

CHAPTER 6: ENVIRONMENTAL MANAGEMENT PLAN

6.1 Outline of Environmental Management Plan

The environmental management plan consists of two components: 1) mitigation and consideration measures taken in the course of project implementation examined based on project description and results of the environmental impact assessment (EIA), social impact assessment (SIA), health impact assessment (HIA), and emergency risk assessment (ERA); and 2) environmental monitoring plan to confirm whether mitigation and consideration measures as well as the environmental levels were properly taken in the operation and closure stages through environmental measurements.

6.1.1 Mitigation and Consideration Measures for Operation Stage

Table 6.1-1 shows the mitigation and consideration measures during operation stage. The project proponent, MITT is responsible for implementation of the following proposed mitigation and consideration measures for port operation-related activities throughout the operation stage.

Table 6.1-1 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. -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. 	Project Proponent
	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. 	

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> -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. 	
	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> <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. 	Project Proponent
	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. 	Project Proponent

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> -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. 	
	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. -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. 	Project Proponent
	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. 	Project Proponent

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> -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. 	
Social Environment	Local Economy (e.g. Employment and Livelihood)	<p>[Job Opportunity]</p> <ul style="list-style-type: none"> -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>[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]</p> <p><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 -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.) <p><i>From lifting operations</i></p> <ul style="list-style-type: none"> -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 	Project Proponent

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - To implement workforce violence employee training & employee diligence in watching out for suspicious, abnormal behavior and activities From slips, trips & falls <ul style="list-style-type: none"> - Good housekeeping (remove debris, store equipment material adequately) - Ensure slopes & ramps have suitable ribbed surfaces to prevent slipping [Exposure to heat] <ul style="list-style-type: none"> - 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] <ul style="list-style-type: none"> - 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] <ul style="list-style-type: none"> - 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 OHSA) - Mechanical, electrical and process isolation - 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) [Working at Height] <ul style="list-style-type: none"> - Conduct risk assessment for any work carried out at height 	

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - 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 - 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. 	Project Proponent
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. 	Project Proponent

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - 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 	
	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

6.1.2 Mitigation and Consideration Measures for Closure Stage

Table 6.1-2 shows the mitigation and consideration measures for closure stage of the project. The demolition contractor is responsible for implementation of the proposed mitigation and consideration measures for demolition activities under the supervision of the project proponent, MITT.

Table 6.1-2 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. - Installation of temporary septic tanks for the collection of sewage and domestic wastewater. 	Contractor

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - 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). - Restriction of Speed for vehicles in the site. 	Contractor

Category	Item	Mitigation and Consideration Measures	Implementer
		<ul style="list-style-type: none"> - 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 unauthorized 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

Category	Item	Mitigation and Consideration Measures	Implementer
	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 - 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. 	Contractor

Source: EMP Study Team

6.2 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 plan including monitoring items, methods, frequency and locations during operation stage and closure stage of the project are developed and described in the below sessions.

6.2.1 Environmental Monitoring Plan for Operation Stage

Table 6.2-1 show environmental monitoring plan for operation stage. The project proponent, MITT is responsible for the implementation of environmental monitoring, summarization of the results and submission of the monitoring report to Environmental Conservation Department (ECD), Yangon Region under Ministry of Natural Resources and Environmental Consideration (MONREC) periodically.

Table 6.2-1 Environmental Monitoring Plan for Operation Stage

Category	Monitoring Items	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,	Port Area	Monthly	Project Proponent

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

Category	Monitoring Items	Monitoring Method	Location	Frequency	Implementer
		and water supply amount for ships			
	Connecting between outsourced sewage collector and ships	Record of the ship name, wastewater collector and amount of sewage	Port area	As necessary	Project Proponent
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
	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

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

Category	Monitoring Items	Monitoring Method	Location	Frequency	Implementer
	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-Down Systems for QC		Monthly	
	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

6.2.2 Environmental Monitoring Plan for Closure Stage

Table 6.2-2 shows environmental monitoring plan for closure stage. The demolition contractor is responsible for the implementation of environmental monitoring, summarization of the results and submission of the monitoring report under the supervision of the project proponent, MITT Environmental Conservation Department (ECD), Yangon Region under Ministry of Natural Resources and Environmental Conservation (MONREC) periodically.

Table 6.2-2 Environmental Monitoring Plan for Closure Stage

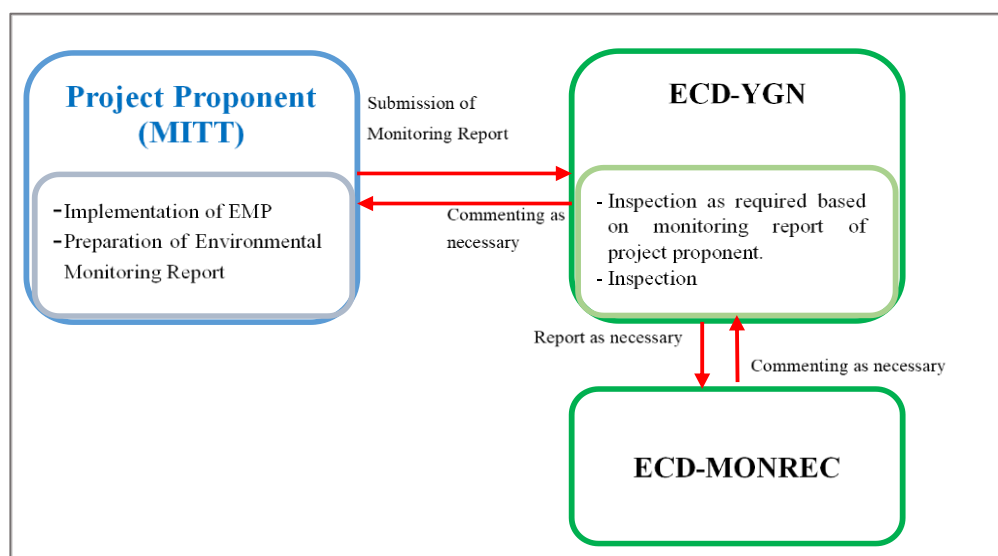
Category	Monitoring Item	Monitoring Method	Location	Frequency	Implementer
Common	Monitoring of Mitigation Measures	Visual Inspection and Checking the records	Demolition Site	Once/Month	Contractor
Air Pollution	5 parameters from NEQG (SO ₂ , NO ₂ , CO, PM _{2.5} , PM ₁₀)	Measurement by equipment	Emission 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
	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

Category	Monitoring Item	Monitoring Method	Location	Frequency	Implementer
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

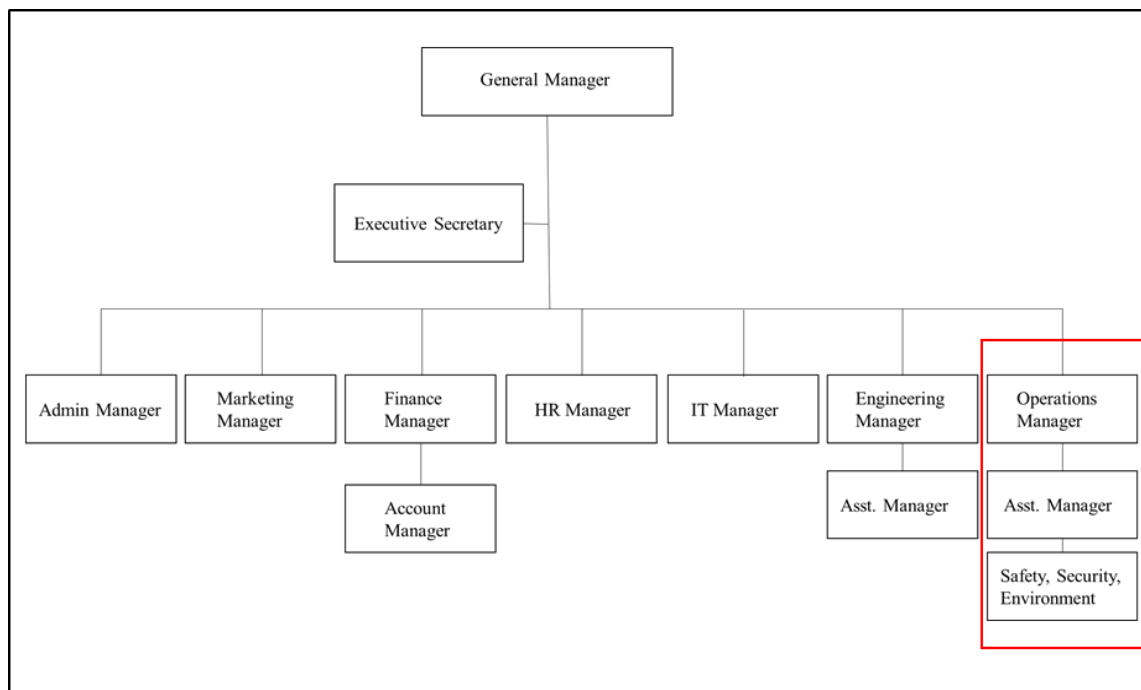
6.3 Institutional Arrangement for Environmental Management

The organization structures in the operation and closure stages of the project are proposed as following figures. Detailed descriptions of institutional arrangement for environmental management is provided in Chapter 2.



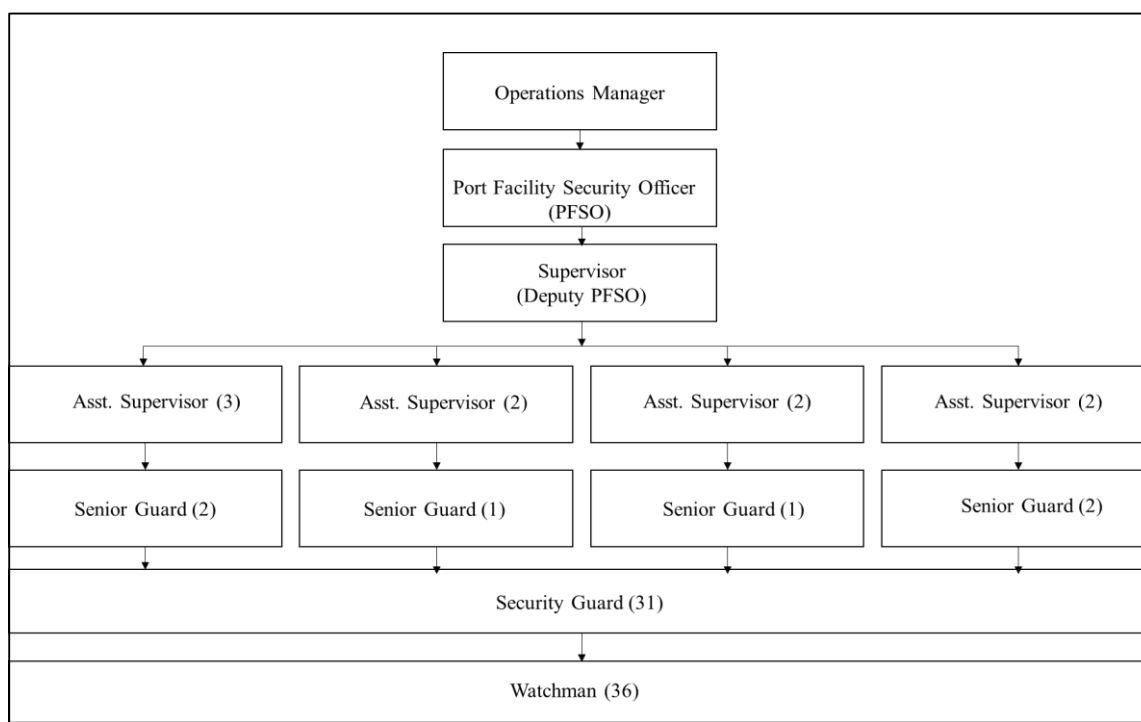
Source: EMP Study Team

Figure 6.3-1 Institutional Arrangement during Operation Stage



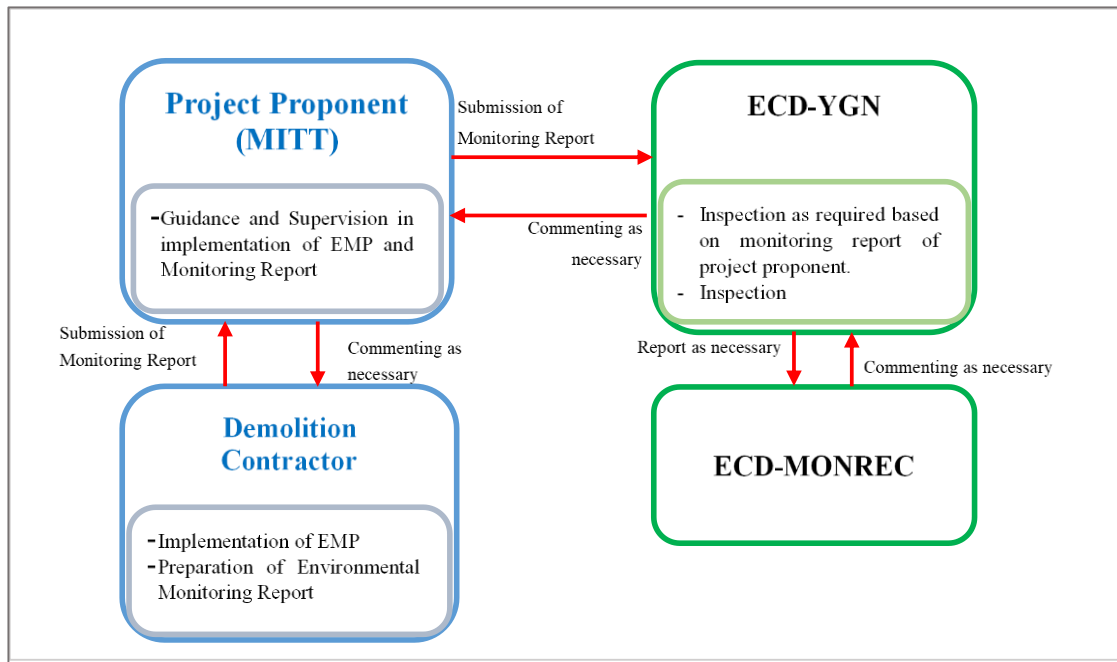
Source: MITT

Figure 6.3-2 Organization Structure of MITT (as of January 2020)



Source: MITT

Figure 6.3-3 Organization Structure of in-charged department for SHE in MITT (as of January 2020)



Source: EMP Study Team

Figure 6.3-4 Institutional Arrangement during Closure Stage

6.4 Budget Plans for Environmental Management and Monitoring

The budget plans for environmental management and monitoring that will be implemented by the project proponent are estimated and proposed in the following sections.

The project proponent, MITT will be responsible to implement necessary environmental mitigation measures and the expenses for environmental management not only the operation stage but also the closure stage in accordance with EMP study.

6.4.1 Budget Plan for Environmental Management

The main costs for implementing environmental management by the project proponent are estimated and proposed in the following Table 6.4-1.

Table 6.4-1 Estimated 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 Training for Safety and Emergency Drill	Project Proponent	Annually	5,000 USD	
	CSR Activities	Project Proponent	Annually	20,000 USD	
Total				113,000USD/ year	

Note: 1) Costs are estimated as of January 2020 and can be changed with the times and project proponent is responsible for all expenses.
Source: MITT (as of January 2020)

6.4.2 Budget Plan for Environmental Monitoring

The main costs for implementing environmental monitoring during both operation and closure stages are estimated and proposed in the following Table 6.4-2 and Table 6.4-3.

Table 6.4-2 Estimated Budget Plan for Environmental Monitoring during Operation Stage

Stage	Monitoring Items	Burden of Expense	Frequency	Expected Cost per year (Tentative)	Remarks
Operation	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.
Source: EMP Study Team

Table 6.4-3 Estimated Budget Plan for Environmental Monitoring during Closure Stage

Stage	Monitoring Items	Burden of Expense	Frequency	Expected Cost per year (Tentative)	Remarks
Operation	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.
	Vibration	Project Proponent	Once/ 3 Months (4 days for each)	1,000 USD	*(500 USD/time x 2 times) for Vibration.
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)

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