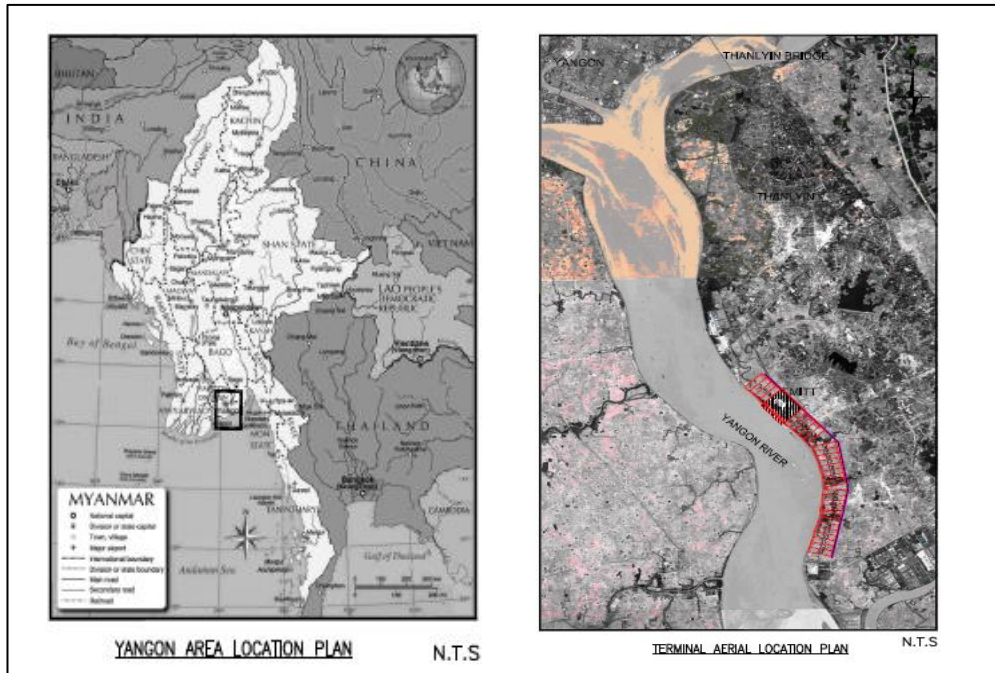
Proposed Scope of Services	Proposed Schedule	2019					2020				February	March	April	
		November	December				January							
		4th week	1st week	2nd week	3rd week	4th week	1st week	2nd week	3rd week	4th week				
I Preparing EMP Report in line with Government requirements (EIA Procedures-2015) [Scope 1]		← Dry Season →												
1)	Developing EMP Study Framework													
2)	Site visit and Data Collection from MITT													
3)	Confirmation of actual Environmental management activities in MITT													
4)	Desktop Study on collected data and secondary data													
5)	Environmental Baseline Monitoring (Air Quality, Water Quality, Noise&Vibration)		▲	▲										
6)	Environmental Baseline Data Analysis													
7)	Environmental Impact Assessment and Evaluation													
8)	Preparation of EMP Report in accordance with EIA Procedures													
7)	Translation of Executive Summary of EMP Report													
8)	Submission of EMP Report													
II Follow-Up Activities [Scope 2]														
1)	Review of EMP by ECD-YGN under MONREC													
2)	Finalization of EMP Report with comments from ECD-YGN under MONREC													
3)	Submission of Revised EMP Report to ECD-YGN under MONREC													▲

Source: EMP Study Team

6. Description of the Project

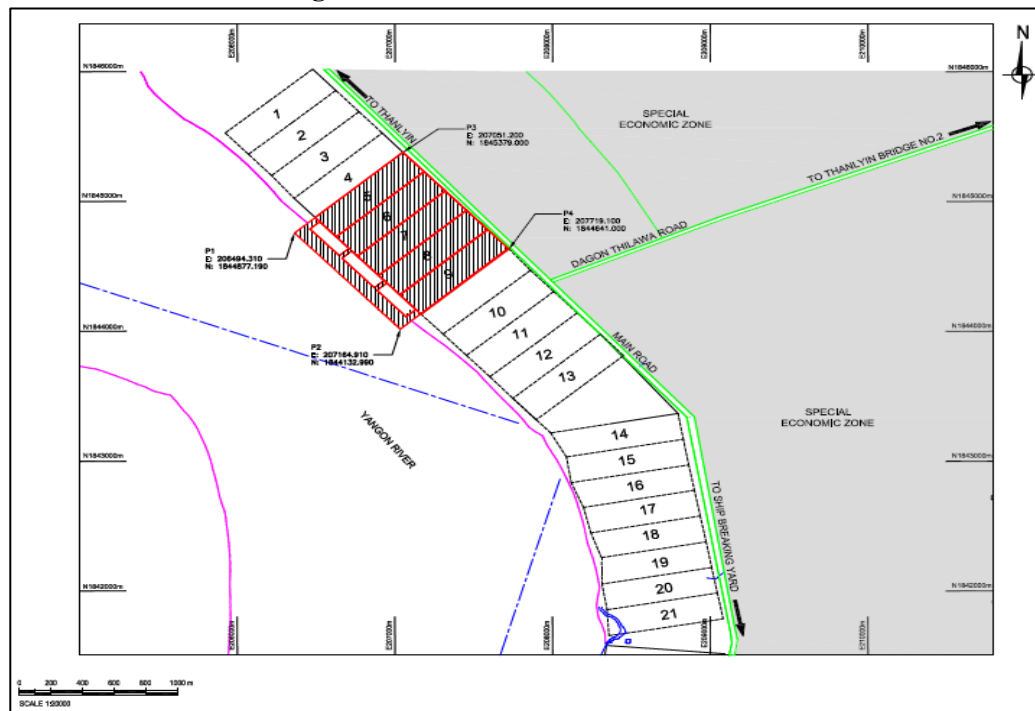
Outline of the Project

Thilawa Area Port is compartmented from Plot 1 to Plot 37, and project site is located from Plot 5 to Plot 9 as shown in Figure 6-1 and Figure 6-2. The project started construction in 1995 and officially opened on 9th November 1997. The total area of the project is about 75 ha (185 acres) berth length is 1000 meters with the berthing capacity of minimum 5 vessels.



Source: MITT

Figure 6-1 Location of MITT Area



Source: MITT

Figure 6-2 Location of MITT Plot Area

Transportation Access

MITT is located just 25km from Yangon City, the largest commercial city of Myanmar and international trade portal which handles 90 percent of national maritime trade. MITT has direct access to industrial zones in Yangon by means of road transportation which includes five major roads running in the north direction, only one road extending to the south.

There are two main access routes from and to Yangon City and Thilawa area (see in Figure 6-3), namely Yangon-Thanyin Bridge (Thanlyin Bridge 1) with current permissible load of around 20 tons and Dagon Bridge (Thanlyin Bridge 2) with maximum permissible load of 75 tons. Due to the current efficiency and limited number of lanes in Yangon-Thanyin Bridge, trailer trucks carrying logs and containers have been using Dagon Bridge for transportation.

In terms of railway system, there is only a single track railway between Yangon and Thilawa area in which the rail line ends up around MITT in Thilawa area. This rail route is used by commuter and work rolling stock sometimes. Figure 6-4 shows the rail route from Thilawa area to Yangon.



Source: Google Earth (Prepared by EMP Study Team)

Figure 6-3 Road Routes from/ to Yangon City and Thilawa area

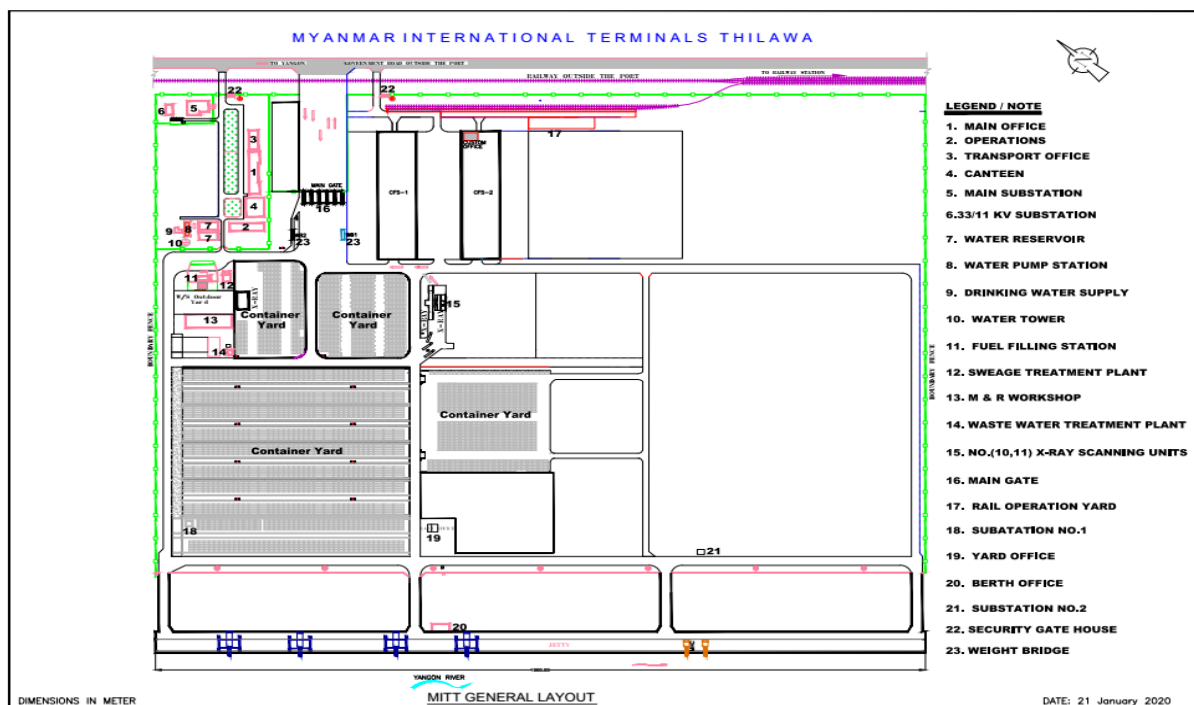


Source: Google Earth (Prepared by EMP Study Team)

Figure 6-4 Rail Route from/ to Yangon City and Thilawa area

Project Layout and Facilities

MITT Port comprises various facilities such as berthing facilities, cargo handling facilities and equipment, buildings, port operation facilities and auxiliary facilities. The general layout plan of the project including all project facilities is shown in Figure 6-5 (clear view of layout is attached in Appendix-3) and the descriptions of each facility are mentioned in below sections.



Source: MITT

Figure 6-5 General Layout Plan of MITT (as of January 2020)

Table 6-1. List and description of port berthing facilities

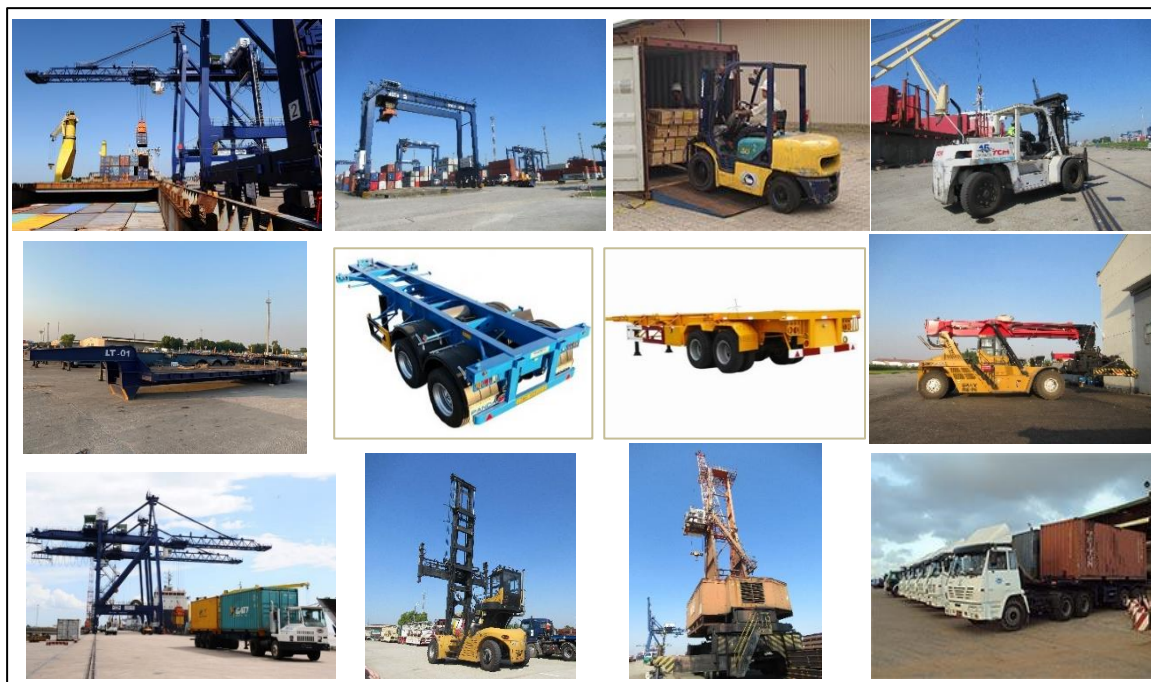
Component	Description
Berth/ Jetty (5 units)	<ul style="list-style-type: none"> Total berth length 1000m, Apron width 30m, Depth Alongside 10m accommodating container and general cargo berth and adapted for ship-to-shore (STS) gantry cranes and mobile harbor cranes. The berth/ jetty is Batter Pile Type constructing in situ using a vibro-hammer (not pile driven).
Trestle	<ul style="list-style-type: none"> Size (Length 92m x Width 14m) Total four trestles perpendicular to the shore.
Container Yard	<ul style="list-style-type: none"> Full Container Yard (FCY) Empty Container Yard (ECY) Reefer Container Yard Dangerous Cargo Yard Car Yard Rail Operation Yard
Types of berthing ships	<ul style="list-style-type: none"> Container Ship General Cargo Ship (Bulk Carrier, RO-RO, Cruise, etc.)
Maximum Handling Capacity of ships	<ul style="list-style-type: none"> 2,000 TEU for container ships 35,000 DWT for general cargo ships
Cargoes to be handled	<ul style="list-style-type: none"> Containerized cargoes (e.g. machinery parts, loose metal, drummed cargo, boxes, etc.) Non-containerized cargoes (e.g., copper plate, steel structures, draw back machinery, , cement, fertilizers, cars, heavy machineries, project cargoes, etc.) Refrigerated cargoes (e.g.meats, fruits, dairy products, etc.) Dry bulk cargoes (e.g. rice, grain, iron, ore, coal, sugar, wheat, etc.)

Source: MITT (Prepared by EMP Study Team)

Table 6-2. List and description of cargo handling facilities

Sr. No.	Equipment Name	Specification & Fuel Usage
1.	Quay Crane (High Profile QC)	<ul style="list-style-type: none"> • ZPMC Quay Crane (Electricity usage) • ZPMC Quay Crane (Electricity usage)
2.	Mobile Harbour Crane	<ul style="list-style-type: none"> • Gottwald Mobile Harbur Crane HMK 260E (Diesel usage) • Gottwald Mobile Harbour Crane HMK 170E (Diesel usage)
3.	Rubber Tyre Gantry (RTG) Crane	<ul style="list-style-type: none"> • ZMPC Rubber Tyre Gantry Crane • Noell Rubber Tyre Gantry Crane
4.	Front Loader	<ul style="list-style-type: none"> • Kalmer DC 13.6 EC5 (Empty Handler) (Diesel usage) • Sany SDCY90K7H1 (Empty Handler) (Diesel usage) • Kalmer DC 4160 RS5 (Reach Stacker) (Diesel usage) • Sany SRSC 45 H1 (Reach Stacker) (Diesel usage)
5.	Forklift	<ul style="list-style-type: none"> • Komatsu Forklift 3 Tons • TCM Forklift 3.5 Tons • TCM Forklift 10 Tons • TCM Forklift 15 Tons
6.	Terminal Tractors	<ul style="list-style-type: none"> • Ottawwa YT 50 Commando Tractor • Kalmar Tractor
7.	Terminal Trailer	<ul style="list-style-type: none"> • Low Bed Trailer (40 ft) • Terminal Trailer (20ft) • Terminal Trailer (40ft)
8.	Trailers (Old)	<ul style="list-style-type: none"> • Trailer (40ft) • Trailer (20ft)
9.	Transporter	<ul style="list-style-type: none"> • Nissan Transporter with Soon Wing Trailers • Shacman O'Long Tractor with Trailers • Shacman O'Long Tractor with Trailers • Chenglong Tractor with Trailers • Chenglong Tractor with Trailers • Trailers (20ft) • Foton Tractor with Trailers • Terminal Trailers
10.	Bagging Units	<ul style="list-style-type: none"> • Simon High Speed Mobile Bagging Unit
11.	Grab	<ul style="list-style-type: none"> • Landing Grab for Grains • Remote/ Wire Control Mechanical Grab for Grains

Source: MITT (Prepared by EMP Study Team)



Source: MITT (Prepared by EMP Study Team)

Figure 6-6 Description of Cargo Handling Facilities

Table 6-3. Buildings and Utilites Installed in MITT

Sr.No.	Description	Constructed Design
1	Main Office	R.C. Structure, Brick wall, Concrete floor, R.C roof slab
2	Operations Building	R.C Structure, Brick wall, Concrete floor, R.C roof slab
3	Transport Office	R.C. Structure, Brick wall, Concrete floor, R.C Roof Slab
4	Marine Berth Office	R.C. Structure, Brick wall, Concrete floor, R.C roof slab
5	Yard Office	Modular Container Structure
6	Canteen Building for staff	R.C. Structure, Brick wall, Concrete floor, R.C roof slab
7	Canteen Building for stevedores	Brick Noggin Building, Brick Wall, Concrete Floor, CGI Sheet Roof
8	Security Gate House	R.C Structure , Brick Wall , Concrete Floor, R.C Roof Slab
9	Terminal Gate	Steel Structure , Aluminium Frame Duty Room ,Metal Sheet Roof, Concrete Floor
10	Container Freight Station (CFS)	Steel structure with metal sheet cladding, Paver block flooring
11	No. (10 & 11) X-Ray Scan Unit	RC Wall & Structure Building
12	Truck Scale	R.C Pit & Steel Structure
13	Fuel Filling Station	R.C. Structure, Brick wall, Concrete floor, R.C roof slab
14	M&R Workshop	R.C. Structure, Brick wall, Concrete floor, Pile Foundation, Steel truss & Metal Sheet Roof
15	Office Car Shelter	Steel structure Open Shed
16	Ferry Bus Parking Shed	Steel structure Open Shed

Source: MITT (Prepared by EMP Study Team)



Source: MITT(Prepared by EMP Study Team)

Figure 6-7 Buildings and Utilities in MITT

Table 6-4 List and description of auxiliary facilities

Sr. No.	Description	Constructed Design
1	Main Sub Station	R.C. Structure, Brick wall, Concrete floor, R.C roof slab
2	33/11kV Sub Station	R.C. Structure, Brick wall, Concrete floor, Timber truss & Metal Sheet Roof
3	Sub Station 1	R.C. Structure, Brick wall, Concrete floor, R.C roof slab
4	Sub Station 2	R.C. Under Ground Cell, Outdoor type compacted Sub station
5	Water Reservoir	R.C. Structure (1000 Ton Capacity)
6	Pump House	R.C. Structure, Brick wall, Concrete floor, R.C roof slab
7	Water Tower	R.C. Structure, Pile Foundation (200 Ton Capacity,30m Head)
8	Drinking Water Treatment Plant	Brick noggin wall, Concrete floor, Metal sheet roofing
9	Sewage Treatment Plant	R.C. Structure, Brick wall, Concrete floor, R.C roof slab
10	Wastewater Treatment Plant	R.C. Structure, Brick wall, Concrete floor, R.C roof slab
11	Waste Disposal Site	Concrete floor, Steel Structure, Open shed

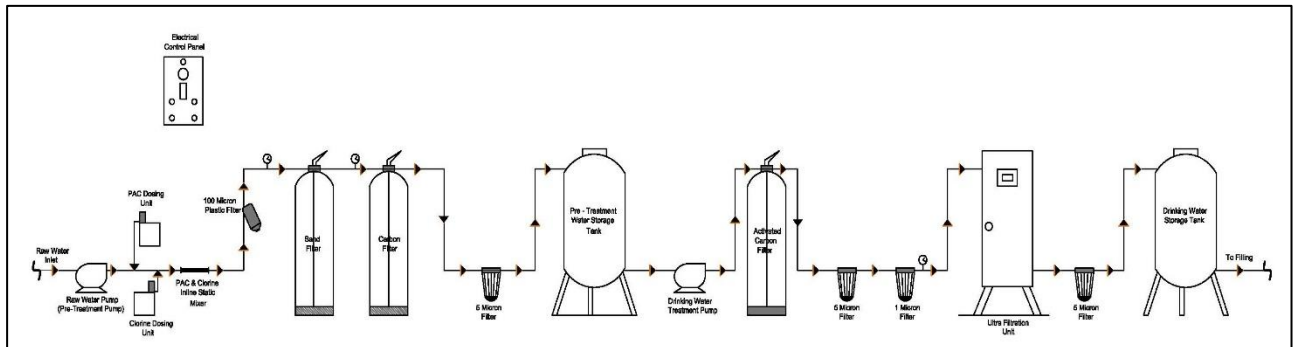
Source: MITT

Auxiliary Facilities

Drinking Water Treatment Plant

The raw water purchased from the Thilawa Dam is treated with the drinking water treatment plant to supply the safe drinking water at MITT Port. This treatment plant is designed by Supreme Water Doctor

Co.,Ltd. and consists of pumping, chlorine dosing, filtration, and sedimentation. The flow rate of the treatment plant is 2000 Litres/hr and its flow chart is described in Figure 6-8. The purpose of the drinking water treatment plant is to remove and reduce the contaminants and disease-causing bacteria to provide the safe drinking water. After treatment, the drinking water quality parameters are acceptable and satisfactory to drink under the range of WHO drinking water guideline.

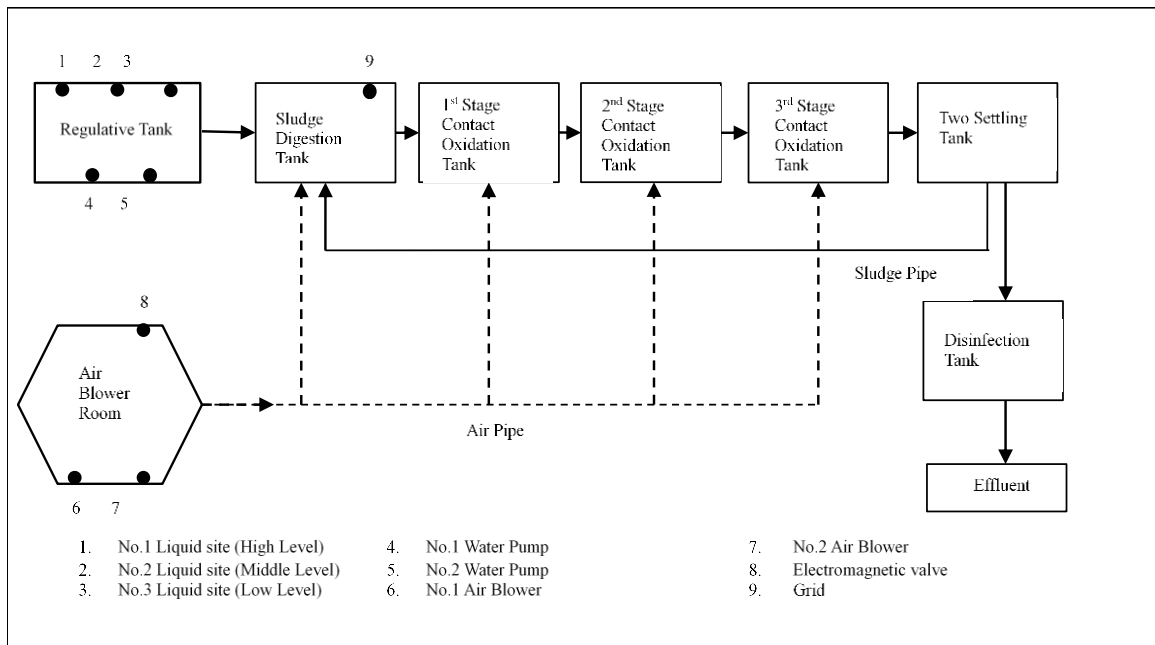


Source: MITT

Figure 6-8 Flow Chart of Drinking Water Treatment (2000 Liters/hr)

Sewage Treatment Plant

The sewage treatment plant installed at MITT consists of step-by-step processes such as pumping, oxidation, sedimentation, disinfection, and sludge digestion. Sewage indicates the liquid waste that includes sullage, discharge from toilets and urinals. The purpose of the sewage treatment plant is to remove pollutants by using physical, biological, and chemical processes. The designated treatment efficiency of the plant is to maintain the effluent quality in the range of 10~30 mg/L for BOD, 40~80mg/L for COD and 6.5~8.5 for pH level. The entire flow chart of sewage treatment plant is described in Figure 6-9.



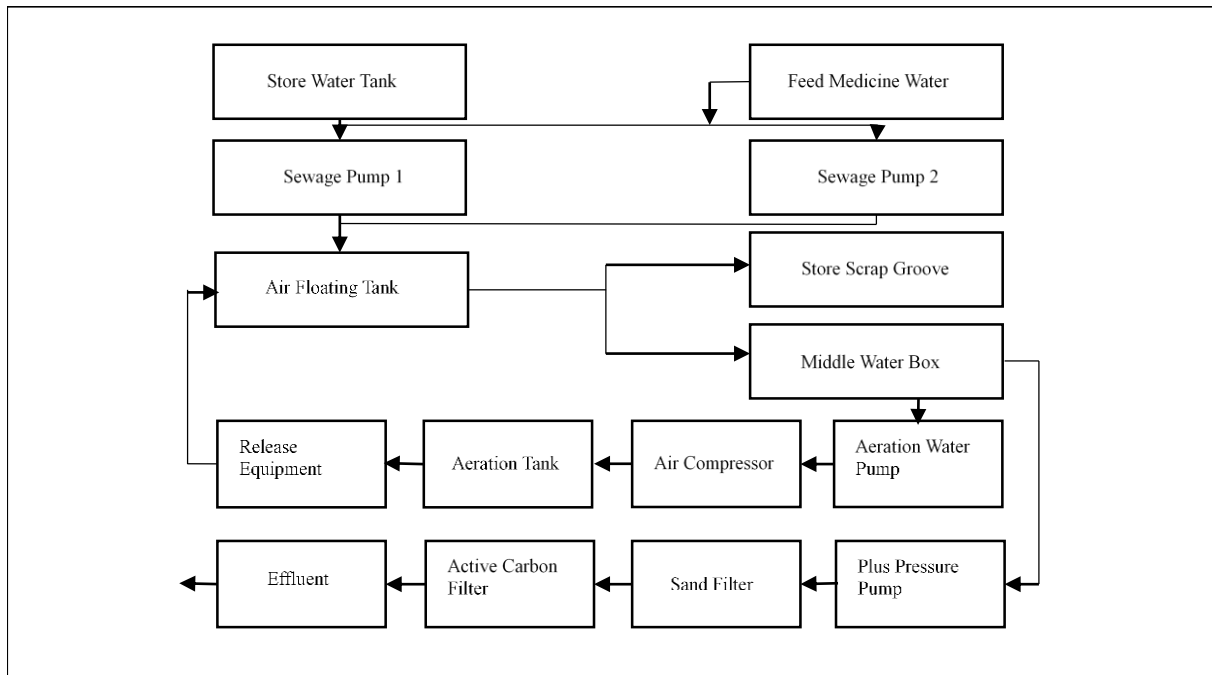
Source: MITT

Figure 6-9 Flow Chart of Sewage Treatment Plant

Wastewater Treatment Plant

Wastewater treatment plant is installed to treat wastewater generated especially from container washing activity. The treatment plant consists of pumping, chemical dosing, floatation, sedimentation, aeration, and filtration. The objective of the wastewater treatment facility is to reduce the contaminants by using

physical, chemical, and biological processes. The flow chart of operation wastewater treatment system is provided in Figure 6-10.



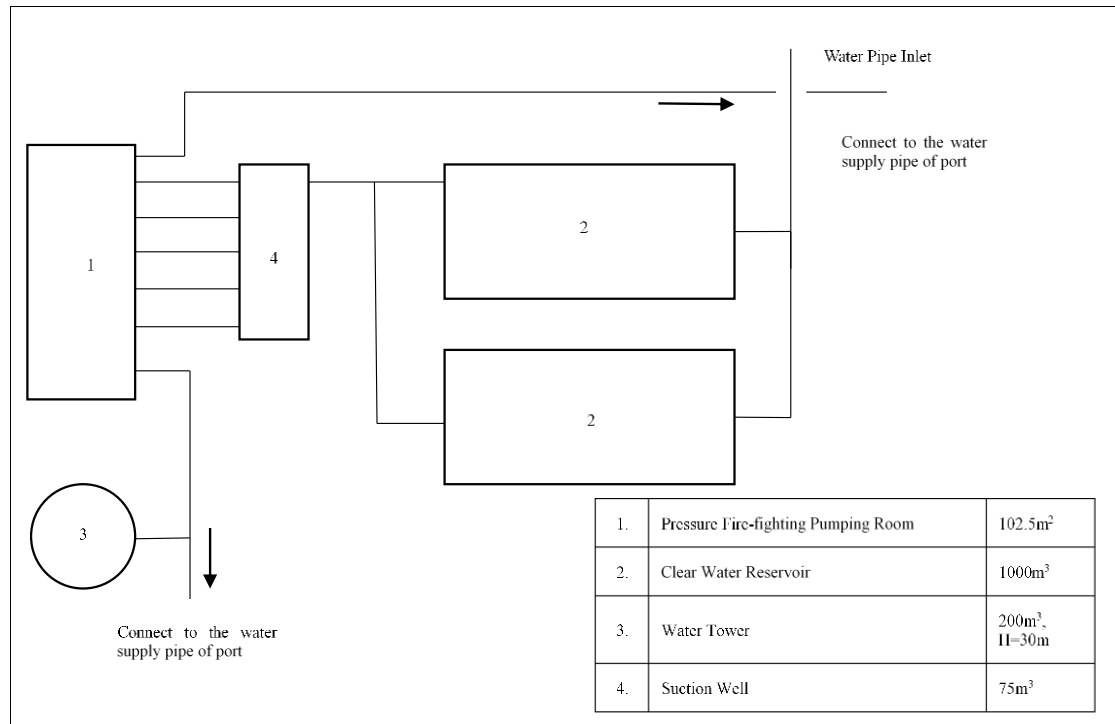
Source: MITT

Figure 6-10 Flow Chart of Operation Wastewater Treatment System

Water Resources and Consumption by Areas

The raw water purchased from the Thilawa Dam is used for ship water supply, drinking water supply, and water supply for domestic and port operation in MITT. The water purchased is stored in the two clear water reservoirs with each capacity of 1000m³ and the water tower with the capacity of 200m³ and 30m height. The stored water is distributed to the water supply pipe of port by pumping in the fire-fighting pumping room. The suction well is kept standby for the emergency use. The flow chart of water supply system is shown in Figure 6-11.

The water purchased is mainly used for domestic and port operation, and the remaining amount is used for ship water supply with the constant drinking water supply amount of 50m³ per month. Meanwhile, the drinking water usage of MITT is 30m³ per month, and the remaining 20m³ is used for the back-washing part of drinking water treatment system. The monthly water consumption is always recorded with purpose of usage.

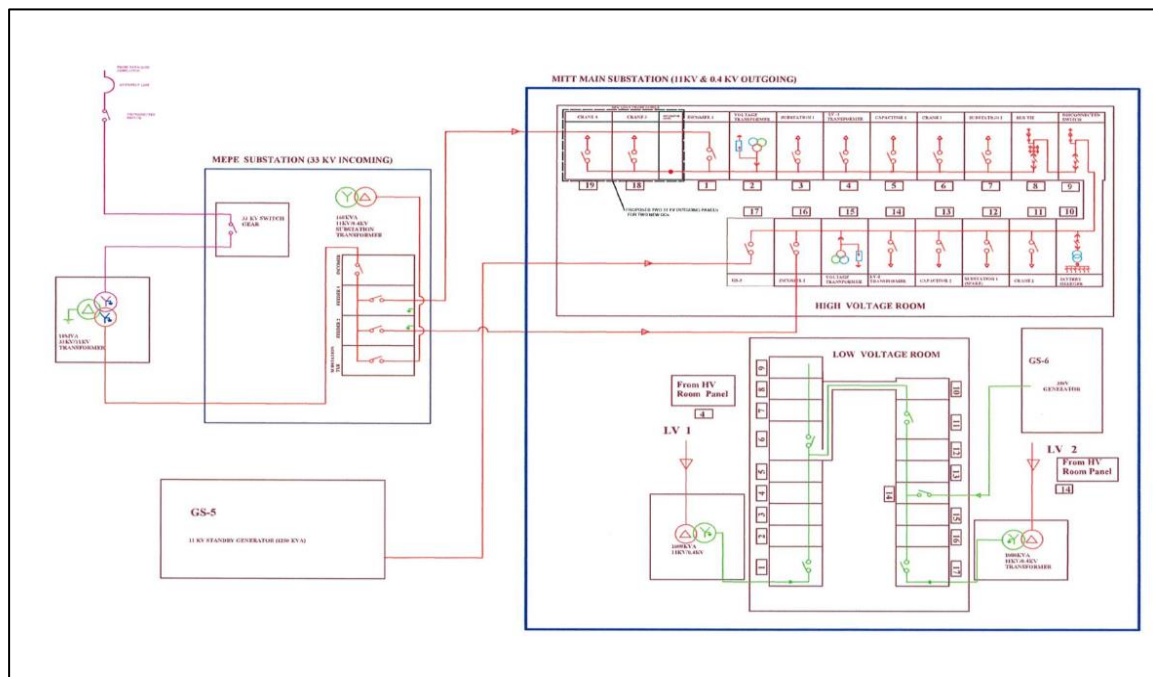


Source: MITT

Figure 6-11 Flow Chart of Water Supply System

Energy Resources and Consumption by Areas

The electricity required for the operation of MITT is received from the national grid line of YESC mainly and backup generators are installed in case of electricity cut off. YESC Thilawa Grid Line is 33kV Electricity and electricity is distributed to the MITT Main Substation (11kV and 0.4kV outgoing) through the MEPE Substation (33kV incoming). Then, the electricity is distributed to the Substation No.1 which is also called the Reefer Sub-station and the Substation No.2. The MITT electric power supply layout is shown in Figure 6-12. The list of electricity consumption per month in MITT is described in Table 6-5.



Source: MITT

Figure 6-12 MITT Electric Power Supply Layout

Table 6-5 List of electricity consumption in MITT

Total Electricity Consumption in kWh												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	219968	189027	258299	207311	256514	209453	218425	225065	262467	281603	303693	262159
2019	312034	243264	303258	322516	211106	174266	320754	213619	258096	223165	257559	-

Source: MITT

Waste Management

There are domestic wastes separated as wet waste and dry waste such as waste papers, food waste, plastic bottles, and other solid wastes that are generated from the office buildings, and canteens, etc., and the workshop wastes including hazardous wastes such as spilled/ leaked lubricants and waste batteries that are generated from backup generators and from repair and maintenance of factory machineries and vehicles in MITT. Waste segregation is implemented systematically and 3R (reduce, reuse, recycle) practices are promoted throughout the operation period. Wastes are stored separately at designated waste storage area including three chambers for wet wastes, dry wastes and wastes from workshop (see in Figure 6-13).

Waste lubricants and batteries are reused and stored separately with closed drums and containers at waste storage area with marking and labels. They are not allowed to discharge directly into the drainage in MITT. The Project Proponent will entrust Kyauktan Municipal for non-hazardous waste collection and disposal while there is a third-party organization that is in-charge contractor for hazardous waste collection. The types and amount of non-hazardous wastes can be checked at the waste storage area and around the project and recorded monthly throughout operation stage. The total amount of recycled wastes are also recorded monthly.



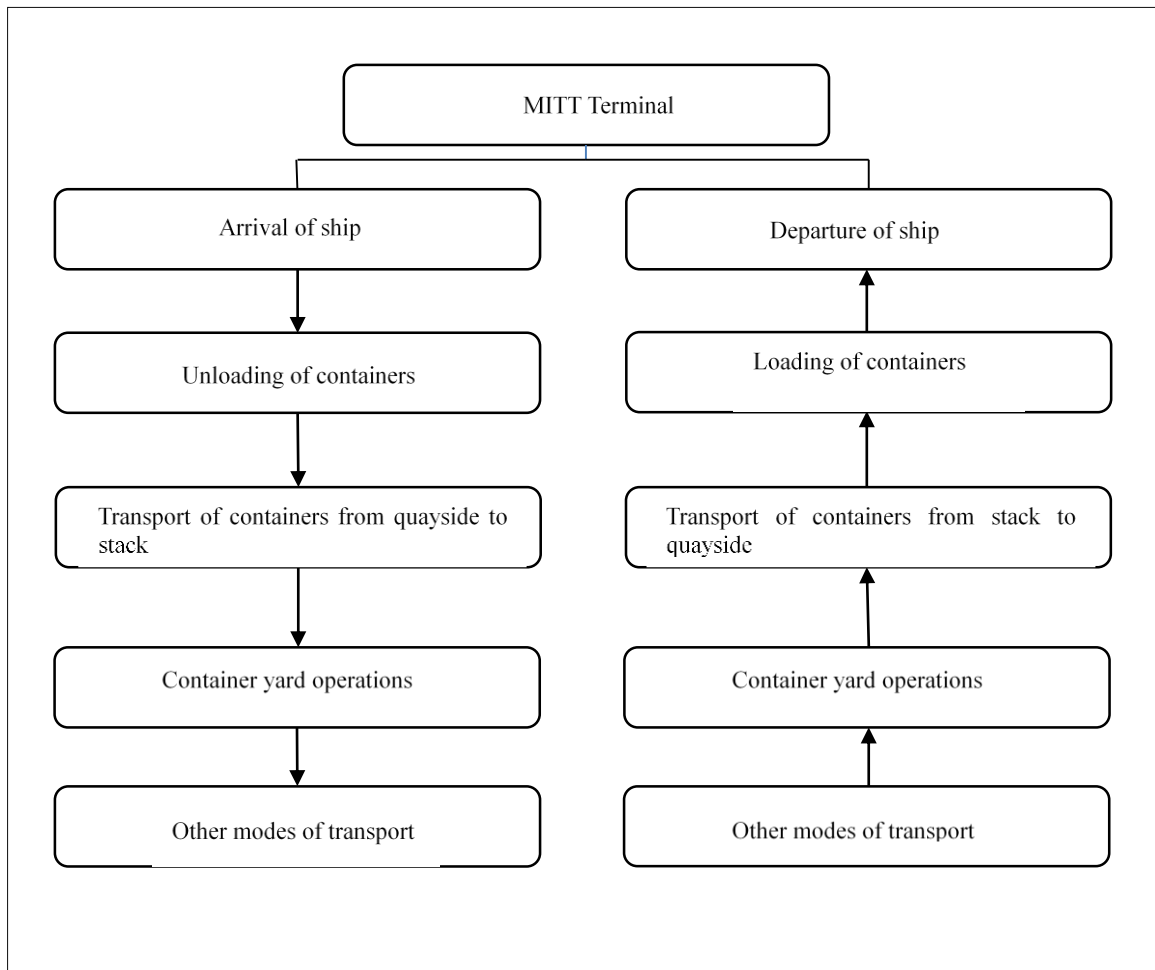
Source: MITT

Figure 6-13 Waste Storage Area in MITT

7. Description of Port Operations

Container Handling Process

The container handling process is one of the most important process of port operation activities and it consists of unloading/ loading of ship, transport of containers from ship to stack and vice versa, container yard operations, and inter terminal transport and other modes of transportation. The flow chart of the container handling process is provided in Figure 7-1. The description of container handling process in MITT is described in Table 7-1.



Source: MITT

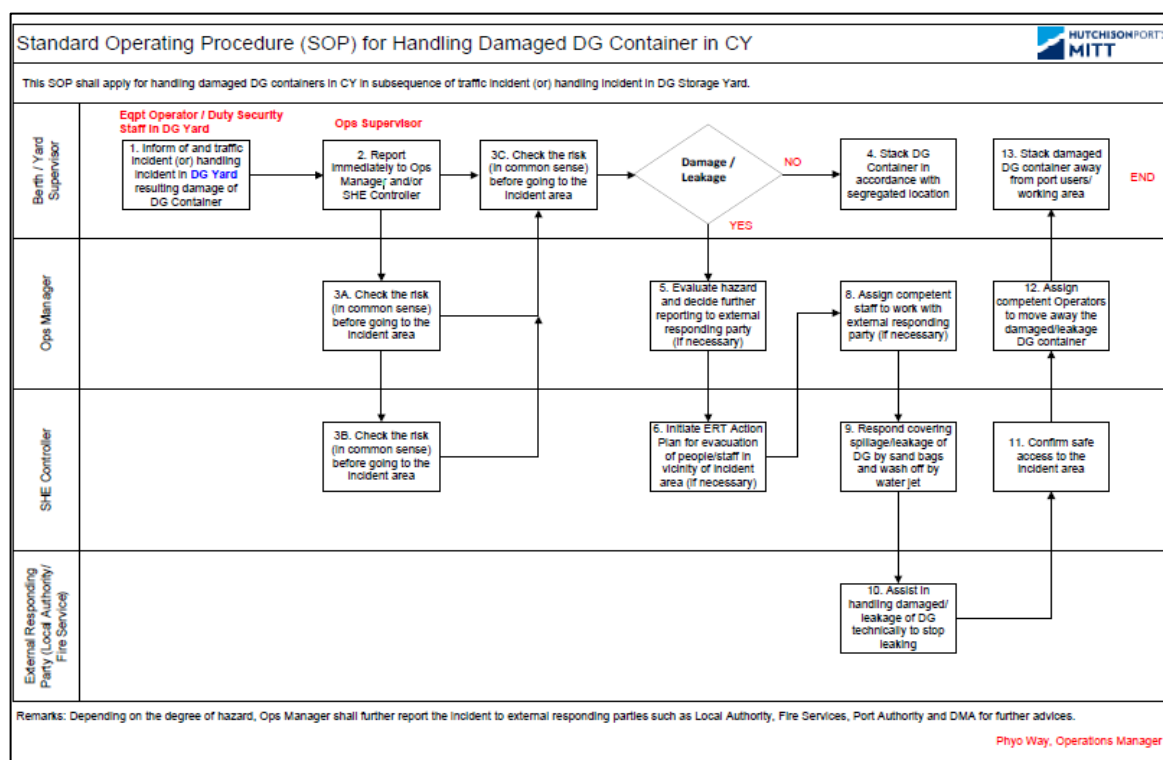
Figure 7-1 Container Handling Process in MITT

Table 7-1 Description of Container Handling Process in MITT

Sr. No.	Operation Process	Description
1	Unloading/Loading of Ship	<ul style="list-style-type: none"> When a ship arrives at the port, quay cranes (QCs) or ship-to-shore (STS) cranes take the import containers off the ship's hold or off the deck. It can be occurred that one QC is unloading containers while another QC is loading containers at the same time. The unloading time of a container depends on its place in the ship. A good distribution of containers over the ship is necessary. Containers with the same destination, category, weight, size, contents and so on, belong to the same category. Unnecessary moves should be avoided by placing containers designated for a terminal visited later during the journey on top of containers designated for the earlier visited terminals.
2	Transport of Containers from Ship to Stack and vice versa	<ul style="list-style-type: none"> The containers are transferred from the QCs to transportation vehicles that travel between the ship and the stacking area. This stacking area consists of a number of lanes, where containers can be stored for a certain period. Container handling equipment such as Rubber Tyred Gantry (RTG) cranes and Reach Stackers serve the lanes for container stacking.

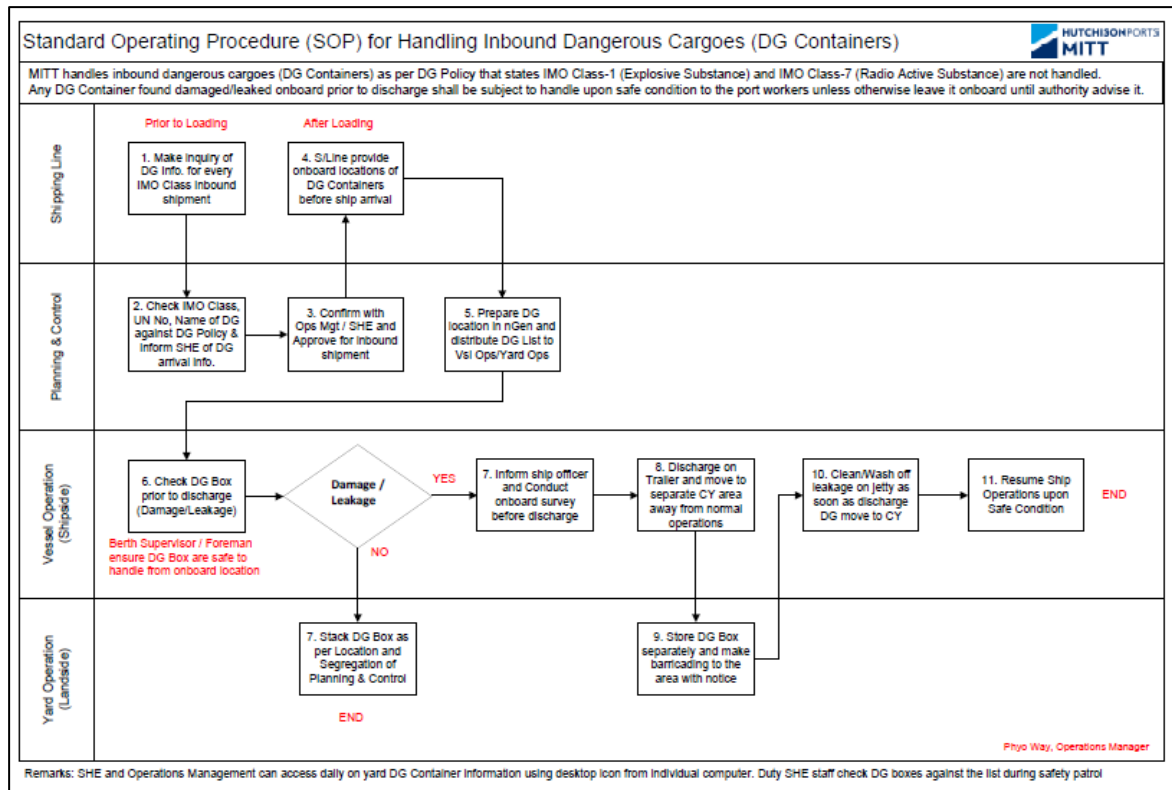
Sr. No.	Operation Process	Description
		<ul style="list-style-type: none"> When a vehicle arrives at the stacking area, it puts the load down or the stack equipment takes the container off the vehicle and stores it in the stacking area.
3	Container Yard Operations	<ul style="list-style-type: none"> Two ways of storing containers can be distinguished: storing on a chassis and stacking on the ground. The height of stacking varies per terminal between two and eight containers high. Empty containers are usually stored separately. The efficiency of stacking depends among other things on the stack height and strategies for storage and retrieval planning of import and export containers. After a certain period, the containers are retrieved from the stack by cranes and transported by vehicles to transportation modes like barges, deep sea ships, trucks or trains. Before leaving from the port, the trucks have to be passed through the custom area where inspection is conducted by X-Ray machine and physical check at the platforms. In order to carry dangerous containers safely, certain principles must be adopted that prevent the vessels and its occupants from being put at risk. No matter how cargo is being transported, it must comply with The United Nations (UN) nine hazard classes for dangerous goods. Among them, MITT handles Class-1, 3, 4, 5, 6, 8, and 9 except Class-2 and Class-7. There are standard operating procedures for handling damaged, inbound, and outbound dangerous containers in MITT.
4	Inter Terminal Transport and Other Modes of Transportation	<ul style="list-style-type: none"> As the final stage of the imported container handling process, these containers are delivered by either external trucks or in-land shipping barges or rails for delivery to the recipients.

Source: MITT(EMP Study Team)



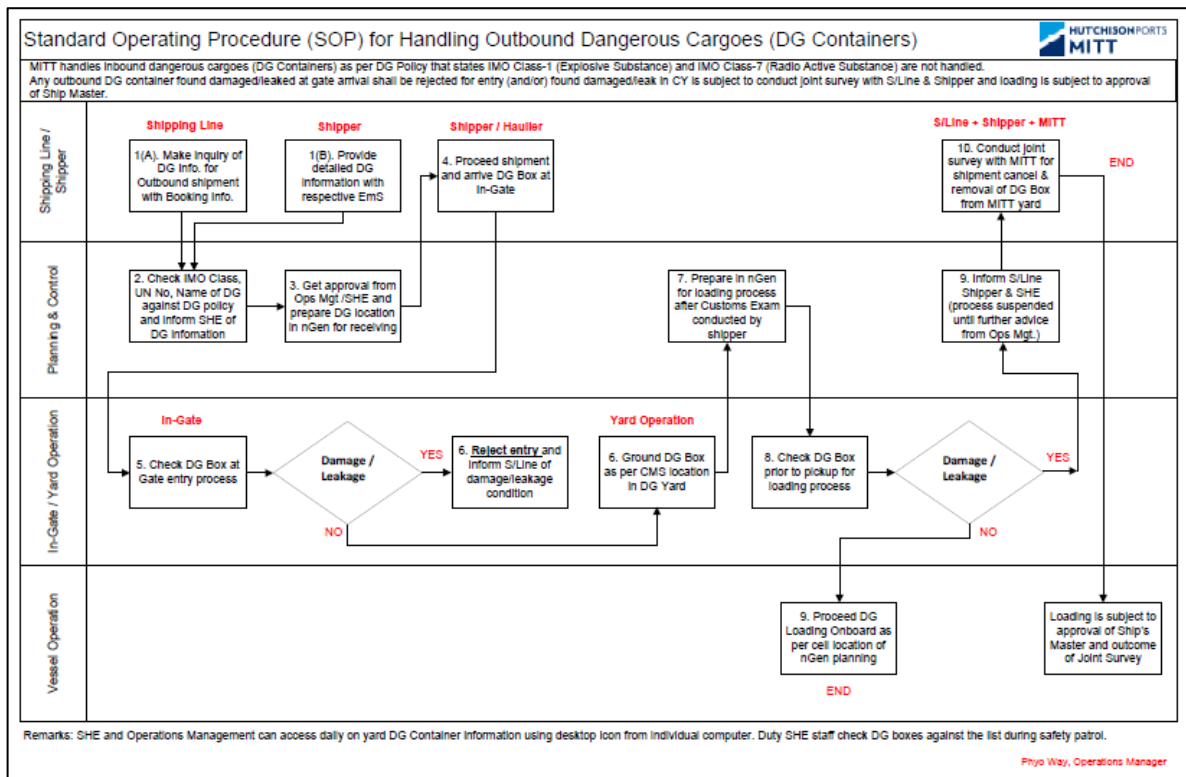
Source: MITT

Figure 7-2 Standard operating procedure for handling damaged dangerous containers



Source: MITT

Figure 7-3 Standard operating procedure for handling inbound dangerous containers



Source: MITT

Figure 7-4 Standard operating procedure for handling outbound dangerous containers

Cargo Handling Process

The two main categories of cargoes are general and bulk cargo. General cargo is unitized (carried in defined load units) while bulk cargo is loose (carried in any quantity). General cargo can be sub-divided into three categories of break bulk, neo bulk and containerized. Bulk cargo can be divided in two categories of liquid bulk and dry bulk. The types of cargoes with example handled in MITT are described in Table 7-2 and import and exports cargoes at MITT are described in Table 7-3. The cargo handling process in MITT is shown in Table 7-4 and Figure 7-5.

Table 7-2 Types of Cargoes handled at MITT

Type of cargo	Categories of cargo	Examples
General Cargoes	Break Bulk Cargoes	Copper plate Fertilizers Rice bags Garment Cement bags Feed meals, Machinery parts Loose metals Drummed cargoes Boxes, etc.
	Neo Bulk Cargoes	Steel structures Draw back machineries Cars, Heavy machineries Industrial equipment Project cargoes, etc.
	Containerized Cargoes	Break bulk cargoes, Refrigerated cargoes such as meats, fruits and dairy products, etc.
Bulk Cargoes	Dry bulk cargoes	Grain Cement Iron Ore Coal Sugar Wheat, etc.

Source: MITT

Table 7-3 Types of Import and Export Cargoes at MITT

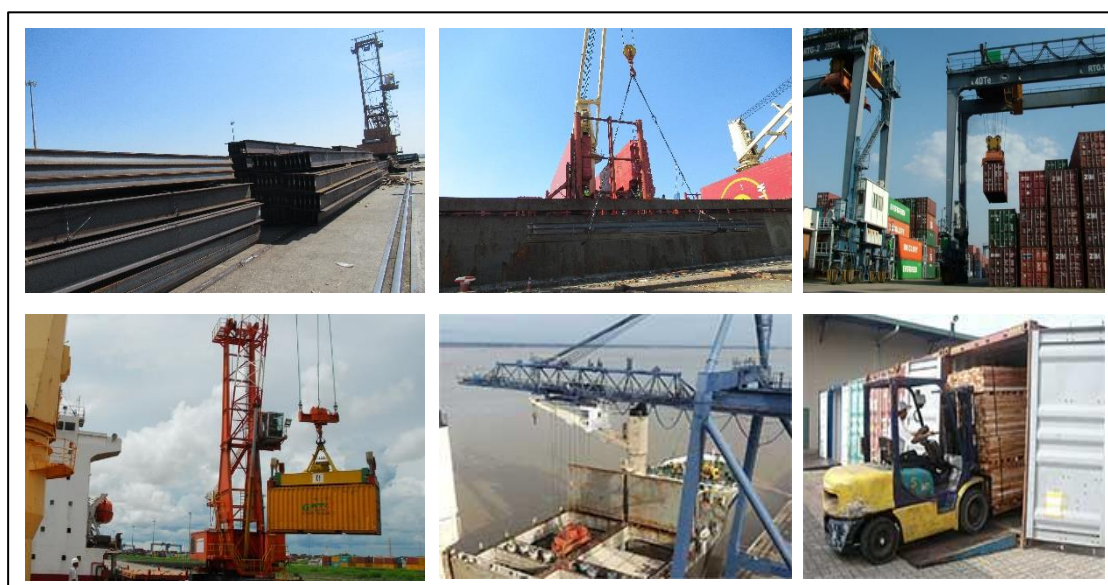
Imports	Exports
Steel cargo Feed meals and fertilizers in Jumbo bags Project cargoes Machineries and equipment Coal Vehicles	Rice in 50-kg bags Draw back Machineries Steel Structures

Source: MITT

Table 7-4 Description of Cargo Handling Process in MITT

Sr. No.	Operation Process	Description
1	General Cargo Handling	<ul style="list-style-type: none"> • Containerized cargoes including break bulk cargoes and refrigerated cargoes are handled by quay cranes (QC) and RTG cranes for unloading and loading from trucks or barges onto the vessels. • When additional terminal capacity is required, the mobile harbour canes are used as a back-up for conventional dock cranes, to handle special loads. • The Rubber Tyred Gantry Cranes are used for stacking, loading and unloading of shipping containers within the storage yards of the terminal. • Reach Stackers, Front Loaders and forklift, etc. are used as transportation vehicles in cargo yard operations. • Empty Handler is used to handle empty containers in empty container yard operation. • The heavy equipment and special cargo such as bulldozers, cars and industrial equipment, etc. which are transported by bulk cargo ship/ Ro-Ro ship are hulled by terminal trailers. • For transhipment of cargo and containers from port to cargo recipient, the transporters are used.
2	Bulk Cargo Handling	<ul style="list-style-type: none"> • There are cargo handling equipment like bagging units and grabs owned by the sub-contractors in MITT. • On-site movement and site-to-site transportation means that up to 120 tons of bulk delivered or stockpiled materials can be bagged each hour. • Landing grab is clam shape consisting two complete buckets and is mainly designed for handling of power and fine bulk materials such as chemicals, fertilizer, grain, iron ore, sand, particle construction materials and smashed rocks, etc. • It is widely used together with tower cranes, ship cranes, ship unloaders, travelling cranes and other types of cranes.

Source: MITT (EMP Study Team)



Source: MITT

Figure 7-5 Cargo Handling Process in MITT

Additional Port Services

MITT mainly operates loading and unloading of cargoes and containers from berthing ships to container yards. But in order to meet customers' requirement and satisfaction, MITT provides other additional services such as linking with customers and logistic companies for delivery, arranging modes of transport

for transshipment of cargoes and containers. Hutchison Logistic Myanmar service (HLM) has been servicing logistic and transportation from MITT to the customers and vice versa.

Maintenance Dredging Work

The purpose of the maintenance dredging work is to deepen or maintain navigable waterways or channels which are threatened to become silted with the passage of time, due to sedimented sand and mud, possibly making them too shallow for navigation. Maintenance dredging work for MITT has been fully serviced by MPA for overall dredging and disposal works including manpower and equipment etc. Grab dredger and hopper barge dredger types are typically used for dredging to maintain the 10m target depth along the jetty. The annual maintenance dredging amount is around 70,000 m³ and the frequency of this activity is normally two to three times (before and after rainy season) in a year. The illustrative photos of maintenance dredging work are shown in Figure 7-6.

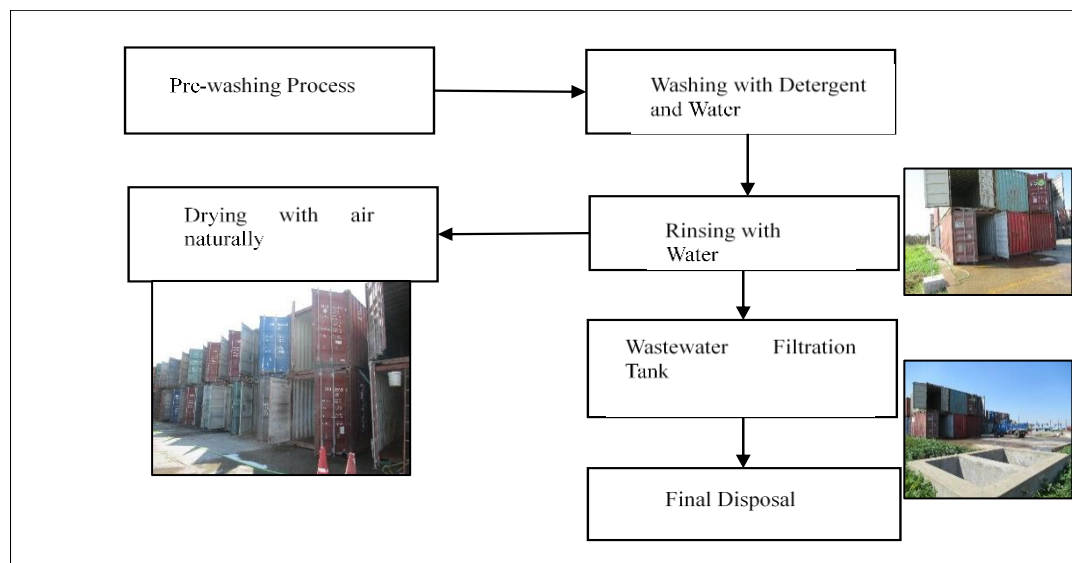


Source: MITT

Figure 7-6 Maintenance Dredging Work at MITT

Container Washing Process

In MITT Port, container washing process has been servicing due to customers' request to reduce the risk of transmission of exotic pests and diseases via import or export pathways. The contaminants can attach to the surfaces of containers or locate in the many nooks and cervixes available on a container. As current container washing area where wastewater treatment facility exists has a limited space, temporary container washing area is occupied at the remaining land area and washing processes are being serviced currently there. The flow chart of temporary container washing process is shown in Figure 7-7.






Source: MITT

Figure 7-7 Flow Chart of Container Washing Process (Temporary)

Modes of Transport

Modes of transportation in MITT are provided in Table 7-5.

Table 7-5 Modes of Transportation in MITT

Sr. No.	Modes of Transport	Description	Picture
1	Road Transportation	<ul style="list-style-type: none"> There are two access routes from MITT Port to the industrial parks around Yangon. Container trailers are not allowed to cross Yangon-Thanlyin Bridge (Thanlyin Bridge 1) located at the downstream of the Bago River, which has a rail track as well as motorway, due to the aging bridge's load restriction of 36 tons. Meanwhile, Dagon Bridge (Thanlyin Bridge 2) (at the upstream has a load restriction of 60 tons and container trailers are allowed to cross it. 	
2	Rail Transportation	<ul style="list-style-type: none"> There is also a rail line right into the terminal linking MITT not only with Yangon city but also with the national rail network. Most of the shipments moved by rail are carried between domestic points, including shipments imported from other nations. Railway services are hardly used for the bonded transport of export or import freight.. 	
3	Inland Waterway Transportation	<ul style="list-style-type: none"> MITT facilitates container trucking service and inland shipping barges to ensure cost effective and efficient movement of cargoes. The service was started to reduce transportation costs and relieve congestion on the road. The containers are transported by container barges and tugboats along the river between Myanmar International Terminals Thilawa (MITT) and Shwe Me port, Shwe Pyi Thar Township Most of the shipments moved by rail are carried between domestic points, including shipments imported from other nations. 	

Source: MITT (EMP Study Team)

Port Security Measure

As port security measure for MITT, Access control for personnel, cars and cargos are conducted properly and monitoring by personnel and CCTVs are also conducted properly. The current status of port security measures at MITT is shown in Table 7-6.

Table 7-6 Current Status of port security measures at MITT

Access Control	MITT implements a bar code system as a control measures for port users' access in terms of issuing 4 different types of pass. These passes serve as a day-pass for 24 hours in exchange of port users' ID cards. In addition to the assess pass system, a portrait photo of individual port user is taken into system and saved for 7 days period.
Restricted Areas	MITT nominates 9 restricted areas on terminal premises namely main office building, CCTV control rooms, IT sever room, Documentation office, Power station, Fuel filling station Dangerous cargo area, LCL cargo area(CFS) and access onto equipment. Apart from the access onto equipment, all restricted areas are being looked after by way of fence, under lock and key, monitoring by CCTV and physical security staff assignment.

Cargo Handling	MITT handles both container and general cargoes in terms of incoming and outgoing via trucks through gate lanes, rail and quay-side vessels. All cargoes are subject to handle only after receiving of related documentation and physical checking at entry points as follows: <ol style="list-style-type: none"> 1. Gate staff physically check both outbound and inbound containers, including empty containers, at gate/rail entry points with respect documentation. 2. Quayside operation staff physically check both outbound and inbound containers, including empty containers, underneath the cranes during loading/discharging time against respective shipping document.
Delivery of Ship's store	Myanmar Port Authority (MPA) yearly tender for the selection of approved ship chandler together with security screening process. MITT allows only MPA approved ship chandler to provide provision to ship up on presentation of respective documentation from the customs department. Duty gate security staff physically check provisions against document, requested by the ship and approved by the authority concern, before entering into terminal. Duty security staff onboard also oversee the loading process of ship's provisions onboard.
Monitoring Port Facility	MITT assigns 24/7 security staff for monitoring port facility both physically on ground and from the CCTV room. A total of 84 units CCTV (Fixed cameras 62 units and speed domes 22 units) are being fixed at below locations for monitoring the whole MITT premises 24/7 by duty security staff from the CCTV control room: <ul style="list-style-type: none"> • Office buildings • Main Gate area • Office Gate area • LCL Gate area • Container Yard area • CFS area • X' rays area • DG Yard area • Jetty/ Quay Deck area

Source: MITT

Project Schedule and Manpower Requirement

The working schedules for general cargo operation and container operation are shown in Table 7-7. The number of workers at each activity are shown in Table 7-8.

Table 7-7. Operation Schedule

Operation	Shift	Hours
General Cargo Operation	2 x 12 hour	(08:00-20:00) (20:00-08:00)
Container Operation	3 x 8 hour	(06:00-14:00) (14:00-22:00) (22:00-06:00)

Source: MITT

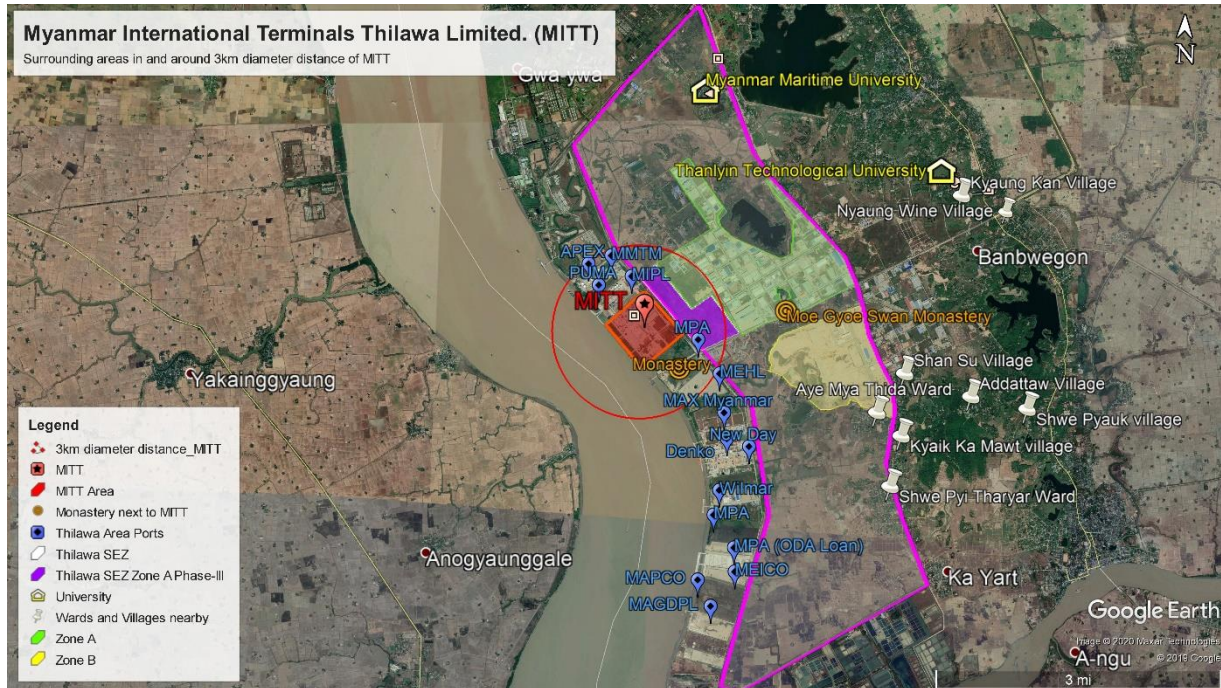
Table 7-8. Number of Workers at each Activity

Staff Headcount	Permanent	Casual Staff and Stevedore
Planning and administration	18	0
Ship operations	6	70 (Container), 250 (General Cargo)
Quay transfer operations	0	50
Yard operations	66	15
Receiving/Delivery (Gate and document counter)	14	7
Container Freight Station Operations	5	30
Safety, security, and environmental activities	15	73
Total	124	495

Source: MITT

CSR Activities

CSR is defined as the voluntary activities undertaken by a company to operate in an economic, social and environmentally sustainable manner. The Project Proponent is investing in CSR activities by planning, recording, future activities, and donations, etc. Donations to primary schools in the nearby community, providing scholarships for outstanding students from the Myanmar Maritime University (MMU) is conducted on a yearly basis by the Project Proponent. Furthermore, the Project Proponent also actively participates in charitable activities in the local community. The places nearby the project area is shown in Figure 7-8.



Source: EMP Study Team

Figure 7-8 Satellite Image of Places nearby the Project Area

Future Prospects

The container handling capacity of the MITT Port in current condition is 450,000 TEU and it is expected to increase over 1 million TEU in the future.

8. Description of Surrounding Environment

The current environmental and social conditions in and around the project area are shown in Table 8-1. The result of air quality, water quality, soil quality, and noise and vibration are adopted from the field survey conducted during the EMP study for the MITT Project (29 November 2019 to 2 December 2019). Other information was collected through literature survey and/or reconnaissance survey. The information on natural and social environment was collected through the literature survey and/or reconnaissance survey.

Table 8-1. Current Environmental and Social Conditions around the MITT Project

Item	Description
Natural Environment	
Meteorology/ Temperature and Rainfall	Greater Yangon has a tropical monsoon climate characterized by altering rainy season (from May to October) and dry season (from November to April). According to the data observed in the Kaba-aye Meteorological Station from 2009 to 2018, the mean monthly temperature is highest in April at 30.7 °C and lowest in January at 24.9 °C. Except in January, the monthly temperatures are above 25.0 °C. The southwest monsoon wind is the main source of rain, and

Item	Description
	the Yangon area receives rain during the period from May to October. The average annual amount of rainfall is 241.42 mm. Rainfall sharply decreases from November and continues to be less than 30 mm from December to April. The average relative humidity in Yangon is 76% during 2009-2018.
Hydrological Situations	The proposed project will be located adjacent to the Yangon River in Kyauktan Township. The Yangon River is formed by the confluence of the Bago River and Myitmaka River in Myanmar. Yangon River estuary flows into the Gulf of Martaban of the Andaman Sea. The channel is navigable by ocean-going vessels playing an important role in the economy of Myanmar. The largest tidal range at Yangon River is 6.81 meters to 22.3 meters. Current velocity of Yangon River is 4 to 6 knots. The elephant point is located at the mouth of the Yangon River, 32 km south from the Yangon Port.
Topography	The topography of Thilawa area is generally characterized as flat terrain with somewhat changes in elevation of the area from 3 m to 21 m. Higher areas in Thilawa is found in the middle and the east while low-elevation land is located in the west and south.
Geographical Features	Regional geomorphic features of the entire area include ridges and deltaic lands lying in the south of the Pegu Yoma between the Sittaung River in the east and the Irrawaddy River in the west. This area is in a north-south trending sedimentary basin containing thick sedimentary deposits from the Tertiary to Quaternary periods.
Soil Erosion	The main types of soil are Ferrosols, Gleysols, Solonchaks, and Arenesols. Ferrosols (plinthic) or lateritic soils are found on low hills along Thanlyin-Kyauktan. About 90% of these soils are composed of silt and clay, but humus content varies from place to place. These soils are favorable for paddy cultivation. The main problem, however, is poor drainage and water-logged conditions. In the rainy season, they are covered with flood water. Because of the high content of clay, these soils become very dry and crack in the dry season. Solonchaks (gleyic) or saline swampy gluey soils are found along the coastal area. These soils develop from sediments transported and deposited on the estuaries of the Yangon River.
Flora, Fauna, and Biodiversity	According to the field survey result in 2015, there are 158 flora species, 71 kinds of butterfly, 4 dragonflies, 67 kinds of bird, 7 kinds of mammals, 13 kinds of reptilian and amphibian species, and 22 kinds of fish in and around the Thilawa SEZ Zone B area.
Emergency Risk	Flood, cyclone, and earthquake are identified as notable natural hazards around the project area.
Social Conditions	
Population	In 2018, there are about 250,430 in Thanlyin Township and 168,106 in Kyauktan Township. The percentage of urban population is about 32% in both townships.
Ethnicity	In 2018, most of the people who live in Thanlyin and Kyauktan townships are Bamar, followed by Kayin and Rakhine.
Religion	More than 90% of the people living in Thanlyin and Kyauktan townships are Buddhists. There are more Hindus and Christian living in Kyauktan Township than in Thanlyin Township.
Local Economy and Livelihood	The main sources of livelihood in the two townships are service staff, agriculture, livestock, trade, industry and official employment in the government. More than 20% of livelihoods in Thanlyin Township are earning for trade and odd job, while about 30% of livelihoods are earning from other livelihoods activities in Kyauktan Township.
Access Road	Main access roads are as follows: the road that passes through Thanlyin Bridge and another road that passes through Dagon Bridge. The peripheral road of Thilawa SEZ is paved with concrete while the road between Thanlyin Bridge and Thilawa SEZ is paved with asphalt. Most of the roads connecting the villages are still unpaved. Road expansion from Thanlyin Bridge to Thilawa SEZ has been planned and will be funded by JICA.
Water Source/ Usage	There are three major water reservoirs in and around SEZ: Zarmani Reservoir, Bant Bwaykone Reservoir, and Thilawa Reservoir. Zarmani Reservoir and Bant Bwaykone mainly provide water to the agricultural field. On the other hand, Thilawa Reservoir supplies to nearby factories, for irrigation, and the port.
Waste Management	The Pollution Control and Cleansing Department (PCCD) of YCDC is in charge of solid waste management of 33 townships in Yangon City. The waste collection system in Yangon City is a combination of primary waste collection method, waste temporary storage and secondary waste collection (waste transportation). In Thanlyin Township, the Sanitary Department is in-charge of waste management and collects waste from all wards. On the other hand, the Sanitary Section of the Administration Department is in-charge of waste management in Kyauktan Township. Each of the two townships has operated its own final disposal site as open dumping.

Item	Description
Electricity	There are three sources of electricity in the area, namely: Thanlyin Substation, Thaketa Substation, and Kamarnat Substation are located in the surrounding area of Thilawa SEZ. Among them, the Thanlyin Substation is the closest one from Thilawa SEZ, about 10 km to the north. In 2014, the main source of lighting in Thanlyin and Kyauktan townships comes from electricity (48% and 33% of households) followed by battery (26% and 25%) in 2014.
School	There are a number of schools, including basic education primary school (B.E.P.S.), basic education middle school (B.E.M.S), basic education high school (B.E.H.S) and university, in Thanlyin and Kyauktan townships. There are 20 schools in Thanlyin township and 15 schools in Kyauktan townships near Thilawa SEZ area. There are no school located within the range of 1000 m from the project site.
Medical Facilities/ Services	It was identified that there are 9 major hospitals and healthcare centers near Thilawa area in Thanlyin and Kyauktan townships.
Cultural Heritage/ Assets	There is no cultural heritage site designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) or the Myanmar government in project area. It was confirmed that there is no cultural heritage in and around the Project site.
Landscape	No specific landscape located in the project was identified during the field visit in the region. The project site and its surrounding area is composed of flat plains and typical rural landscapes of urban neighborhood.
Environmental Baseline Situation	
Air Quality	The monitoring survey of SO ₂ , NO ₂ , Ozone, PM _{2.5} and PM ₁₀ for the ambient air quality was conducted in the Project site for continuous one day from 29 – 30 November, 2019. Comparing with the tentative target value, the concentration of NO ₂ and Ozone, daily results were lower than the target value, while some results of SO ₂ , PM _{2.5} and PM ₁₀ were exceeded than the tentative target value. Possible emission sources are affected from running vehicles on Dagon-Thilawa road and transportation in and around the monitoring area, natural origin such as dust from unpaved vacant area and the operation activities from MITT compound.
Water Quality	The surface water sample and the discharged water sample were collected at three survey points of upstream and downstream of the Yangon River and middle-discharge point of MITT on 2 December, 2019. The comparison with the target value according to NGQG Guideline value, the results of SS, total nitrogen, ammonia, iron and total coliform at the surface water and discharged water monitoring points were exceeded than the target value. The expected reasons for exceeding the target values of SS, total nitrogen, ammonia, iron and total coliform are delivered from upstream and downstream of Yangon river and discharged water for project area such as natural characteristics of the Yangon river, soil erosion in the upstream basin, surface water run-off from the surrounding area, wastewater from the upstream area and delivered from surrounding area by tidal effect.
Soil and Sediment Quality	The soil and sediment quality analysis were conducted on 2 December, 2019. The comparison with the target value, all parameters were lower than the target value. The soil qualities of project surrounding area are good condition.
Noise and Vibration Level	Noise and vibration survey conducted at one point near to the operation main gate of MITT compound on 29 – 30 November, 2019, all of the noise and vibration levels were lower than the target level.
Weather Monitoring	Weather monitoring systems provides total seven parameters information of wind direction, wind speed, precipitation, air pressure, temperature, humidity and water levels in the Thilawa area. All these systems are to help disaster risk reduction (DRR) which is needed to minimize the human damage and economic losses, to maximize the effectiveness of economic development and investment and to protect the safety and security of people's lives.

Source: Prepared by EMP Study Team

9. Summary of Environmental, Social, Health Impacts and Emergency Risk Assessment

The potential impact area boundary was set up to 3km diameter distance which is sufficient for the main potential impacts such as noise and dust impacts. According to the following satellite image, one monastery at southeast side, four oil and gas terminals at the northwest side and Thilawa SEZ area at the east side are located and there are no communities within study area.

Environmental and social impacts of the Project were assessed and evaluated in accordance with EIA Procedures (2015) based on the project description, results of baseline surveys and literature reviews. and the project was divided into two stages: i) Operation Stage (OS) and ii) Closure Stage (CLS). The impacts of pollution, natural environment, social environment and health and safety, and emergency risks are predicted and evaluated by using the following methodology (see in Table 9-1) and the impacts were classified as A (\pm), B (\pm), C (\pm), D & E with colour code and criteria as below.

Table 9-1 Impact Assessment Matrix

		Likelihood				
		Improbable / Rare (1)	Remote / Unlikely (2)	Occasional (3)	Probable / Likely (4)	Almost Certain / Frequent (5)
Severity	Very High (5)	5	10	15	20	25
	High (4)	4	8	12	16	20
	Moderate (3)	3	6	9	12	15
	Minor (2)	2	4	6	8	10
	Negligible (1)	1	2	3	4	5

Source: EMP Study Team

A-:	(20-25)	Very Significant Negative Impact	A+:	Very Significant Positive Impact
B-:	(15-19)	Significant Negative Impact	B+:	Significant Positive Impact
C-:	(9-12)	Moderately Significant Negative Impact	C+:	Moderately Significant Positive Impact
D:	(5-8)	Generally Acceptable Risks		
E:	(1-4)	Minimal to Insignificant		

Table 9-2 shows the summary of the assessment results for the environmental, social and health impacts and emergency risks of the Project.

**Table 9-2 Summary of Assessment Results of Environmental, Social and Health Impacts and
Emergency Risks**

Category	Assessment Item	Source of Impact / Causes	Assessment Evaluation		Reason for Preliminary Assessment
			OS	CLS	
Pollution	Air Quality	Emission of dust and exhaust gases	B-	C-	<p>OS: Dust and particulate matters' emission from cargo handling operations, exhaust gas emission from backup generators, operation- related machineries, vehicles and engines are expected. Emission of exhaust gas (SO_x, NO_x, CO, etc.) from berthing ships' engines is also anticipated. Likelihood is "Likely (4)" and Severity is "High (4)", thus Impact Rating is "Significant Negative Impact (16)".</p> <p>CLS: Dust and particulate matters' emission from material transportation and demolition works, and exhaust gas emission from demolition-related vehicles and engines are anticipated. Likelihood is "Likely (4)" and Severity is "Moderate (3)", thus Impact Rating is "Moderately significant (12)".</p>
	Water Quality	Effluents from surface runoff, utilities and activities	B-	C-	<p>OS: Water quality deterioration of receiving water body and surrounding environment due to the wastewater generation from surface runoff, domestic activities, effluent from utilities are expected. Also, accidental leakage of oil and chemical substances during loading and unloading of berthing ships and wastewater generated from maintenance dredging works can be occurred. Likelihood is "Likely (4)" and Severity is "High (4)", thus Impact Rating is "Significant Negative Impact (16)".</p> <p>CLS: Water quality deterioration of receiving water body and surrounding environment due to the wastewater generation from surface runoff and demolition activities is expected. Likelihood is "Likely (4)" and Severity is "Moderate (3)", thus Impact Rating is "Moderately Significant (12)".</p>

Category	Assessment Item	Source of Impact / Causes	Assessment Evaluation		Reason for Preliminary Assessment
			OS	CLS	
	Wastes	Hazardous and non-hazardous waste generation	C-	C-	<p>OS: Non-hazardous wastes such as domestic wastes, food wastes, garbage and bulk cargo residues can be generated from port activities, cargo operations and berthing ships. Hazardous wastes such as leftover paints, oily wastes, dredged materials, etc. are also anticipated to generate. Likelihood is “Likely (4)” and Severity is “Moderate (3)” thus Impact Rating is “Moderately Significant (12)”.</p> <p>CLS: Both hazardous and non-hazardous wastes from land excavation, domestic activities and demolition of building structures can be generated. Likelihood is “Occasional (3)” and Severity is “Moderate (3)” thus Impact Rating is “Moderately Significant (9)”.</p>
	Hazardous Chemicals and Materials	Fuel and other hazardous chemicals and materials usage	B-	C-	<p>OS: Oil and fuels used for generators, machineries and engines, and dangerous containers, toxic and harmful cargoes may impact on surrounding environment and living beings more or less if not properly stored, handled in case of spillage, leakage or damage. Likelihood is “Likely (4)” and Severity is “High (4)” thus Impact Rating is “Significant Negative Impact (16)”.</p> <p>CLS: Spillage and leakage of fuel used for backup generators, oils, lubricants, etc. used for demolition works may impact on surrounding environment and living beings. But this impact may be very limited and impact duration will also be very short. Likelihood is “Occasional (3)” and Severity is “Moderate (3)” thus Impact Rating is “Moderately Significant (9)”.</p>
	Offensive Odor	Odor emission from domestic activities and port operation activities	C-	C-	<p>OS: Domestic wastes, sewage treatment plant, toilets, and temporary container washing area would generate offensive odor to the surrounding nearby and make nuisance to the workers, staffs and the surrounding environment. Likelihood is “Likely (4)” and Severity is “Moderate (3)” thus Impact Rating is “Moderately Significant (12)”.</p> <p>CLS: Bad smell from temporary toilets, domestic wastes and wastewater from construction/ demolition activities would generate offensive odor more or less and make nuisance to people nearby and surrounding environment. Likelihood is “Likely (4)” and Severity is “Moderate (3)” thus Impact Rating is “Moderately Significant (12)”.</p>
	Soil Contamination	Spill/ leakage of fuel, hazardous materials and hazardous waste	B-	C-	<p>OS: Dredged materials, wastes and wastewater from domestic activities, spillage and leakage of oil and fuels, runoff from quay, container washing area and storage areas, spills from bulk cargo operations and wind-blown dust would cause soil contamination when contacted with sub soil and bottom soil of the river. Likelihood is “Likely (4)” and Severity is “High (4)” thus Impact Rating is “Significant Negative Impact (16)”.</p> <p>CLS: Spillage and leakage of fuel used for generators and engines, domestic wastes and wastewater may cause soil contamination when contacted with the sub soil. Likelihood is “Occasional (3)” and Severity is “Moderate (3)” thus Impact Rating is “Moderately Significant (9)”.</p>
	Noise and Vibration	Noise and vibration generation from operation and demolition activities	B-	C-	<p>OS: Operation and movement of cranes, pumps, vehicles, heavy machineries, cargo handling equipment, generators, cargo operations, ship traffic and other port activities may increase noise and vibration level and cause nuisances to surrounding area. Likelihood is “Likely (4)” and Severity is “High (4)” thus Impact Rating is “Significant Negative Impact (16)”.</p> <p>CLS: Operation and movement of demolition-related vehicles, temporary power supply generators, machineries, equipment and other demolition activities may generate noise and vibration in and around the site.</p>

Category	Assessment Item	Source of Impact / Causes	Assessment Evaluation		Reason for Preliminary Assessment
			OS	CLS	
					Likelihood is “ Likely (4) ” and Severity is “ Moderate (3) ” thus Impact Rating is “ Moderately Significant (12) ”.
	Ground Subsidence	Ground water usage and other activities that can happen ground subsidence	E	E	OS/ CLS: Ground water will not be extracted and used for water supply and thus, ground subsidence due to the project at both operation and closure stages is not expected. Likelihood is “ Unlikely (2) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (4) ”.
	Bottom Sediment	Activities that can cause bottom sediment	C-	E	OS: Dredged materials generated from regular maintenance dredging can cause bottom sediment if not properly disposed to the designated disposal area. Likelihood is “ Occasional (3) ” and Severity is “ Moderate (3) ” thus Impact Rating is “ Moderately Significant (9) ”. CLS: There are no activities that can cause impact on bottom sediment to the nearest water bodies during closure stage.
Natural Environment	Protected area	Natural reserved areas, public parks & other protected areas	E	E	OS/ CLS: Although Banbwagon reserved forest area is located over 3km east side from MITT, there are no project activities which can cause any impacts on that reserved forest. Likelihood is “ Rare (1) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (2) ”.
	Marine Ecology	Activities that can impact on marine ecology	C-	E	OS: Leakage of oils, oily wastes and mixtures from berthing ships may directly cause damage to fishery resources, aquatic biota and coastal habitat. Besides, runoff, spills or leakage of toxic or harmful materials or oily compounds from cargo handling and storage may cause deterioration of aquatic biota and fishery resources. Likelihood is “ Occasional (3) ” and Severity is “ Moderate (3) ” thus Impact Rating is “ Moderately Significant (9) ”. CLS: No impact on hydrology is anticipated as there are no project activities that can cause impact on it. Likelihood is “ Rare (1) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (2) ”.
	Hydrology	Activities that can impact on hydrology	E	E	OS/ CLS: No impact on hydrology is anticipated as there are no project activities that can cause impact on it. Likelihood is “ Rare (1) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (2) ”.
	Topography and Geography	Land acquisition, site cleaning and factory operation	E	E	OS/ CLS: No impact on topography and geography is anticipated as there are no project activities such as large-scale excavation works that can cause impact on it. Likelihood is “ Rare (1) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (2) ”.
Social Environment	Involuntary Resettlement and Land Acquisition	Land acquisition, site cleaning and factory operation	E	E	OS/ CLS: The project is located inside 37 plots in Thilawa Port Area and has been operating since from 1997. Thus, no resettlement or land acquisition issues are necessary to consider for operation and closure stages. Likelihood is “ Rare (1) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (2) ”.
	Local Economy (e.g. employment and livelihood)	Job opportunities for local people	B+	E	OS: There will be positive impacts on local economy in terms of increment of job opportunities for surrounding communities and creating some businesses for local people to get more income during operation stage. Likelihood is “ Likely (4) ” and Severity is “ High (4) ” thus Impact Rating is “ Significant Positive Impact (16) ”. CLS: During closure stage, temporary job opportunities for local workers in demolition activities will be provided. After that, the local economy will revert back to the original condition same as the time before construction of the port. Likelihood is “ Unlikely (2) ” and Severity is “ Minor (2) ”, and Impact Rating is “ Insignificant (4) ”.
	Indigenous and Ethnic People	Activities that can impact on indigenous and ethnic people	E	E	OS/ CLS: No indigenous and minority people are around the project site as the factory is located in urban and industrial area. Likelihood is “ Rare (1) ” and Severity is “ Negligible (1) ” thus Impact Rating is “ Insignificant (1) ”.

Category	Assessment Item	Source of Impact / Causes	Assessment Evaluation		Reason for Preliminary Assessment
			OS	CLS	
	Land Use and Local Resources	Activities that can impact on land use and local resources	E	E	OS/ CLS: No impact on land use and local resources as the project is already located in Thilawa Port Area and has been operating since 1997. Likelihood is “ Rare (1) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (2) ”.
	Greening and Landscape	Activities that can impact on greening and landscape	D	E	OS: Impact on visual landscape can be caused by physical appearance of QC, RTG, berthing ships and container yards, etc. Development of greening area inside the port area can create better visual appearance. Likelihood is “ Occasional (3) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Generally Acceptable (6) ”. CLS: No impacts on landscape is expected during closure stage as the landscape of the project area will revert back to the original condition as same as the time before construction of the port. Likelihood is “ Rare (1) ” and Severity is “ Minor (2) ”, thus Impact Rating is “ Insignificant (2) ”.
	Existing Social Infrastructures and Social Services	Activities that can impact on Existing Social Infrastructures and Social Services	E	E	OS/ CLS: No impact on existing social infrastructures and services is anticipated as the project is already located in Thilawa Port Area. Likelihood is “ Unlikely (2) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (4) ”.
	Conflict of interests within the region	Activities that can impact on conflict of interests within the region	E	E	OP/ CLS: No impact on social institutions is expected as the project is already located in Thilawa Port Area. Likelihood is “ Rare (1) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (1) ”.
	Cultural Heritage	Activities that can impact on cultural heritage	E	E	OS/ CLS: No impact on cultural heritage is anticipated as the project is located in Thilawa Port Area since 1997 and there is no cultural and archaeological structures and sites within study area boundary. Likelihood is “ Rare (1) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (2) ”.
	Gender Discrimination	Activities that can impact on gender discrimination	E	E	OS/ CLS: The project will not make any impact on gender discrimination. Likelihood is ““ Rare (1) ” and Severity is “ Minor (2) ” thus Impact Rating is “ Insignificant (2) ”.
	Children’s Right	Working in construction/ operation/ demolition works	E	E	OS/ CLS: The project will not make any impact on children’s right as the project will not employ child workers under age of 18 years. Likelihood is ““ Rare (1) ” and Severity is “ Negligible (1) ” thus Impact Rating is “ Insignificant (1) ”.
Health and Safety	Occupational Health and Safety	Occupational health and safety risks to worker during operation and closure stages	B-	C-	OS: During operation stage of the project, physical hazards due to movement of vehicles, equipment and cargo handling operations, exposure to heat and noise, asphyxiation or drowning, working at height, exposure to infectious diseases, etc. would be occurred in port workers. Likelihood is “ Likely (4) ” and Severity is “ High (4) ” thus Impact Rating is “ Significant Negative Impact (16) ”. CLS: During closure stage of the project, air pollution, noise and vibration, exposure to heat, workplace injuries, movement of demolition-related vehicles, and other communicable diseases would be occurred in demolition workers. Likelihood is “ Likely (4) ” and Severity is “ Moderate (3) ” thus Impact Rating is “ Moderately Significant (12) ”.
	Community Health and Safety	Community health and safety risks to worker during operation and closure stages	B-	C-	OS: During operation stage of the project, traffic accidents, port safety and security and public nuisance due to the operation of heavy machineries and vehicles would be occurred. Likelihood is “ Likely (4) ” and Severity is “ High (4) ” thus Impact Rating is “ Significant Negative Impact (16) ”. CLS: During construction/ closing stage, communicable diseases may occur due to the influx of workers and other migrant workers such as HIV/ AIDS. Also, other common communicable diseases

Category	Assessment Item	Source of Impact / Causes	Assessment Evaluation		Reason for Preliminary Assessment
			OS	CLS	
					such as diarrhea due to materials, chemicals, working environment, stagnant water and unsanitary facilities can occur. Likelihood is “Occasional (3)” and Severity is “Moderate (3)” thus Impact Rating is “Moderately Significant (9)”.
Emergency Risks	Fire	Fire explosion due to fuel and harmful chemicals and materials usage and storage	B-	B-	<p>OS: Improper storage and handling of flammable materials, fuel and oil, dangerous containers, improper waste management and careless behavior of workers and operators may cause fire risk during the operation stage. Likelihood is “Occasional (3)” and Severity is “Very High (5)” thus Impact Rating is “Significant (15)”.</p> <p>OS: Behavior of workers, improper storage and handling of oil and fuel, improper waste management, etc. may cause fire risk during closure stage of the project. Likelihood is “Occasional (3)” and Severity is “Very High (5)” thus Impact Rating is “Significant (15)”.</p>
	Flood	Flood occurrence due to heavy rain, and drainage system	C-	C-	<p>OS/CLS: Flood can occur due to the heavy rains, overflowing of canals, moats and drainage systems, etc. during heavy storms, cyclones, rainfall and unexpected weather conditions, etc. Likelihood is “Occasional (3)” and Severity is “High (4)” thus Impact Rating is “Moderately Significant (12)”.</p>
	Earthquake	Earthquake occurrence	C-	C-	<p>OS/CLS: Earthquakes are possible to happen as the Yangon area is near earthquake faults and is prone to earthquake. Also, there is possibility that structures for operation and demolition works may collapse if an earthquake occurs. Likelihood is “Occasional (3)” and Severity is “High (4)” thus Impact Rating is “Moderately Significant (12)”.</p>

Source: EMP Study Team

Note: OS= Operation Stage and CLS= Closure Stage

10. Environmental Management Plan (EMP)

Mitigation Measures and Consideration Measures

Based on project description and assessment results of the environmental, social and health impacts and emergency risk assessment, both current and proposed mitigation measures and consideration measures for operation and closure stages are shown in Table 10-1 and Table 10-2 respectively.

Table 10-1 Mitigation and Consideration Measures for Operation Stage

Category	Item	Mitigation and Consideration Measures	Implementer
Pollution	Air Quality	<p>[Exhaust gas emission]</p> <ul style="list-style-type: none"> - Using modernized and eco-friendly backup generators and vehicles - Keeping generators, equipment and vehicles in a good and effective working order. - Regular inspection, repair and maintenance of generators, vehicles, machineries, container and cargo handling equipment as per maintenance plan for each type. - Using Low-Sulphur fuel (premium diesel which contains 500ppm Sulphur content) to minimize SO₂ emission. - Provision of adequate ventilation system for staff and stevedores. - Advising berthing ships to use Low-Sulphur fuel to reduce air pollutant emissions and scrubbers to cut emissions of SO₂. - Advising berthing ships to conduct internal engine modifications using the techniques such as water injection and exhaust gas reticulation to reduce NO_x. <p>[Dust, soot and particulate matter emission]</p> <ul style="list-style-type: none"> - Transfer, storage and handling of dry bulk cargo in enclosed system to reduce soot and dust dispersion. 	Project Proponent

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - Reduction of dust and soot emission by covers, screens and sprinkling water or other similar methods on dry bulk cargo except anti-humid materials like grains or cement. - Taking care of each step during the transfer of dry bulk cargo from ship to transportation vehicle and vice versa to reduce and prevent splashes and spills. - Cleaning any bulk materials spilled as expeditiously as possible, but not later than the end of the daily work shift. 	
	Water Quality	<p>[For Port Terminal]</p> <ul style="list-style-type: none"> - Not allowing any wastewater to discharge directly to the river prior to the treatment system. - Recording monthly water consumption amount for port operation activities and ship water supply. - Sewage Treatment Plant (STP) has been installed and used for domestic wastewater treatment before discharging into the river. - The designed effluent water quality after treatment is much lower than NEQG guideline values. - TJQ Flotation Water Purifier has been installed and used for wastewater treatment. - Temporary filtration tank has been installed at temporary container washing area for container washing wastewater. But adequate treatment system for container washing wastewater should be considered to reduce the increase of phosphorus from the washing detergent in the receiving water body. - Drinking water treatment plant using Ro System has been installed for domestic water treatment and the purified water quality is met with WHO drinking water standard. - Proper storage and handling of oils and fuels not to spill or leak into the drainage. - Installation of oil separating facility at the workshop, catch basins with oil trap in fuel storage area and workshop. - Installation of adequate drainage system for storm water runoff and effluent water from treatment facilities. - Keeping mangroves behind the jetty to indirectly recover water quality and provide habitat for terrestrial and aquatic biota. - Regular Checking, Repair and Maintenance of STP, WWTP and Drinking WTP are highly recommended. - Proper treatment for temporary container washing area and better control of the quality of run off are recommended. <p>[For Berthing Ships]</p> <ul style="list-style-type: none"> - Prohibition of the berthing ships to discharge any domestic wastewater, bilge water, ballast water, oily wastes, sewage, garbage and other residues in the berthing ships into the river. - Connecting between local service-provider and berthing ships for disposal of domestic wastewater. - Compliance with rules and regulations issued by MPA and DWIR for ship discharges. - In case of accidental spills from ships, it is recommended to prepare recovery vessels, oil fences, and treatment chemicals with a view to minimizing dispersal. - Having proper contingency plans and prompt reporting system for prevention of oil dispersal. - Periodic clean-up of floating wastes around jetty is recommended for preservation of port water quality. 	Project Proponent
	Wastes	<p>[Non-hazardous Waste Control]</p> <ul style="list-style-type: none"> - Segregation of garbage, food wastes, and other non-hazardous wastes. - Promoting and practicing 3R (Reduce, Reuse, Recycle) for solid waste control. - Proper storage of non-hazardous wastes and cargo residues at designated waste storage area and disposal by Kyauktan Municipal regularly. - Connecting between local service-provider and berthing ships for the disposal of all kinds of wastes generated from ships. - Provision of adequate reception facilities for ship discharges can be considered as an alternative. <p>[Hazardous Waste Control]</p>	Project Proponent

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - Prohibition of direct discharge of any kind of hazardous wastes into the drainage. - Proper disposal of dredged materials from maintenance dredging work into designated disposal area by the full service of MPA. - Hazardous oily wastes such as lubricant, batteries, oily residues, etc. will be stored separately and sold for recycle as much as possible. - Prohibition of discharges of oily wastes, toxic residues and other hazardous wastes from berthing ships. 	
	Hazardous Chemicals and Materials	<ul style="list-style-type: none"> - Recording the usage and amount of oil and fuels, lubricant, paints monthly. - Getting the license issued by Department of Mines under MONREC (formerly MOECAP) to store dangerous and non-dangerous petroleum in tanks in connection with a pump outfit for fueling motor conveyances. - Proper storage and handling of oils and fuels in accordance with the instruction of relevant government organization. - Installation of trench and catch basin and secondary containment at the underground and on ground fuel storage areas and at the whole boundaries in case of spillage and leakage. - Filling the diesel fuel for engines of heavy equipment with handling equipment such as forklift or pallet track or trolley. - Segregation of dangerous cargoes and other types of cargoes in accordance with IMO classes. - Careful storage and handling of inbound and outbound dangerous cargoes in accordance with respective handling procedures. - Development of Inbound and Outbound Container Handling Procedures, Damaged Container Handling Procedure, etc. as necessary. - Consideration of emergency response plan for spillage and leakage of hazardous chemicals and materials is recommended. 	Project Proponent
	Offensive Odor	<ul style="list-style-type: none"> - Regular check of waste storage area, toilets, kitchens, etc. - Proper waste storage and disposal of domestic wastes by Kyauktan Township Development Committee. - Smell checking in and around sources that can generate offensive odor. - Prohibiting direct discharge of any kinds of wastes into the drainage or the river. - Regular checking the operation of sewage treatment plant, wastewater treatment plant and temporary container washing area. - Consideration for prevention of offensive odor generation from temporary container washing area (e.g. covering the filtration tank or treatment system) is highly recommended. 	Project Proponent
	Soil Contamination	<ul style="list-style-type: none"> - Proper storage and handling of oils and fuels in accordance with the instruction of relevant government organization. - Installation of trench and catch basin and secondary containment at the underground and on ground fuel storage areas, in the workshop and at the whole boundaries of the port in case of spillage and leakage. - Filling the diesel fuel for engines of heavy equipment with handling equipment such as forklift or pallet track or trolley. - Checking leakage and ground cracking in oil and fuel storage areas. - Taking care of runoff from quay and cargo storage area, spills from bulk cargo operations not to cause soil contamination. - Consideration of Emergency response plan for spillage and leakage of fuel and hazardous materials and cargoes to prevent soil contamination. 	Project Proponent
	Noise and Vibration	<ul style="list-style-type: none"> - Installation of backup generators in roofed area to minimize noise contribution. - Regular checking of backup generators, cranes, cargo handling equipment, heavy machineries and vehicles as necessary. - Using high-efficiency and eco-friendly generators, heavy machineries and vehicles to minimize noise and vibration. - Planting of trees, fences in and around port boundary can be served as effective noise barriers. - Setting speed limit for transportation vehicles inside the port area. - Turning off the engines when not in use. 	Project Proponent

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - Noise and vibration check by equipment in and around the factory periodically. - Complying with NEQG guideline values and other international guideline values for noise and vibration. 	
	Bottom Sediment	<ul style="list-style-type: none"> - Using low pollution type grab bucket which is designed to be water-tight and avoid scattering dredged sediments while pulling up in the water during grab dredging process. - Proper disposal of dredged materials into designated area defined by MPA. 	Project Proponent
Natural Environment	Marine Ecology	<ul style="list-style-type: none"> - Keep growing the mangroves in the bank to provide habitat for terrestrial and aquatic biota and indirectly recover water quality. - In case of accidental spills from ships, it is recommended to prepare recovery vessels, oil fences, and treatment chemicals with a view to minimizing dispersal. - Having proper contingency plans and prompt reporting system for prevention of oil dispersal. - Periodic clean-up of floating wastes around jetty is recommended for preservation of port water quality. 	Project Proponent
Social Environment	Local Economy (e.g. Employment and Livelihood)	<p>[Job Opportunity] Employing local employees to work in the port in different work positions (planning, administration, terminal operation, and stevedores, etc.) as permanent and casual employees.</p> <p>[Capacity Building and Trainings]</p> <ul style="list-style-type: none"> - Conducting staff appraisal system on a yearly basis. - Conducting required internal trainings arranged by Human Resources (HR) Department. - Conducting capacity development training for equipment driving and issuing internal license on a yearly basis. - Arranging online learning systems by Hutchison Ports for staff's capacity. <p>[Health Surveillance]</p> <ul style="list-style-type: none"> - Implementing Health Surveillance program for staff <p>[CSR Activities]</p> <ul style="list-style-type: none"> - Implementing Social welfare program to provide staff with life insurance. - Conducting tree planting ceremonies and greening activities on a yearly basis together with all staff inside the port and in primary schools, - Donations (e.g. school facilities, teaching aids, water purification system, water supply, sanitary facilities, playground equipment, etc.) to primary schools, donations to monasteries and villages around the project area. - Providing scholarships and gold medal awards for outstanding students from MMU and monetary support to MMU for academic needs (e.g. lab equipment, teaching aids, computers sets, furniture, reference books, survey equipment, etc.) and project/ research assistance on a yearly basis. 	Project Proponent
	Greening and Landscape	<ul style="list-style-type: none"> - Securing greening area approximately 107,500m² in the land and 75,000m² in the river bank (approximately 21.67% of total MITT land area). - Green belt development along the road and port boundary which can reduce noise levels, arrest dust and improve the environment to the surrounding in consequently. - Conducting planting activity on a yearly basis together with all staffs. - Keep maintaining mangroves behind the jetty to prevent river bank erosion, stabilize the river coast line and conserve environment. 	Project Proponent
Health and Safety	Occupational Health and Safety	<p>[Physical Hazards] <i>From moving vehicles and equipment</i></p> <ul style="list-style-type: none"> - Segregating vehicle movement and pedestrians, as much as reasonably possible - Implement safe driving within the premises, post speed limit signs - Provision of appropriate road signs & markings - Restricting access to operational areas for members of the public, private vehicles and delivery vehicles 	Project Proponent

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - Ensure that all operational areas and access routes are sufficiently lit, especially at night or in reduced visibility conditions - Ensure all drivers, operators are licensed - Training all vehicle drivers and equipment operators so that they are fit and competent to carry out their respective job tasks (e.g. forklifts must be operated by a qualified person, and follow the operation practices, e.g. parking in designated place, fully lowering forks, avoid lifting with one fork, avoid overloading, ensure stable load, drive at safe speed, check surroundings, conduct regular inspection & maintenance, etc.) From lifting operations - Avoiding lifts over areas where people are likely to be working or passing - Ensure that workers are trained, competent and experienced in safe lifting procedures - Regular inspection and checking of all lifting equipment and accessories - Restriction of access to lifting area - Discontinue operations if wind conditions make it unsafe (high winds, ice or unduly cold or hot weather, performance of lifting equipment, etc.) From manual handling - Using mechanical handling equipment, such as vehicle mounted hydraulic hoists, portable roller conveyors and pallet trucks, handheld carts, etc. to minimize manual workload of the worker - Encourage workers to adopt safe lifting techniques - Avoiding manual handling of loads, where possible From electrical shock - All electrical works must be conducted by a certified and competent electrical worker who will conduct all electrical works, such as checking and inspection, ensure safe usage of approved electrical equipment, prohibit usage of un-safe & faulty electrical devices - Layout drawings must be readily available in order to identify electrical wiring such as underground or hidden cables From workplace violence - To implement workforce violence employee training & employee diligence in watching out for suspicious, abnormal behavior and activities From slips, trips & falls - Good housekeeping (remove debris, store equipment material adequately) - Ensure slopes & ramps have suitable ribbed surfaces to prevent slipping [Exposure to heat] - Job acclimatization & job rotation - Buddy system to check one another - Use of machine/equipment to reduce physical work - Provision of adequate PPE (thick gloves to prevent burns, scalds, to prevent sweaty hands) - Wear appropriate clothing for the hot climate (light & loose clothing) but wearing of PPE must be mandatory (hard hats, gloves, boots etc. - Provision of adequate drinking water, rest areas with shade and cover from the elements - Monitoring of weather forecasts - Wearing of “thanaka” (a Myanmar traditional cosmetic product) on face & skin as a form of sunscreen and natural alternative to sunblock [Exposure to Noise] - Provision of adequate and proper PPE such as ear plugs/muffs and gloves - Rotation and scheduling of work near source of noise to limit time of exposure - Keep in enclosure & on good foundation, machine/equipment which emit loud noise - Conduction of noise monitoring - Conduct hearing checks for workers [Asphyxiation or Drowning] - Permit-to-work procedure - Gas purging and ventilation - Testing and monitoring of the atmosphere inside confined space - (Acceptable levels of oxygen are between 19.5% & 23.5% as per OSHA) - Mechanical, electrical and process isolation 	

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - Respiratory protective equipment - Competence, training, supervision & suitability - Stand-by of rescue equipment and emergency rescue procedures - Provision of suitable PPE (e.g. lifejackets or buoyancy aids) if work involves being within 1 m of unprotected quay edge over water - Competence, training, supervision & suitability - Stand-by of rescue equipment and emergency rescue procedures (safety harnesses, life-lines, life-buoys, throwing lines, rescue poles, etc.) - Ensuring edge protection at areas at risk of falling (e.g. handrails, railings, barricades, danger signages, etc.) - Ladders at quay walls (if required) <p>[Working at Height]</p> <ul style="list-style-type: none"> - Conduct risk assessment for any work carried out at height - Proper planning and organizing work at heights - Selecting and using suitable work equipment, such as guardrails & mobile elevated work platforms (ensure proper rigging & maintenance) - Regular inspection and maintenance of equipment and accessories - Ensuring edge protection at open edges where there is a risk of falling from height - Ensure holds/hatches are not left open for longer than required <p>[Exposure to Infectious Diseases]</p> <ul style="list-style-type: none"> - Provide health surveillance for workers - Implement health awareness and education briefings on the risks, prevention and available treatment for the potential disease - Encourage personal hygiene, cleanliness and good habits - Take precautionary measures during occasions of outbreaks of communicable diseases in the surrounding and immediate area (take & record body temperature, segregate from healthy workers, allow rest at home, consult with health professionals, treat at clinic, hospital, etc.) - Provide clean and sanitary facilities (canteen, kitchen, eating area, adequate and clean toilets, etc.) - Ensure proper housekeeping is conducted daily - Ensure proper covering of food, proper disposal of food & leftovers (to prevent propagation of vector, i.e. rats, mice which can carry disease) - Ensure no consumption of food & drinks outside of designated place (prohibit eating/drinking in labs, chemicals rooms/storage, toilets, etc.) - Ensure no water ponding or stagnant water in and around port premises to prevent vector (mosquito) breeding <p>[Mitigation Measures by Project Proponent]</p> <ul style="list-style-type: none"> - Provision of adequate lighting - Provision of rest area, canteen, portable drinking water, sanitary facilities. - Provision of First Aid, Health Check-up, Snake Bite Plan - Provision of OHS Trainings and Awareness for infectious diseases. - Issuing general safety rules for Hatch Foremen, Stevedores, Winch and Crane Operators and Signalmen. - Provision for traffic control in the port compound. - Provision of dangerous cargo handling procedures. 	
	Community Health and Safety	<p>[Mitigation for Traffic Accidents]</p> <ul style="list-style-type: none"> - Implement best transport practices to prevent traffic accidents - Emphasize safe driving aspects among drivers (e.g. to follow traffic rules & regulations, avoid dangerous routes, to consider rush-hour traffic, be aware of school areas and school hours, etc.) - Training, certification of vehicle drivers & machine operators - Regular inspection, servicing & maintenance of vehicles, cranes, machineries, etc. - Safe loading and unloading of goods, securing loads, ensure vehicles are road-worthy, etc. - Providing commute buses to prevent traffic <p>[Mitigation for Public Safety & Security]</p> <ul style="list-style-type: none"> - Provision of security gate and system to prevent un-authorized entry - Provision of CCTV system - Provide adequate vehicle parking for employees, visitors, vendors 	Project Proponent

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - Provide safety information of the port - Provide necessary PPE and escort for visitors <p>[Mitigation for Public Nuisance]</p> <ul style="list-style-type: none"> - Enclosure of noisy machinery & equipment (e.g. pumps, compressors, etc.) inside buildings to prevent noise pollution to surrounding environment and community - Provision of water treatment system to prevent water pollution to surrounding environment and community. 	
Emergency Risks	Fire	<ul style="list-style-type: none"> - Provision of fire-fighting facilities (e.g. emergency exits, fire extinguishers, fire alarms, dedicated water tank & supply system for fire-fighting, assembly points, etc.) - Posting fire notices at all required areas with the port. - Proper storage and handling of flammable and harmful cargoes and containers in accordance with handling procedures. - Regular fire-drills, exercises, training for port staff & employees (e.g. demonstration on use of fire-extinguisher, etc.) - Lightning strike prevent (Lightning Arrestor Plan) - Emergency preparedness & response plans 	Project Proponent
	Flood	<ul style="list-style-type: none"> - Provision of drainage system with adequate capacity for rainwater - Consideration of history and accepted flood level risks of the project area - Construction and design of port taking into consideration the above - Conduct regular flood drills, exercises, training for port personnel - Provision of emergency exits, alarm systems, safe routes, assembly points - Emergency plan (including rescue and rehabilitation) - Preparation of flood preparedness checklist - Preparation of Quay Crane Tie-Down System to mitigate and control the failures or collapse of cranes during high intensity wind speed occurrence. - Preparation of storm protection plan 	Project Proponent
	Earthquake	<ul style="list-style-type: none"> - Construction of buildings and structures in considerations of earthquake resistance. - Preparation of Emergency Response Plan (ERP) and Escape routes. - Trainings for emergency responses. 	Project Proponent

Source: EMP Study Team

Table 10-2 Mitigation and Consideration Measures for Closure Stage

Category	Item	Mitigation and Consideration Measures	Implementer
Pollution	Air Quality	<p>[Dust Emission]</p> <ul style="list-style-type: none"> - Regular Spraying water to bare land and site access roads. - Proper treatment for exposed earth by compaction or covering with bitumen within six months after last construction activity on the site or part of the site where there is exposed earth. - Conducting demolition works under well-ventilated areas. - Keeping all dusty and demolished materials under covers to prevent dust dispersion. - Preparing temporary green belt zone or open space between the site and local community during closure stage. - Proper movement of vehicles for the transportation of demolished materials with covers. <p>[Exhaust Gas Emission]</p> <ul style="list-style-type: none"> - Using modernized and eco-friendly generators and vehicles, and avoiding usage of old machineries and vehicles that can emit more exhaust gases. - Keeping generators, equipment and vehicles temporarily used in the site in a good and effective working order. - Regular inspection, repair and maintenance of generators, vehicles and machineries. - Turning off the generators and engines when not in use. 	Contractor
	Water Quality	<ul style="list-style-type: none"> - Prohibition of direct discharges of any kinds of wastes and wastewater into the drainage. - Developing proper temporary drainage system around the whole boundary of the site. 	Contractor

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - Installation of temporary septic tanks for the collection of sewage and domestic wastewater. - Setting temporary settling ponds for turbid water generated from demolition activities. - Collection and Disposal of domestic wastewater by licensed contractor. - Monthly recording the collection amount of domestic wastewater by licensed contractor. 	
	Wastes	<p>[Non-hazardous Waste Control]</p> <ul style="list-style-type: none"> - Segregation of domestic wastes, demolished wastes and debris. - Recycling demolished wastes and debris as much as possible. - Practicing 3R (Reduce, Reuse and Recycle) for waste control. - Proper storage of different types of non-hazardous in designated temporary storage area. - Record of amount of wastes and regular disposal of wastes by entrusting Kyauktan Township Development Committee. <p>[Hazardous Waste Control]</p> <ul style="list-style-type: none"> - Proper collection and storage of oily wastes, leftover paints, batteries, lubricants, and packaging materials etc. from demolition activities at temporary storage area with proper labels and signs. - Proper disposal of hazardous wastes and materials by licensed contractor. 	Contractor
	Hazardous chemicals and materials	<ul style="list-style-type: none"> - Fuels used for generators and engines will be stored properly with fire extinguishers and notice board. - Secondary containment such as steel trays filling with sand, concrete foundation with oil pit will be installed under generators and fuel storage areas in case of spillage or leakage. 	Contractor
	Offensive Odor	<ul style="list-style-type: none"> - Regular checking of temporary waste storage area, temporary septic tanks installation area and other possible sources of offensive odor within the site. - Proper waste management system for domestic wastes and disposal by Kyauktan Municipal. 	Contractor
	Soil Contamination	<ul style="list-style-type: none"> - Proper storage of fuels, lubricants and paints with secondary containments such as steel trays, concrete foundation including oil trap not to direct contact with soil in case of spillage and leakage. - Proper waste and wastewater management not to direct contact with soil to prevent soil contamination. 	Contractor
	Noise and Vibration	<ul style="list-style-type: none"> - Regular repair and maintenance of demolition-related vehicles, vessels and machineries in a good and effective working order to minimize noise generation to the surroundings. - Installation of generators and engines under roofed areas to minimize noise contribution. - Turning off the generators and engine when not in use. - Setting the speed limit for vehicle movement within the site. - Temporary installation of noise insulation walls around demolition site as necessary. 	Contractor
Social Environment	Local Economy (e.g. Employment and Livelihood)	<p>[Job Opportunities]</p> <ul style="list-style-type: none"> - Employing local workers to work in demolition activities in different positions. - Creating small businesses (e.g. restaurants, small shops, vendors, etc.) of local people targeted to the workers on a temporary basis. <p>[Cleaning Environment for Local Community]</p> <ul style="list-style-type: none"> - Daily cleanliness and tidiness of the work environment - Weekly hygiene plan implementation cycle (total cleaning) for both inside and surrounding of the demolition site compound. 	Contractor
Health and Safety	Occupational Health and Safety	<p>[Air Pollution]</p> <ul style="list-style-type: none"> - Provision of adequate PPE (full face masks covering nose & mouth adequately) for all workers. - Spraying of dusty surfaces with water (especially during the dry season). 	Contractor

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> -Restriction of Speed for vehicles in the site. -Covering of material such as earth, rubble. -Regular maintenance of machine, equipment & vehicles. -Avoid using old & outdated machinery. -Remove existing port's road network after completion of removal of buildings, etc. <p>[Noise & Vibration]</p> <ul style="list-style-type: none"> -Provision of adequate PPE (ear plug/muffs, thick cotton gloves, etc.). -Instruct workers to stay away from noise sources. -Implement work rotation (jack hammer users). -Place noisy equipment such as generators inside enclosures. -Regular maintenance of machine, equipment & vehicles. -Implement ear checks for workers and noise monitoring to ensure compliance of noise standards. <p>[Heat]</p> <ul style="list-style-type: none"> -Provision of adequate PPE (thick gloves to prevent burns and sweaty hands) -Wearing traditional "straw hats" to provide shade and applying "thanaka" which is nature's sunscreen and natural sunblock and protects the skin against pollution, sunburn, etc. -Provision of shady resting areas and drinking water -Implement work and rest schedules, job rotation, provide ventilation such as electric fans -Monitor weather reports so that strenuous works can be scheduled to a cooler time of day -Provide machinery, equipment (wheel-barrow, forklift, hand-cart, etc.) to assist in manual labor work -Implement health check for workers. <p>[Workplace Injuries]</p> <ul style="list-style-type: none"> -Implement proper work at height procedures (safety harnesses, life-lines, anchor, safe use of ladder/scaffolding, etc., provision of safety netting, toe boards -Designate walkway for pedestrians and movement for traffic -Barricade working area -Conduct proper housekeeping daily -Provide artificial illumination -Implement rest and work schedule. -Ensure electrical equipment are of industry approved type and in good condition, certified electrical worker, etc. <p>[Exposure to hazardous materials]</p> <ul style="list-style-type: none"> -Identify all possible hazardous materials (obtain information on substances and materials used during the operation stage). -Locate all above ground and underground services (e.g. gas pipe lines) and storage. -Provision of suitable PPE (clothing with long sleeves, gloves, goggles, face masks). -Training & instruction to workers. -Provision of washing facilities. <p>[Communicable Diseases]</p> <ul style="list-style-type: none"> -Ensure items to be removed, dismantled do not contain hazardous substances and if so, to take the necessary appropriate control and prevention -Health awareness and briefings 	

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> -Promotion of hygiene, cleanliness and good habits (washing of hands, etc.) -Provision of clean and hygienic sanitary facilities -Daily housekeeping -Covering of food, proper disposal of leftovers, food wrappings, etc. -Prohibit eating/drinking outside of permitted areas -Ensure no water ponding to eliminate mosquito breeding, implement pest control services. <p>[Others]</p> <ul style="list-style-type: none"> -Provision of first aid station, qualified first aider, & facilities (stretchers, beds, etc.) -Posting of emergency telephone number for Fire, Ambulance, Police -Designate nearest hospital or clinic -OHS training <ul style="list-style-type: none"> ➢ Safety meetings, coordination meetings ➢ Safety orientation and induction ➢ Safety toolbox meeting, site walks -Risk assessment -Emergency drills and simulation exercises (to conduct at least twice yearly) 	
	Community Health and Safety	<p>[Traffic Accidents]</p> <ul style="list-style-type: none"> -Implement best transport practices to prevent traffic accidents. -Emphasize safe driving aspects among drivers (e.g. to follow traffic rules & regulations, avoid dangerous routes, to consider rush-hour traffic, be aware of school areas and school hours, etc.). -Training, certification of vehicle drivers & machine operators. -Regular inspection, servicing & maintenance of vehicles, cranes, machineries, etc. -Safe loading and unloading of goods, securing loads, ensure vehicles are road-worthy, etc. -Providing commute buses to prevent traffic. <p>[Public Safety & Security]</p> <ul style="list-style-type: none"> -Provision of security gate and CCTV system to prevent un-authorized entry. -Provide adequate vehicle parking for employees, visitors, vendors. -Provide safety information of the closing works. -Provide necessary PPE and escort for visitors. 	Contractor
Emergency Risks	Fire	<ul style="list-style-type: none"> -Prohibit use of explosives during dismantling work. -Confirm and check previous storage places -Provision of fire-fighting facilities, fire prevention and control. -Segregate and store waste accordingly. -Provide proper storage for fuel. -Implement safety rules and regulations, warning signs, etc. -Provide proper and adequate PPE. -Emergency response plan, drills, exercises, etc. 	Contractor
	Flood	<ul style="list-style-type: none"> -Elevation of the demolition area will be more than adequate in regard to flood history of the area in which the project is situated. -Provision of stand-by emergency equipment & facilities (e.g. pumps, sandbags, etc.). -Provision of alarm, escape routes and assembly points. -Shut down of machine & equipment prior to escape. -Emergency response plan (drills, exercises, etc.). 	Contractor
	Earthquake	<ul style="list-style-type: none"> -Workers in the project site (especially those working on heights) should be aware of the earthquake risks and familiar with the emergency procedures 	Contractor

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - Know the location(s) of the previous hazardous substance storage, electrical power lines, underground cables, etc. - Emergency response plan (drills, simulation exercises, rescue equipment, etc.) - Be aware of aftershocks, avoid re-entering area if site is unstable - Clear path for first responders - If trapped, find something to tap against to alert search and rescue - Wear protective clothing (PPE) to get protection from sharp objects, falling materials, etc. 	

Source: EMP Study Team

11. Environmental Monitoring Plan

In order to confirm that the environmental mitigation and management activities implemented by the project proponent are proper and adequate enough, the environmental monitoring plans including monitoring items, methods, frequency and locations during operation stage and closure stage of the project are developed and described in Table 11-1 and Table 11-2 respectively.

Table 11-1 Environmental Monitoring Plan for Operation Stage

Category	Monitoring Item	Monitoring Method	Location	Frequency	Implementer
Common	Monitoring of Mitigation Measures	Visual inspection and record check	In and around the port	Monthly	Project Proponent
Air Pollution	5 parameters from NEQG (SO ₂ , NO ₂ , CO, PM _{2.5} , PM ₁₀)	Measurement by equipment	Emission point in port operation area	Twice/Year	Project Proponent
	Repair & Maintenance of machineries and vehicles	Recording repair & maintenance activities	Port area	As necessary	Project Proponent
	Dust and Soot	Visual check of storage and handling dry bulk cargo	Operation area	Daily	Project Proponent
Water Pollution	Measurement of 28 parameters from NEQG (2015) for general application	Laboratory analysis	Outlet-2 which is major storm water drain line	Yearly	Project Proponent
	Measurement of 8 parameters from NEQG (2015) for Ports, Harbours and Terminals (pH, Temperature, BOD, COD, Oil & Grease, pH, Total coliform bacteria, T-N, T-P, TSS)	Laboratory analysis	Outlet-2 which is major storm water drain line, Upstream area near jetty, Downstream area near jetty.	Three times/ Year	Project Proponent
	Water consumption and Water Supply for berthing ships	Record water consumption amount for port operations, and water supply amount for ships	Port Area	Monthly	Project Proponent
	Connecting between outsourced sewage collector and ships	Record of the ship name, wastewater collector and amount of sewage	Port area	As necessary	Project Proponent

*Port Operation of Myanmar International Terminals Thilawa Limited (MITT) In Thilawa Area
Environmental Management Plan (EMP) Report*

Category	Monitoring Item	Monitoring Method	Location	Frequency	Implementer
Wastes	Storage/ Disposal of hazardous/ Non-hazardous wastes	Visual Check the waste segregation and storage	Waste Storage Area	Weekly	Project Proponent
	Amount of Wastes	Record of each type of wastes and recycled wastes (solid, liquid, sludge)	Waste Storage area	Monthly	Project Proponent
	Waste Collection	Record the waste collection receipts (Hazardous/ Non-hazardous)	Waste Storage Area	Monthly	Project Proponent
Hazardous chemicals and materials	Amount of hazardous chemicals and materials	Record of each type of hazardous chemicals and materials (e.g. DG containers, oil and fuels, etc.) with labels.	Container Yard, Fuel storage area	Monthly	Project Proponent
	Amount of oil and fuels	Record monthly consumption amount of oils and fuels	Fuel Storage Area	Monthly	Project Proponent
	Renewing the license for fuel storage	Record of annually renewed licenses issued by relevant ministry	Port area	Annually	Project Proponent
	Handling and storage of DG containers	Checking handling of inbound and outbound DG containers in accordance with Standard Operation Procedures (SOP) for handling of inbound and outbound DG containers	Container Yard	As necessary (Daily/ Weekly/ Monthly)	Project Proponent
	Segregation of cargoes/ containers	Checking the segregation and storage of cargoes/ containers in accordance with IMO classes and SOPs	Container Yard	As necessary (Daily/ Weekly/ Monthly)	Project Proponent
Offensive odor	Odor from domestic and operation activities	Checking the odor generation, operation status of utilities	Waste storage area, Container Washing Area, Sewage Treatment Plant (STP), Wastewater Treatment Plant (WWTP)	Monthly	Project Proponent

*Port Operation of Myanmar International Terminals Thilawa Limited (MITT) In Thilawa Area
Environmental Management Plan (EMP) Report*

Category	Monitoring Item	Monitoring Method	Location	Frequency	Implementer
	Odor from fuel storage tanks	Visual check and Record the status	Fuel Storage Area	Monthly	Project Proponent
Soil Contamination	Leakage, Spillage and Ground Cracking	Visual Check the leakage from storage tanks, warehouse and operation activities	Fuel Storage Area, Warehouse Port operation area	Monthly	Project Proponent
	Condition of concrete paving in container yard	Visual checking and Record of maintenance	Container Yard	As necessary	Project Proponent
Noise and Vibration	Noise and Vibration Check	Measurement of noise levels by equipment	Port area	Yearly (4 days for each)	Project Proponent
	Repair and Maintenance of machineries, equipment and vehicles	Record of regular repair and maintenance	Port area	As necessary	Project Proponent
Bottom Sediment	Sediment Quality Check	Laboratory Analysis	Downstream area near jetty	Once/Year	Project Proponent
	Regular maintenance dredging	Record of amount of dredged materials, and frequency of maintenance dredging	Jetty area	Twice/ Year (before and after rainy season)	Project Proponent
Local Economy	Job employment in port operation works	Record the numbers of local workers in the port	Port area	Yearly	Project Proponent
CSR Activities	Donations, Social welfare programs, Provision of scholarships, etc.	Record of CSR activities	Surrounding areas nearby the port	Yearly	Project Proponent
Greening and Landscape	Status of greening activities and Landscape plan	Visual Check of planting, Record of Greening activities	Port area	As necessary	Project Proponent
Occupational Health and Safety	Work injuries and accidents	Record and Report	Port area	As occasionally	Project Proponent
	OHS Trainings and Safety Trainings			Yearly	
	Claims from Workers			Monthly	
	Health Check-up			Yearly	
Community Health and Safety	Traffic Accidents and Incidents	Record and Report	In and around the Port	As required	Project Proponent
	Complains from Community				
Emergency Risks	Fire	Record and Report the occurrence of fire risk	Port Area	At the time of occurrence	Project Proponent
		Checking fire-fighting facilities and equipment		Monthly	
	Flood	Record and Report the occurrence of flood risk	Port Area	At the time of occurrence	Project Proponent
		Checking Drainage systems, and Tie-		Monthly	

Category	Monitoring Item	Monitoring Method	Location	Frequency	Implementer
		Down Systems for QC			
	Earthquake	Record and Report the occurrence of earthquake risk	Port Area	At the time of occurrence	Project Proponent
	Spillage/ damage of dangerous containers and cargoes	Visual Inspection of Container Yards and Warehouse	Port Area	At the time of occurrence	Project Proponent
	Emergency Drills, Trainings and Preparedness	Record and Report the activities for emergency responses	Port Area	Twice/ Year	Project Proponent

Source: EMP Study Team

Table 11-2 Environmental Monitoring Plan for Closure Stage

Category	Monitoring Item	Monitoring Method	Location	Frequency	Implementer
Common	Monitoring of Mitigation Measures	Visual Inspection and Checking the records	Demolition Site	Once/Month	Contractor
Air Pollution	5 parameters from NEQG (SO ₂ , NO ₂ , CO, PM _{2.5} , PM ₁₀)	Measurement by equipment	Emission point within Demolition Site	Once/ Six Months	Contractor
	Dust Control	Visual Inspection	Demolition Site	Daily	Contractor
	Exhaust Gases Control	Visual Inspection	Demolition Site	Monthly	Contractor
	Repair and Maintenance of engines and machineries	Record of repair and maintenance services	Demolition Site	As necessary	Contractor
Water Pollution	Measurement of 28 parameters from NEQG (2015) for general application	Laboratory analysis	Effluent Pit before discharging	Once/ Six Months	Contractor
	Domestic wastewater Collection	Record of wastewater collection receipts	Installation area of temporary Septic Tanks	Monthly	Contractor
	Operation of temporary settling ponds	Visual Inspection	Demolition Site	Weekly	Contractor
Wastes	Storage/ Disposal of hazardous/ Non-hazardous wastes	Visual Checking	Temporary Waste Storage Area	Weekly	Contractor
	Amount of hazardous, non-hazardous wastes and recycled wastes (solid, liquid, sludge)	Record of each type of wastes	Temporary Waste Storage area	Monthly	Contractor
	Waste Collection (Hazardous/ Non-hazardous)	Record the waste collection receipts	Temporary Waste Storage Area	Monthly	Contractor
Hazardous and Chemical Substances	Usage and storage of oil, fuel, lubricants, paints, etc.	Record monthly consumption amount, Visual Inspection	Workshop, Fuel Storage Area,	Monthly	Contractor
Soil Contamination	Oil and Fuel Leakage	Visual Inspection	Fuel Storage Area, Workshop Generator Installation Area	Weekly	Contractor
Noise and Vibration	Noise and Vibration Levels	Measurement by equipment	Demolition Site	Once/ Six Months	Contractor

Category	Monitoring Item	Monitoring Method	Location	Frequency	Implementer
	Repair and Maintenance of heavy machineries and vehicles	Record of repair and maintenance works	Demolition Site	As necessary	Contractor
Offensive Odor	Odor from wastes and temporary septic tanks	Smell checking	Temporary Waste Storage Area, Around Demolition Site	Weekly	Contractor
Water Use	Water consumption amount	Record Water Purchasing Bill	Demolition Site	Monthly	Contractor
Social Considerations	Employment of local workers	Record of the numbers of local workers	Demolition Site	Monthly	Contractor
Occupational Health and Safety	Work injuries and accidents	Record and Report	Demolition Site	As occasionally	Contractor
	OHS Trainings and Safety Trainings			Once/ Six Months	Contractor
	Claims from Workers			Monthly	Contractor
Community Health and Safety	Traffic Accidents and Incidents	Record and Report	In and around Demolition Site	Once/ Six Months	Contractor
	Intrusion Prevention			As necessary	Contractor
	Complaints from community			Monthly	Contractor
Emergency Risks	Fire	Record and Report the occurrence of fire risk	Demolition Site	At the time of occurrence	Contractor
		Checking fire-fighting facilities and equipment	Demolition Site	Monthly	
	Flood	Record and Report the occurrence of flood risk	Demolition Site	At the time of occurrence	Contractor
	Earthquake	Record and Report the occurrence of earthquake risk	Demolition Site	At the time of occurrence	Contractor
	Emergency Drills, Trainings and Preparedness	Record and Report the activities for emergency responses	Demolition Site	Once/ Six Months	Contractor

Source: EMP Study Team

12. Budget Plans for Environmental Management and Monitoring

The budget plans for environmental management and environmental monitoring by the project proponent and contractor during operation stage and closure stage of the project are described in Table 12-1, Table 12-2, and Table 12-3 respectively.

The project proponent will be responsible for implementation of environmental management and monitoring and also for expenses for overall environmental management not only for operation stage but also for closure stage in accordance with EMP study.

Table 12-1 Budget Plan for Environmental Management during Operation Stage

Stage	Item	Burden of Expense	Frequency	Expected Cost per year (Tentative)	Remarks
Operation	Repair & Maintenance of heavy machineries and engines	Project Proponent	Annually	74,400 USD	Installation areas in the port
	Waste Disposal	Project Proponent	Annually	3,600 USD	*Non-hazardous waste collection by Kyauktan Township Development Committee. *Hazardous waste recycling by outsourced collector.
	Maintenance of Greening Areas and Landscape	Project Proponent	Annually	5,000 USD	
	Internal Trainings (Operation, Capacity Building, etc.)	Project Proponent	Annually	5,000 USD	
	Internal Trainings for Safety and Emergency Drill	Project Proponent	Annually	5,000 USD	
	CSR Activities	Project Proponent	Annually	20,000 USD	
Total				113,000USD/ year	

Note: Costs are estimated as of January 2020 and can be changed with the times and project proponent will be responsible for all expenses.
Source: MITT (as of January 2020)

Table 12-2 Budget Plan for environmental monitoring during operation stage

Stage	Monitoring Items	Burden of Expense	Frequency	Expected Cost per year (Tentative)	Remarks
	Air Quality	Project Proponent	Twice/Year	4,000 USD	5 parameters as of NEQG guideline (SO ₂ , NO ₂ , CO, PM _{2.5} , PM ₁₀) *(2,000 USD/time x 2 times)
	Effluent Water Quality	Project Proponent	Once/Year	2200 USD	Total 28 parameters under NEQG (2015) for general application.
			Once/ Three months	6,000 USD	pH, Temperature, BOD, COD, Oil & Grease, pH, Total coliform bacteria, T-N, T-P, TSS under NEQG (2015) for Effluent Levels of Ports, Harbours and Terminals *(1,500USD/ time x 4 times)
	Sediment Quality	Project Proponent	Once/ Year	1,200 USD	7 parameters (Water content, Arsenic, Cadmium, Lead, Chromium, Copper, Zinc)
	Noise	Project Proponent	Twice/Year (4 days for each)	2,000 USD	Noise and Vibration will be conducted at the same time. *(1,000 USD/time x 2 times) for Noise.
	Vibration	Project Proponent	Twice/Year (4 days for each)	1,000 USD	*(500 USD/time x 2 times) for Vibration.
Total				16,400 USD/ year	

Note: Costs are estimated as of January 2020 and can be changed with the times project proponent will be responsible for all expenses.
Source: MITT (as of January 2020)

Table 12-3 Budget Plan for Environmental Monitoring during Closure Stage

Stage	Monitoring Items	Burden of Expense	Frequency	Expected Cost per year (Tentative)	Remarks
	Air Quality	Project Proponent	Once/ Six Months	2,000 USD	5 parameters as of NEQG guideline (SO ₂ , NO ₂ , CO, PM _{2.5} , PM ₁₀)
	Effluent Water Quality	Project Proponent	Once/Six Months	2200 USD	Total 28 parameters under NEQG (2015) for general application.
			Once/ Three months	3,000 USD	Total 7 parameters under NEQG for site runoff and wastewater discharges during closure stage (BOD, COD, Oil & grease, pH, Total coliform bacteria, T-N, T-P, TSS) *(1,500USD/ time x 2 times)
	Noise	Project Proponent	Once/ 3 Months (4 days for each)	2,000 USD	Noise and Vibration will be conducted at the same time. *(1,000 USD/time x 2 times) for Noise. *(500 USD/time x 2 times) for Vibration.
	Vibration	Project Proponent	Once/ 3 Months (4 days for each)	1,000 USD	
Total				10,200 USD/year	

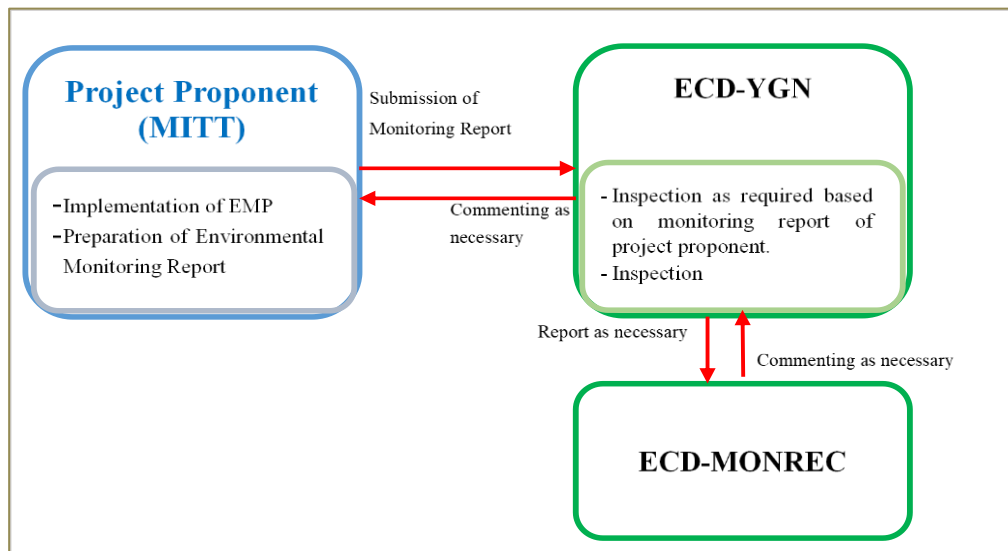
Note: 1) Costs are estimated as of January 2020 and can be changed with the times and contractor will be responsible for all expenses.

2) Duration for demolition is roughly considered on 6-month basis.

Source: MITT (as of January 2020)

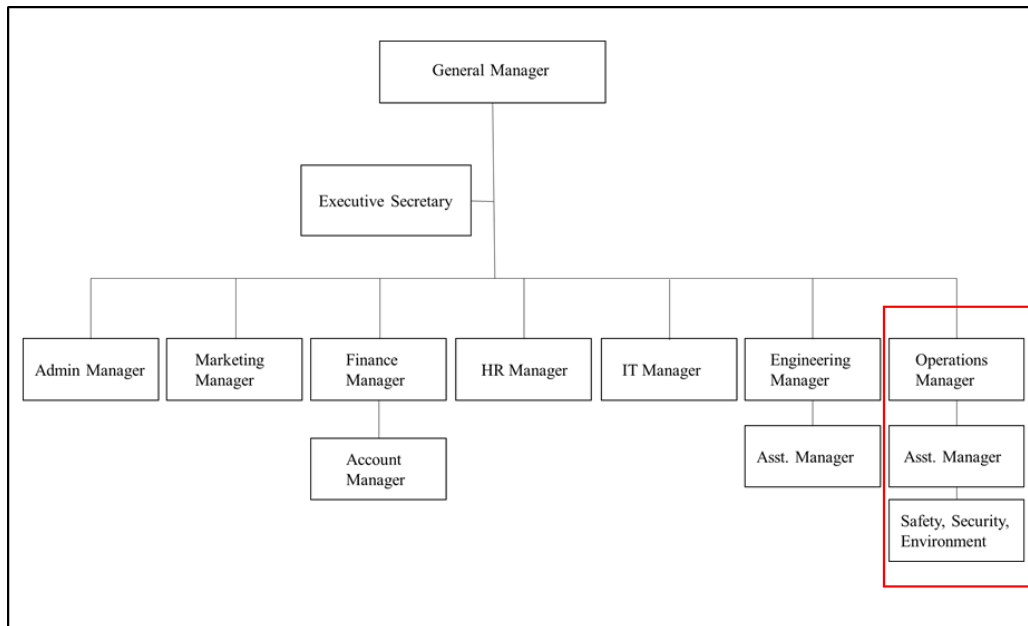
13. Institutional Arrangement for Environmental Management Plan

The proposed institutional arrangements for environmental management during operation stage and closure stage of the project are described in the following tables.



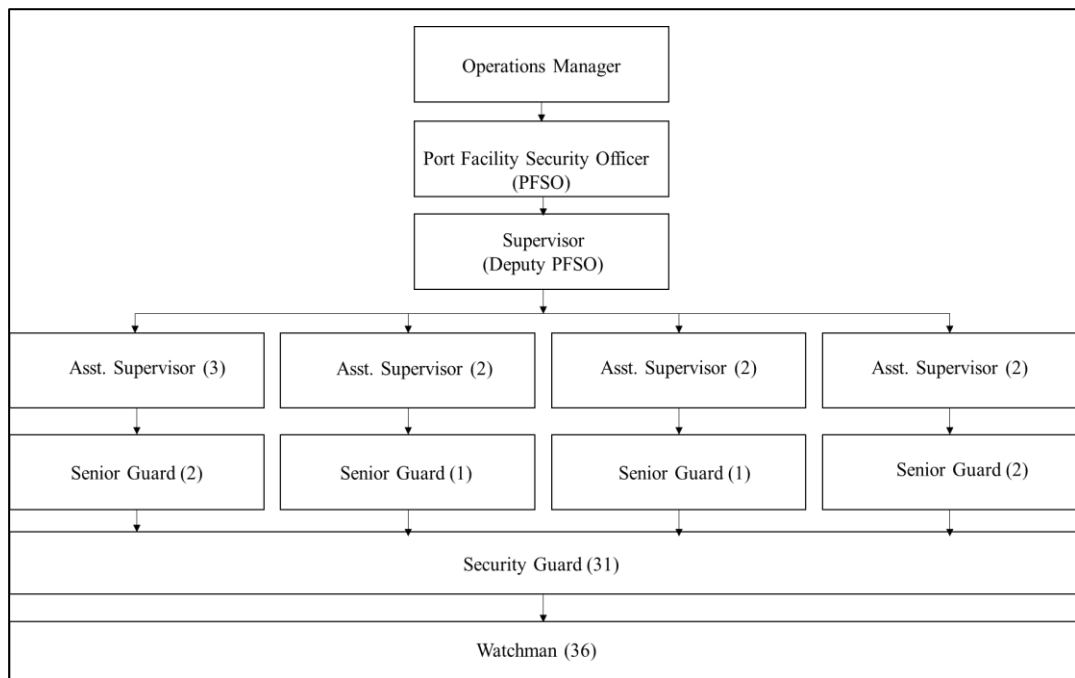
Source: EMP Study Team

Figure 13-1 Institutional Arrangement during Operation Stage



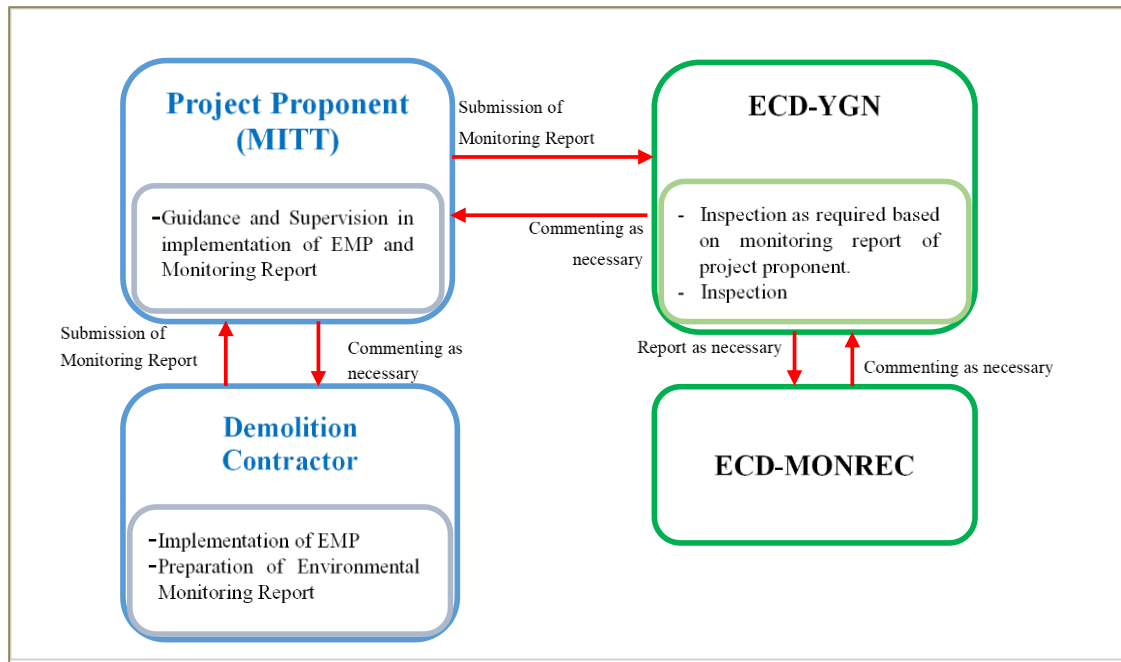
Source: MITT

Figure 13-2 Overall Organization Structure of MITT (as of January 2020)



Source: MITT

Figure 13-3 Organization Structure of in-charged department for SHE in MITT (as of January 2020)



Source: EMP Study Team

Figure 13-4 Institutional Arrangement during Closure Stage

14. Key Findings and Conclusions

Key Findings

As the results of EMP study for MITT port operation, the followings were found out:

- i. Hutchison Ports MITT is Myanmar's first international container-based multipurpose terminal with container handling capacity of 450,000 TEU as maximum operation at Berth 5-9, Thilawa area, Yangon and offering a comprehensive range of safe, efficient and productive services to the shipping industry 24 hours a day, seven days a week.
- ii. MITT have been trying to fulfill their mission which is to be leading port and terminal operator in Myanmar, committed towards providing high quality services to meet customers' needs, enhancing the well-being of employees, ensuring consistent returns to shareholders and meeting the needs of changing society.
- iii. MITT have total berth length of 1000m with five berths capable of handling a wide variety of cargo. Compared to terminals at Yangon downtown area, large vessels with deeper draft can enter at MITT.
- iv. There are road networks into MITT with various industrial zones in Yangon City and also rail line right into the terminal linking MITT not only with Yangon City but also with the national rail network.
- v. MITT will try to minimize the discharges from port operations and berthing ships which can pollute the environment. MITT is committed to comply with relevant laws, rules, acts and regulations in regional, national levels and international good practices. In addition, MITT has set up Environmental Policy, Security Policy and Occupational Health and Safety (OHS) Policy to make sure safe and clean port environment with minimum pollution.
- vi. MITT has been implementing port operation activities with advanced cargo handling facilities same as other international ports. MITT is committed to comply with international guidelines such as International Ship and Port Facility Security Code (ISPS code) to enhance the security of ships and port facilities.

- vii. According to EMP Study, the key impacts during operation stage are air pollution, water pollution, wastes, noise pollution, hazardous materials, occupational health and safety and emergency risks such as fire and flood. However, in the operation stage, most of the impacts are limited only within the port area and MITT has prepared necessary standard operation procedures, checklists, action plans and systems for pollution control and emergencies.
- viii. Based on the assessment results of environmental, social, health and emergency risks, Environmental Management Plan (EMP) with Environmental Monitoring Plan (EMoP) including checking and recording the various aspects of environmental, social and health conditions and measurement of pollutant parameters of air, water and soil, etc. for both operation and closure stages was developed.

Conclusions

The EMP Study for port operation of Myanmar International Terminals Thilawa Limited. (MITT) can be concluded as follows:

- i. This Environmental Management Plan (EMP) report has been prepared based on the technical and operational information provided by the project proponent, site investigation, desktop study of reports, articles and international good practices related to ports and harbours, and environmental monitoring results of the project.
- ii. Qualitative and quantitative impact assessments have been conducted and significance of each impact has been identified based on its likelihood and severity, evaluation of current management activities and mitigation measures and consideration measures to minimize the impacts have been recommended and incorporated in EMP. Institutional arrangements for implementing EMP for both operation and closure stages are also included to ensure the effectiveness of EMP.
- iii. During EMP study, possible impacts were identified and it was found in assessment results that there are no big significant impacts nor the project is not evaluated environmentally sensitive, and most of the impacts can be reduced after implementation of current and recommended mitigation and control measures.
- iv. The implementation of port operation activities of MITT with the considerations for environmental management is environmental friendly which can result in the substantial increase in the efficiency and safety of port operation functions which lead to the increased inbound and outbound movement of shipping containers and commodities resulting in an increased business opportunities and income generation for the nation and foreign trade.