1. EXECUTIVE SUMMARY

1.1. Project Background

Pyi Phyo Tun International Co., Ltd (PPT) was built value added wood factory in Pahtet Industrial Zone 2, Kyunsu Township, Myeik District Thanitharyi Region. This factory was built in 2004, and has been produced value added wood products. The factory has operated with Timber License Permit 15/211281. In Myanmar, as per the comments of the Ministry of the Natural Resources and Environmental Conservation (MONREC), Annex 1 of the EIA (Environmental Impact Assessment) Procedure dated 29th December 2015, an Initial Environmental Examination (IEE) is required for the proposed value added wood factory.

1.2. Summary of Introduction

1.2.1. Description of Project Proponent

The following are the brief information about the project proponent.

Company Name	Pyi Phyo Tun International Company Limited (PPT)
Project Type	Valued Added Wood Factory
Project location	Pahtaw-Pahtet island, Kyunsu Township, Myeik District
Company Address	No.15, 11th Street, Lanmadaw Township, Yangon
Contact Person	Dr. Aung Lwin Phone number- 095 – (1) 2300460, 2300480 Fax-95-(1) 2300480 Email - fishmealppt@yangon.net.mm
Company Type	Public Company Limited

1.2.2. Description of IEE Service Provider

Ever Green Tech Environmental Services and Training Co., Ltd. (EGT) has been appointed by PPT to prepare the IEE and to provide assistance in related activities. This IEE report is prepared by EGT to assess the potential impacts of the proposed project and to formulate, implement and monitor the environmental protection measures in the phases of its construction, operation and decommissioning in order to reduce the environmental impacts. Below is the background information on Ever Green Tech Environmental Services and Training Co., Ltd., (Third party) who drawn up the IEE.

Ever Green Tech Environmental Services & Training Co., Ltd.	
Company Name	Ever Green Tech Environmental Services and Training Co., Ltd.
Company Registration Number	3344/2015-2016 (Ygn)
Transitional Third Party Registration Number	0047
Contact Address	No.1/9, Baho Street, 16th Quarter, Hlaing Township, Yangon
Telephone Number	09-5099230; 09-5099232
Company E-mail	md@evergreentechmyanmar.com green.evergreentech@gmail.com
Contact person	Dr. Kyaw Swar Tint Principal Environmental Consultant 09-797111000 11kyawswar@gmail.com

1.2.3. IEE Study Team and Their Responsibilities

Below is the information of IEE team and their responsibilities.

Name	Degree	Responsibility and Report Writing	Experiences	Registration as Consultant at ECD
1. Dr. Kyaw Swar Tint	Ph.D. (Mining)	Noise and Environmental Management	At least 7 yrs experiences in environmental related field	In progress
2. Dr. Thein Tun	Ph.D. (Metallurgy)	Soil Quality	At least 4 yrs experiences in environmental related field	Free land Consultant
3. Dr. Myo Min Tun	Ph.D. (Metallurgy)	Air Quality	At least 4 yrs experiences in environmental related field	Free land Consultant
4. Dr. Pyi Phyo Kyaw	Ph.D. (Archeology)	Cultural and Heritage Impact Assessment	At least 3 yrs experiences in environmental related field	In progress
5. Dr. Kyaw Zay Moe	Ph.D. (Botany)	Flora Diversity	At least 3 yrs experiences in environmental related field	In progress

6. Dr. Ko Myint	Ph.D. (Zoology)	Fauna Diversity	At least 3 yrs experiences in environmental related field	Registered Consultant at ECD, No. 0037
7. Dr. Khon Aung	M.B.B.S (Ygn)	Occupational Safety and Health	At least 5 yrs experiences in environmental related field	Free land consultant
8. U Min Aung	M.Sc. (Chemistry)	Water Quality	At least 5 yrs experiences in environmental related field	In progress
9. Ms. Thazin Htwe	M.S. (Environmental Assessment and Management); Dip in Applied Psychology	Public Consultation and Participation	At least 3 yrs experiences in environmental related field	In progress
10. Ma Nandar Nwe	M.S. (Environmental Assessment and Management); Dip in Applied Psychology	Risk Assessment and Management	At least 3 yrs experiences in environmental related field	In progress
11. Mg Yaw Ma Nar	B.Sc. (Forestry), Dip. In EIA/EMS	Environmental Baseline Study	At least 3 yrs experiences in environmental related field	Free land Consultant
12. Ma May Thet Zaw	M.E. (Civil)	Water Resources Management and Hydrology	At least 3 yrs experiences in environmental related field	Free land Consultant
13. U Aung Naing Tun	L.L.B, M.B.A, M.A (B.L), M.A (TEFL)	Laws and Regulations	At least 4 yrs experiences in environmental related field	Free land Consultant

1.3. Summary of Policy, Legal and Other Requirements

1.3.1. National Requirements

The IEE has been undertaken in accordance with the Myanmar Environmental Impact Assessment Procedure, which was promulgated on December 29, 2015, according to the Environmental Conservation Law 2012 and Environmental Conservation Rules 2014.

Environmental Conservation Department (ECD) is the most legally responsible agency for approval of IEE.

1.3.2. Laws and Regulations Related to the Proposed Project

Myanmar has promulgated several laws and regulations safeguarding of the natural environment. The following table describes laws and regulations which are directly or indirectly associated with the proposed project.

Table - Relevant Environmental Laws and Regulations in Myanmar

Laws and Regulations	Year
Constitution of the Republic of the Union of Myanmar (Articles 24,45,349,359)	2008
Environmental Conservation Law (Law No.7(o), 14,15,24,25,29)	2012
Environmental Conservation Rules (Rule 55, 69 (a), (b))	2014
EIA Procedures (Article 102 to 110, 113, 115, 117)	2015
National Environmental Quality (Emission) Guidelines (Section 2.1.9)	2015
The Protection of rights of National Race Law, (Law No. 5)	2015
Myanmar Investment Law (Law No. 50(d), 51, 73)	2016
Labour Organization Law, (Law No. 1,7 to 11)	2011
The Settlement of Labour Dispute Law, (Law No. 38, 39, 40, 51)	2012
Employment and Skill Development Law, (Law No. 5, 14, 30(a,b))	2013
The Leave and Holiday Act, 1951 (Law Amended July, 2014)	2014
Minimum Wages Law (Law No. 12, 13 (a to g)	2013
Payment of Wages Act (Law No. 3,4, 5, 14, 8 with 7,10)	2016
The Myanmar Insurance Law (Law No. 15, 16)	1993
The Social Security Law (Law No. 11(a), 15(a), 18(b), 48, 49, 75)	2012
Workman Compensation Act	1951
Myanmar Fire Force Law, (Law No. 25)	2015
National Food Law,	1997
Public Health Law (Law No. 3, 5)	1972
The Myanmar Tourism Law, (Section 6 ,7 ,8,9 and 10)	1990
Private Industrial Enterprise Law	1990
Forest Law	1992
Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law	1994
Protection and Preservation of Cultural Heritage Regions Laws (Law No. 15, 16)	1998
Prevention and Control of Communicable Diseases Law (Law No. 3, 4, 9, 11)	1995
The Control of Smoking and Consumption of Tobacco Product Law (Law No. 9)	2006
Conservation of Water Resources and Rivers Law (Law No. 8, 11(a), 13, 19, 24(b), 30)	2006
Myanmar Port Authority Law	2015
Agricultural Land Law	2012

The Protection and Preservation of Antique Objects Law (Law No. 12,15 20)	2015
The Protection and Preservation of Ancient Monuments Law (Law No. 12,15 20)	2015
the Prevention of Hazard from Chemical and Related Substances Rules (Law No. 8,15,16,17, 20, 22, 23, 27)	2013
The Freshwater Fisheries Law (Law No. 36,40,41)	1991
Automobile Law Pyidaungsu Hluttaw Law No. 55/2015	2015
The Myanmar Engineering Council Law (Law No. 20,24,25,31(a), 37)	2013

1.4. Summary of Project Description

(a) Background

The proposed project is invested by PPT and aimed to produce value added wood products to distribute to both local and foreign countries.

(b) Product

PPT produces value added wood products from raw materials (Ka-Nyin, Ou-Ban, Ka-Tood and Pa-dauk) in Myeik region. The production capacity is 200-300 tons per month.

(c) Production Capacity

The project uses approximately 600 tons of raw materials in its manufacturing process and produces 200-300 tons per month.

(d) Land Use

The project covers total land area of 21.24 acres**.** The project area was surrounded by the commercial aquaculture farms, some residential buildings and forest land.

(e) Project Location

The project is located at the Pahtet Industrial Zone 2, Kyunsu Township, Myeik District, Thanitharyi Region, at the coordinates of 12° 26′ 38.97″ N Latitude and 98° 35′ 8.86″ E Longitude as shown in the following figure.

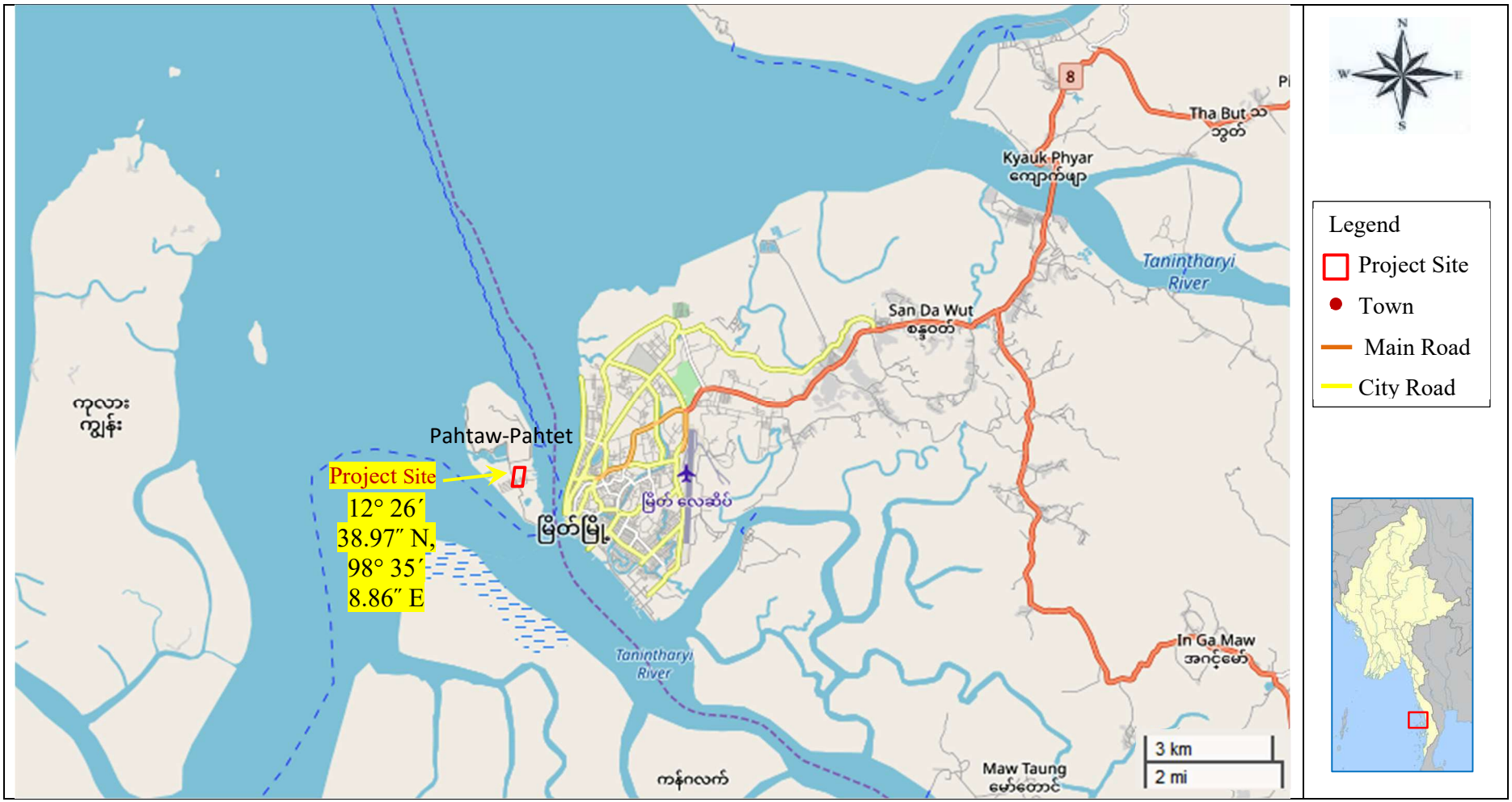


Figure - The Location of Value Added Wood Factory

(f) Summary of Process Description

(i) Pre-construction Phase

Pre-construciton phase will include tree cutting, site clearing and earth filling (sand filling) activities for valued added wood factory.

(ii) Construction Phase

Construction phase will include (1) foundation works for concrete and steel structure and (2) erection of steel structures and minor earth works for internal drainage system.

(iii) Operation Phase

The production of value added wood factory is mainly producing in six departments; raw material department, kiln room, manufacturing department, finger joint department, packaging department, and spraying room.

Raw material department – Raw materials of PPT factory include Ka-Nyin, Ou-Ban, Ka-Tood, Thayaphi, Yamanay and Pyin-Ma. The logs from the log yard are transported to the factory compound and cut in the band saw to break it into pieces. And the thickness of the log can be changed depending on the customers' requirements. Unprocessed wood is cut into small pieces and reused as boiler fuel. To meet customers' requirements, the broken log pieces are futher refined in Band Saw.

Kiln room – The obtained lumbers are classified according to the type of wood and size. The lumbers are air-dried temporarily on the outside of the kiln dryer to slightly reduce moisture content before kiln drying. The moisture content of the lumbers is made to meet the needs of the customers. The drying time varies depending on the type of lumbers and size.

Manufacturing department – The dried lumbers are smoothened by two-side planer first and then the surface is trimmed and the lumbers are cut to get the required length and sorted by their size. By using one-way lathe machine, the edges of the lumbers are straightened and smoothened. After that, the lumbers are smoothened in four-sided planer machine. Depending on the customers' requirements, the lumbers are jointed and polished or they are packed and stored directly for distribution.

Finger joint department – The lumbers which are needed to be jointed are attached to the finger joints. And joints are cut with sawmill to get the required length and the correct length is checked. The the lumbers are machined on a four-sided planer machine and transported to the double end by forklift to adjust.

Spraying room – The types of wood, size of the lumbers and defects are checked. The lumbers are inspected and polished to make them smoother. The lumbers are then sprayed in the spraying room where it is made to absorb the fumes. Then these lumbers are air-dried in the drying chamber and sent to the packaging department.

Packaging department –The lumbers are inspected for defects, packaged according to their size and stored before being shipped to the customers.

The following are the summary of process description.

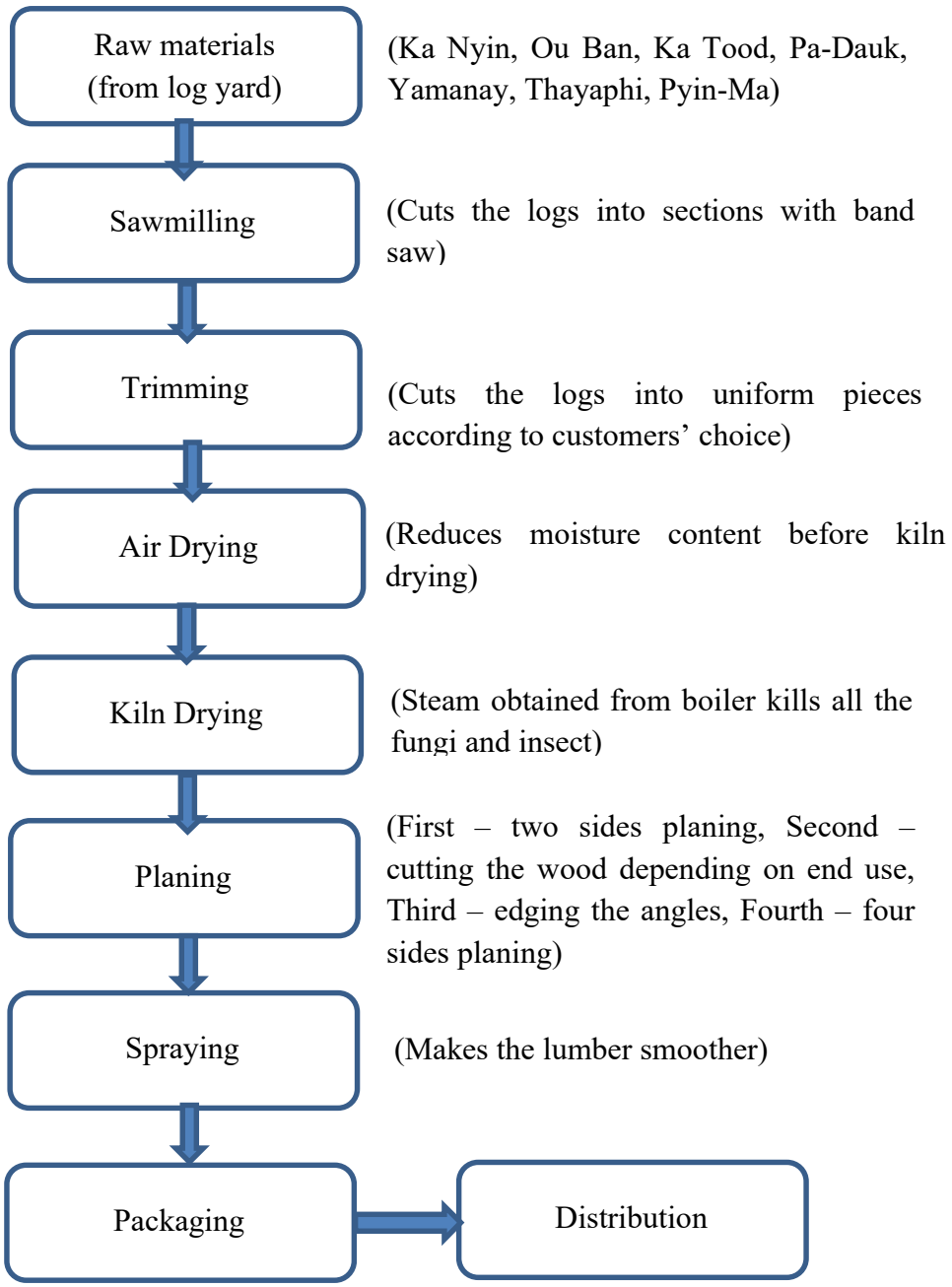


Figure – Flow chart of Value Added Wood Factory by PPT Company

(iv) Decommissioning Phase

Although the proposed project is long-term project, decommissioning of the project would occur at the end of its lifespan. The goal of project decommissioning will be to remove the concrete and steel structures, and return the site to a condition as close to a pre-construction state as feasible. The physical removal of the structures and equipment will be the reversal of the construction process. All areas disturbed by the proposed project will be restored to pre-project conditions and/or to conditions acceptable to the CDC (Kyun Su and/or Myeik) rule and regulations. During decommissioning phase, all concrete and steel structures and equipment will be dismantled and removed. The major activities that will be required for the decommissioning of the proposed project are:

(a) Concrete structures removal,
(b) Value added wood factory removal,
(c) Wood fired boiler plant removal, and
(d) Equipment and electrical supply system removal.

1.5. Summary of Surrounding Environment

The key findings from the baseline study will be as follow:

1.5.1. Ambient Air Quality

According to the monitoring results, the concentrations of $PM_{2.5}$ and PM_{10} are below the Myanmar Emission Guideline (MEG) value, WHO guideline value and NAAQS. For gases emissions, comparing with the MEG value, WHO guideline value and NAAQS, the concentration of all gases were within the acceptable limit for industrial, residential, rural and other areas. For carbon dioxide, no guideline values were provided for the ambient air quality.

1.5.2. Noise Level

The existing noise level in or within the Pahtaw village are lower than the permissible level for residential area. The nosie level near the the proposed project was higher than other sampling points during the daytime.

1.5.3. Water Quality

According to the above table, the groundwater testing result is compared with National Drinking Water Quality Standards and it has shown that all the measurements value are below its guideline value.

The sea water result is compared with National Drinking Water Quality Standards and the amount of total dissolved solid is above the permissible limits of 1000mg/L. The amount of chlorine and electro conductivity are above the permissible limits of 250mg/L and 1500 µmhos/cm.

1.5.4. Socio-economic Profile

The proposed project is situated in rural area although it is located to Myeik Township (urban area). So, the life style of nearest residents in Pathaw-Pahtet Island is peaceful and isolated. The social services for education, health care, seweage system, available of safedrinking water are relatively good. The most important socio-economic impacts will be public anxiety due to the noise coming from the proposed project.

1.5.5. Biodiversity Environment

Survey resulted that plants and animals in both terrestrial and aquatic environments are low in the project area. But some animal population in buffer zone of the project area is fairly abundant such as birds. Sample collection was conducted in the field, and scientific and systematically approached. A total of (147) flora species from (52) families and (11) species of phytoplankton are recorded. Three red list species of *Myristica malabarica* (Kywe-thwe) as vulnerable status (VU), *Vatica maingayi* (Kanyin-kyaung-che) as critical endangered status (CR) and *Dipterocarpus kerrii* King. (Sibin) as endangered status (EN) were recorded as threatened species. These plants will be maintained for plant conservation. Seven species of mangrove plants are recorded and the forest status are investigated as scattered forests. Nevertheless, these mangrove communities are essentially important to conserve for their ecological and environmental health. As phytoplankton, a total of (11) species was recorded with fairly population so that water quality will be favorable condition for other aquatic animal survivals. Among these (11) species, Species of *Coscinodiscus radiates* Ehrenberg, *Thalassiosira punctigera* (Castracane) Hasle; and *Melosira nummuloides* Agardh. were recorded as top three species. In fauna (51) species comprises of (15) amphibian and reptile, (10) species of birds, (17) species of fish, (3) species of benthos and (5) species of zooplankton are recorded during the survey. Stingray fish species *Himantura walga* is recorded which is described as near threatened species (NT) in IUCN Red List. No other red list species of animal are found. A number of the bird, Black Eared Kite *Milvus lineatus* is about 300 found in and surrounding area of the project site. This species is indicator and top predator species which need to protect for ecological process. 7 species of benthos and zooplanktons were recorded with fairly population density which indicated that the water quality is favorable condition for aquatic organisms in food chain and food web system. As a

conclusion, the proposed project is considered may be affected with low significant impact on terrestrial and aquatic environment by the project implementation. The extent of the impact on fauna and flora is anticipated as only in the site specific and duration of the impact is assumed as temporal or permanent.

1.5.6. Cultural and Heritage

Assessment works have been done with the seven potential places that are mostly found as religious context and local community. For the national level of cultural heritage nomination, there is no trace of outstanding cultural heritage. In addition, there is no special finding of local or regional commemorative value of cultural heritage concerning the archaeological or anthropological or cultural heritage context. But the main things are mostly concerned with the local community and their religious places as well as their traditional or seasonal festivals. The cultural significance and possible impact are not so much serious around the project area. Additionally, the type of project could be acceptable without mitigation because the low and minimum threat will only be happened.

1.5.7. Vicinities around the Proposed Project

The nearest environmentally sensitive areas of the value added wood factory are shown in the following table and figure.

No.	Legend	Vicinity	Description	Distance (miles)/(km)
1.	1	Nearest Public Residents	Pahtaw Village	0.14 miles (0.22 km)
2.	2	Nearest Water Body	Andaman Sea	0.78 miles (1.25 km)
3.	3	Nearest Densely Populated Area	Myeik	0.72 miles (1.17 km)
4.	4	Nearest Cultural and Hesitate Site	TaungPaw Pagoda Shwethalyaung Pagoda	0.64 miles (1.04 km) 0.68 miles (1.1 km)
5.	5	Nearest Airport	Myeik Airport	2.42 miles (3.9 km)
6.	6	Nearest Road	Myeik-Kyaukphyar Road [NH-8 Rd]	0.73 miles (1.17 km)

Figure - Vicinities around the Proposed Project

1.5.8. Local Residences around the Project

Although the project was located in Kyun Su Township, the nearest local residences within 3km radius of the project are:

(a) Pahtaw Village;

(b) Pahtet Village; and

(c) Myeik Township (Kan Nar Part).

1.6. Summary of Anticipated Impacts and Mitigation Measures

The most significant impact will be gaseous emissions from wood fired boiler and the other anticipated impacts are described in the following figure.

Table - Summary of Anticipated Impacts and Mitigation Measures

The following table shows estimated cost for mitigation measures for anticipated impacts in all phases

Anticipated Impacts	Source	Mitigation Measures	Intensity of Mitigation	Responsibility
Pre-Construction Phase				
Impacts on Air Environment	Fugitive dust emissions	-Watering the site regularly by using handheld spray to suppress dust emissions during truck movement; -Prohibiting the burning of vegetation or waste on site	Minor	Pre-construction services provider
	Gaseous emission	- Use machineries with good engine with low sulphur content fuel	Minor	Pre-construction services provider
	Noise level in dB(A)	- Use sound proof machines - Provide earplug to all workers	Minor	Pre-construction services provider
Impacts on Surface Water Environment	- Increase turbidity, oil and grease in Sea - Blockage of drainage due to earth filling	-Avoid earth working and excavation during rainy seasons, waste water channels, avoid leakage of oil & lubricant, vegetation of bare areas. -Earth filling will ensure not to block natural drainage system	Minor	Pre-construction services provider
Impacts on Soil and Ground Water Environment	Potential to soil contamination	Proper waste management system	Minor	Pre-construction services provider
	Potential to ground water pollution	Dispose solid wastes according to CDC (Myeik) and CDC (Kyunsu)	Minor	Pre-construction services provider
Impacts on Biodiversity	Impacts on flora diversity	Avoid tree cutting as much as possible and replanting the trees	Minor	Pre-construction services provider
	Impacts on fauna diversity	Avoid working at night	Minor	Pre-construction services provider

	Impacts on aquatic lives	Raise environmental awareness to workers	Minor	EMMT
Impacts on Socio-Economic Environment	Potential to Increase in household income	Job creation	Minor	EMMT
Construction Phase				
Impacts on Air Environment	Dust generation	- Water spraying of or covering all exposed areas and access roads;	Minor	Construction services provider
	Gaseous emissions	- Regular equipment maintenance, reduce construction time, good engine vehicles will be used.	Minor	Construction services provider
	Noise level in dB(A)	- Avoid running construction machineries at the same time. - Avoid working at night.	Minor	Construction services provider
Impacts on Surface Water Environment	Construction Debris	Temporary settling pond, limit uncessary earth works	Minor	Construction services provider
	Oil and Grease	Avoid any leakage of oil and lubricant	Minor	Construction services provider
	Domestic Wastes	Use proper waste management system	Minor	Construction services provider
Impacts on Soil and Ground Water Environment	Leakage of fuel oil and lubricants	- Care should be taken not to leak during the handling of fuel oil and lubricants - Store over concrete floor or impermeable pad	Minor	Construction services provider
	Construction debris and domestic Wastes	Solid wastes according to the rules and regulations of CDC (Kyunsu)	Minor	Construction services provider
Impacts on Biodiversity	Impacts on flora diversity	-Conserve the plants and vegetation as possible as which existing around the project area	Minor	Construction services provider
	Impacts on fauna diversity	-Raise environmental conservation awareness among the visitors and workers (not to kill the birds and monkey which are protected by law)	Minor	Construction services provider

Impacts on Socio-Economic Environment	Increase pressure on health care facility	Unskilled and semi-skilled job opportunities should be offered to the locals as much as possible	-	EMMT
	Population influx	Providing training programs	-	EMMT
	Pressure on local food consumption	Population influx can be minimized by the use of labor force	-	EMMT
	Health Impacts (a) Air-borne diseases	Providing medical check-up for workers who are susceptible of air-borne diseases	Minor	EMMT
	(b) Dust emission exposing locals and workers with bronchial and other respiratory tract diseases	- Spraying water - Restricting vehicle speeds	Minor	EMMT
	(c) Water borne diseases	- Avoid construction during rainy seasons - All areas of fuel storage will be banned to prevent hydrocarbon pollution of surface water	Major	EMMT
	(d) Infection from mosquito	- Avoid construction during rainy season - Proper temporary or permanent drainage system will be compensated	Moderate	EMMT
	(e) Sexually transmitted infections	Provide information and education about safe sex and implement HIV control program for migrant construction workers	Minor	EMMT
Operation Phase				
Impacts on Air Environment	Gaseous emissions	-Install bag filters to reduce the stack emissions -Maintain vehicle and equipment according to manufacturers' specifications	Major	EMMT
	VOCs emissions	Use biofiltration process	Moderate	EMMT

	Noise	-Install of sound suppressive devices on factory machines such as Band Saw -Check hearing protection measures are working	Minor	EMMT
Impacts on Surface Water Environment	Condensate from kiln dryer	Implement adequate sanitary facilities for onsite personnel; -Liquid effluents arising from operations will be treated to the applicable national emission guideline prior to discharge -Use adsorption process on activated carbon	Moderate	EMMT
Impacts on Soil and Ground Water Environment	Wood Ash from boiler	- Install cyclone system and bag filter -Reuse bottom ash as fertilizer in agriculture	Major	EMMT
	Domestic solid waste	Segregation, storage at source and collection of the waste management system	Minor	EMMT
	Liquid waste	-Use activated carbon to treat condensate from boiler -Recycle treated water as boiler blowdown water	Mirnor	EMMT
Impacts on Biodiversity	Impacts on fauna diversity	-Proper waste management system as it has effect on fish diversity and population	Minor	EMMT
	Impact on flora diversity	-Proper waste management system, wind-break tree species -Replantation inside the project area	Minor	EMMT
Impacts on Socio-Economic	Visual Impact	- Keep clean the area near the farming every day and implement suitable waste management system.	Minor	EMMT
	General health and safety impacts	- First aid kits will be kept ready at all public places	Minor	EMMT

		- A car or boat kept 24-hour standby to send to the nearby hospitals or clinics within the few minutes, in case of injury		
Utilities Consumption	Electricity	Install energy and water meters, Use LED lights, Installation of timers and thermostats,	Major	EMMT
	Domestic water	Implementing water efficient fixtures, Awareness campaign, Proper methods of water use	Minor	EMMT
Decommissioning Phase				
Impacts on Air Environment	Fugitive Dust generation	Spraying water	Minor	EMMT
	Gaseous emissions	Use machineries with good engine with low sulphur content fuel	Minor	EMMT
	Noise level in dB(A)	Avoid working at night	Minor	EMMT
Impacts on Surface Water	Wastes from demolition	- Avoid doing demolition activities during monsoon season	Minor	EMMT
	Oil and Lubricants	- Avoid any leakage of oil and lubricant - Check machineries maintenance on regular basis	Minor	EMMT
	Domestic wastes from workers	- Connect wastewater channel to the septic tank	Minor	EMMT
Impacts on Soil and Ground Water	Leakage of fuel oil and lubricants	- Store fuel tank and lubricant container over concrete floors - Use machinery of good condition and check maintenance	Minor	EMMT
	Demolition wastes and domestic wastes	Waste disposal according to the rule and regulations of CDC (Mawlamyine), administrative office of industrial zone	Minor	EMMT

1.7. Summary of Cumulative Impacts

The cumulative impacts will be as follow:

(a) Depletion of Mangrove Area as Cumulative Impact

There will have deforestation and depletion of mangrove area as cumulative impact because there already had other industries and will be used 70.63 acres of the whole island (at least 25% of the whole project area).

(b) Surface Water Pollution as Cumulative Impact

Although there will have very little impact on surface water environment during operation phase (the volume of waste water compared to the volume of sea water). Waste water from various industires in Pathaw and Pahtet Islands will be impact on surface water quality (sea water quality) around the islands.

(c) Soil Contamination as Cumulative Impacts

Solid wastes generate from various industries at Pathaw and Pahtet Islands will be combined as cumulative impact for soil contamination if they are not properly disposed.

(d) Odor Emissions as Cumulative Impacts

As there will have another odor emission source such as dried fish factory and other sea food production factories, odor will be impact as cumulative impact.

(e) Visual Impact as Cumulative Impact

All of the factories located in Phathaw-Pahtet Island will need to cut trees and mangrove and so there will have impacts on visual as cumulative in both plan view and side view from the sea.

1.8. Summary of Environmental Management and Monitoring Budgets

The environmental management cost will be 6,350,000 kyats per year and environmental monitoring cost will be 910,000 kyats.

1.9. Summary of Public Consultation and Participation Process

Different techniques of consultation and participation with public were used during the IEE study. These included interviews with local people during household survey (socio-economic

survey) and public meetings. Most pubic needs and concerns about the proposed project through public consultation process are as follow:

Village Name	Most Public Needs	Most Pubic Concerns
Pahtaw	• Expanding and upgrading of village road • Supporting for health care facilities, water supply and electricity • Improvement of the Pagodas in Pathaw-Pahtet Island	• Noise from value added wood factory
Pahtet	• Supporting for health care facilities and water supply • Full time electricity • Development to the Shwethalyaung Pagoda	-
Kan Nar(Myeik)	• Maintenance of the Kan Nar road • Provide trash bin along the Kan Nar Road	• Unobjectionable noise from value added wood factory • Increased in traffic

1.10. Conclusion

The IEE study will describe the key anticipated environmental and social impacts of the proposed project. Moreover, proper mitigation measures for anticipated impacts in all phases and good environmental management practices are also described. The most public concerns about the proposed project is noise and all of the environmental impacts can be mitigated to acceptable level by proper mitigation measures described in this report. So, it can be concluded that the proposed project need not to conduct comprehensive EIA and all of the essential thing for impact assessment, mitigation measures and management practices are presented in this IEE report. To summarize, the proposed project can be allowed to operate if the developer (PPT) will do all of the mitigation and enhancement measures described in this report.

2. INTRODUCTION

2.1. Project Background

Pyi Phyo Tun International Company Limited (PPT) was built value added wood factory located in Pahtet Industrial Zone 2, Kyun Su Township, near Myeik Discrit, Thanitharyi Region, Republic of the Union of Myanmar. According to the Environmental Conservation Law, 2012 and Environmental Impact Assessment Procedure, 2015, the proposed project will have to prepare IEE. Ever Green Tech Environmental Services and Training Co., Ltd. (EGT) was appointed by PPT to prepare the IEE and to provide assistance in related activities. This IEE report is prepared to assess the potential impacts of the proposed project and to formulate, implement and monitor the environmental protection measures in the phases of its construction, operation and decommissioning in order to reduce the environmental impacts or have to minimum impacts to the environment.

2.2. The Aim of the Proposed Project

The developer statements publicly that the proposed project will need in Myanmar due to the following reasons:

(a) To export the aquatic products to foreign countries as enrichment products,
(b) To reduce wasting of obtained raw aquatic products,
(c) To improve national foreign currency income,
(d) To improve employment opportunities for local people,
(e) To improve the educational, health and social status of local residents and obtain safe and better life., and
(f) To get benefits for both customers and supplier together with increasing employment opportunities for local people as well as resulting in government revenues.

2.3. Aim and Objectives of the IEE Report

The objectives of the IEE report for PPT are to;

(i) assess the project's potential positive and negative, direct and indirect impacts to physical, biological, socioeconomic, and physical cultural resources in the vicinity of the project area,

(ii) identify the stakeholders, hold consultation meeting with project affected people and consider their concerns in the implementation of the project,

(iii) present mitigation measures to help reduce and/or mitigate, and/or compensate for the negative environmental impacts from the proposed project,

(iv) describe the monitoring measures and reporting procedures to ensure the operations of the project meet with proposed mitigation measures, and identify the responsible person or team to proceed the proposed mitigation and monitoring measures.

2.4. Description of Project Proponent

The following are the brief information about the project proponent.

Company Name	Pyi Phyo Tun International Company Limited (PPT)
Project Type	Value Added Wood Factory
Project location	Pahtet Industrial Zone 2, Kyunsu Township, Myeik District
Company Address	No.15, 11th Street, Lanmadaw Township, Yangon
Contact Person	Dr. Aung Lwin Phone number- 095 –(1) 2300460 , 2300480 Fax-95-(1) 2300480 Email - fish meal ppt@yangon.net.mm
Company Type	Public Company Limited

2.5. Environmental Impact Assessment Service Provider

PPT was appointed Ever Green Tech Environmental Services and Training Co., Ltd. (EGT) to draw up IEE. Below is the background information on Ever Green Tech Environmental Services and Training Co., Ltd., (Third party).

Ever Green Tech Environmental Services & Training Co., Ltd.	
Company Name	Ever Green Tech Environmental Services and Training Co., Ltd.
Company Registration Number	3344/2015-2016 (Ygn)
Contact Address	No.1/9, Baho Street, 16th Quarter, Hlaing Township, Yangon
Telephone Number	09-5099230; 09-5099232

Company E-mail	md@evergreentechmyanmar.com green.evergreentech@gmail.com
Contact person	Dr. Kyaw Swar Tint Principal Environmental Consultant 09-797111000 11kyawswar@gmail.com

2.6. EIA Study Team and Their Responsibilities

Below is the information of IEE team and their responsibilities.

Name	Degree	Responsibility	Experiences	Registration as Consultant at ECD
1. Dr. Kyaw Swar Tint	Ph.D. (Mining)	Noise and Environmetal Management	At least 7 yrs experiences in environmental related field	In progress
2. Dr. Thein Tun	Ph.D. (Metallurgy)	Soil Quality	At least 4 yrs experiences in environmental related field	Freeland Consultant
3. Dr. Myo Min Tun	Ph.D. (Metallurgy)	Air Quality	At least 4 yrs experiences in environmental related field	Freeland Consultant
4. Dr. Pyi Phyo Kyaw	Ph.D. (Archeology)	Cultural and Heritage Impact Assessment	At least 3 yrs experiences in environmental related field	In progress
5. Dr. Kyaw Zay Moe	Ph.D. (Botany)	Flora Diversity	At least 3 yrs experiences in environmental related field	Registered Consultant at ECD, No. 0037
6. Dr. Ko Myint	Ph.D. (Zoology)	Fauna Diversity	At least 3 yrs experiences in environmental related field	In progress
7. Dr. Khon Aung	M.B.B.S (Ygn)	Occupational Safety and Health	At least 5 yrs experiences in environmental related field	Freeland consultant

8. U Min Aung	M.Sc. (Chemistry)	Water Quality	At least 5 yrs experiences in environmental related field	In progress
9. Ms. Thazin Htwe	M.S. (Environmental Assessment and Management); Dip in Applied Psychology	Public Consultation and Participation	At least 3 yrs experiences in environmental related field	In progress
10. Ma Nandar Nwe	M.S. (Environmental Assessment and Management); Dip in Applied Psychology	Risk Assessment and Management	At least 3 yrs experiences in environmental related field	In progress
11. Mg Yaw Ma Nar	B.Sc. (Forestry), Dip. In EIA/EMS	Environmental Baseline Study	At least 3 yrs experiences in environmental related field	Freeland Consultant
12. Ma May Thet Zaw	M.E. (Civil)	Water Resources Management and Hydrology	At least 3 yrs experiences in environmental related field	Freeland Consultant
13. U Aung Naing Tun	L.L.B, M.B.A, M.A (B.L), M.A (TEFL)	Laws and Regulations	At least 4 yrs experiences in environmental related field	Freeland Consultant

2.7. Scope for IEE Study

This IEE report identifies the potential environmental and social impacts that could be associated with the proposed project activities including those of an indirect and cumulative nature. The study area for IEE covers within 1.5km radius (3km diameter) which cover all of the project operational areas (value added wood factroy), including where supporting activities (wood fired boiler, and roads). The reason to conduct within 3km sector is to cover air emissions from wood-fired boiler and noise from machines.

2.8. Local Residences within 3km Boundary

Although the project was located in Kyun Su Township, the nearest local residences within 1.5km radius of the project are:

(d) Pahtaw Village;

(e) Pahtet Village; and

(f) Kan Nar Quarter.

Pathaw village and Pahtet village are located in Kyun Su Township and Kan Nar Quarter is situated in Myeik Township.

Figure 2.1 - Local Residences within 3km around the Proposed Project

2.9. Data Collections

Although the proposed project was situated in Kyun Su Township, it is nearer to Myeik Township rather than Kyun Su. So, the project related secondary data are sourced from both of Kyun Su and Myiek. The project related data, factory layout plans and design parameter were provided by PPT. Secondary data on demographic distribution in the area were soucred from Head of Local Administration Offices (Kyun Su and Myeik) and data on public health were sourced from Public Health Departments (Kyunsu and Myeik). Primary data for public concerns, socio-economic and health profiles were conducted by household survey.

3.0. POLICY, LEGAL AND OTHER REQUIREMENTS

This chapter sets out the relevant legal and policy context in Myanmar and documents the environmental and social standards with which the project has to comply with, as well as the international standards that the project will follow.

3.1. National Requirements

The IEE has been undertaken in accordance with the Myanmar Environmental Impact Assessment Procedure which was promulgated on December 29th, 2015, and provides legislation for environmental and social governance of economic development in Myanmar, under the Environmental Conservation Law 2012 and Environmental Conservation Rules 2014 of the National Environmental Policy for Myanmar 1994.

In addition, the IEE assessment was undertaken in accordance with Myanmar's National Environmental Quality (Emission) (NEQ) Guidelines which were promulgated on December 29th, 2015. The guidelines include noise and vibration, air emissions, and effluent discharges. An overview of the approval of the IEE process (from the EIA Procedure,2015) is shown in Figure 3.1.

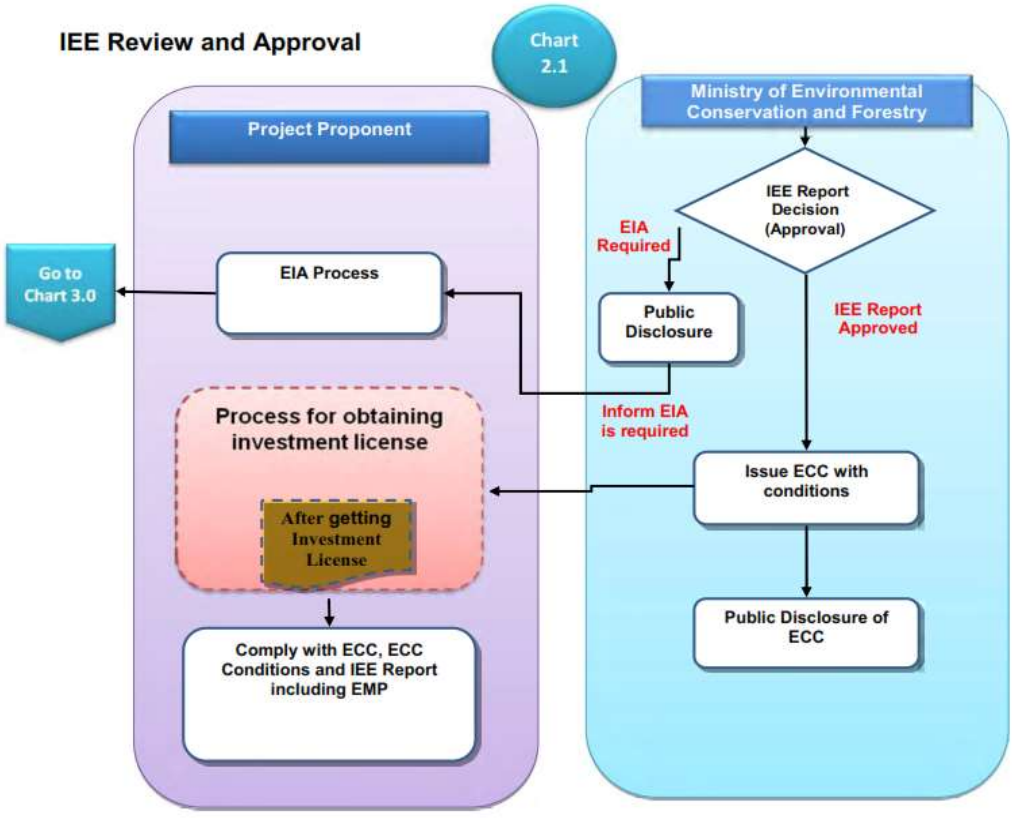


Figure 3.1. IEE Review and Approval Process

3.2. Developer's Environmental, Social and Health Policies

The main policy and commitment of PPT will be identified in the following points:

- the protection of public safety, the health and safety of the workforce and the local communities;
- the protection of the environment and the conservation of biodiversity and ecosystems;
- the compliance with Myanmar laws, regulations and industrial standards regarding the environment, health, safety and hygiene at work in all of our operations;
- seek and achieve continuous improvement in our processes, consistent with our strategic objectives and priorities, by adopting the most advanced systems for environmental protection and energy efficiency; and
- creating a culture in which PPT employees, Contractors and Visitors share these commitments and understand that working safely is a condition of employment.

3.2.1. PPT's Sustainability Policy

PPT's sustainability model is "To operate in a sustainable manner means to create value for stakeholders, and to use resources so that the needs of future generations will not be compromised, respecting people, the environment and the society as a whole." PPT adheres to a sustainability policy, which is composed of the following principles:

- *Stakeholder relations* – "Engaging stakeholders and involving them in company's business are both prerequisites for sustainability and for the construction of reciprocal value."
- *Human Rights* – "The respect of Human Rights represents the basis for an inclusive growth of societies, of the territories and, consequently, of the companies that work there."
- *Relations with communities and contribution to local development* – "Dialogue, the respect of local communities, the evaluation of impacts are all preconditions for an effective cooperation, targeted at creating territorial value."
- *Climate strategy* – "To satisfy the world's energy demand, by containing, at the same time, emissions of gases that have an impact on climatic change, is one of the greatest challenges of modern society."

3.2.2 PPT's Quality Policy

The Quality Policy is published in this Quality Manual, and is placedin suitable locations around the factory and customer access areas.

- To produce Seafood in accordance with the International Standards.
- To produce New Products and Value Added Products.
- To increase of Export Products processing 25% annually.
- To follow strictly implemented system.
- To avoid the customer complaints by prevention elimination and reduction to acceptable level and always standby position for inspection from concern authorie.

To fulfill Microbiological and Chemical Standard laid down by DOENHL, EU, and Export Countries Regulations.

3.3. Legal Commitments of Laws Related to Proposed Project

Myanmar has promulgated several laws and regulations concerning protection of the environment. The following table describes laws and regulations directly or indirectly associated with the proposed project.

Table 3.1. Legal Commitments of Laws Related to Proposed Project

Law name and Section	Legal Commitments
Constitution of the Republic of the Union of Myanmar, 2008	
Section 24	The project proponent has to follow the section 24 of the Constitution of the Republic of the Union of Myanmar.
Section 45	The project proponent has to follow the section 45 of the Constitution of the Republic of the Union of Myanmar.
Section 349	The project proponent has to follow the section 349 of the Constitution of the Republic of the Union of Myanmar.
Section 359	The project proponent has to follow the section 359 of the Constitution of the Republic of the Union of Myanmar.
Environmental Conservation Law, 2012	
Section 7 (d)	The project proponent has to manage according to the Section 7 (d).
Section 14	The project proponent has to carry out treating of emitting substances which cause pollution in the environment in accord with stipulated environmental quality standards.
Section 15	The project proponent has to install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution.
Section 24	The project proponent has to follow the Ministry terms and condition relating to environmental conservation.
Section 25	The project proponent has to accept the penalties if the proponent failed to comply with the Ministry terms and conditions.

Section 29	The project proponent has to follow the rules, notifications, orders, directives and procedures issued under this Law.
Section 32	The project proponent has to comply the prohibition contained in rules, notifications, orders, directives and procedures issued under the law and not to violate any of them.
Environmental Conservation Rules,2014	
Rule 55	The project proponent has to comply the rule 55 of preparing and implementation of environmental impact assessment with stipulated terms and conditions approved by Ministry within time stipulated by Ministry.
Rule 69	The project proponent has to follow the rule of not to pollute the environment, not to cause damage to the ecosystem.
EIA Procedures, 2015	
Article 102 to 110	The project proponent has to report the monitoring included in EIA procedure article 102 to 110.
Article 113	The project proponent has to comply with the determination of Ministry if environmental obligations are not being complied by project proponent.
Article 115	The project proponent has to cost all the inspection and monitoring of project according to article 115 of EIA Procedure.
Article 117	The project proponent has to follow the Ministry program described in Article 117 of EIA procedure.
National Environmental Quality (Emission) Guidelines, 2015	
Section 2.3.1.3	Section 2.3.1.3 The project proponent has to comply with the National Environmental Quality (Emission) Guidelines.
The Protection of rights of National Race Law, 2015	
Section 5	The project proponent has to completely be informed, coordinated and performed with the relevant local ethnic groups in the case of development works, major projects, businesses and extraction of natural resources will be implemented within the area of ethnic groups.
Myanmar Investment Law, 2016	
Section 50 (d)	The project proponent has to invest according to the section 50 (d) of Myanmar Investment Law.
Section 51 (f to q) (exclude h and n)	The project proponent has to comply with section 51 of Myanmar Investment Law.
Section 65	The project proponent has to respect and comply with customs, traditions and traditional culture of the ethnic groups in the Union and has to invest according to the section 65 of Myanmar Investment Law.
Section 73	The project proponent has the type of insurance specified in the rules in any insurance business authorized to conduct insurance business in the State.
Myanmar Investment Rules	
Rule 202	The project proponent has to comply with all terms and conditions in the permit and other applicable laws when the investment is carried out.
Rule 206	The project proponent has to follow the procedure of appointing expert foreigner as a senior level manager or expert or advisor.
Rule 212	The project proponent has to insure the relevant insurance out of the six types of insurance given by the authority.
Underground Water Act, 1930	
Section 3	The project proponent has comply the section 3 of Underground Water Act by not sinking a tube for the purpose of obtaining underground water without a license granted by water officer.

Section 6	The project proponent has to know and follow the section 6 of Underground Water Act.
Myanmar Petroleum and Petroleum Products Law, 2017	
Section 9 (a, e)	The project proponent has to comply with Section 9 (article (a) and (e) of Myanmar Petroleum and Petroleum Products Laws.
Section 10 (e)	The project proponent has to comply the procedures and terms for the standard quality of storage tanks and warehouses and of the storage tank of the motor vehicles.
Section 11	The project proponent has to mark a warning sign if the container which contains dangerous petroleum or petroleum products are presented.
Factories Act 1951(Pyidaungsu Hluttaw Law No. 12/2016)	
Section 3	The project proponent has to comply with section 3 of the Factories Act.
Section 4	The project proponent has to comply with section 4 of the Factories Act.
Labor Organization Law, 2011	
Section 1	The project proponent has to follow the Labor Organization Law.
Section 7	The project proponent has to comply for dispute between employer and worker with section 7 of the Labor Organization Law.
Section 8	The project proponent has to comply for dispute between employer and worker with section 8 of the Labor Organization Law.
Section 9	The project proponent has to comply for dispute between employer and worker with section 9 of the Labor Organization Law.
Section 10	The project proponent has to follow the section 10 of the labor organization law by giving permission to draw the constitution or rules of the labor organization containing the terms and approval of the majority of members.
Section 11	The project proponent has to comply with section 11 of the Labor Organization Law.
Section 17	The project proponent has to know the right of labors and comply with the section 17 of labor organization law.
Section 18	The project proponent has to know the right of labors and comply with the section 18 of labor organization law.
Section 19	The project proponent has to comply for dispute between employer and worker with section 19 of the Labor Organization Law.
Section 20	The project proponent has to know the right of labor organization to participate in discussing with the Government.
Section 21	The project proponent has to know the right of labor organization to participate in solving the collective bargains of the workers in accord with labor laws.
Section 22	The project proponent has to know the right of labor organization which the labor organization can carry out holding of meetings, going of strike and carry out collective activities in accord with their procedure.
The Settlement of Labor Dispute Law, 2012	
Section 38	The project proponent has to comply with section 38 of Labor Dispute Resolution Law.
Section 39	The project proponent has to comply with section 39 of Labor Dispute Resolution Law.
Section 40	The project proponent has to comply with section 40 of the Labor Dispute Resolution Law.
Section 51	The project proponent has to comply with section 51 of Labor Dispute Resolution Law.

Employment and Skill Development Law, 2013	
Section 5	The project proponent has to employ according to section 5 of Employment and Skill Development Law.
Section 13	The project proponent has to pay money not less below 0.5% of salary, total wages paid to the level of worker supervisor and the workers below such level in such work monthly without fail as the contribution to the fund. The project proponent has to ensure that put in money paid has to not be deducted from the wage or salary of the workers.
Section 14	The project proponent has to carry out training programs in accord with the work requirement in line with the policy of the skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present.
Section 30	The project proponent has to put into the fund monthly as put in fees without fail for the total wages of the subordinates and the supervisors' salary for not less than 0.5%.
The Leave and Holiday Act, 1951 (Law Amended July, 2014)	
Section 3	The project proponent has to comply for the holiday of worker according to section 3 of 1951 Leave and Holidays Act.
Section 5	The project proponent has to comply in related to leave of worker according to section 3 of 1951 Leave and Holidays Act.
Section 14	The project proponent has to comply with section 14 of 1951 Leave and Holidays Act.
Section 16	The project proponent has to comply with section 16 of 1951 Leave and Holidays Act.
Minimum Wages Law,2013	
Section 12	The project proponent has to pay wage according to section 12 of Minimum Wages Law.
Section 13 (a, b, c, d, e, f, g)	The project proponent has to carry out with section 13 of Minimum Wages Law.
Section 18	The project proponent has to know right of inspection officer assigned by the Ministry and cooperate.
Payment of Wages Act, 2016	
Section 3	The project proponent has to pay the wages according to section 3 of Payment of Wages Act.
Section 4	The project proponent has to pay the wages according to section 4 of Payment of Wages Act.
Section 5	The project proponent has to difficulty to pay the wages according to Section 4 sub-section (c) because of significant happenings, including natural disaster, the employer must report to the Department with solid evidence that wages will be paid at the mentioned day upon the workers' agreement.
Section 7	The project proponent has to comply according to section 7 of Payment of Wages Act.
Section 8	The project proponent has to comply according to section 8 of Payment of Wages Act.
Section 10	The project proponent has to comply according to section 10 of Payment of Wages Act.
Section 14	The project proponent has to allow the presiding overtime rate for an employee carries as set by the Law of Payment of Wages Act

The Myanmar Insurance Law, 1993	
Section 15	The project proponent has to follow compulsory Third Party Liability Insurance with the Myanmar Insurance.
Section 16	The project proponent has to comply with section 16 of the Myanmar Insurance Law.
The Social Security Law, 2012	
Section 11 (a, d)	The project proponent has to comply in accordance with section 11 (article (a) and (d)) of the Social Security Law, 2012.
Section 15 (a)	The project proponent has to pay Social Security Fund described in section 15 of the Social Security Law, 2012.
Section 18 (b)	The project proponent has to deduct contributions to be paid by worker from his wages together with contribution to be paid by him and pay to the social security fund.
Section 48	The project proponent has to comply with section 48 of the Social Security Law, 2012.
Section 49	The project proponent has to follow the non- application to the Workmen's Compensation Act of the Social Security Law.
Section 75	The project proponent has to prepare and keep records described in section 75 of the Social Security Law, 2012 and lists correctly and submit to the relevant township social security office in accord with the stipulations. The project proponent has to inform the relevant township social security office if the matters described in section 75b arise and submit records of work and lists if requested by inspectorate or official assigned by the Social Security Head Office and various levels of Regional Social Security Office under this Law.
Workman Compensation Act, 1923	
Section 3	The project proponent has to liable to pay compensation in accordance with section 3 of the Workmen's Compensation Act if personal injury is caused to a workman by accident arising out of and in the course of his employment
Myanmar Fire Force Law, 2015	
Section 25	The project proponent has to comply according to law no. 25 of Myanmar Fire Force Law by forming the reserve fire brigade and providing fire safety equipment.
National Food Law, 1997	
Section 7	The project proponent has to comply with authorities according to the section of 7 of this law.
Section 9	The project proponent has to get a license from the Public Health Department.
Public Health Law, 1972	
Section 3	The project proponent has to allow the government to improve the health of the working population and advising on the health issues described in section 3 of 1972 Union of Myanmar Public Health Law to protect the health of the working population.
Section 5	The project proponent has to follow the organizations formed under this law to inspect and instruct the project at any time.
Private Industrial Enterprise Law, 1990	
Section 13	The project proponent has to follow the duties described in section 13 of Private Industrial Enterprise Law, 1990.
Forest Law, 1992	
Section 12	The project proponent has to get approval of the Ministry to carry out any development work or economic scheme within forest land or forest covered land.

Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law, 1994	
Section 7	The project proponent has to comply according to Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law
Protection and Preservation of Cultural Heritage Regions Laws, 1998	
Section 13	The project proponent has to apply for prior permission if the proponent desirous of carrying out the project within the ancient monumental zone or the ancient site zone.
Section 15	The project proponent has to comply with the Regional Conservation Committee in accordance with the stipulations, to obtain the prior approval that there is no harm to the cultural heritage area.
Section 16	The Project proponent has to comply with the section 16 of the Protection and Preservation of Cultural Heritage Regions Laws.
Section 22	The project proponent shall not construct a building which is not in conformity with the conditions prescribed region wise by the Ministry of Culture in the cultural heritage region.
Prevention and Control of Communicable Diseases Law, 1995	
Section 3 (a)	The project proponent has to follow the Ministry of Health to prevent the spread of infectious diseases.
Section 4	The project proponent has to comply with the provisions of Article 3 of the Ministry of Health and the Department of Health regarding the prevention and control of communicable diseases.
Section 9	The project proponent has to report immediately to the nearest health department or hospital if the event like rat fall, outbreak of a principal epidemic disease and outbreak of a notifiable disease.
Section 11	The project proponent has to allow the health officer according to section 11 of Infectious Disease Prevention and Control Law for the prevention of spread of infection diseases.
The Control of Smoking and Consumption of Tobacco Product Law, 2016	
Section 9	The project proponent has to carry out the task according to section 9 of the Control of Smoking and Consumption of Tobacco Product Law.
Conservation of Water Resources and Rivers Law, 2006	
Section 8 (d)	The project proponent shall not be carried out any act or channel shifting with the aim to ruin the water resources and rivers and creeks.
Section 11 (a)	The project proponent has to follow the prohibitions from the section 11 of Conservation of Water Resources and Rivers Law.
Section 19	The project proponent shall not be disposed of any substance into river- creek that may cause damage to waterway or change of water course from the bank.
Section 22	The project proponent shall not pile sand, shingle and other heavy materials for business purposes in the bank area and waterfront area.
Section 29	The project proponent has to know that whoever attempts or conspires or abets in the commission of an offence under Conservation of Water Resources and Rivers Law shall be punished.
Section 30	The project proponent has to follow the prohibitions from the section 30 of Conservation of Water Resources and Rivers Law.
Myanmar Port Authority Law, 2015	
Section 19	The project proponent has to comply according to the Myanmar Port Authority Law.
Agricultural Land Law, 2012	
Section 30 (b)	The project proponent has to know and comply according to the section 30 (b) of Agricultural Land Law.

Boiler Law, 2015	
Section 5	The project proponent has to register according to the section 5 of the Boiler Law.
Section 6	The project proponent has to comply with the local or international standard of boiler according to the section 6 of the Boiler Law.
Section 7	The project proponent has to submit registration along with the required certificate or information of the boiler according to the section 13 of the Boiler Law.
Section 12 (a, b)	The project proponent has to follow the registration process according to the section 12 (a, b) of the Boiler Law.
Section 14	The project proponent has to request the permit from the related government personnel if the proponent want to use the boiler more than the permitted pressure or change the pressure part of the boiler.
Section 15	The project proponent has to show the related department asked for the required boiler certificate.
Section 18	The project proponent has to inform the related personnel when the accident occur.
Section 20	The project proponent has to know the using of non-certified boiler or certification expired boiler or certification rejected boiler are prohibited.
Section 21	The project proponent has to mark the registration number which is given by the related personal.
Section 24	The project proponent has to make sure that installing or repairing the boiler should be done by the certified professional.
Section 31	The project proponent has to restrict the boiler operator not to use the boiler over the given parameter.
Section 38	The project proponent has to know the right of the inspector represented the government.
The Protection and Preservation of Ancient Monuments Law, 2015	
Section 12	The project proponent has to promptly inform the relevant Ward or Village-Tract Administrative Office when he finds an ancient monument.
Section 15	The project proponent has to apply to get prior permission to the Department when the project is within the specified area of an ancient monument.
Section 20 (f)	The project proponent does not have to carry out discarding chemical substance and rubbish which can affect an ancient monument and the environment within the specified area of an ancient monument or of a listed ancient monument without a written prior permission.
The Prevention of Hazard from Chemical and Related Substances Rules, 2013	
Section 8	The project proponent has to know the Central Supervisory Board shall check field work practically whether or not the precaution and prevention of hazard to human being, animal and natural environment has been done.
Section 15 (a, b)	The project proponent has to carry out inspection and training according to section 15 of Prevention of Hazard from Chemical and Related Substances Law.
Section 16 (b, c, d, f, g, h, i, j)	The project proponent has to comply the procedure that given in the Section 16 of Prevention of Hazard from Chemical and Related Substances Law.
Section 17	The project proponent has to put the insurance in accordance with the prescriptive stipulations to be able to pay the compensation, if the impact and damage is occurred on the Human Being and Animals or the environment in respect of the chemical and related substances businesses.

Section 20	The project proponent has to comply Section 20 of Prevention of Hazard from Chemical and Related Substances Law.
Section 22	The project proponent has to abide the regulations consisted in the registration certificate furthermore shall also abide the order and instructions issued occasionally by the Central Supervisory Board.
Section 23	The project proponent has to comply Section 23 of Prevention of Hazard from Chemical and Related Substances Law.
Section 27 (a, b, c, d)	The project proponent has to control and decrease the hazard of the chemical and related substance according to section 27 of Prevention of Hazard from Chemical and Related Substances Law.
The Freshwater Fisheries Law, 1991	
Section 36	The project proponent shall not erect, construct, place, maintain or use any obstruction such as a dam, bank or weir in a freshwater fisheries waters without the permission of the Department.
Section 40	The project proponent shall not cause harassment of fish and other aquatic organisms or pollution of the water in freshwater fisheries waters.
Section 41	The project proponent shall not alter the quality of water, volume of water or the water -course in a leasable fishery, reserved fishery and creeks contiguous thereto or in water-courses.
The Export and Import Law, 2012	
Section 6	The project proponent shall not export or import the specified goods without obtaining license.
Section 7	The project proponent shall not violate the conditions contained in the export and import license.
Automobile Law Pyidaungsu Hluttaw Law, 2015	
Section 55	The project proponent has to comply according to the section 55 of Automobile Law.
The Myanmar Engineering Council Law,2013	
Section 20	The project proponent has to comply according to the section 20 of Myanmar Engineering Council Law.
Section 24	The project proponent has to follow the section 24 of Myanmar Engineering Council Law.
Section 25	The project proponent has to follow the section 25 of Myanmar Engineering Council Law.
Section 31	The project proponent has to follow the section 31 of Myanmar Engineering Council Law.
Section 34	The project proponent has to follow the section 34 of Myanmar Engineering Council Law.
Section 37	The project proponent has to follow the section 37 of Myanmar Engineering Council Law.

3.4. International Agreements and Conventions

In addition to the domestic laws listed above, Myanmar is also a signatory to the following international conventions, and these may have relevance to the proposed survey activities. Refer to the following table.

Table 3.2. International Agreements and Conventions Relevant to the Proposed Project

International Agreements and Conventions	Status	Purposes
Vienna Convention for the Protection of the Ozone Layer, 1985	1998	Aims at the protection of the ozone layer, including requirements for limiting the production and use of ozone depleting substances.
Montreal Protocol on Substances that Depletion the Ozone Layer, 1989	1993	Aims at the protection of the ozone layer, including requirements for limiting the production and use of ozone depleting substances.
Basel Convention,1989	2015	The Convention regulates the trans boundary movements of hazardous wastes and provides obligations to its parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.
United Nations Frame- work Convention on Climate Change (UNF CCC),NewYork, 1992 and Kyoto Protocol 1997	1995 and 2005	Provide a framework for intergovernmental efforts to tackle climate change. Recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.
Convention on Bio- logical Diversity, Rio de Janeiro, 1992	1994	Aims to promote national policies for the conservation of wild flora, fauna and habitat that needs to be included in planning policies. The three main goals are: (1) the conservation of the biological diversity; (2) the sustainable use of its components; (3) fair and equitable sharing of the benefits.
Asia Least Cost Greenhouse Gas Abatement Strategy (1998 ALGAS)	1998	Develop national and regional capacity for preparation of GHG inventories. Assist in identifying GHG abatement options and preparation of a portfolio of abatement projects for each country.
United Nations Agenda 21	1997	Formed by the National Commission for Environmental Affairs (NCEA) in Myanmar. Provides a framework of programmes and actions for achieving sustainable development in the country. Building on the National Environment Policy of Myanmar, takes into account principles contained in the Global Agenda 21. Myanmar Agenda 21 also aims at strengthening and promoting systematic environmental management in the country.
Relevant ILO Conventions in force in Myanmar • C1 Hours of Work (Industry) • C14 Weekly Rest (Industry) • C17 Workmen's Compensation (Accidents) • C19 Equality of Treatment (Accident Compensation) • C26 Minimum Wage Fixing Machinery • C29 Forced Labour Convention • C42 Workmen's Compensation (Occupational Diseases) Revised 1934 • C52 Holidays with Pay • C87 Freedom of Association and Protection of the Right to Organize		Sets out legal instruments drawn up by the ILO's constituents (governments, employers and workers) and setting out basic principles and rights for workers.

3.5. National and International Guidelines for Proposed Project

National Guidelines and Internal standard guidelines are referred for Environmental Management Plan of the proposed value added wood factory project.

1. Environmental Impact Assessment Procedure (2015)
2. National Environmental Quality (Emission) Guidelines (2015) for Wood Processing
3. World Health Organization Guidelines (WHO)
4. National Ambient Air Quality Standard (NAAQS), USEPA
5. IFC Guidelines for Waste Management Facilities, 2007
6. IFC Guidelines for Water and Sanitation, 2007
7. IFC Guidelines for Community Health and Safety
8. IFC Guidelines for Occupational, Health and Safety

3.6. National Environmental Quality (Emissions) Guideline for Proposed Project Wood Processing

3.6.1. Effluent Level

This guideline applies to wood processing facilities, including the harvesting of wood, breaking the logs into pieces, edging and trimming processes.

Table 3.3 - Effluent Levels for Wood Processing

Parameter	Unit	Guideline Value
5-day Biochemical oxygen demand	mg/l	50
Arsenic	mg/l	0.1
Chemical oxygen demand	mg/l	150
Chromium (total)	mg/l	0.5
Chromium (hexavalent)	mg/l	0.1
Copper	mg/l	0.5
Fluorides	mg/l	5
Oil and grease	mg/l	10
Pesticides (each)	mg/l	0.05
pH	S.U.[b]	6-9
Phenols (mono- and dihydric)	mg/l	0.5
Polychlorinated dibenzo-p-dioxins / dibenzo furans	mg/l	0.1
Polycyclic aromatic hydrocarbons (each)	mg/l	0.05
Temperature increase	°C	<3[c]
Total suspended solids	mg/l	50

[a] Process wastewater containing chemical preservatives should be contained as part of closed loop application system

[b] Standard unit

[c] At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from the point of discharge

3.6.2. Air Emission Level

Table 3.4 - Air Emission Levels for Wood Processing

Parameter	Unit	GuidelineValue
Volatile organic compounds	mg/Nm^{3a}	20
Wood dust	mg/Nm^3	50

[a] Milligrams per normal cubic meter at specified temperature and pressure

Table 3.5- National Environmental Quality (Emission) Guidelines

Parameter	Averaging Period	Guideline Value ($\mu g/m^3$)
Nitrogen dioxide	1-year 1-hour	40 200
Ozone	8-hour daily maximum	100
Particulate matter PM_{10}[a]	1-year 24-hour	20 50
Particulate matter $PM_{2.5}$[b]	1-year 24-hour	10 25
Sulfur dioxide	24-hour 10-minute	20 500

Table 3.6 - WHO Air Quality Guidelines

`Pollutant	Averaging Time	WHO 2021 Air Quality Guidelines values	WHO 2005 Air Quality Guidelines Values
$PM_{2.5}$ ($\mu g/m^3$)	Annual	5	10
	24-hour[a]	15	25
PM_{10} ($\mu g/m^3$)	Annual	15	20
	24-hour[a]	45	50
O_3 ($\mu g/m^3$)	Peak season[b]	60	N/A
	8-hour[a]	100	100
NO_2 ($\mu g/m^3$)	Annual	10, 0.005 ppm, 5 ppb	40
	24-hour[a]	25, 0.013 ppm, 13 ppb	N/A
	1-hour	200, 0.106 ppm, 106 ppb	200
SO_2 ($\mu g/m^3$)	24-hour[a]	40, 0.015 ppm	20
	10-minute	500, 0.191 ppm	500

CO (mg/m^3)	24-hour[a]	4	N/A
	8-hour	10, 8.729 ppm	N/A
	1-hour	35	N/A
	15-minute	100	N/A

Table 3.7 - National Ambient Air Quality Standards (NAAQS), Central Pollution Control Board

Sr. No	Pollutant	Time Weighted average	Concentration in Ambient Air	
			Industrial, residential. rural and other areas	Industrial, residential. rural and other areas
1	Sulphur Dioxide	Annual	50	20
		24 hours	80	80
2	Nitrogen Dioxide	Annual	40	30
		24 hours	80	80
3	PM $_{10}$ ($\mu g/m^3$)	Annual	60	60
		24 hours	100	100
4	PM $_{2.5}$ ($\mu g/m^3$)	Annual	40	40
		24 hours	60	60
5	Ozone O_3 ($\mu g/m^3$)	8 hours	100	100
		1 hour	180	180
6	Lead (µg/m3)	Annual	0.5	0.5
		24 hours	1.0	1.0
7	Carbon monoxide (mg/m^3)	8 hours	2	2
		1 hour	4	4
8	Ammonia ($\mu g/m^3$)	Annual	100	100
		24 hours	400	400
9	Benzene ($\mu g/m^3$)	Annual	5	5
10	Benzo (a) pyrene (ng/m^3)	Annual	1	1
11	Arsenic (ng/m^3)	Annual	6	6
12	Nickel (ng/m^3)	Annual	20	20

Note: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute or continuous monitoring and further investigation.

3.6.3. Noise Level

According to the NEQG that has been prescribed by Ministry of Environmental Conservation and Forestry on 29th December, 2015, under Chapter 1 (General Provision), Section 1, sub-section 1.3 mentioned the following requirements for noise levels;

Table 3.8 – Noise Level set in NEQG

Receptor	One Hour LAeq (dBA)	
	Daytime (7:00-22:00) (10:00-22:00 for public holidays)	Night time (22:00-7:00) (22:00-10:00 for public holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

3.6.4. Water Quality

Table 3.9 - National Drinking Water Quality Standard, Myanmar (2014)

Parameter	Unit	Maximum Permissible Limit
TCU (True Color Unit)	Pt.Co	20
Turbidity (NTU-Nephelometric Turbidity Unit)	NTU	5
Total Dissolved Solvents (TDS)	mg/l	1000
Chloride	mg/l	250
Total Hardness (as $CaCO_3$)	mg/l	500
Iron	mg/l	1
pH	mg/l	6.5-8.5
Sulphate	mg/l	400
Calcium	mg/l	200
Magnesium	mg/l	150
Electrical Conductivity	µs/cm	1500

3.7. Statement of Commitments

3.7.1. Commitments of Project Developer

We, PPT Co., Ltd commit to comply with the followings:

a) Comply with the commitments of the environmental and socio-economic development revealed in the Initial Environmental Examination report.

b) Acknowledge and comply the laws, regulations and guidelines associated with the project, included in the report.

c) Comply and proceed the alternative methods, mitigation measures and monitoring plans included in the report for the reduction of the negative environmental impacts; and take responsibility for the environmental impacts due to non-compliance of the commitment.

d) Give priorities for the occupational health and safety of the workers.

e) Utilize the exact amount of fund as stated in proposed expenditure for cooperate social responsibility funds.

f) Comply fully with the commitments, mitigation measures, and plans in the IEE Report.

g) Take responsibility for all of the works and absence of the contractors, sub-contractors, officers and representatives of the company in operating the processes.

h) Take responsibility to support after discussion for the impacted people to ensure for their stable livelihood not lower than before the project; and resettlement and rehabilitate the impacted local people, government organizations and other related people and organizations.

i) We, (PPT) commit to follow the environmental commitments, mitigation measures, management plans illustrated in the IEE report. We also commit to follow the Environmental Conservation Laws 2012, and the Environmental Conservation Rules 2015.

(Signature)

Name -

Position -

Date -

3.7.2. Commitments of the Environmental Assessment Practitioner

The IEE report was written by Ever Green Tech Environmental Services and Training Co., and the report were planned by the following criteria;

(a) The drawn the IEE complied with the National Constitution, Environmental Conservation Law, IEE Procedures, and National Environmental Quality Guidelines.

(b) This IEE also complied with the existing or future Labor laws, Occupational Health and Safety Laws, and related Rules and Procedures.

(c) These environmental impact protection procedures are designed of incident avoiding, mitigation and replacing for the project proponent who commits to follow the environmental impact protection procedure.

(d) This environmental management report is systematically planned not only for environmental impact protection procedures and occupational safety and health but also emergency management planning and social welfare programs.

(e) All facts including in this report are systematically surveyed without bias. As a third party, we commit and take full responsibility for all of the factors described in this report.

(Signature)

Name -

Position -

Date -

3.8. Penalties and Administrative Punishment

PPT will keep an eye on the penalties and other administrative punishment granted in EIA Procedures in Myanmar.

No	Non-Compliance	Penalties	Specific Administrative Punishment of the Ministry
1.	Failure or delay in timely submission of reports within Period prescribed by Ministry	100 to 500 US$ or equivalent Myanmar Kyat + 10-25 US$/ day unit cured or equivalent Myanmar Kyat	-Issue Enforcement Notice
2.	Obstruction or interference with an official in the course of their duties	250 to 5,000 US$ or equivalent Myanmar Kyat	-Issue Enforcement Notice -Criminal prosecution
3.	Failure to provide information to the Ministry or any representative	1,000 to 5,000 US$ or equivalent Myanmar Kyat	-Suspension of Approval of EMP, EMP-CP, EMP-OP in whole or in part
4.	Failure to provide information to the Ministry Inspector or any representative when requested in regard to inspection and monitoring	250 to 5,000 US$ or equivalent Myanmar Kyat	- Issue Enforcement Notice
5.	Undertaking or allowing any preparatory or other construction works without the prior approval by the Ministry of a reserved EMP or EMP-CP	1,000 to 5,000 US$ or equivalent Myanmar Kyat +50 to 500 US$/ day until cured or equivalent Myanmar Kyat	-Criminal prosecution
6.	Operating/implementing without a permit, or approval by the Ministry of an EMP or EMP-Op	1,000 to 5,000 US$ or equivalent Myanmar Kyat +50 to 500 US$/ day unit cured or equivalent Myanmar Kyat	- Criminal prosecution
7.	Non-compliance with an Enforcement Notice or Suspension Notice issued by the Ministry	2,000 to 10,000 US$ or equivalent Myanmar Kyat +100-500 US$/day unit cured or equivalent Myanmar Kyat	-Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part -Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
8.	Failure to notify to the Ministry of any knowledge of any event of an imminent of Environmental damage	1,000 to 5,000 US$ or equivalent Myanmar Kyat	- Issue Enforcement Notice - Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part

			-Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
9.	Failure to take reasonable steps to prevent an imminent thread of damage to the Environment, social, human health, livelihoods, or property, where application based on the EMP, EMP-CP or EMP-OP	2,500 to 10,000 US$ or equivalent Myanmar Kyat	-Issue Enforcement Notice - Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part -Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
10.	Non-compliance with conditions in 'the ECC and allowable Emission Limit Values	1,000 to 10,000 US$ or equivalent Myanmar Kyat	-Issue Enforcement Notice - Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part -Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
11.	Failure to take pay compensation amounts required in respected in respect of social impacts	1,000 to 10,000 US$ or equivalent Myanmar Kyat	-Issue Enforcement Notice - Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part -Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part
12.	Failure to fully restore social conditions upon resettlement	1,000 to 10,000 US$ or equivalent Myanmar Kyat	-Issue Enforcement Notice - Suspension of Approval of EMP, EMP-CP or EMP-OP in whole or in part -Revocation of Approval of EMP, EMP-CP or EMP-OP in whole or in part

Notes:

1. All penalty amounts set forth in this Annex are denominated in United states Dollars (US$) and are subject to annual inflation adjustment
2. Abbreviations are as follows;
   EMP =Environmental Management Plan,
   EMP-CP = Environmental Management Plan – Construction Phase,
   EMP-OP = Environmental Management Plan –Operational Phase

4. DESCRIPTION OF PROJECT AND ALTERNATIVES

4.1. Introduction

PPT value added factory, which was built in 2004, produces value added wood products such as four-sided plane lumbers, lumbers from sawdust and plywood, and distributes to local and foreign countries like Japan, China and Thai.

4.2. Location of the Project

The proposed project is located in the Pahtet Industrial Zone 2, Kyun Su Township, Myeik District, Thanitharyi Region, at the coordinates of 12° 26′ 38.97″ N Latitude and 98° 35′ 8.86″ E Longitude and covering a total land area of 4.95 acres. The location map of project area is shown in the following figure.

Figure 4.1. The Location Map of Proposed Value Added Wood Factory

Figure 4.2. Seattleite View of Proposed Value Added Wood Factory

4.3. Project Layout Plan

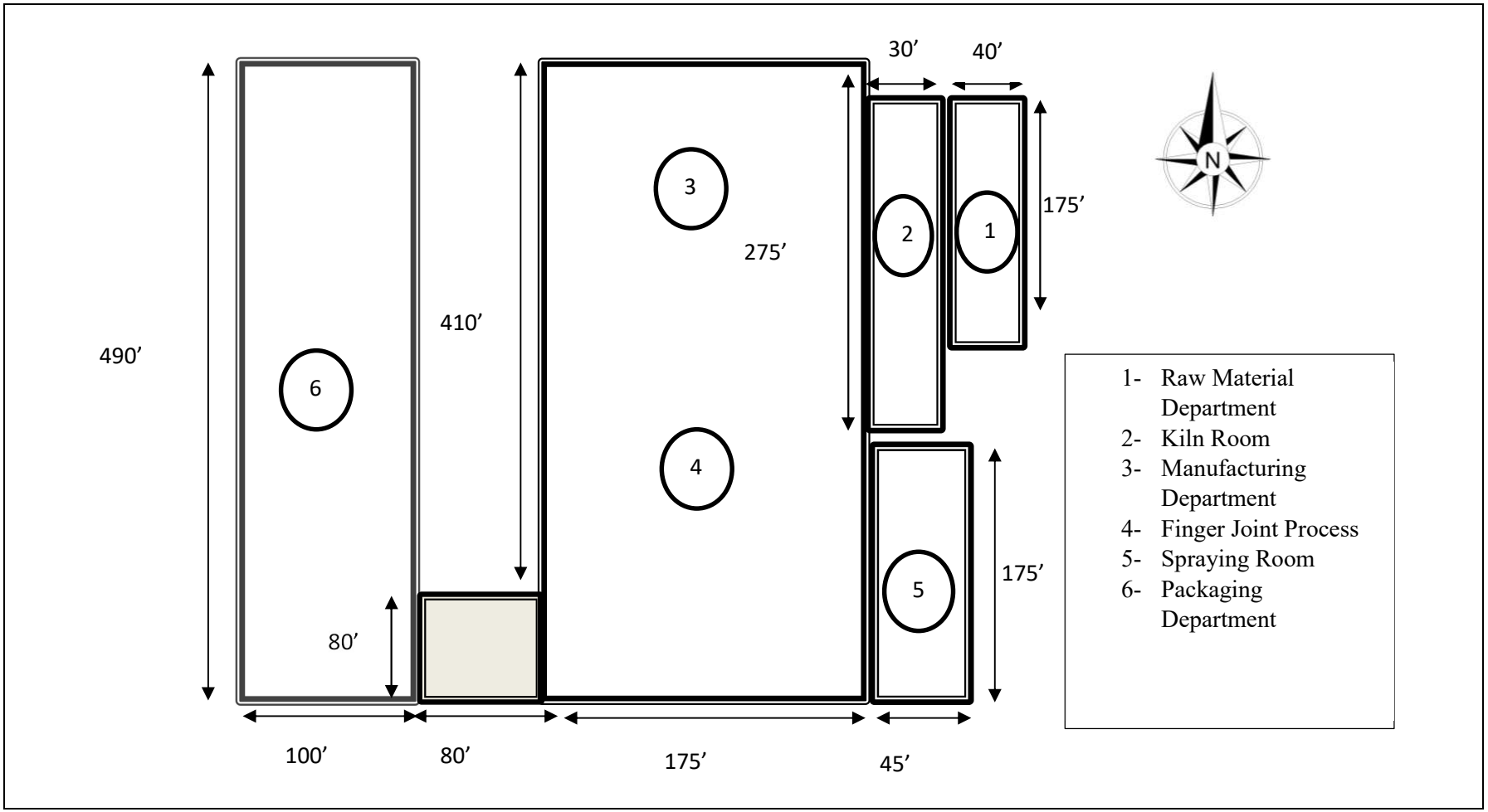


Figure 4.3. Layout Plan of Proposed Valued Added Wood Factory

4.4. Brief Description of the Project

No	Facts	Description
1.	Project Area	21.24 acres
2.	Products	Value Added Wood Products
3.	Production (Monthly)	200-300 tons
4.	Water sources	Pumped Water
5.	Electrical power consumption	350 KVA
6.	Electrical power source	Self Generator (Combined Generator for the Whole Island)
8.	Solid waste management system	Most by-products (wood pieces) from milling process are used as fuel in wood fire boiler
9.	Raw materials getting	By tendering process from Myanma Timber Enterprise
10.	Job oppotunities	Total 125 empolyes that include specialists for wood processing, male and female labors

4.5. Production Rate

The consumption of raw material is about 600 tons per month and final value added product is about 200-300 tons per month.

4.6. Implementation Time Schedule

The proposed schedule of implementation is described below.

Phase	Estimated Duration
Pre-Construction	3 Months
Construction	1 Year
Operation	2009 - Present
Decommissioning	6 Months

4.7. Land Use

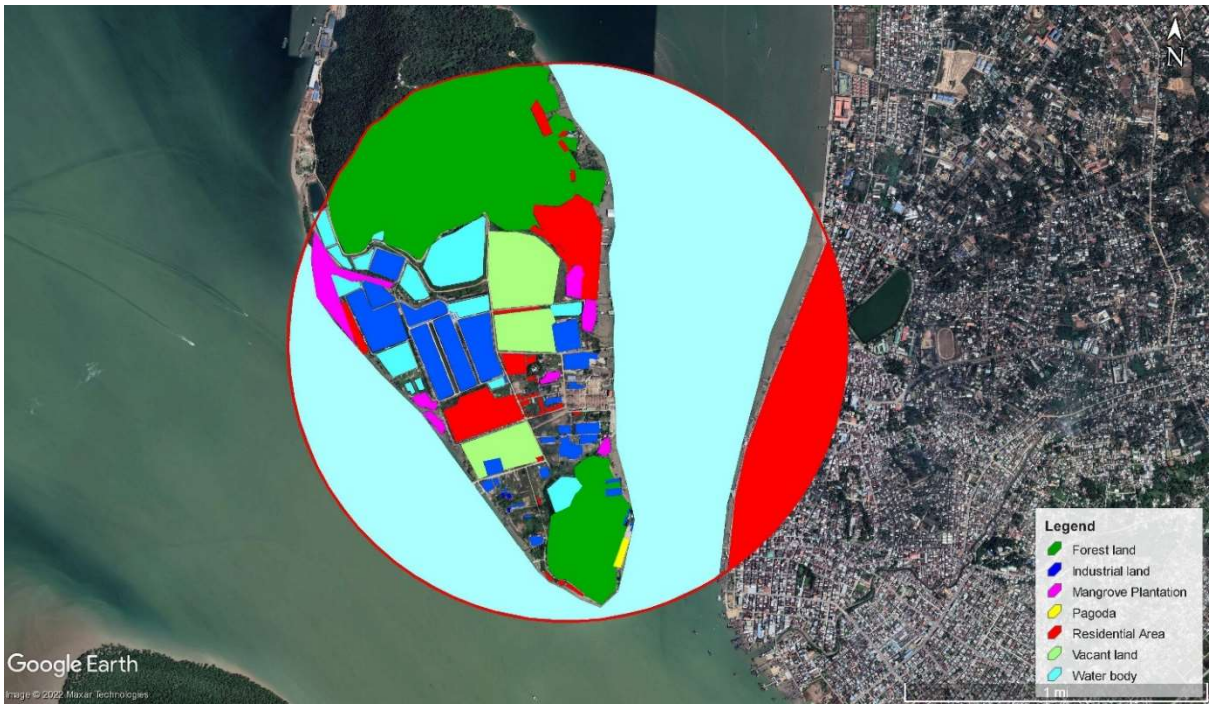


Figure 4.4. Land Use for Value Added Wood Factory

Land Use for Value Added Wood Factory

Land Use	Percentage (%)
Water Body	32.17
Residential Area	20.48
Forest land	13.74
Pagoda	1.05
Industrial land	19.28
Mangrove Plantation	7.07
Vacant land	6.22

4.8. Overall Project Description

The overall process description for the proposed project are shown below.

4.8.1. Pre-Construction Phase

At the pre-construction phase, site clearing and ground levelling works was carried out. As the proposed project is about 20 acres, it was unnecessary to do much clearing and levelling. Approximately 10 workers. 2 trucks and 1 dozer were used for minor site clearing activities. The pre-construction phase was long approximately 3 months.

4.8.2. Construction Phase

The construction period took about one year. Construction of proposed project included (1) foundation works for concrete and steel structure and (2) erection of steel structures and minor earth works for internal drainage system. Therefore, the major activities during construction phase included:

(a) Vehicular movement,
(b) Loading and unloading construction materials,
(c) On site storage of construciton materials,
(d) Connection of power supply system,
(e) Maintenance of construction machinery, and
(f) Disposal of solid wastes from both construction site and workers etc.

4.8.3. Operation Phase

Functional description of value added wood manufacturing will be as follow:

- Raw materials are transported to the factory from the log yards and sent to the Band Saw.
- The Band Saw is useful for cutting logs to size and roughing out shapes. It contains a serrated blade that forms one continuous loop. The blade is stretched over two pulleys, the upper one idle, and the lower one driven by a variable speed electric motor. The appropriate cutting speed varies widely for different jobs.
- Edger is next in line from the Band Saw. An edger trims irregular edges to produce squared lumber.
- The best way of wood drying or seasoning would be kiln drying, where the wood is placed into a kiln compartment in stacks and dried by steaming, and releasing the steam slowly. Drying time and wood quality depend on the air velocity and its uniform circulation. At a constant temperature and relative humidity, the highest possible drying rate is obtained by rapid circulation of air across the surface of wood, giving rapid removal of moisture evaporating from the wood.
- Vapour from the kiln drier is drawn out and treated by biofiltration process. (optional)
- A planer is a woodworking machine to trim boards to a consistent thickness throughout their length and flat on both surfaces.

- Finger joints are generally created by using identical profiles for both pieces. They are made complementary by rotation or translation of the tool with respect to the workpiece.

4.8.4. Decommissioning Phase

The goal of project decommissioning phase is to remove the concrete and steel structures, and return the site to a condition as close to a pre-construction state as feasible. The physical removal of the structures and equipment will be the reversal of the construction process. Two trucks and 1 dozer will be used in decommissioning phase and will take approximately 6 months. The major activities that will be required for the decommissioning of the proposed project are:

(a) Concrete structures removal,

(b) Value added wood factory removal,

(c) Wood fired boiler plant removal, and

(d) Equipment and electrical supply system removal.

4.9. Value Added Wood Production Processes Description

PPT factory is producing raw wood to finished value added wood products. Total of 125 employees are working in the factory. The machines used in this factory include 9 veneer machines of different types operationg with 63 motors. PPT factory is producing the value added wood in the six departments; raw materials department, kiln room, manufacturing department, finger joint, packaging department, and spraying room.

Processes in Raw Material Department

Step 1 – Raw materials of PPT value added wood factory include Pa-Dauk, Ka-Nyin, Ou-Ban and Ka-Tood. The logs from the log yard are transported to the factory with cranes and piled up in the factory compound. It is then transported to the Band Saw by a small forklift to break it into pieces. The band saw can break a log at a time and it takes about 30 minutes to break a log. The thickness of the log can be changed according to the customers' requirements.

Figure – Piling up Logs in a Factory

Figure – Breaking Logs with Sawmill

Step 2 – The broken log pieces are delivered by forklift to be cut into required sizes by Band Saw according to the customer's requirements.

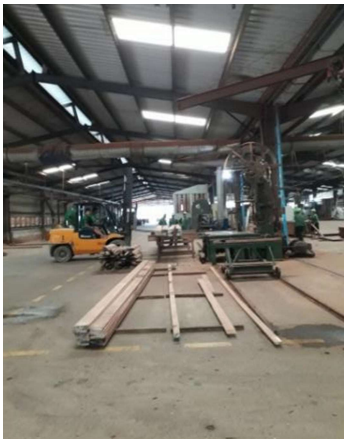


Figure – Transporting Logs by Forklift

Figure – Cutting Logs with Band Saw

Unprocessed raw wood is cut into small pieces and reused as boiler fuel.

Figure – Cutting Unprocessed Wood into Small Pieces

Step 3 – The lumbers are further refined if necessary to precise sizing of customers' requirements by sawmills. The side panels from the wood cutting operation are reused as fuel in boilers.

Figure – Cutting in Details with Sawmill to Meet Customers' Requirements

Processes in Kiln Room

Step 1 – Lumbers are classified according to the type of wood and size.

Step 2 – Before it is incubated in a kiln, the lumbers are air-dried on the outside of the kiln dryer to slightly reduce moisture content.

Figure – Arranging Lumbers for Air-drying

Figure – Air-drying by Sorting into Size

Step 3 – Air-dried lumbers, placed outside the kiln temporarily, are heated by a steam boiler. The moisture content of the lumbers is made to meet the needs of the customer. The drying time varies depending on the type of lumbers and size.

Figure – Placing Lumbers in the Kiln Dryer

Figure – Kiln Dryer

Figure – Boiler

Processes in Manufacturing Department

Step 1 – The dried lumbers from steam boiler are smoothened by the two-side planer machine.

Figure – Adjusting Surfaces with Two-side Planer Machine

Step 2 – The surface is trimmed and the logs are cut to size, according to the customer's required length. After trimming, the lumbers are cut and sorted to the required length and size.

Figure – Cutting Lumbers with the Chainsaw

Figure – Sorting Lumbers by Length and Size

Step 3 – By using one-way lathe machine, the edges of trimmed lumbers are straightened and smoothened.

Figure – Edging Angles with One-way Lathe Machine

Step 4 – After the lumbers had smoothened and straightened the angles, the lumbers are planed with four-side planer machine. Depending on the customers' requirements, the lumbers are joint and polished, or they are packed directly for distribution.

Figure – Planing with Four-side Planer Machine

Processes in Finger Joint

Step 1 – The lumbers, which are machined on a four-sided planer machine are attached to the joints, by using the finger joint.

Figure – Making Joints

Figure – Joining with Finger Joint

Step 2 – Joints are then cut with sawmill to get the required length, and the correct length is checked.

Figure – Cutting the Lumbers with a Sawmill

Step 3 – The length is checked and the wooden rods are sent to a four-sided planer machine by forklift to smooth the four-sided surface.

Figure – Planing with Four-sided Planer Machine

Step 4 – The lumbers, which are smoothened with the four-sided planer machine, are transported to the double end by forklift and these lumbers are further adjusted. The finished product is sent to the packaging department to inspect defects and for packaging.

Figure – Edging the Angles with Wood Edger Machine

Processes in Spraying Room

Step 1 – The types of wood, size of the lumber and defects are checked. The lumbers are inspected the defects and polished to make them smoother.

Figure – Polishing the Lumbers

Step 2 – During spraying, the lumbers are sprayed in the room where it is made to absorb the fumes.

Figure – Spraying the Lumbers

Step 3 – The sprayed lumbers are dried in a drying chamber to allow them to dry. Dried lumbers are sent to the packaging department for packing.

Figure – Air-drying the Lumbers after Spraying

Processes in Packaging Department

Step 1 – Before packing, the lumbers are packaged according to size.

Figure – Before Packaging

Figure – Packaging the Lumbers

Step 2 – Before being shipped to the customer, the packaged wood is stored by their types and size.

Figure – Stacking the Lumbers after Packaging

The process flow diagram of value added wood production is described clearly as follows.

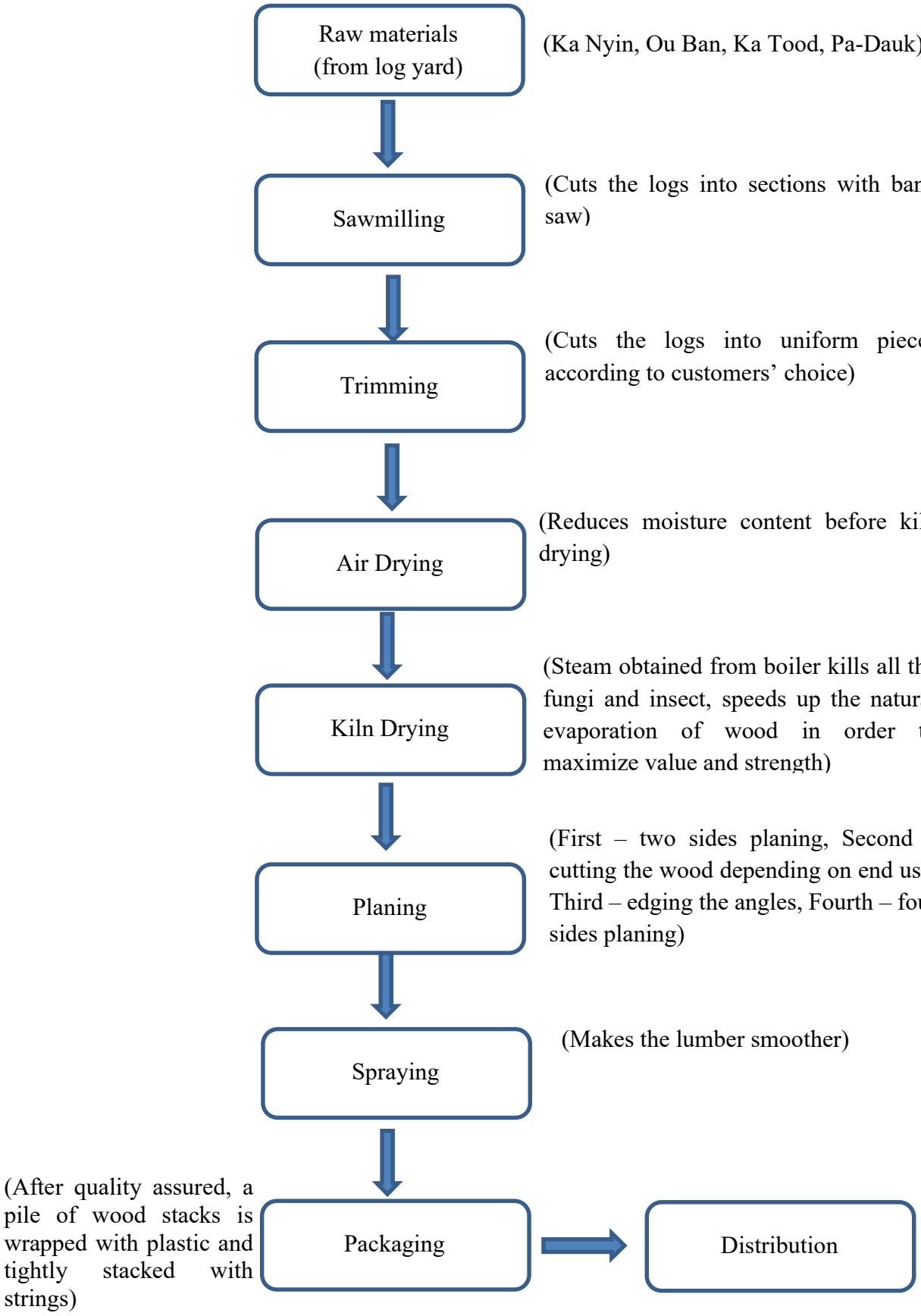


Figure 4.5. Flow chart of Value Added Wood Factory by PPT Company

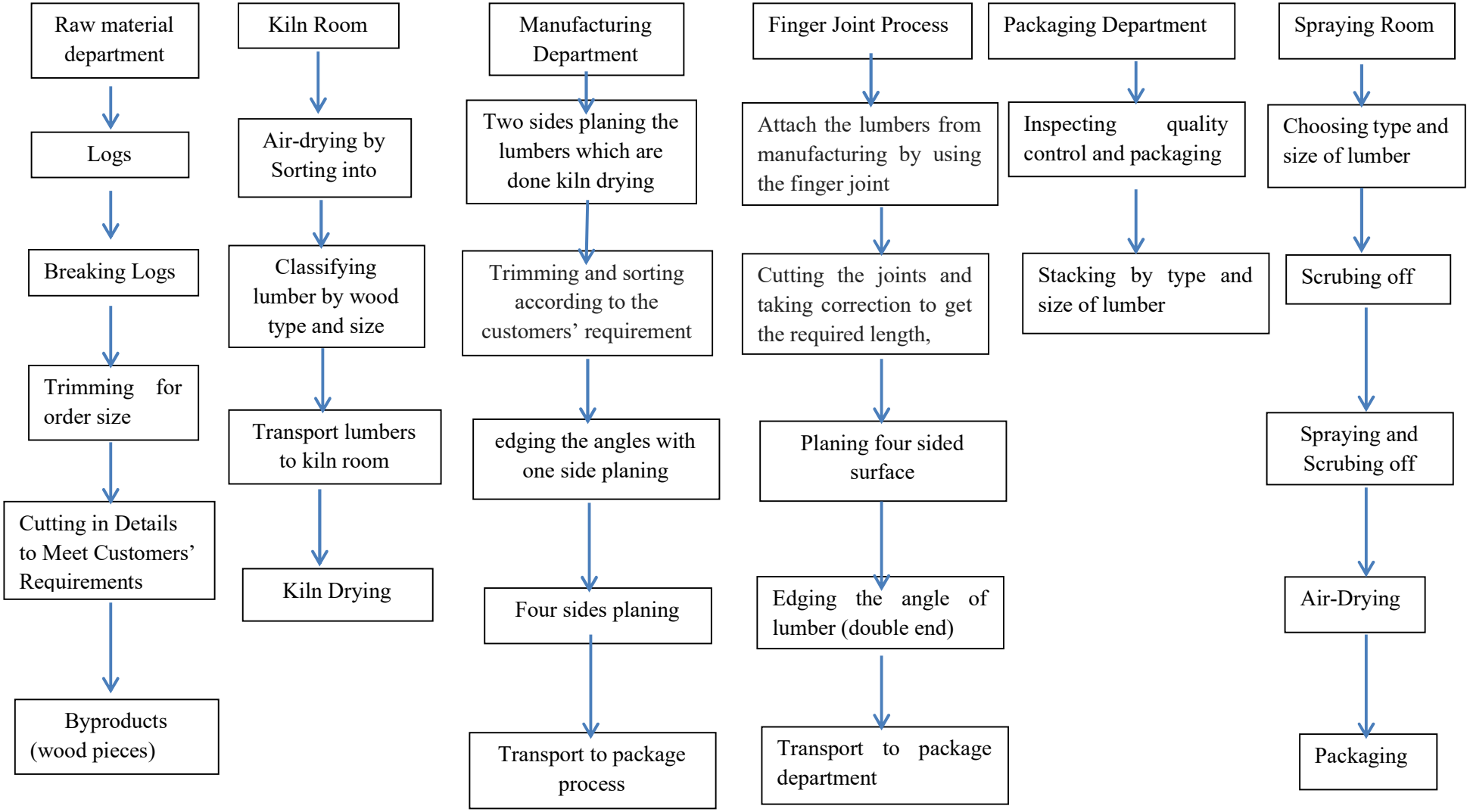


Figure 4.6. Flow Chart of Processes from Six Departments

Figure 4.7. Photo Diagram of Value Added Wood Processes

4.10. Machinery and Equipments

Components of proposed project are show follow;

Table 4.1- Motor Vehicle for Proposed Project

Sr.No.	Particular	Qty
1.	Auto mobile	2
2.	3RC Truck	2

Table 4.2- Machinery and Equipments for Value Added Wood Factory

Sr.No.	Particular	A/U	Qty
1	Band Saw		14

2	Cutting Board		3
3	Two-side Planer Machine		2
4	Four-side Planer Machine		1
5	Wood Splitter		1
6	Dryer		1
7	Kiln Room		17
8	Wood fire Boiler	Set	1
9	Electric Motor		63

Table 4.3– List of Additional Veneer Peeling Machines

No.	Types of machines	No. of machines	Power (kW)	No. of motors	Total Power (kW)
1.	10’ Veneer Peeling Machine	1			
			110.00	1	110.00
			1.50	4	6.00
			7.50	1	7.50
			22.00	1	22.00
			5.50	1	5.50
			3.70	1	3.70
			2.20	1	2.20
			0.75	1	0.75
2.	8’ Veneer Peeling Machine	1			
			18.50	1	18.50
			2.20	2	4.40
			0.75	2	1.50
3.	8’ Veneer Peeling Machine (Rough)	1			
			18.50	1	18.50
			2.20	2	4.40
			1.50	2	3.00
4.	Veneer Roller	1			
			2.20	2	4.40
			1.50	7	10.50
			0.75	2	1.50
5.	Veneer Kiln Room	1			
			15.0	12	180.0
			11.0	4	44.0
			5.5	6	33.0
6.	Veneer Bench	3			
			2.20	3	6.60
			1.50	3	4.50

7.	Veneer Knife Honing Machine	1			
			3.70	1	3.70
			1.50	1	1.50
			0.90	1	0.90
	Total	9		63	498.55

Description of Electrical and Instrumentation Systems

Motor Control Center-MCC Section

- Approximately 63 motors are required. Approximately 50% will have frequency inverters.
- The panel is equipped with one main isolating switch. Customer must provide power to the terminals on this switch. At present the system is designed for motor supply voltage 3×440 VAC (±5%), 60 Hz (±2 Hz).
- The panel is designed for all motors according to a Motor List which will be finalized when the plant components have been placed.
- The panel has cable access through the bottom and has only access through the front doors.
- The panel is made of mild steel, protected by grey lacquer.
- Speed (rpm) adjustable motors normally uses a frequency inverter variable speed drive.
- Short circuit capacity for each motor starter will depend upon type of equipment being used.
- Motor control voltage is 230 VAC.
- There is an emergency stop system that will stop all machineries connected to the panel. It consists of one emergency switch in front of the panel and 2 switches for field installation.

Programmable logic controller-PLC section

- The panel is designed for supply voltage 1×230 VAC (±5%)
- The panel will be designed according to instrument list or PID, built into the above panel, with sensors, transmitters, actuators and valves for field installation.
- Electronic analogue signals are standardized to either 4-20 mA DC or 3-wire PT100 resistance thermometer.
- The main components are:

- electronic transmitters for measuring equipment.
- 24 V DC power supply for control loops.
- computer touch screen for all man-machine communication.
- PLC computer that handles all motor start/stop and control valves.
- PLC based motor starter control system.
- PLC based motor interlocking control system, and.
- PLC based alarm handling system

Field instrument

- Temperature transmitters for coagulated material and dried product.
- Pressure transmitters for vapor vent pressure.
- Level transmitter in press liquid tank.
- Level switches in raw material hopper, cooker outlet, press inlet and meal silo.

Automatic valves

- Control valves are normally 90° rotary valves, equipped with pneumatic/electric actuator and positioner or solenoid valve.
- Included (preliminary list) is two steam control valves for cooker and drier, discharge valve for press liquid tank, closing valves for seawater and cooling water.

4.11. Employee Statement

The following tables show the employee statement and working cycle.

Labors required	
Laboratory Staff	4 members
Office Staff	6 members
Factory Labors (Male)	41 members
Factory Labors (Female)	4 members
Total	55 members
Working hours	
Morning time	10:00am to 6:00pm (Breaktime 12:30pm to 1:00pm)
Evening time	6:00pm to 6:00am (Breaktime 11:30pm to 1:00am)

4.12. Factory Products and By-Products

The factory manufacture 200-300 tons of value added wood products per month and distribute to the local and aslo to foreign countries like China, Thai and India. There is no any other product except value added wood products. However it was found that some of the by-products such as the iron pieces and other unwanted sawdust are generated from the milling process.

4.13. Utilities Consumption

(a) Energy Required

The proposed project is intended to get required electricity supply form 350 kVA generators. Electric power will be used for the purpose of to run the production machinery and to provide lighting. The total estimated demand for electricity will be 160 KVA.

(b) Wood

Wood is used for wood fired boiler in drying process. General information of proposed boiler information is mentioned in below table.

Table 4.4 - Utilities of Wood Fired Steam Boiler

Description	Process
Brand name	Yuanda Boiler
Output	Steam
Rated steam temperature	184 ℃
Fuel consumption (wood)	176 kg/hr
Water consumption	1m^3/hr
Wastewater discharge	0.13m^3/hr
Bottom ash released	17 kg/hr (10% of fuel usage)

5.0. DESCRIPTION OF SURROUNDING ENVIRONMENT

5.1. General Geology

The investigated area lies on the southern part of Shan-Taninthayi massif and northern continuation of Taninthayi ranges, it is covered with Late Paleozoic rocks. The western part of the study area, which is in Taungnyo Range, are Carboniferous rock units (Taungnyo Series) arranged and systematically described (Leicester, 1930). Further up to the northwestern part, also in Mottama Range, Late Permian rocks (Martaban Beds, Pascoe, 1959) and Mesozoic granitic rocks are exposed. Along the Tanintharyi area, quaternary deposit of gray and gray swampy soil and red brown forest soil types are present. Soil Map of Tanintharyi region is shown in Figure 5.1.

The project site is underlain by limestones belonging to the coastal formation, which are found at depths below ground level. The soil at the surfaceof the project site consists of a layer of reddish-brown silty clay and coarse to finecalcareous sand that is up to 6 meters deep.

This soil type covers the entire site and overlays four different other soil types, the arealdistribution of which is shown in Figure 5.1. These consist of dense calcareous sand, sand gravels, compact to dense medium to fine sands, soft peaty clays and compact sands.

The Coastal Group of limestones consists of a variety of limestones deposited in shallow coastal environments comprised of reef deposits, limestone muds, and gravels, colluvium and rubbly reworked materials. Further to the south the Coastal Group limestones are overlain by limestones belonging to the Montpelier Formation.

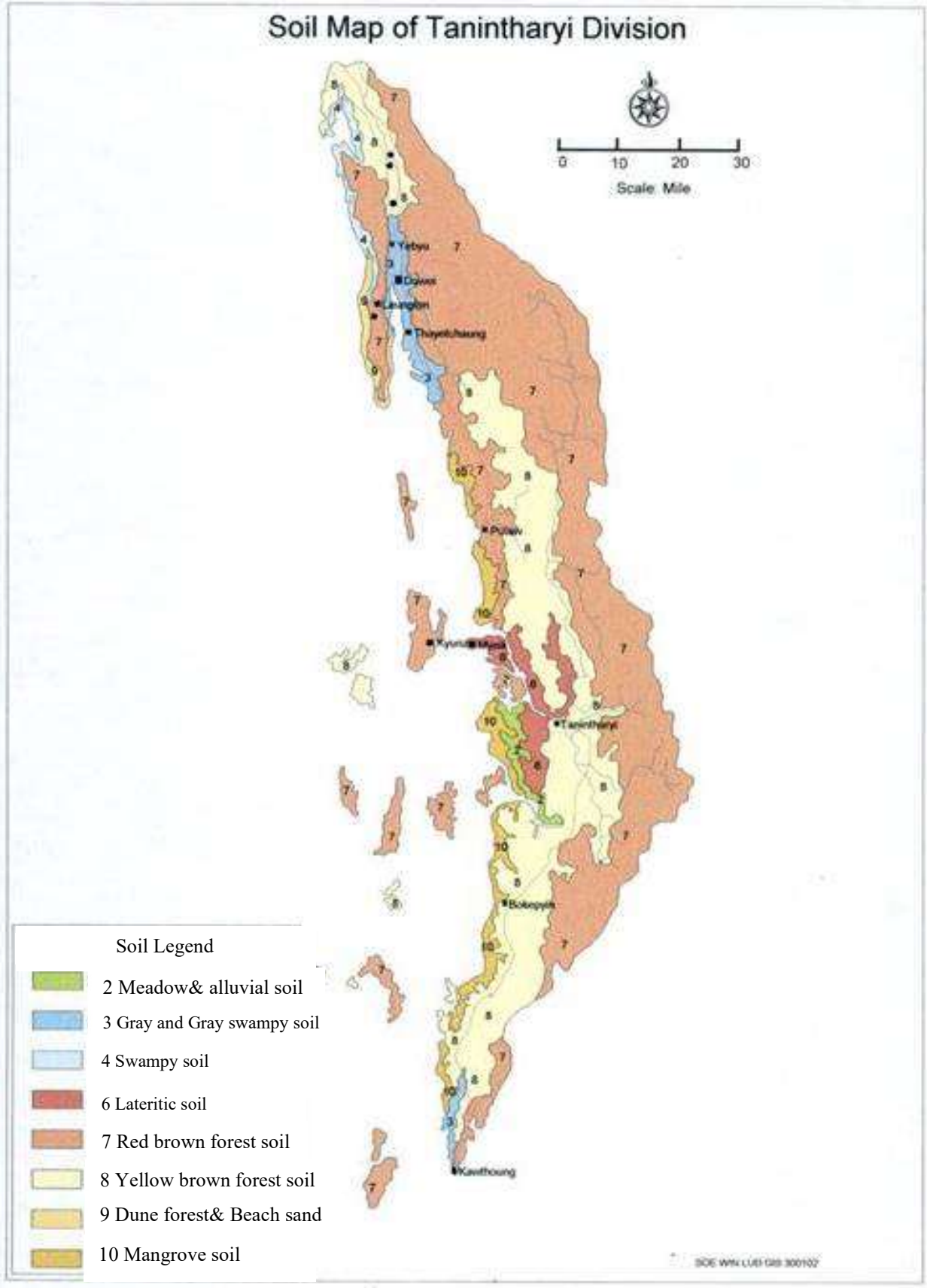


Figure 5.1. Soil Map of Tanintharyi Region

5.2. Seismicity

Myanmar is an earthquake-prone country because it lies in a one of the world major earthquake belt, Alpide Belt, which extends from northern Mediterranean through Iran, Himalaya region and Myanmar. Most of the earthquake in central and delta region of Myanmar have resulted from movement of Sagaing Fault which extends from the northwest of Katha, through Sagaing, along the eastern flank of Pegu Yoma and finally into the western Gulf of Martaban for a distance of about 600 miles. Structurally, Hpa-pon fault and Three - pagoda fault are situated at the northern and southern part of the area and their trend in nealy NW - SE direction. Earthquake intensity in the area can be seen in Figure 5.4. The approach is mainly empirical and historical in the sense that it makes use of past seismic events and history to make educated guesses about region wide intensities in the future. Recent earthquakes include one in April 2016 near Mawtaik on the India and Sunda (Eurasia) plates at 6.9 magnitudes on the Richter scale, as well as a magnitude 6.8 earthquake that occurred on the Sagaing fault in Myanmar on November 11, 2012. The Sagaing fault is a major fault in Southeast Asia between the India and Sunda (Eurasia) plates. This strike-slip fault (side-to side motion) is part of a broad zone of deformation that includes the India Asia collision zone to the north and extension of the Andaman Sea to the south. The November 11 earthquake and its four aftershocks (with magnitudes ranging from M-5 to M-5.8) occurred north of the city of Mandalay, along a stretch of the Sagaing fault. A map of earthquakes in the SE Asian region is shown in Figure 5.2. and a historical earthquake map of Myanmar is shown in Figure 5.3.

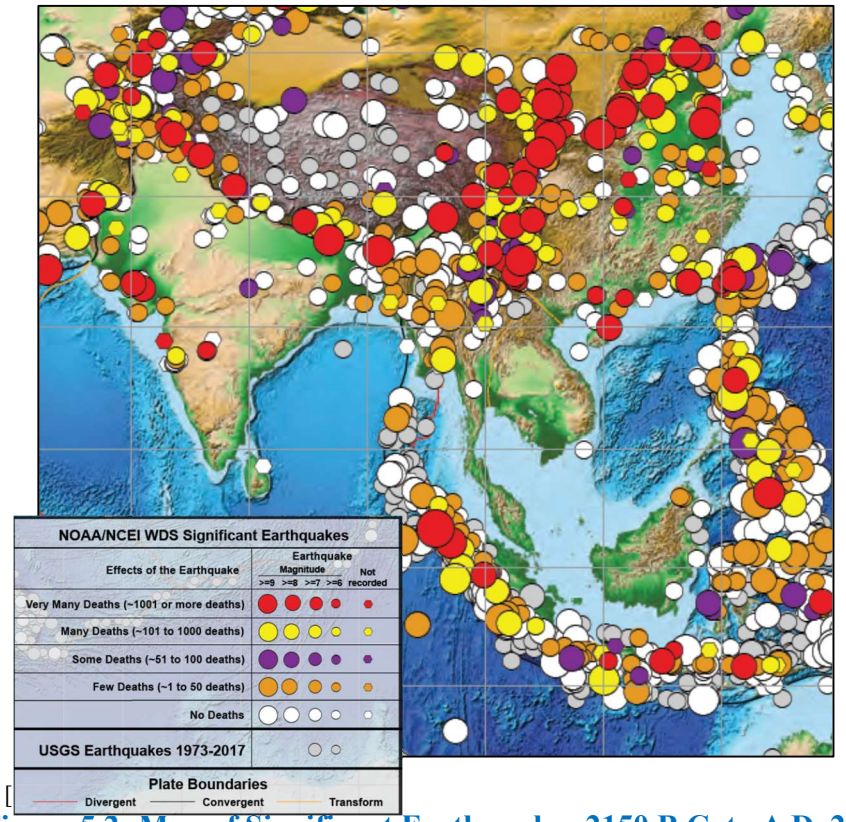
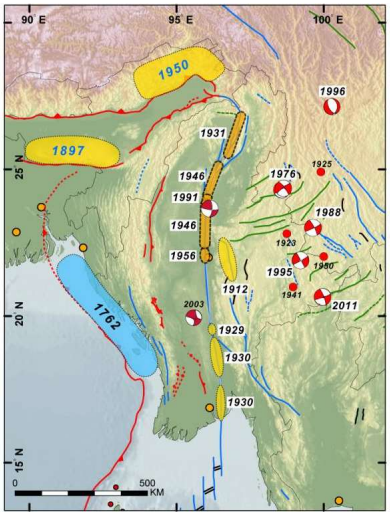
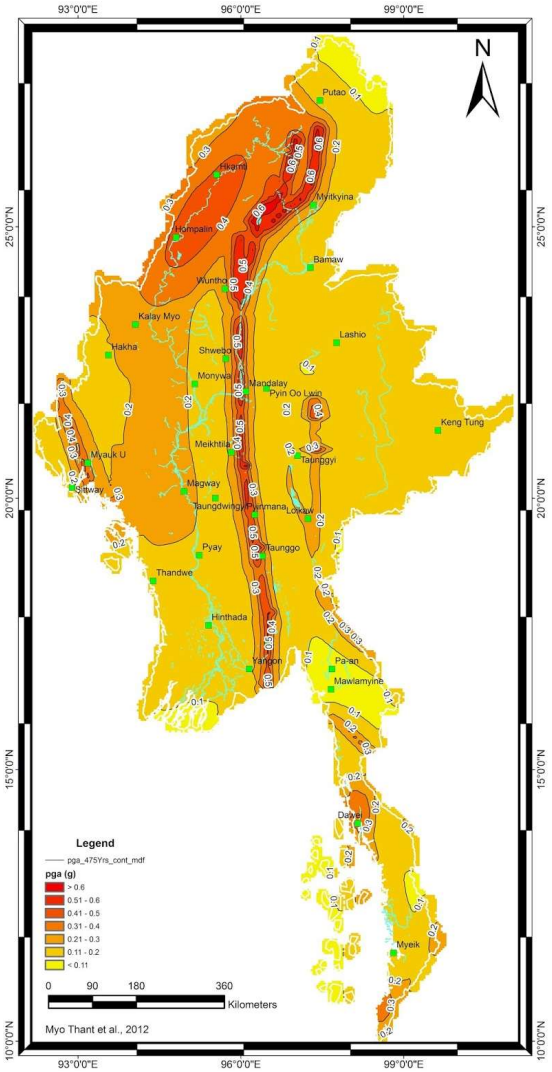


Figure 5.2- Map of Significant Earthquakes 2150 B.C. to A.D. 2017



[Source: http://www.earthobservatory.sg/news/strong-quake-myanmar#.U4wB1ncxXmQ , Accessed 2016]

Figure 5.3. Neotectonic Map of Myanmar



Source: Myo Thant et al.,2012

Figure 5.4- Seismic Zone Map of Myanmar (PSHA Map, 2012)

As per map the proposed project is located within the Zone II (Moderate zone) of earthquake hazard, as shown in prbabilistic seismic hazard Assessment Map (PSHA Map) of Myanmar showing expected peak ground acceleration (PGA) values with 100% probability in 500 years.

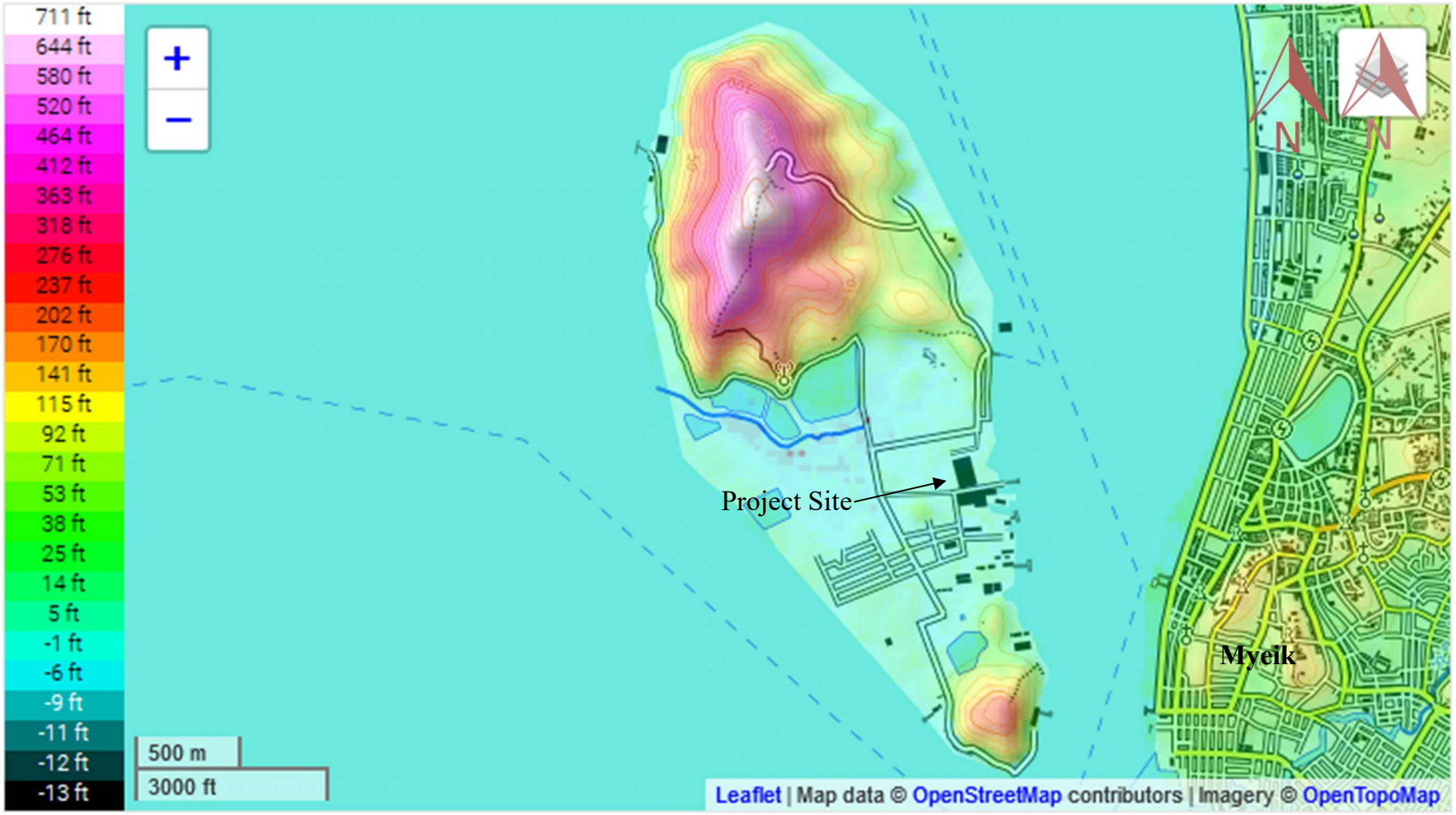
5.3. Topography

The topography of Tanintharyi coast is greatly influenced by tectonic movement and volcanic activity resulting from the docking of the Indian tectonic plate with the Eurasian plate in the early Miocene. The twisting of the Eurasian plate as the Indian plate dragged its margins northwards formed many rocky shorelines and the rocky headlands and capes jutting out into the sea. The region's granitic islands began as intrusions of hot magma that rose through weak spots in the Earth's crust hundreds of million years ago, working their way through thick layers of sedimentary rock laid down at least 100 million years earlier still.

The project site is located on a coastal strip at the base of the Pahtaw-PahtetIsland (Figure 5.5.). Here the limestone hills to the westslope eastwards from an altitude of 77 m (245 ft) high of the top.

The project site south of the main road is relatively flat with a low-lying flat area close to sea level in east and rising to a height of 5 m (17 ft) in the central section of the site. From the northeast the land rises gently towards the east. Here the elevation at the coastline is in the order of 1.5 m (5 ft) (Figure 5.5).

The project site itself is relatively flat and has distinct drainage features on the slopes. Storm runoff from the slopes is intercepted by the east-west running main road and therefore should prevent any significant storm runoff from flowing onto the site.



Source: http://en-us.topographic-map.com

Figure 5.5. Site Topography

5.4.Hydrology

5.4.1.Surface Water

The Tanintharyi Coastal area is the longest coastal zone of Myanmar and is bounded by Andaman Sea in the west. This coastal zone covers south of the Gulf of Mottama up to the mouth of Pakchan River. It also includes Myeik Archipelago and Andaman Sea. Myeik Archipelago extends from Mali Island to Similand Island and contains about 800 islands covering an area of about 34,340 sqkm and is lying up to 30km off shore. Some islands also exist at the northern part of this coastal area. The length of the mainland coast is about 1,200 km and the total land area is about 43,344 sqkm. The coastal plain is narrow and gradually rises towards the east to become the Tanintharyi Yoma with 2,073 meter high Myint Moe Let Khat Taung as the highest peak. The vertical temperature distribution in sea waters showed a maximum at the surface layer and then decreased with depth. However, salinity increased gradually with Country report on pollution. The thermo cline zone of the Tanintharyi coast was presented at 50 meter depth to 230 meter depth. The Great Tenasserim River or the Tanintharyi River is a major river of southeastern Burma. It flows through the Tanintharyi Region, past the town of Tanintharyi, and enters the sea at Myeik (Mergui). The river rises from the Tenasserim Range at an altitude of 2,074 m (6,804 ft), and flows into the Andaman Sea. The river banks are characterized as almost perpendicular in some areas. Islands dot the river in the low land areas. Rapids occur in narrow areas of the channel. The tide is felt 10 mi (16 km) above Tanintharyi. The Tenasserim plains to the north are drained by a series of short rivers and tributaries. The tributaries include Tonbyaw Creek, Thuggoo River, as well as the Hti-phan-ko stream on the Great Tenasserim's right bank. Soil erosion is reported in the upland ridges of the region.

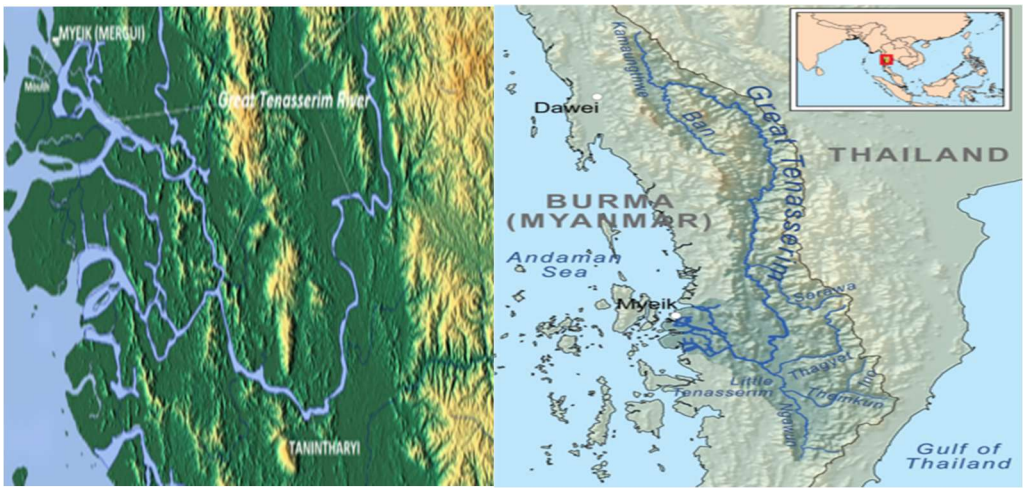


Figure 5.6 - Surfacewater of Tanintharyi Region

5.4.2 Groundwater

The major aquifers of Myanmar range from Precambrian to Recent age and vary from coastal and north-south trending tectonically controlled basins. The major groundwater recharge is from monsoonal rainfall, which extends from June to September, ranges up to 3050 mm in the deltaic area, 3810 mm in the north, ~2000 mm in the eastern mountainous region, and only 760 mm in the central dry zone. The largest aquifer is the Irrawaddy river basin, which like the IGBM basin is the most prolific aquifer, however, much of the aquifers of the basin have been identified to have groundwater enriched with as (Fig. 5.7). The other aquifers are in the Thanlwin, the Chindwin, and the Sittaung rivers. The total groundwater potential of Myanmar is ~495 km^3/year, respectively. The groundwater use in Myanmar is mostly for agriculture purposes, ranging up to ~90%, the rest ~10% being used in industrial practices and domestic purposes.

On the basis of stratigraphic unit, Myanmar has eleven different types of aquifers. Depending on their lithology and depositional environment, groundwater from those aquifers varies in quality and quantity. Of these, groundwater from alluvial and Irrawaddian aquifers is more potable for both irrigation and domestic uses.

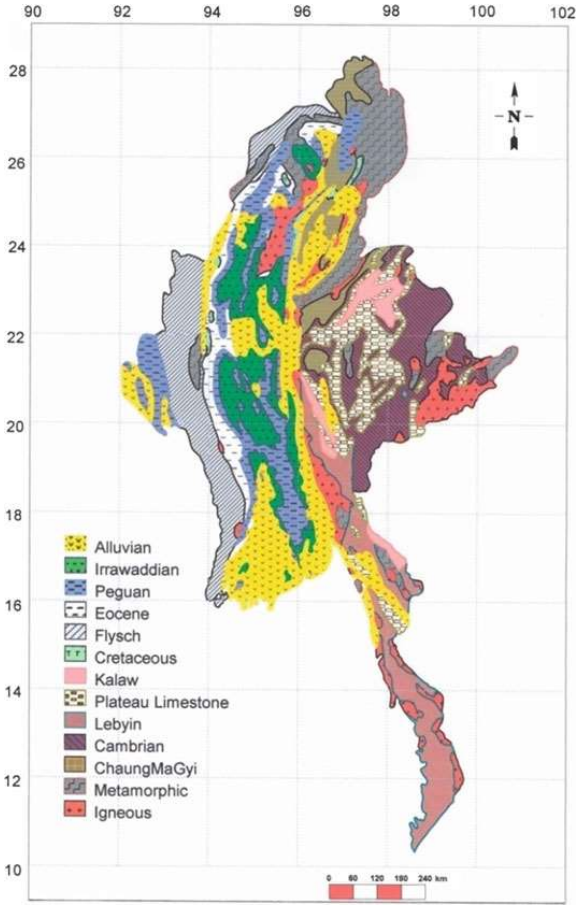
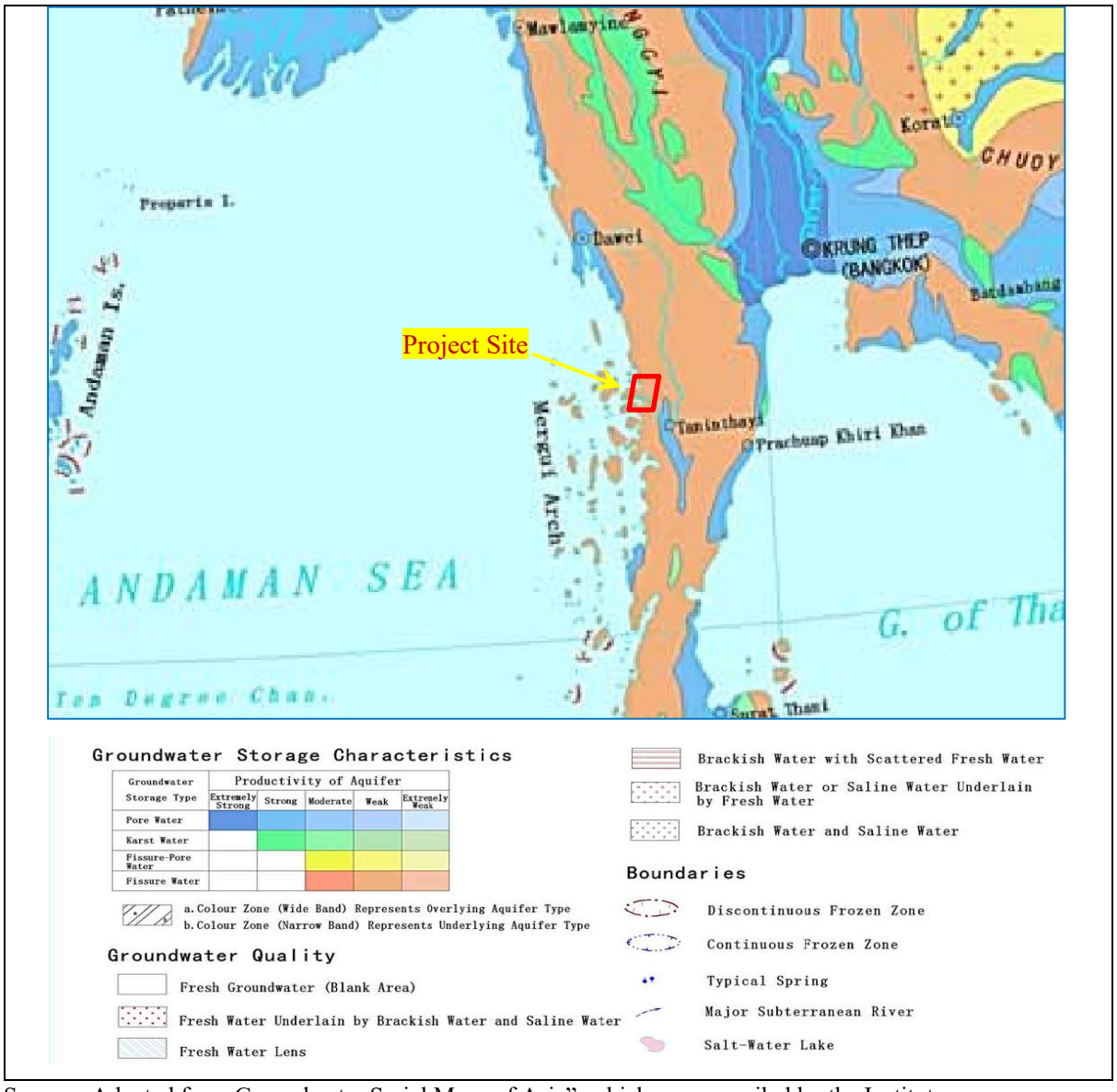


Figure 5.7- Aquifers in Myanmar. [*Source* WRUD]

5.4.3 Groundwater Resource in Tanintharyi Region

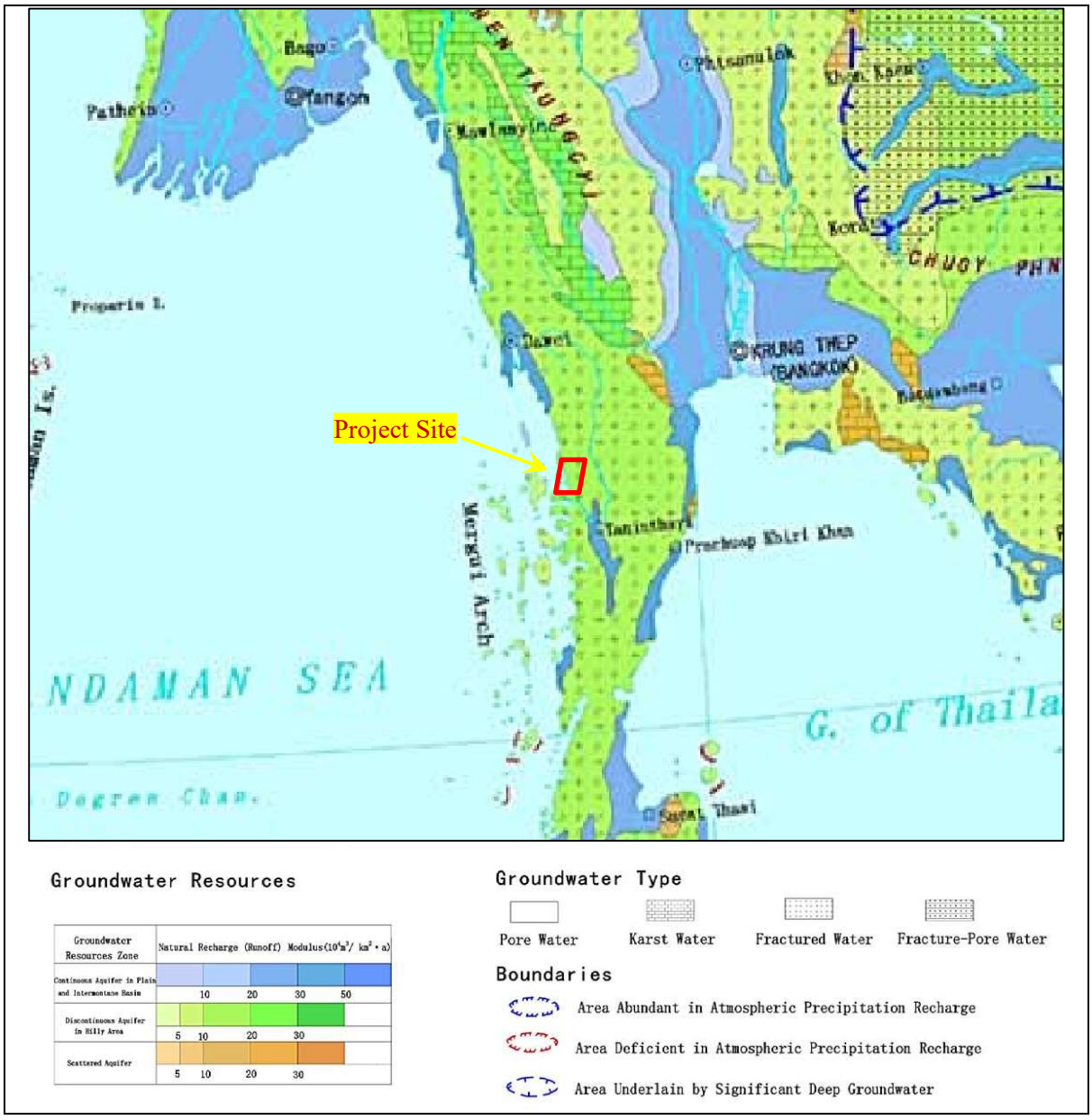
Groundwater occurs mainly in limestone of the Carboniferous–Permian age. In the eastern part of the area, it lies in beds of Mesozoic and Precambrian ages. Groundwater in volcanic rocks is found in the southeastern part. Generally, it is fresh and mostly suitable for drinking and irrigation. To exploit economically, drilling method may be limited.

The following Figure 5.8 and Figure 5.9 shows, a Hydrogeological Map, and Groundwater Resources Map, reference from the China Geological Survey has organized the publication of a document titled "Groundwater Serial Maps of Asia", which was compiled by the Institute of Hydrogeology and Environmental Geology of CAGS in 2012, and summarizes research on groundwater systems in Asian countries, including Myanmar.



Source: Adapted from Groundwater Serial Maps of Asia", which was compiled by the Institute of Hydrogeology and Environmental Geology of CAGS in 2012

Figure 5.8- Hydrogeological Map of Project Area



Source: Adapted from Groundwater Serial Maps of Asia", which was compiled by the Institute of Hydrogeology and Environmental Geology of CAGS in 2012

Figure 5.9- Groundwater Source in Project Area

Based on these maps, the productivity of aquifers near the project area can beclassified as groundwater storage characteristic is *Moderate Fissure Water*, and groundwater type is *Fractured Water*. The groundwater quality is considered *Fresh Groundwater*. Groundwater resources classifications consist of *Discontinuous Aquifer in Hilly Area*, with Natural Recharge Modulus ranging from 100,000-300,000m^3/km^2-yr.

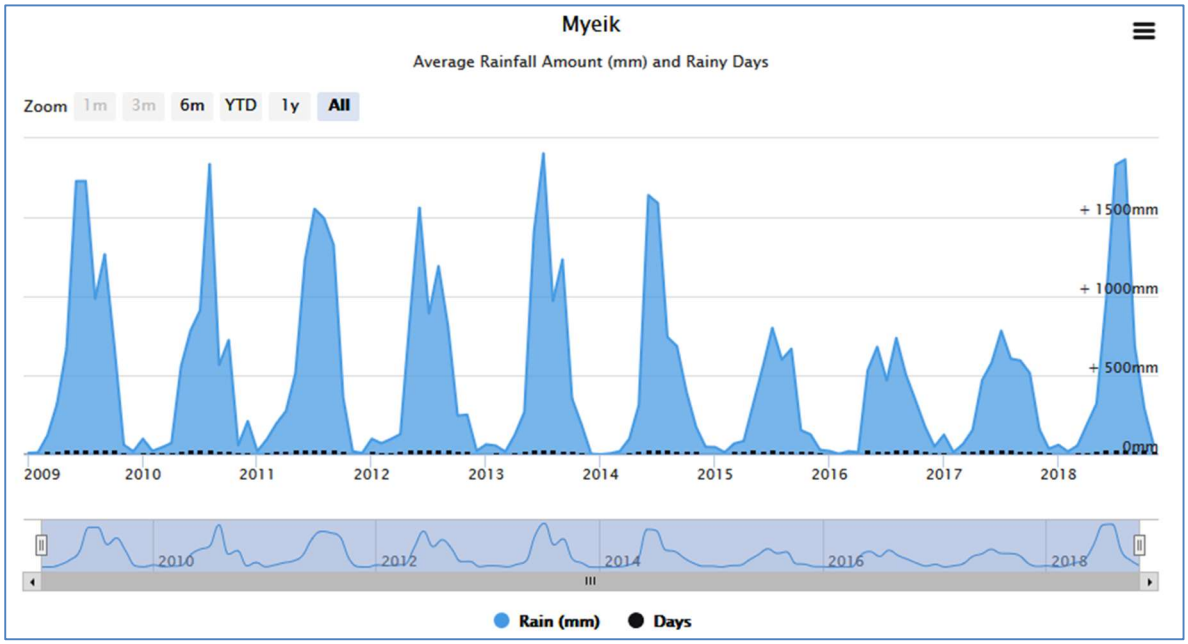
5.5. Climate and Meteorology

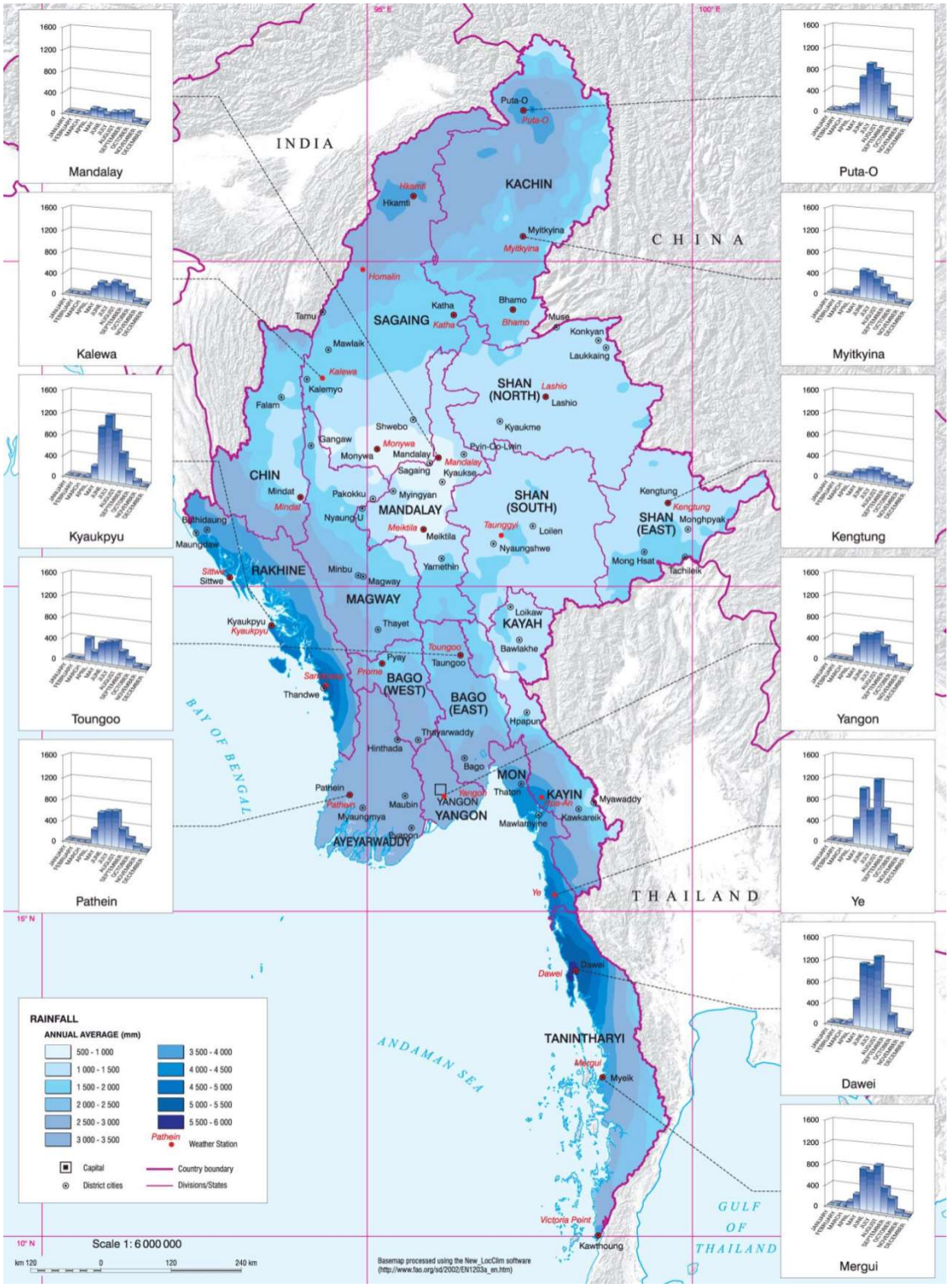
Tanintharyi region has a tropical climate. The region has only slight changes in temperature. Myeik has temperate weather, as it is located in the low latitude zone and near the sea. The dry season of the area in which the project lies starts in February and ends in May. The rainy season starts in June and ends in September and the cold season follow with the cooler, drier months of October to January. Some important meteorological data which are collected from Meteorological Station (Myeik) are as follow:

5.5.1. Rainfall

The project area is warm and wet season with the highest temperature (37˚C) and lowest temperature (14.5˚C). Yearly rainfall and temperature are as follow:

No.	Year	Rainfall		Temperature	
		Raining Days	Total Rainfall	Summer	Winter
				Maximum	Minimum
1	2012	183	169.58	35.5	23.0
2	2013	182	185.39	35.5	15.5
3	2014	149	181.66	35.5	14.5
4	2015	151	171.34	36.5	18.5
5	2016	162	146.26	35.5	17.0
6	2017	13	6.95	37.0	20.5





[Source: http://dwms.fao.org/atlases/myanmar/atlas_en.htm]

Figure 5.10. Rainfall Map of Myanmar with Monthly Distribution Patterns

5.5.2 Wind

Winds approach the project area primarily from the east and northeast. Long-term wind data obtained from the station of Myeik (Department of Meteorology and Hydrology Myanmar) located 1 miles east of the site. During the pre-monsoon months of onset date to June, the wind blew Southeast, South and Southwest direction over the country. In the Southwest monsoon months of July and August, the wind blew South and Southwest direction and in the post monsoon months of September to withdrawal date, the wind blew from North and Northeast direction over the country. For the wind speed, the coastal areas have stronger wind than the inland areas and also stronger wind prevailed monsoon season than the pre and post monsoon. Figure 5.11 to 5.13 shows the results for the wind direction and speed representing the regions of Myeik during the study period 2001-2010 (10yrs). The data indicates that greater than 4 mph of the wind speed are more frequently from the southwest in pre-monsoon season and monsoon season. In post monsoon season southwest, southeast and northeast sectors are greater than 4 mph of wind speed.

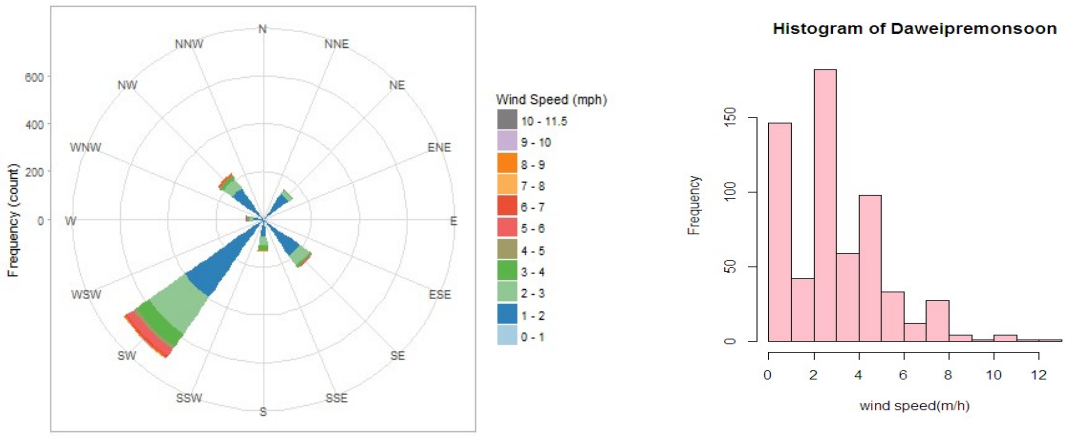


Figure 5.11. Wind Rose and Frequency of Wind Speed for Pre-monsoon Season
(Source: Myanmar Climate Report, No. 9/2017)

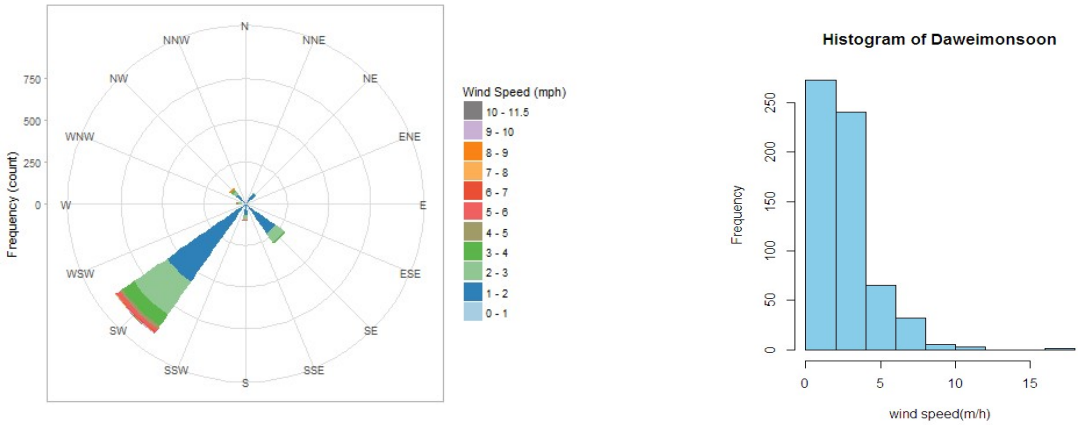


Figure 5.12- Wind Rose and Frequency of Wind Speed for Monsoon Season
(Source: Myanmar Climate Report, No. 9/2017)

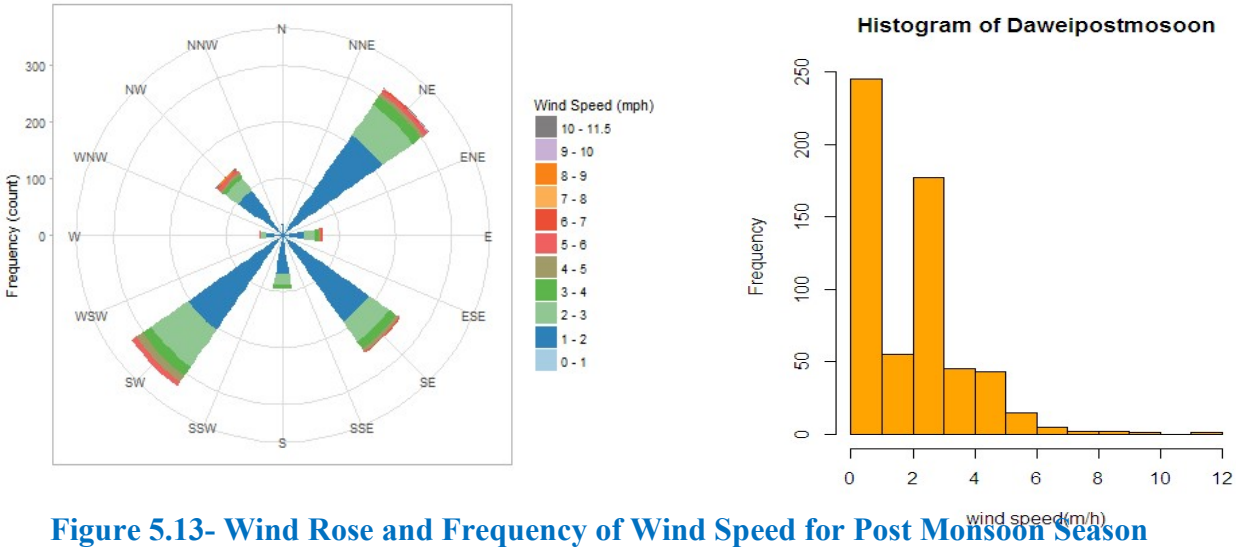


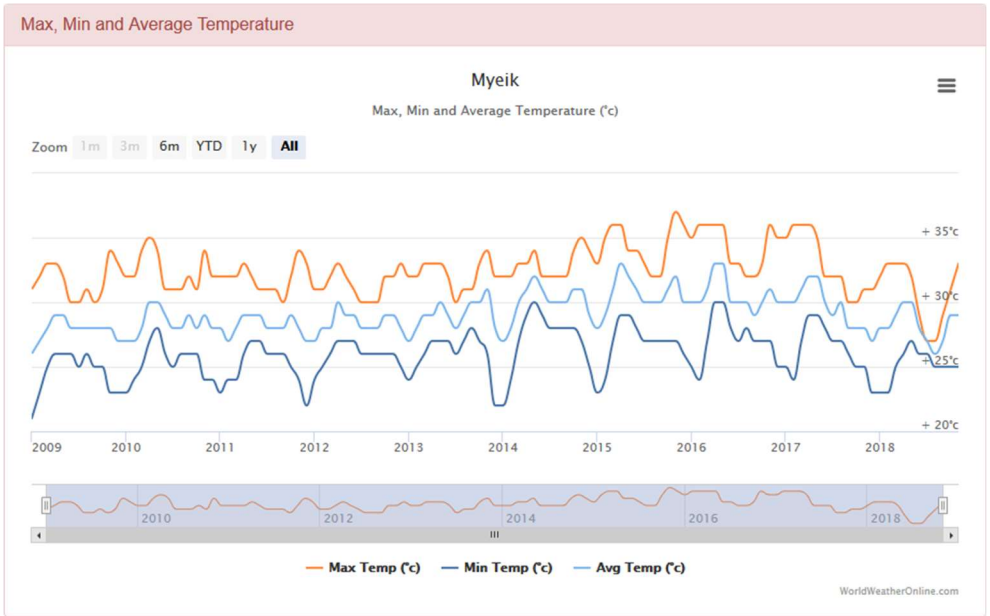
Figure 5.13- Wind Rose and Frequency of Wind Speed for Post Monsoon Season

(Source: Myanmar Climate Report, No. 9/2017)

5.5.3 Temperature Trends

It was very clear from temperature trend analysis that the maximum temperature showed increasing trends and decreasing trend for minimum temperature over all parts of the years in the project site.

The deviation for T_{max} was calculated following the formula: $T_{maxn} - T_{max}$, andthe deviation for T_{min} was calculated by $T_{minn} - T_{min}$, where "n" represents eachyear and "normal" is the T_{max} or T_{min} normals calculated for the period 2009-2018



Source: www.worldweatheronline.com/myeik-weather-averages/tenasserim/mm.aspx

Figure 5.14 - Maximum and Minimum Temperature Deviation Trend over Myeik

5.6. Oceanography

The project area is including Myeik archipelago, lies in the Andaman Sea off the coast of southern Tanintharyi,consists of some large offshore islands, and the near-shore areas between these and the coastline are marshy and partly covered with mangrove forests.

5.6.1 Waves

Wave climates at the project site are consistent with the local wind conditions. Predominant waves are from the easterly and wastely directions.Current wave conditions of Project area is *significantheight*, about 14% of waves will be higher than the significant wave height (about 1 in every 7 waves). The average wave height is 0.1m.The project seashore has a smooth beach slope and is very little potential to wave impacts. The waves on the shore can be slightly affected by the orientation of the coastline and the seabed of the beaches, although in most cases they are usually equivalent.

5.6.2 Tides

Tidal variation at Myeik is relatively low. The tide at the project site will only depend on the situation of the moon (especially in full moon day). The following graph shows the ***progression of the tidal coefficient*** in the month of ***December of 2018***.These values give us a rough idea of the tidal amplitude in Myeik, forecast in December. Large coefficients indicate important high and low tides; major currents and movements usually take place on the sea bed. But bear in mind that this tidal amplitude may be greatly affected by the weather.

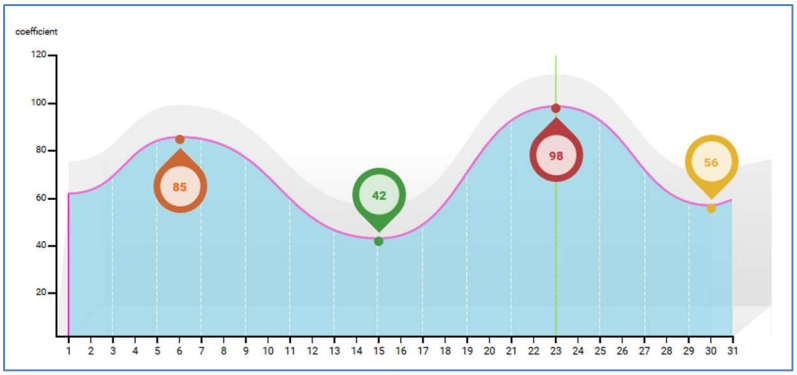


Figure 5.15 - Progression of the Tidal Coefficient in Myeik Area

5.7. Tsunamis

In Myanmar there were records of moderate tsunamis, generated by two large magnitude earthquakes, which originated in the Andaman-Nicobar Islands [these are the 31 December 1881 Car Nicobar Earthquake (7.9 Richter scale [RS]) and the 26 June 1941 Andaman Island

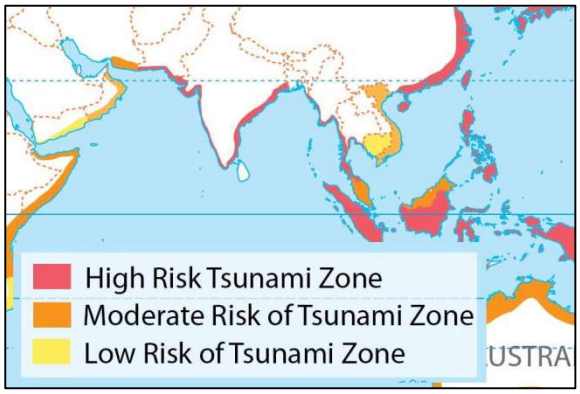
Earthquake (7.7 RS)]. The tsunami generated by the giant 2004 Sumatra Earthquake also caused moderate damage in some parts of the Myanmar Coast. It is evident that Myanmar is vulnerable to hazards from moderate and large tsunami along its long coastline.

Previous Indian Ocean tsunamis have not been properly documented. The southern Tanintharyi Coast, consists of some large offshore islands, and the near-shore areas between these and the coastline are marshy and partly covered with mangrove forests. This setting therefore provides partial protection from tsunami waves. However, the northern Tanintharyi Coast is generally flat and sandy areas. Thus, this area is comparatively more vulnerable to the tsunami hazard. The probable earthquake and tsunami hazards along the Myanmar coastal areas are summarised in the following table.

Table 5.1 - Probable Earthquake and Tsunami Hazards along the Myanmar Coastal Areas

Coastal Region	**Area**	**Earthquake Hazard** (Modified Mercalli Intensity Scale)	**Tsunami Hazard**
Rakhine Coast	Northern Part	Strong Zone with MMI 8	Moderate
	Southern Part	Moderate Zone with MMI 7	Moderate
Delta Area	Ayeyarwady Delta	Moderate Zone with MMI 7	Moderate
	Sittaung Estuary	Severe Zone with MMI 8 - 9	Moderate
Tanintharyi Coast	Northern Part	Moderate Zone with MMI 7	Moderate
	Southern Part	Moderate Zone with MMI 7	Light

Source: Hazard Profile of Myanmar (2009)



Source: World Tsunami Zones (www.mapsofworld.com)

Figure 5.16- Tsunami Risk in the Bay of Bengal

By studying the above facts and figures, there will be moderate impact of Tsunami on the proposed project.

5.8. Traffic Study

Since the project is near located in the relatively populated municipal area (Myeik) and the nature of the project is highly interrelated with the traffic conditions, IEE team took a traffic study and prepared vehicle movements summaries at the vicinity of the project. The purpose of the traffic study is to summarize the counts of vehicle movements through Kanner road and to know the peak period hours. This type of volume summary is used in making decisions regarding the movement making, traffic circulation patterns, capacity analysis, and vehicle classification.

Figure 5.17. Accounting Point of Vehicle Movement in Google Map

Table 5.2 -Summary of Vehicle Movements in Weekend Day

	SUMMARY OF VEHICLE MOVEMENTS	
	LOCATION: Kanner Rd	
TOWNSHIP: Myeik		CITY: Myeik
OBSERVER: IEE Team		DATE: 29.9.2018 (Sat)
WEATHER: Clear		Weekend Day

REMARK:					
	VEHICLE MOVEMENTS				
TIME		**Types of Vehicles**			**Total**
BEGIN	Motorcycle	Car	Truck	Tricycle	
7:00(Am) -10:00 (Am)	1297	227	39	85	1648
11:00(Am) -2:00 (Pm)	996	98	21	68	1183
4:00(Pm) -7:00 (Pm)	1380	261	30	75	1746
7:30(Pm) -9:30 (Pm)	1149	182	28	47	1406
	Traffic Volume				**5983**
4:00(Pm) -7:00 (Pm)	Peak Period Hours	**1746**			
	Peak Period Traffic Volume				
4:00(Pm) -7:00 (Pm)	1380	261	30	75	

According to the traffic count result in weekend day, morning peak hour occurs at 7:00-9:00 am, midday peak at 11:00 am-2:00 pm, and evening peak at 4:00-7:00 pm and night peak at 7:30-9:30 pm. At morning peak hour, peak volume is 1648 vehicles. In this period, vehicles coming from Kanner road as the time is inbound hours at the beginning of weekend day. At midday peak hour, peak volume is 1183 vehicles. In this period, vehicles moving in all inbound and outbound directions were about the same amount. At evening peak hour, peak volume is 1746 vehicles. Comparing to morning peak volume, the peak volume recorded between 4:00-7:00 pm is significantly high. And Weekend day peak volume is 5983 vehicles.

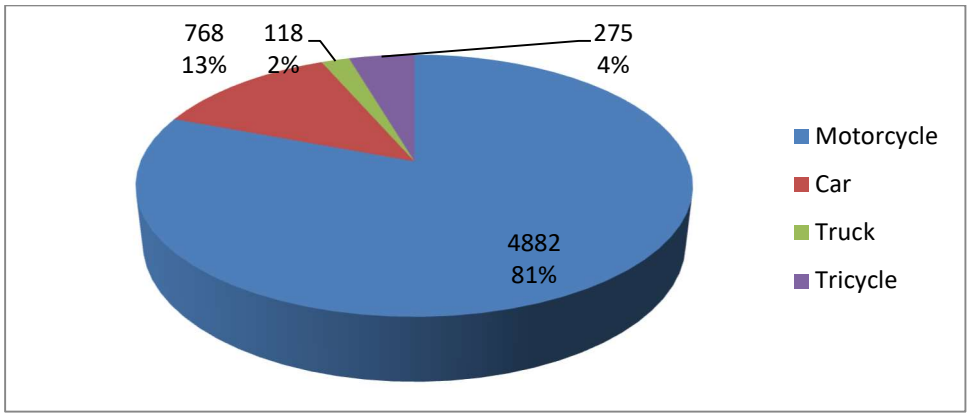


Figure 5.18 - Types of Vehicles used percentage in Weekend Day at Kanner Road

Table 5.3 -Summary of Vehicle Movements in Work Day

	SUMMARY OF VEHICLE MOVEMENTS
	LOCATION: Kanner Rd

TOWNSHIP: Myeik			CITY: Myeik		
OBSERVER: IEE Team			DATE: 28.9.2018 (Fri)		
WEATHER: Clear			Work Day		
REMARK:					
	VEHICLE MOVEMENTS				
TIME		**Types of Vehicles**			**Total**
BEGIN	Motorcycle	Car	Truck	Tricycle	
7:00(Am) -10:00 (Am)	1740	386	70	118	2314
11:00(Am) -2:00 (Pm)	1046	154	39	98	1337
4:00(Pm) -7:00 (Pm)	1528	307	57	129	2021
7:30(Pm) -9:30 (Pm)	1224	258	29	87	1598
	Traffic Volume				**7270**
7:00(Am) -10:00 (Am)	Peak Period Hours		**2314**		
	Peak Period Traffic Volume				
7:00(Am) -10:00 (Am)	1740	386	70	118	

According to the traffic count result in work day, morning peak hour occurs at 7:00-10:00 am, midday peak at 11:00 am-2:00 pm, evening peak at 4:00-7:00 pm, and night peak at 7:30-9:30 pm.At morning peak hour, peak volume is 2314 vehicles. In this period, vehicles coming from Kanner road as the time is inbound hours at the beginning of work day. At midday peak hour, peak volume is 1337 vehicles. In this period, vehicles moving in all inbound and outbound directions were about the same amount. At evening peak hour, peak volume is 2021 vehicles. Comparing to morning peak volume, the peak volume recorded between 7:00-10:00 am is significantly high.

So, the Vehicle Movements in Work day is greater 1.7% generation rate of in Weekend day vehicles volume.

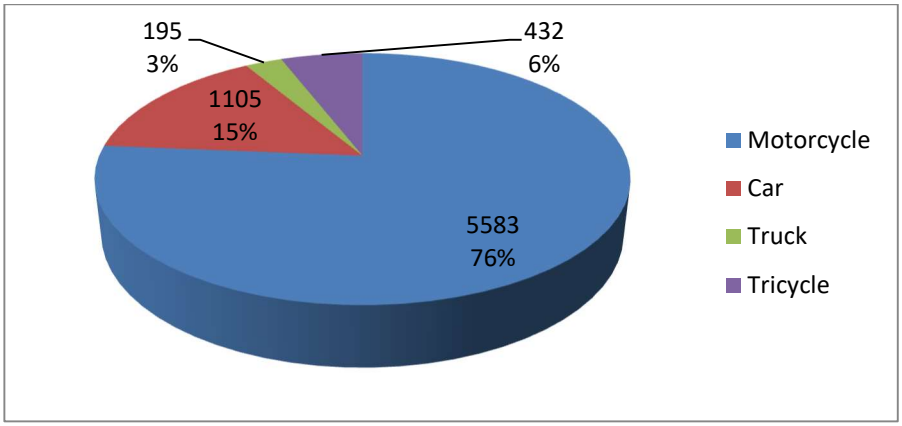


Figure 5.19 - Types of Vehicles used percentage in Working Day KannerRoad

Ferry Boat

Three ferry boat for conveying passengers and goods, especially for workers who works in Pathaw-Pahtet Island from Myeik as a regular service of 10 to15 times per a day. As per count result approximately (816) and (1120) amount of people travel in weekend day and work day, respectively.

5.9. Socio-Economic Profile

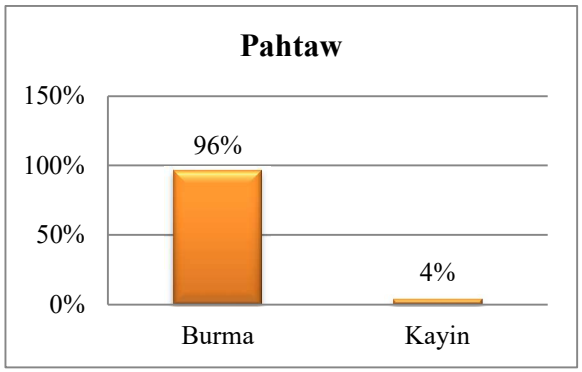
5.9.1. Socio Economic Profile by Primary Data Collection

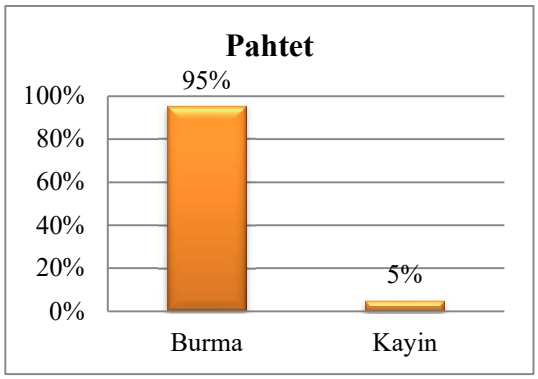
Although the proposed project is located in Phthaw-Pahtat Island in Kyun Su Township, it is very close to Myeik Township and so the township profile are described for not only for Kyun Su but also for Myeik.

(a) Major Ethnic Groups

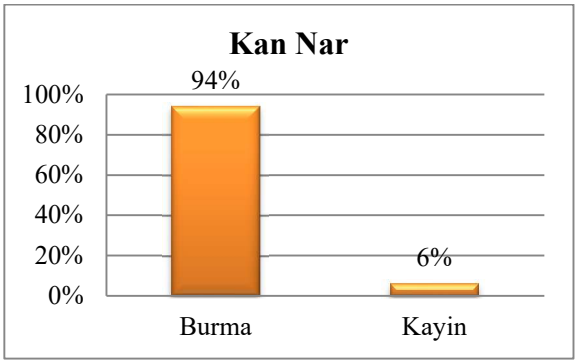
Within the village of project affected area, Burma is the major ethnic group. The only one dominant religion of the people in the project area is Buddhism nearly 95% and other such as Christian; are nearly 5%. According to the survey result, most of the people are Myanmar and Buddhism.

(i)Pahtaw-Pahtet Island



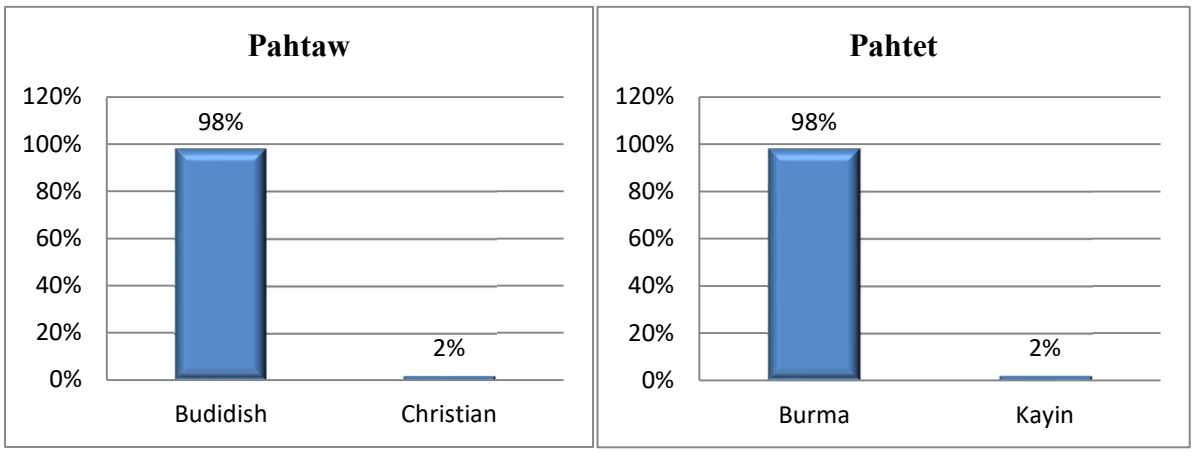


(ii) Myeik (Kan Nar)

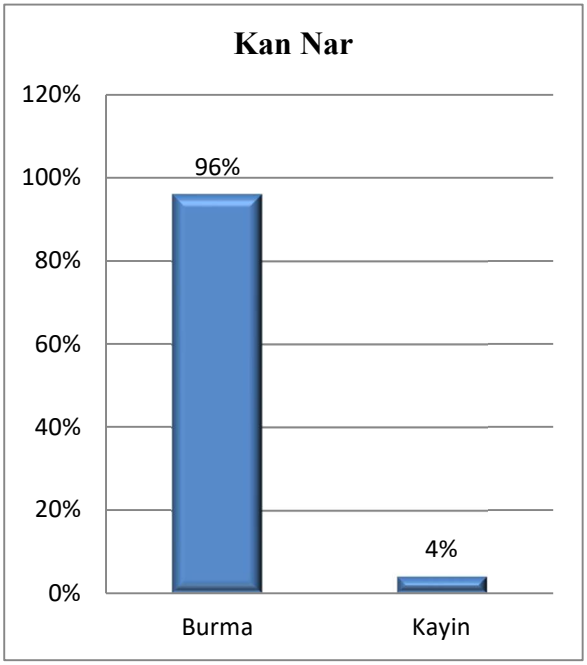


(b) Religious Groups

(i) Pahtaw-Pahtet Island



(ii) Myeik (Kan Nar)

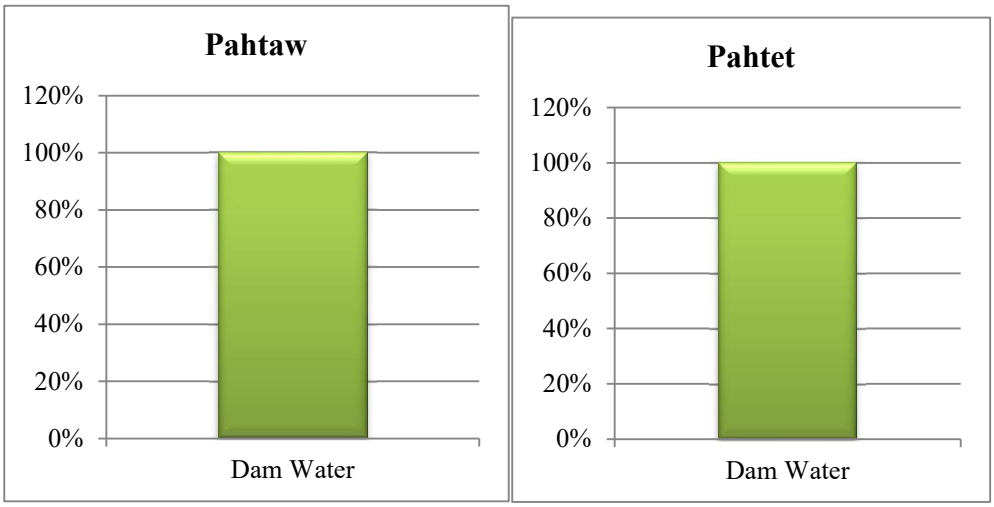


According to the above facts and figures, most of the people in study area are Burma and Buddish.

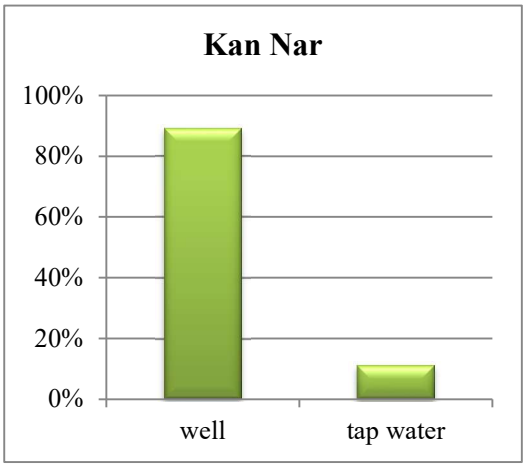
(c) Domestic Use of Water

Domestic water sources used by the local communities during the survey in the project area are provided in the following figures. All of people in Pahtaw and Pahtet Villages use dam water (storage water from dam) as domestic water and the people in Kan Nar area mostly use well as for domestic usage.

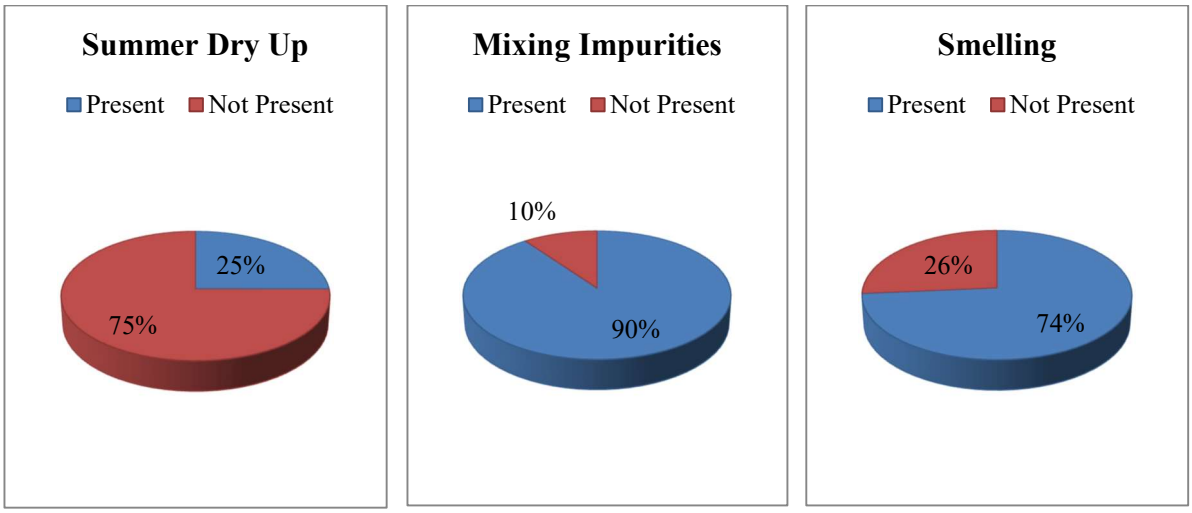
(i) Pahtaw-Pahtet Island



(ii) Myeik



Accessing of clean and safe water is crucial to the health population and thus have a direct impact on the quality of life of local community.



According to the survey, there have less potential to dry up during summer, high in mixing impurities and smelling of domestic water used. The following figures had shown the answers of respondents in percentage on the existing quality of domestic water.

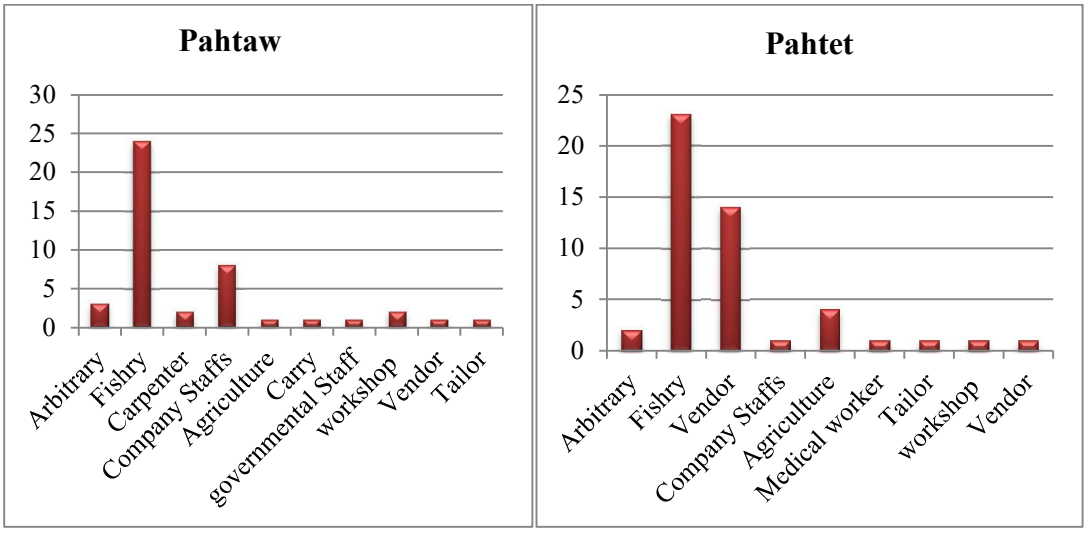
(d) Drinking Water

Purified drinking water (bottled water) is the main source of the villages. The villagers buy and use this bottled water from purified drinking water plant located in the island. Most people living in Kan Nar area also use bottled water and some use well water after boiling and filtering.

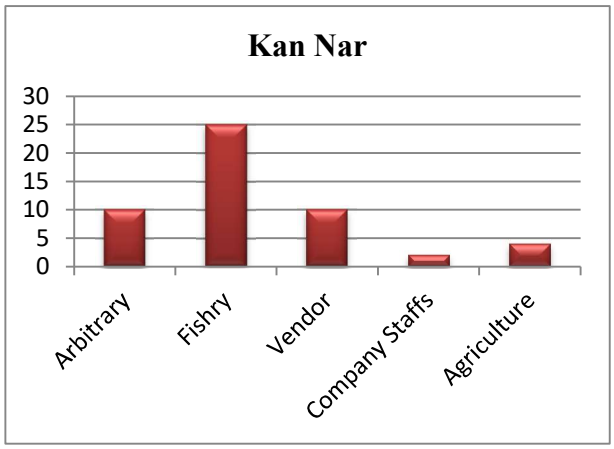
(e) Livelihood and Occupational Pattern

Most of residents in the proposed project are fishermen followed by company staffs, vendor and arbitrary.

(i) Pahtaw-Pahtet Island

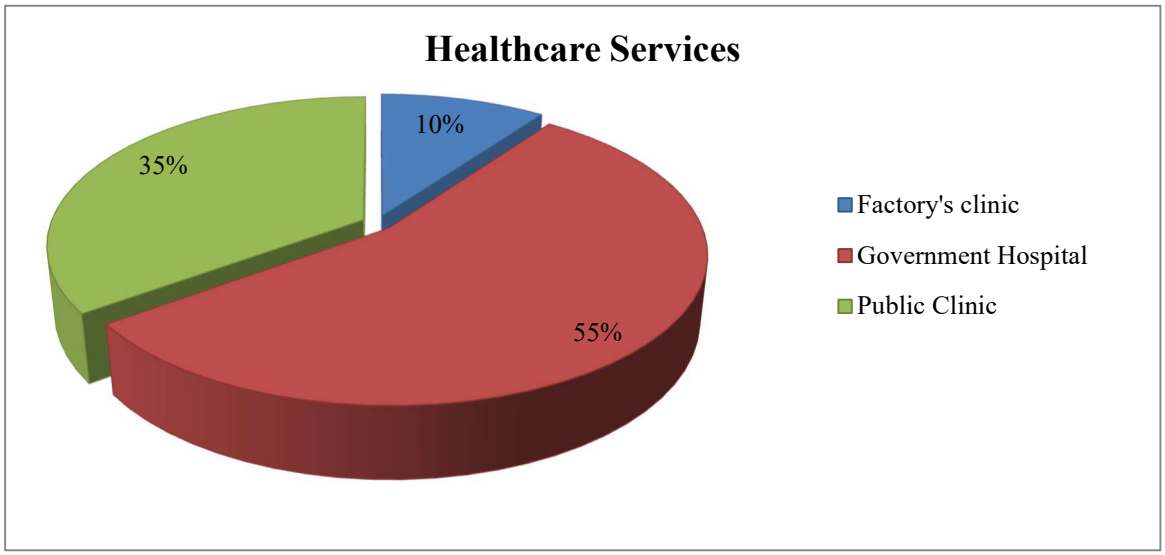


(ii) Myeik (Kan Nar)



(f) Healthcare Services

In the survey, there were three types of healthcare centers people in the project area usually go for their illness and disease. As shown in the following figure, government hospitals in Myeik township were the most common centers people attended (55%), followed by public clinic (35%) andprivate (factory) clinic in Bahtwabahtet island (10%). Most of people in Kan Nar area are easily accessible for medical service at Myeik township.



According to the household questionnaires, most local people in Pahtaw-Pahtet Island answered that it is a little difficult to go to clinic and hospital in Myeik Township. So, they want to have health care facilities near the village.

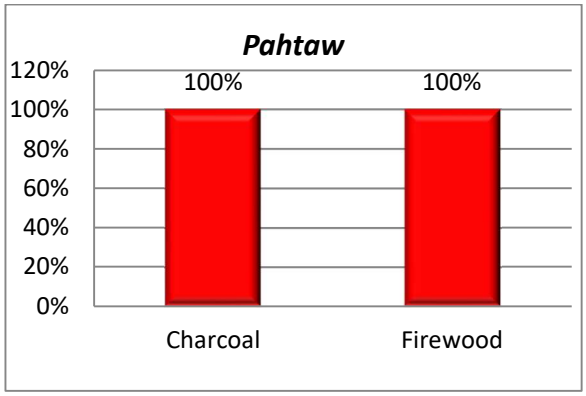
(g) Energy Sources for Lighting

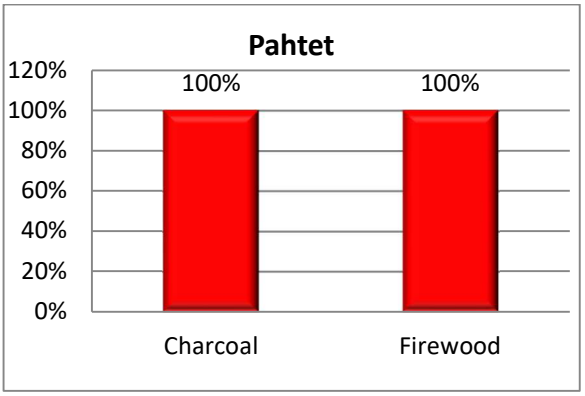
Primary data from household survey revealed that the sources of energy for lighting in the villages are mainly the electricity from village generator and other is from solar energy. Some of the villagers are not accessible to electricity and use candle for lighting.But in Kan Nar area, there is accessible for electricity and some people use battery for lighting.

(h) Energy Sources for Cooking

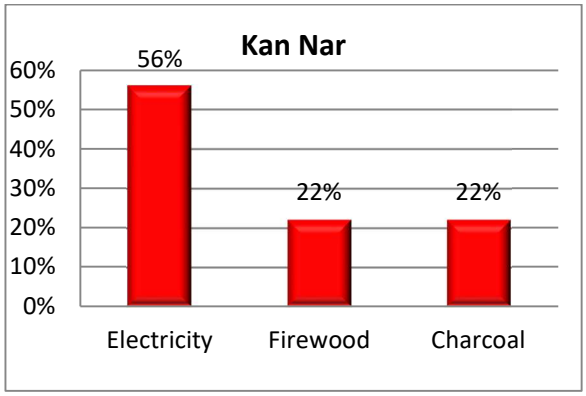
Primary data from field survey show that firewood and charcoal were the main source for cooking fuel in the proposed project area. According to household survey, the only Kan Nar area gets electricity for cooking but some people still depend on firewood and charcoal.

(i) Pahtaw-Pahtet Island





(ii) Myeik (Kan Nar)



(i) Types of Transportation

According to household survey, the main transportation vehicles between town and the villages are vessels and most local people use motorcycle within the villages in the Pahtaw-Pahtet Island. In the Kan Nar area of Myeik, the main transportation is carried out by cars and motorcycle.

(j) Most Public Needs and Concerns during Household Survey

During socio-economic survey, immediate community needs and concerns about the project were assessed. The most important positive outcomes from the project expected by the local people and most of their concerns about proposed project are as follow:

(i) Pathaw and Pahtet Villages

Village Name	Most Public Needs	Most Pubic Concerns
Pahtaw	• Expanding and upgrading of village road • Supporting for health care facilities, • Water supply and electricity	• Noise
Pahtet	• Supporting for health care facilities and water supply • Electricity on full time • Maintenance to the Shwethalyaung Pagoda	• Noise

(ii) Myeik

Name	Most Public Needs	Most Pubic Concerns
Kan Nar	• Maintenance of the Kan Nar road • Settle Trash Bin along the Kan Nar Road	• Noise • Traffic • Solid waste alongside the seashore

All of these data are local people needs and concerns that were got from household survey in Pahtaw Village, Pahtet Village and Kan Nar Quarter within the limited borders (3km).

5.9.2 Socio-economic Profile by Secondary Data Collection

5.9.2.1 Population

(i) Kyunsu Township

The project is located in Kyunsu Township, near Myeik district in Taninthayi Region. In 2017, there are about 175,000 people in Kyunsu Township as shown in the following Table. In Kyunsu Township, there are fewer females than males with 102 males per 100 females. The majority of the people in the Township live in rural areas with only (3.4%) living in urban areas. The population density of Kyunsu Township is 36 persons per square kilometre.

Population of KyunsuTownship

Township	Total (Male/Female)				Total (Urban/Rural)			
	Male	Female	Total	Sex Ratio	Urban	Rural	Urban	Households
Kyunsu	88756	86478	175234	1.02	5779	169455	3.4	30665

Source:KyunsuTownship Administrative Offices

(ii) Myeik Township

The project is located in Kyun Su Town, near Myeik Township at Myeik District in Taninthayi Region. In 2018, there are about 255,000 people in Myeik Township as shown in the following Table. The percentage of urban population is about 40.5% in township.

Table - Population of Myeik Township

Township	Total (Male/Female)				Total (Urban/Rural)			Households
	Male	Female	Total	Sex Ratio	Urban	Rural	Urban Population	
Myeik	125167	130629	255,769	50.9	21548	32801	40.5	54349

Source: Myeik Township Administrative Offices

5.9.2.2 Ethnicity

(i) Kyunsu Township

Most of the people who live in these townships are Bamar, followed by Kayin and Salone people. A small number of Mon and Rakhine are live in Kyunsu Township. The races residing in Kyunsu Township are shown in the following Table.

Table - Races in KyunsuTownship

No.	Race	Number	%
1	Kachin	-	-
2	Kayar	-	-
3	Kayin	16130	9.20
4	Chin	2	0.001
5	Mon	27	0.015
6	Bamar	155201	88.57

7	Rakhine	20	0.011
8	Shan	1	0.0001
9	Salone	656	0.0374
10	China	5	0.002
11	Indian	27	0.015
12	Pakistan	-	-
13	Bangladeshi	-	-
14	Other	3165	1.81
Total		175234	100

Source: Kyunsu Township Administrative Offices

(ii) Myeik Township

Most of the people who live in these townships are Bamar, followed by Kayin, Mon, and China people. A small number of Kachin and Shan are live in Myeik Township. The races residing in Myeik township are shown in the following Table.

Table - Races in Myeik Township

No.	Race	Number	%
1	Kachin	17	0.006
2	Kayar	-	-
3	Kayin	8470	3.31
4	Chin	20	0.008
5	Mon	3121	1.22
6	Bamar	235412	92.03
7	Rakhine	915	0.36
8	Shan	21	0.008
9	China	207	0.08
10	Indian	163	0.06
11	Pakistan	59	0.02
12	Bangladeshi	47	0.02
13	Other	40	0.02
Total		255,769	100

Source: Myeik Township Administrative Offices

5.9.2.3 Religion

(i) Kyunsu Township

The different kinds of religion present in Kyunsu Township are shown in in the following Table. All of 88.72% of the people living in the township are Buddhists. There are many religious places in the region including one historic and well-known pagodas, 46 pagodas and 154 monasteries for Buddhists.

Table - Religion in Kyunsu Township

Township	Religion	Buddhist	Christian	Hindu	Muslim	Animist	Total
Kyunsu	Number	155466	16130	9	2973	656	175234
	(%)	88.72	9.21	0.005	0.02	0.38	100.0

SourceKyunsuTownshipAdministrative Offices

(ii) Myeik Township

The different kinds of religion present in Myeik Township are shown in in the following Table. All of 86.5% of the people living in the township are Buddhists. There are many religious places in the region including four historic and well-known pagodas, 272 pagodas and 153 monasteries for Buddhists.

Table - Religion in Myeik Township

Township	Religion	Buddhist	Christian	Hindu	Muslim	Total
Myeik	Number	221188	8238	1158	25162	255796
	(%)	86.5	3.22	0.45	9.83	100.0

SourceMyeik TownshipAdministrative Offices

5.9.2.4 Land Use

(i) Kyunsu Township

Land uses in Kyunsu Township are shown in in the following Table. Kyunsu Township mainly use its land for agriculture followed by grazing land area.

Table - Land Use of Kyunsu Township

Land Category	Kyunsu	
	Acres	%
Agricultural Land	65200	5.54

Forest and Natural Area	200439	17.03
Grazing land	1815	0.16
Industrial Land	35	0.002
Settlement Land	3874	0.33
Wastelands /wild land	5528	0.47
Forest wild	541269	46.00
Mining	12866	1.09
River/creek	81785	6.95
Other	263828	22.42
Total Area	1176626	100.00

SourceKyunsuTownship Administrative Offices

(ii) Myeik Township

Land uses in Myeik Township are shown in in the following Table. Myeik Township mainly use its land for agriculture followed by grazing land area.

Table - Land Use of Myeik Township

Land Category	*Myeik*	
	ha	**%**
Agricultural Land	89228	25.5
Forest and Natural Area	75111	21.4
Grazing land	10879	3.1
Industrial Land	172	0.05
Settlement Land	9197	2.63
Wastelands	7124	2.0
Forest wild	39389	11.2
wild land	83283	23.7
Other	42941	12.25
Total Area	350367	100.00

Source Myeik Township Administrative Offices

5.9.2.5 Living Profile

(i) Kyunsu Township

(a) Type of Housing Unit

The majority of the households in Kyunsu Township are wooden houses (50.2%) followed by bamboo houses (33.7%). Meanwhile, some 32.2 % of urban households live in bamboo houses while 51.0 per cent of rural households live in wooden houses as follow:

Table - Conventional households by type of housing unit by urban/rural

Residence	Total	Apartment/ Condominium	Bungalow/ Brickhouse	Semi-pacca house	Wooden house	Bamboo house	Hut2-3 years	Hut1year	Other
Total	32,988	1.4	0.8	2.7	50.2	33.7	8.5	1.0	1.7
Urban	1,142	29.2	4.3	5.5	26.4	32.2	1.7	0.6	0.1
Rural	31,846	0.4	0.6	2.6	51.0	33.8	8.7	1.0	1.8

Source:Department of Population, Ministry of Immigration and Population"The2014MyanmarPopulationandHousingCensus–Taninthayi Region-Kyunsu TownshipReport" October2017

(b) Water Usage

In Kyunsu Township, 58.9 per cent of households use improved sources of drinking water (tap water/piped, tube well, borehole, protected well/spring and bottled water/water purifier). The proportion using improved sources of drinking water is 63.6 per cent while total average is 69.5 per cent. Some 30.3 per cent of the households use water from protected well/spring and 26.0 per cent use water from unprotected well/spring. Some 41.1 per cent of the households use water from unimproved sources. In rural area, 42.3 per cent of the households use water from unimproved sources.

Table - Source of Drinking Water in KyunsuTownship

Sourceofdrinkingwater	Total	Urban	Rural
Tapwater/Piped	18.7	26.8	18.4
Tubewell,borehole	7.7	2.9	7.9
Protectedwell/Spring	30.3	46.0	29.7
Bottledwater/Waterpurifier	2.2	15.2	1.7
Total improveddrinkingwater	*58.9*	*90.9*	*57.7*

Unprotectedwell/Spring		26.0	5.6	26.8
Pool/Pond/Lake		1.3	0.8	1.3
River/stream/canal		2.5	0.3	2.5
Waterfall/Rainwater		10.9	2.4	11.2
Other		0.4	-	0.5
Total unimproveddrinkingwater		*41.1*	*9.1*	*42.3*
Total	Percent	100.0	100.0	100.0
	Number	32,988	1,142	31,846

Source:"The2014MyanmarPopulationandHousingCensus–Tanintharyi Region-Kyunsu Township Report"

(c) Lighting

In Kyunsu Township, 11.2 per cent of the households use electricity for lighting. The percentage of households that use electricity in Tanintharyi Region is 8.0 per cent. The use of candle for lighting is the highest in the township with 30.8 per cent.In rural areas, 31.4 per cent of the households use candle for lighting.

Table - Conventional Households by Source of Lighting by Urban/Rural

Sourceoflighting		**Total**	**Urban**	**Rural**
Electricity		11.2	74.0	9.0
Kerosene		26.2	4.6	27.0
Candle		30.8	15.6	31.4
Battery		0.9	0.4	0.9
Generator(private)		28.6	5.1	29.4
Watermill(private)		0.4	-	0.4
Solarsystem/energy		0.7	0.2	0.7
Other		1.1	0.1	1.1
Total	**Percent**	**100.0**	**100.0**	**100.0**
	Number	**32,988**	**1,142**	**31,846**

Source:Department of Population, Ministry of Immigration and Population"The2014MyanmarPopulationandHousingCensus–Taninthayi Region-Kyunsu TownshipReport" October2017

(d) Cooking Fuel

In Kyunsu Township, households mainly use wood-related fuels for cooking with 48.6 per cent using firewood and 49.7 per cent using charcoal.Only 0.4 per cent of households use electricity for cooking. In rural areas, 49.7 per cent of households use firewood and 48.6 per cent use charcoal.

Table - Conventional Households by Type of Cooking Fuel by Urban/Rural

Typeofcookingfuel		**Total**	**Urban**	**Rural**
Electricity		0.4	1.9	0.3
LPG		<0.1	0.2	<0.1
Kerosene		0.6	-	0.6
Bio-Gas		0.2	0.6	0.2
Firewood		48.6	15.8	49.7
Charcoal		49.7	80.1	48.6
Coal		0.4	1.3	0.4
Other		0.2	0.1	0.2
Total	**Per cent**	**100.0**	**100.0**	**100.0**
	Number	**32,988**	**1,142**	**31,846**

Source:Department of Population, Ministry of Immigration and Population"The2014MyanmarPopulationandHousingCensus–Taninthayi Region-Kyunsu TownshipReport" October2017

(ii)Myeik Township

(a) Type of Housing Unit

The majority of the households in Myeik Township are living in wooden houses (46.5%) followed by households in bamboo houses (29.7%). Some 47.3 per cent of urban households and 46.0 per cent of rural households live in wooden houses.

Table - Conventional households by type of housing unit by urban/rural

Residence	**Total**	**Apartment/ Condominium**	**Bungalow/ Brickhouse**	**Semi-pacca house**	**Wooden house**	**Bamboo house**	**Hut2-3 years**	**Hut1year**	**Other**
Total	54349	3.9	9.5	7.5	46.5	29.7	2.0	0.5	0.4
Urban	21548	2.2	15.7	11.2	47.3	23.1	0.2	0.1	0.2
Rural	32801	5.0	5.4	5.0	46.0	34.1	3.1	0.8	0.6

Source:Department of Population, Ministry of Immigration and Population"The2014MyanmarPopulationandHousingCensus–Taninthayi Region-Kyunsu TownshipReport" October2017

(b) Water Usage

In Myeik Township, 84.9 per cent of households use improved sources of drinking water (tap water/piped, tube well, borehole, protected well/spring and bottled water/water purifier). Compared to other townships in Tanintharyi Region, it is the highest and it is also higher than the Union average (69.5%). Some 30.1 per cent of the households use water from bottled water/water purifier and 23.4 per cent use water from protected well/spring. Some 15.1 per cent of the households use water from unimproved sources. In rural areas, 22.7 per cent of the households use water from unimproved sources for drinking water.

Table - Source of Drinking Water in MyeikTownship

Sourceofdrinkingwater		Total	Urban	Rural
Tapwater/Piped		20.7	30.8	14.0
Tubewell,borehole		10.7	13.1	9.2
Protectedwell/Spring		23.4	5.6	35.1
Bottledwater/Waterpurifier		30.1	47.0	19.0
Total improveddrinkingwater		***84.9***	***96.5***	***77.3***
Unprotectedwell/Spring		9.3	0.2	15.3
Pool/Pond/Lake		0.2	-	0.3
River/stream/canal		1.0	-	1.7
Waterfall/Rainwater		1.7	-	2.7
Other		2.9	3.2	2.7
Total unimproveddrinkingwater		***15.1***	***3.4***	***22.7***
Total	**Percent**	**100.0**	**100.0**	**100.0**
	Number	**54,349**	**21,548**	**32,801**

Source:Department of Population, Ministry of Immigration and Population"The2014MyanmarPopulationandHousingCensus–Taninthayi Region-Kyunsu TownshipReport" October2017

(c) Lighting

In Myeik Township, 10.5 per cent of the households use electricity for lighting. The percentage of households that use electricity in Tanintharyi Region is 8.0 per cent. The use of generator

(private) for lighting is the highest in the township with 55.0 per cent. In rural areas, 37.2 per cent of the households use generators (private) for lighting.

Table - Conventional households by source of lighting by urban/rural

Sourceoflighting		Total	Urban	Rural
Electricity		10.5	6.2	13.4
Kerosene		11.8	0.6	19.1
Candle		19.4	8.3	26.6
Battery		0.4	0.4	0.4
Generator(private)		55.0	82.3	37.2
Watermill(private)		1.2	0.9	0.8
Solarsystem/energy		1.4	0.1	2.4
Other		0.2	0.2	0.2
Total	**Percent**	**100.0**	**100.0**	**100.0**
	Number	**54,349**	**21,548**	**32,801**

Source:Department of Population, Ministry of Immigration and Population"The2014MyanmarPopulationandHousingCensus–Taninthayi Region-Kyunsu TownshipReport" October2017

(d) Cooking Fuel

In Myeik Township, households mainly use wood-related fuels for cooking with 30.5 per cent using firewood and 64.5 per cent using charcoal. Only 1.4 per cent of households use electricity for cooking. Some 47.2 per cent of households in rural areas use firewood and 49.5 per cent use charcoal.

Table - Conventional households by type of cooking fuel by urban/rural

Typeofcookingfuel	Total	Urban	Rural
Electricity	1.4	1.9	1.1
LPG	0.9	1.8	0.4
Kerosene	0.2	<0.1	0.3

Bio-Gas		1.4	2.3	0.8
Firewood		30.5	5.1	47.2
Charcoal		64.5	87.3	49.5
Coal		0.5	0.8	0.4
Other		0.5	0.8	0.3
Total	**Per cent**	**100.0**	**100.0**	**100.0**
	Number	**54,349**	**21,548**	**32,801**

Source:Department of Population, Ministry of Immigration and Population"The2014MyanmarPopulationandHousingCensus–Taninthayi Region-Kyunsu TownshipReport" October2017

5.9.2.6 Occupational Patterns

(i) Kyunsu Township

Data shows that fisheriesis the common livelihood means of households in Kyunsu Township. The other main economic activities in the area are agriculture, trade, public services, and livestock. According to official statistics, Kyunsu has a total of 81,615people as the township workforce and 59,014 are employed with an unemployment rate of 27.69%. Per capita income in the township is estimated to be 972,210 Kyats in 2014-2015.

Tabl - Occupational Patterns

Government Employee	Services	Agriculture	Livestock	Trade	Industry	Fisheries	Arbitrary
2176	551	3467	483	703	91	6685	44858

Table - Employment

Workforce	Employed	Unemployed	Unemployment rate
81,615	59,014	22,601	27.69%

Table - Per Capita Income

Year	Income
2014-15	972,210 Ks.
2015-16	-
2016-17	-

(ii) Myeik Township

Data shows that trade is the common livelihood means of households in Myeik Township. The other main economic activities in the area are fisheries, trade, public services, agriculture and arbitrary. According to official statistics, Myeik has a total of 140,655people as the township workforce and 127,670 are employed with an unemployment rate of 9.23%. Per capita income in the township is estimated to be 1935,166 Kyats in 2014-2015 and 2077,592 Kyats in 2015-2016.

Table - Occupational Patterns

Government Employee	Services	Agriculture	Livestock	Trade	Industry	Fisheries	Arbitrary	Others
4614	4052	689	266	4307	618	9739	30209	2536

Table - Employment

Workforce	Employed	Unemployed	Unemployment rate
140,655	127,670	12,985	9.23%

Table - Per Capita Income

Year	Income
2014-15	1935,166 Ks.
2015-16	2077,592 Ks
2016-17	-

5.9.2.7 Education

(i) Kyunsu Township

Over fifteen percent of the total township population is students. For education sector, although primary school education is compulsory and fee-free, school enrollment rate of 5-year-olds is relatively half over of (100%) in the overall township. Percentage of students passing the matriculation is 16.29%. The teacher-student ratios are 1:67 in BEPS, 1:20 in BEMS, and 1:36 in BEHS. Data on education and literacy report that literacy rate in Kyunsu Township was 100%.

Table - Educational Infrastructure

School	No. of Schools	No. of Teachers	No. of Students	Teacher/ Student Ratio
BEHS	6	238	6193	1:36
BEHS (Extan)	8	219	4969	1:22
BEMS	1	10	206	1:20
BEMS (Extan)	26	362	9791	1:27
Post (BEPS)	36	275	8024	1:29
BEPS	66	350	23475	1:67
Monastery school	14	51	1098	1:21
Preschool	6	14	180	1:12

Table - Scholl Enrollment

No. of 5 yrs-old children			Enrollment			Enrollment Rate
Male	Female	Total	Male	Female	Total	
3306	3131	6437	3306	3131	6437	100%

Table - Matriculation Pass Rate

2015-16			2016-2017		
Sit	Pass	Pass Rate	Sit	Pass	Pass Rate
841	137	16.29	927	No. Info.	No. Info.

Table - Literacy Rate

Population	above 15 years of age	Literate	Literacy Rate
175,234	70,100	70,100	100%

(ii) Myeik Township

Over sixteen percent of the total township population is students. For education sector, although primary school education is compulsory and fee-free, school enrollment rate of 5-

year-olds is relatively half over of (100%) in the overall township. Percentage of students passing the matriculation is 31.35%. The teacher-student ratios are 1:19 in BEPS, 1:32 in BEMS, and 1:31 in BEHS. Data on education and literacy report that literacy rate in Myeik Township was 100%.

Table - Educational Infrastructure

School	No. of Schools	No. of Teachers	No. of Students	Teacher/ Student Ratio
Higher Education	4	268	7226	1:27
BEHS	11	702	21988	1:31
BEHS (Extan)	10	341	10831	1:32
BEMS	6	179	5652	1:32
BEMS (Extan)	11	186	4838	1:26
Post (BEPS)	22	237	7319	1:31
BEPS	83	436	8001	1:19
Monastery school	8	145	4970	1:34
Preschool	14	33	660	1:20

Table - Scholl Enrollment

No. of 5 yrs-old children			Enrollment			Enrollment Rate
Male	Female	Total	Male	Female	Total	
3782	3529	7311	3894	3571	7465	100%

Table - Matriculation Pass Rate

2015-16			2016-2017		
Sit	Pass	Pass Rate	Sit	Pass	Pass Rate
5193	1628	31.35	5904	No. Info.	No. Info.

Table - Literacy Rate

Population	above 15 years of age	Literate	Literacy Rate
255,796	150,814	168001	100%

5.9.2.8 Healthcare Profile

(i) Kyunsu Township

In public health sector, the ratios of medical service personnel and local population indicate the existing conditions of the insufficient health care facilities, especially for rural people. According to secondary data available, the most common diseases include Diarrhoea, Hepatitis, malaria, stomach ailment, and tuberculosis. It was also found out that there was substantial amount of incidence of Diarrhoea, and Malaria in the township. As also noted in the following table, there are one25-bedded township hospital and five 16 bedded station hospital. There are also 39 rural healthcare centers and sub- centers. Infrastructures for health care services are also seemed to be insufficient especially for rural people.

Table - Healthcare Facilities

Population	No. of Doctors	Ratio	No. of Nurses	Ratio	No. of Healthcare Assistant	Ratio
175,234	6	1:29205	26	1:6739	5	1:35047

Table - Hospitals

Sr. No.	Hospital	Govt./Private	Bed
1.	Township hospital (Kyunsu)	Govt.	25
2	Station Hospital(Kan Maw)	Govt.	16
3	Station Hospital(Sa Khan Thit)	Govt.	16
4	Station Hospital(Maung Hlaw)	Govt.	16
5	Station Hospital(BarlaPine)	Govt.	16
6	Station Hospital(Yae Kan Taung)	Govt.	16

Table - Healthcare Centers

Sr. No.	Type of Healthcare Center	No. of Healthcare Center
1.	Rural Healthcare Center	6
2.	Rural Healthcare Sub-Center	33

Table - Common Diseases

Sr. No.	Disease	Incidence
1.	Malaria	484
2.	Diarrhoea	2614
3.	TB	122
4.	Stomach Ailment	698
5.	Hepatitis	27

Table - HIV/AIDS

2015-16		2016-17	
Infected	Dead	Infected	Dead
-	-	-	-

Table - Health Indices

No. of Maternal	No. of Infant	Per 1000			
		Birth Rate	Maternal Mortality Rate	Infant Mortality Rate	Abortion Rate
4395	3289	22.6	1.9	15.7	0.2

(ii) Myeik Township

In public health sector, the ratios of medical service personnel and local population indicate the existing conditions of the insufficient health care facilities, especially for rural people. According to secondary data available, the most common diseases include Diarrhoea, Hepatitis, malaria, stomach ailment, and tuberculosis. It was also found out that there was substantial amount of incidence of Diarrhoea, and stomach ailment in the township. As also noted in the following table, there is 100-bed township hospital. There are also 32 rural healthcare centers and sub- centers. Infrastructures for health care services are also seemed to be insufficient especially for rural people.

Table - Healthcare Facilities

Population	No. of Doctors	Ratio	No. of Nurses	Ratio	No. of Healthcare Assistant	Ratio
255,796	89	1:2874	40	1:6394	10	1:25579

Table - Hospitals

Sr. No.	Hospital	Govt./Private	Bed
1.	Township hospital (Myeik)	Govt.	100

Table - Healthcare Centers

Sr. No.	Type of Healthcare Center	No. of Healthcare Center
1.	Rural Healthcare Center	6
2.	Rural Healthcare Sub-Center	26

Table - Common Diseases

Sr. No.	Disease	Incidence
1.	Malaria	68
2.	Diarrhoea	2381
3.	TB	949
4.	Stomach Ailment	826
5.	Hepatitis	1

Table - HIV/AIDS

2015-16		2016-17	
Infected	Dead	Infected	Dead
162	9	46	-

Table - Health Indices

No. of Maternal	No. of Infant	Per 1000			
		Birth Rate	Maternal Mortality Rate	Infant Mortality Rate	Abortion Rate
5894	5858	19.8	0.34	6.15	2.2

5.10. Living Environment

The environmental baseline study (the conditions of air quality, water quality and noise levels) will describe in this chapter. The locations of the baseline study are shown in figure below. Environmental baseline parameters such as air quality, noise and water quality of the existing project are measured on site before the start of the project activities. Air quality and noise are measured at the project location with the relevant devices with frequencies according to the Standard Operating Procedures. Water samples are collected and some parameters of water quality are measured on site and some parameters are sent to respective laboratories.

Figure 5.20 - Locations of Environmental Baseline Study Monitoring

Location	GPS Coordinate	
SW	N12º27′33.10″	E98º34′17.75″
DW	N12º26′50.1″	E98º34′49.5″
AN1	N12º26′38.1″	E98º35′04.0 ″
AN2	N12º26′57.22″	E98º35′04.61″
AN3	N12º26′25.51″	E98º34′51.68″

5.10.1 Ambient Air Quality

ESIA Team used Haz Scanner EPAS air quality monitoring station to detect ambient air quality inside the project. The methodology used by ESIA Team is as follow:

(a) Monitoring Parameters

The parameters for ambient air quality monitoring were SO_2, NO_2, CO_2, CO, H_2S, O_3, $PM_{2.5}$ and PM_{10}.

(b) Methodology

Determination and analysis of ambient air qualities were conducted by using Haz-Scanner Environmental Perimeter Air Station (EPAS).

Haz-Scanner EPAS Air Quality Monitoring Station

Sampling rate of air quality was recorded automatically every one minute for important gases (Sulfur dioxide, Nitrogen dioxide, Carbon dioxide, Carbon monoxide, Hydrogen sulfide, Particulate matter, Hydrogen sulfide and Ozone) to describe ambient air quality. Sampling pump was adjusted to 2 liter/min. Different analysis methods are integrated in the instrument, such as particulates 90° Infrared Light Scattering for particulate matters (PM_{10}, $PM_{2.5}$), electrochemical sensors for toxic gases (SO_2, NO_2, CO, H_2S), NDIR (optional sensor) for (CO_2) and Gas Sensing Semiconductor- GSS technology (optional sensor) for O_3.

Important Gases for Ambient Air Quality

No.	Parameters	Analysis Methods
1.	Sulfur dioxide (SO_2)	Electrochemical sensors
2.	Nitrogen dioxide (NO_2)	Electrochemical sensors
3.	Carbon Dioxide (CO_2)	NDIR (optional sensor)
4.	Carbon monoxide (CO)	Electrochemical sensors
5.	Hydrogen Sulfide (H_2S)	Electrochemical sensors
6.	Particulate matter 2.5 ($PM_{2.5}$)	Infrared Light Scattering
7.	Particulate matter 10 (PM_{10})	Infrared Light Scattering
8.	Ozone (O_3)	Gas Sensing Semiconductor- GSS technology (optional sensor)

(c) Location of Air QualityMonitoring Points

The air quality monitoring was conducted inside the project site. This station was set in a flat area, located inside the proposed project site

Air Quality Monitoring at Day Time (7:00 am to 7:00 pm)

Air Quality Monitoring at Night Time (7:00 pm to 7:00 am)

(d) Monitoring Period

Air quality was monitored by 12 hours for day time and 12 hours for night time. Detailed for measurements are shown in following table.

Duration of Air Quality Monitoring

Monitoring Points	Duration
Night Time	(07:00 pm to 07:00 am)
Day Time	(07:00 am to 07:00 pm)

(e) Air Quality Monitoring Results

The air quality monitoring results obtained by every minute were combined to make average values for day time (12 hours) and nigh time (12 hours) for evaluation and comparison with standard values.

Average Ambient Air Quality Monitoring Results of Day Time

Parameters	Unit	Measured Values
Barometric Pressure	mBar	1128
CO	$\mu g/m^3$	286

CO_2	µg/m^3	975
H_2S	µg/m^3	0.00
NO_2	µg/m^3	3.25
O_3	µg/m^3	30.6
PM $_{10}$	µg/m^3	89.19
PM $_{2.5}$	µg/m^3	53.26
SO_2	µg/m^3	18.1

The followings are the results from Haz-Scanner Software (Haz-Scanner 6.0.1) for day time air quality monitoring.

Average Ambient Air Quality Monitoring Results of Night Time

Parameters	Unit	Measured Values
Barometric Pressure	mBar	1032
CO	µg/m^3	208
CO_2	µg/m^3	986
H_2S	µg/m^3	0.00
NO_2	µg/m^3	2.8
O_3	µg/m^3	20.63
PM $_{10}$	µg/m^3	39.12
PM $_{2.5}$	µg/m^3	21.24
SO_2	µg/m^3	18.9

The followings are the results from Haz-Scanner Software (Haz-Scanner 6.0.1) for night time air quality monitoring.

(f) Comparison with Corresponding Guidelines Values

Monitoring results are compared with Myanmar Emission Guideline (2015); World Health Organization Guideline Value (Global Update 2005); National Ambient Air Quality Standard Central Pollution Control Board, Ministry of Environment and Forests, 2009) as shown in following table.

Pollutants	Day Time (12 hours)	Night Time (12 hours)	MEG Value	WHO Guideline Value	NAAQS
CO_2 ($\mu g/m^3$)	976	986	-	-	-
CO ($\mu g/m^3$)	286	208	5(mg/Nm^3)	-	10,000 for Industrial, 4,000 for residential, (1 hour)
H_2S ($\mu g/m^3$)	0.00	0.00	2 (30 min) for Agriculture, Livestock and Forestry	-	-
NO_2 ($\mu g/m^3$)	3.25	2.8	200 (1 hour)	200 (1 hour)	120 for Industrial, 80 for residential, rural and other areas (24 hour)
O_3 ($\mu g/m^3$)	30.6	20.63	100 (8 hour)	100 (8 hour)	-
PM_{10} ($\mu g/m^3$)	89.19	39.12	50 (µg/m3) (24 hour)	50 (µg/m3) (24 hour)	150 for Industrial, 100 for residential, rural and other areas
$PM_{2.5}$ ($\mu g/m^3$)	53.26	21.24	25(µg/m3) (24 hour)	25(µg/m3) (24 hour)	-
SO_2 ($\mu g/m^3$)	18.1	18.9	500 (10 min)	500 (10 min)	120 µg/m3 (24 hour) for Industrial, 80 for residential, rural and other areas

Note:

MEG = Myanmar Emission Guideline 2015)

WHO Guideline = World Health Organization Guideline Value, Global Update 2005

NAAQS = National Ambient Air Quality Standard, 2009 (Central Pollution Control Board, Ministry of Environment and Forests)

According to the monitoring results, the concentrations of $PM_{2.5}$ and PM_{10} are below the Myanmar Emission Guideline (MEG) value, WHO guideline value and NAAQS. For gases emissions, comparing with the MEG value, WHO guideline value and NAAQS, the concentration of all gases were within the acceptable limit for industrial, residential, rural and other areas. For carbon dioxide, no guideline values were provided for the ambient air quality.

The project site is located in a rural area and difference industries (dried fish factory, dock yard, crab livestock etc.) has been identified within the area. The primary sources of air pollution are therefore anticipated to include gaseous emission from these industries and dust arising from unpaved roads and vehicle movements, and domestic fuel burning from rural households (fuel wood and charcoal for cooking and space heating).

5.10.2 Water Quality

The proposed factory uses process and domestic water from water reservoir, so the surface water was tested in this reservoir. The characteristics of PPT's water sample (location point DW) are presented in the following Table. These tables have desirable as well as permissible limits of National Drinking Water Quality Standard for each parameter.

Table - Summary of Water Quality Testing Results (Dry Season)

Analyses	Ref: Value	Unit	Results	Method
Color	20	TCU	Nil	Platinum Cobalt Method
Turbidity	5	NTU	Nil	Absorption Method
Arsenic	≤0.05	mg/L	0.00	Arsenator
Chloride	250	mg/L	17.6	Argentometric Method
Hardness	500	mg/L as $CaCO_3$	10	Unit Dose Vials Method
Iron	1	mg/L	0.15	Bipyridyl Method
pH	6.5-8.5		6.99	Ion selected Electrode Method
Total Dissolved Solid	1000	mg/L	30.8	Ion selected Electrode Method
Sulphate	400	mg/L	1	Barium Chloride Method
Magnesium	150	Ppm	1.12	Magnecol Method
Calcium	200	mg/L	2.4	Titration Method
Electro conductivity	1500	µmhos/cm	44	Ion selected Electrode Method

According to the above table, the groundwater testing result is compared with National Drinking Water Quality Standards and it has shown that almost all the measurements except arsenic value are below its guideline value. So, it is suitable to use for the drinking purposes. The following Table shows testing results of water quality (location point DW) near the proposed project in wet season.

Table - Summary of Water Quality Testing Results (Wet Season)

Analyses	Ref: Value	Unit	Results	Method
Color	20	TCU	Nil	Platinum Cobalt Method
Turbidity	5	NTU	Nil	Absorption Method
Chloride	250	mg/L	8.6	Argentometric Method
Hardness	500	mg/L as $CaCO_3$	30	Unit Dose Vials Method
Iron	1	mg/L	0.15	Bipyridyl Method
pH	6.5-8.5		6.86	Ion selected Electrode Method
Total Dissolved Solid	1000	mg/L	34.9	Ion selected Electrode Method
Sulphate	400	mg/L	5	Barium Chloride Method
Magnesium	150	Ppm	5.6	Magnecol Method
Calcium	200	mg/L	4	Titration Method
Electro conductivity	1500	µmhos/cm	63.2	Ion selected Electrode Method

According to the above table, the groundwater testing result is compared with National Drinking Water Quality Standards and it has shown that almost all the measurements except arsenic value are below its guideline value. So, it is suitable to use for the drinking purposes.

5.10.3 Noise

Given the generally island nature of the existing environment, noise levels can be predicted to be low. Primary contributions to noise as observed in the project area include diesel generators, and vehicular traffic. Noise receptors would include individual residents, schools, and wild and domesticated animals.

Construction noise mainly comes from the construction machinery working and construction materials transportation, such as the roar of the motor vehicle and the noise of the trumpet, the construction noise will seriously affect the neighboring residents work and rest, especially at night. According to the limit of noise at boundary of construction and its measuring method in different construction stage.

To monitor the existing noise level, the (IEE) team used TES-1353H Integrating Sound Level Meter which is applicable with IEC61672-1: 2003, IEC60651: 1979, ANSI S1.4: 1983 and

IEC60804: 1985 standards. Existing noise level are monitoring in both day time (07:00 to 22:00) and night time (22:00 to 07:00).

The results of noise levels (Leq) are shown in the following Table. The noise levels at AN1 located near project site was at 57.8 dB(A) during daytime and at 44.3 dB(A) during nighttime. On the other hand, the noise levels at AN2 located in Pahtaw villageabout eastside 1.7 km away from the factory was at 50.4 dB(A) during daytime, and at 41.6dB(A) during nighttime. The noise level at AN3 located in Pahthet village was 50.4 dB(A) during daytime and 41.6 dB(A) during night time.

Noise Level Monitoring Results

Receptors and distances from project		**Existing noise levels monitored by integrated noise level meter (dBA)**	
		Daytime	**Nighttime**
AN1	Near Fractory	72.6	44.6
AN2	Pahtaw village	58.7	40.9
AN3	PahtetVillage	49.4	43.4
EQEG Value	Residential, institutional, educational	55	45
	Industrial,commercial	70	70

So, the existing noise level in or within the Pahtaw village are lower than the permissible level for residential area. The nosie level near the the proposed factory was higher than other sampling points during operating the factory.

5.11. Existing Biodiversity Environment

Biodiversity boosts ecosystem productivity where each species, no matter how small, all have an important role to play. For example, A larger number of plant species means a greater variety of crops. Greater species diversity ensures natural sustainability for all life forms. Biodiversity is under serious threat as a result of human activities. The main dangers worldwide are population growth and resource consumption, climate change and global warming, land use for habitat conversion and urbanisation, invasive alien species, over-exploitation of natural

resources and environmental degradation. Thus, with those reasons, biodiversity sustainability and conservation plans are more important for balance of nature and future perspectives. Biodiversity impact assessment is meant to predict the biodiversity impacts and to find out the mitigation measures. The project of Value-Added Wood Factory activities and its operation will have an impact on both terrestrial and aquatic biodiversity. The mitigation measures are important to mitigate the impact of the project. Survey investigated the specific impacts, duration, and extent. The purposes of survey are to identify:

- the important issues and impacts are potentially affected on flora and fauna,
- the information necessary for decision-making; and
- the facts to support the mitigation measures and management plan.

National law for protection of biodiversity

Regards on biodiversity conservation, Myanmar's Environmental laws relating to biological conservation and management issued by the Ministry of Natural Resources and Environment Conservation (MONREC) are listed below (Table 5.7).

Table 5.4 - Environmental law related to biodiversity conservation

1. The Territorial Sea and Maritime Zones Law, 1977	Measures for the protection of marine and coastal zone environments and for the conservation of marine biological diversity
2. The Forest Law, 1992/ (2018)	Provisions to conserve water, soil, biological diversity and the environment; sustain forest produce yields; protect forest cover; establish forest and village firewood plantations; sustainably extract and transport forest products
3. Biodiversity and Protected Area Law 2018	Provision of biodiversity and wildlife protection, natural areas conservation, carrying out the protection and conservation of biodiversity, ecosystems and protected areas as well as protection of migratory birds in accordance with International Conventions acceded by the State, protecting the endangered species of wildlife and their natural habitats and contribution for the development of research on natural science.

Impact levels

Impact classification

Impacts were classified into four categories: Small, Moderate, Large and Very large followed by the Bureau of Land Management by the US (2016).

Table 5.5 - Classification of impact levels and caused event on biodiversity

	Impact level	Caused events
1	Low (L)	This is an impact that is limited to the immediate project area, affects a relatively small proportion of the local population (less than 10%), and does not result in a measurable change in carrying capacity or population size in the affected area.
2	Moderate (M)	This is an impact that extends beyond the immediate project area, affects an intermediate proportion of the local population (10 to 30%), and results in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area.
3	High (H)	This is an impact that extends beyond the immediate project area, could affect more than 30% of a local population, and could result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area.
4	Very High (VH)	This is an impact that extends beyond the immediate project area, could affect more than 50% of a local population, and could result in a very large, measurable, and destabilizing change in carrying capacity or population size in the affected area.

Biological environment of the project area

This island is separated by Myeik River from Myeik Town. Project site is situated at about 1km from the strand road of Myeik. The project site has 200 ft x 960 ft (1.78 ha) on the land. The grassland vegetations, some planted trees, parts of mountain forest, small patch of mangroves and marine environment (Myeik Rive) are in the surrounding area of the project site. According to the survey, the status of biodiversity (birds, reptiles, mammals and mountainous natural plant and mangrove plants) nearby 1km from the project site in both terrestrial and aquatic environment are small. But the birds like a little egrets and Black Eared Kites are commonly found around the project area. Three Red list species of plants with little small number are recorded in the adjacent of the Pahtaw forest. Stingray fish and turtle are reported inhibit near the project area which is described as near threatened species (NT) in IUCN red list. Rhesus macaque or long tail macaque (*Macaca mulatta*) and squirrels are observed in the forest of Pahtaw mountain, outside the project area. Surrounding area of the project site and Phahtaw and Phahtet Islands are rich of natural resources with its beauty which

should be taken measures in management plans for protection of environmental sustainability and its unique ecosystem when implemented the infrastructure development there.

Parts of marine ecosystem

Estuary Ecosystem

The term "estuary" typically describes the shallow, sheltered area of a river mouth where freshwater intermingles with saltwater as it enters the sea, although the term can also refer to other areas with flowing brackish waters, such as lagoons or glades. The degree of salinity varies with the tides and the volume of outflow from the river. The organisms inhabiting estuaries are specially adapted to these distinct conditions; hence, the diversity of species tends to be lower than in the open ocean. However, species which generally inhabit neighboring ecosystems may occasionally be found in estuaries. Estuaries also serve an important function as nurseries for many types of fish and shrimp *(https://sciencing.com › Nature).*

Mangrove Ecosystem

Some tropical and subtropical coastal areas are home to special types of saltwater swamps known as mangroves. Mangroves may be considered part of shoreline ecosystems or estuary ecosystems. Mangrove swamps are characterized by trees that tolerate a saline environment; whose roots systems extend above the water line to obtain oxygen. Mangroves host a wide diversity of life, including sponges, shrimp, crabs, jellyfish, fish, birds and even crocodiles (*https://sciencing.com › Nature)*.

METHODOLOGY

Field work

Based on the characterizations of the biological environment, the faunal and floral groups that might be impacted by the proposed project activities are investigated under field work. The targeted study groups of flora and fauna are as follow:

-Flora (grassland vegetation, mangroves, plants and phytoplanktons)

-Avifauna;

-Mammals;

-Herpetofauna (Reptiles and Amphibia)

-Fish

-Zooplankton

Data collection of plant species

In data collection, walk-through-surveys were conducted across the project site and its surrounding areas for 1 km. Plants were recorded and listed from the project site, 1000ton cool storage campus, Pahtaw village, Pahtet village, Sinmayinthar village and mangrove habitats (Figure 5.22).

Phytoplanktons were collected from similar places of zooplankton sites with plankton net. Phytoplankton identification were carried out by light microscope with 1000X using emerging oils. To clarify the plant species diversity and to calculate the important value index (IVI) of the project area, (15) quadrats (3m x 3m) in the grassland vegetation and (10) quadrats (25m x 25m) in the forest areas of Pahtet and at the base hill of Pahtaw mountain were set up. Sampling points of these quadrats were also described in Figure (5.22).

In flora surveys, laid down the quadrats, specimen collection, pressing and interview were carried out (Figure 5.23). After field trip, plant identification was conducted based on available literatures such as key to the families of the flowering plants, issued by Department of Botany, Yangon University (1994), Backer *et. al.*(1963), Kress *et. al.* (2003), Gardner *et al.* (2000) etc., and verification was conducted by recorded field photographs and some useful internet websites.

A Google map from iTouchMap.com (https://itouchmap.com/latlong.html) was used to show the different biodiversity features, mangrove habitats, grassland vegetations, villages, industrial parts, sampling points for quadrats, zooplankton and phytoplankton collection sites and forests of Pahtaw and Pahtet. Different line colors are used by Adobe Photoshop (7.0) to prominent the different zones of the flora observation (Figure 5.22). The coordinate points of mangrove habitats and sampling points were recorded by Global Positioning System (GPS) (Table 5.9). The threatened levels of plant species of the project area were checked and described their present conservation status in accordance with "The IUCN Red List of Threatened Species, 2016" (http://www.iucnredlist.org/ details/199856/0).

Data collection of animal species

Direct observation in the field was taken to collect the primary data and information. Secondary data and interview survey were also used for manipulation and for the reference. For terrestrial animal species, five groups such as birds, reptiles, amphibians, mammals and insects were targeted to collect the samples while the four groups for the fishes, birds, benthic and zooplankton fauna were main target to gather the sample in the aquatic environment.

Appropriate biological survey methods for each kind of animal are used to collect the data and information. Specimen collection was taken around 1km radius of the project area. For the secondary data, the information of animal presence was obtained about 3km radius of the project area. Identification and list of animal species inhabiting in the surrounding area are made. Observed frequency and abundance of individual species of animals are also recorded. Interview survey was taken with fisherman to investigate fish species richness and abundance. Direct observation and counting of monkey known as Rhesus macaque or long tail macaque (*Macaca mulatta*) was made during the study period. Benthic fauna sampling including along the coastal river at different zones of mudflat were collected by using hand net and observation. Some specimens were recorded by photograph.

Data collection of Herpetofauna

The Survey work mainly involved walking and visual inspection. No traps or Snares were used. Snakes and other reptiles including lizards are observed in their habitats (resting and foraging habitats). Guide books and camera were used to identify the snake species. Interview survey was also used for information.

Observation on Avifauna

Random Point count method was used for the bird survey and took the photograph of birds. Birds were studied using the point count methods using the field guide books with help of the binoculars, camera and GPS. Species identification, observed numbers of birds, habitat utilization was examined. Point count and opportunistic methods were used to census the species richness and point counting was used to get the relative measure of bird abundance. Identification of birds were confirmed using Kyaw Nyunt Lwin and Khin Ma Ma Thwin (2004).

Data Collection of Fish

Fish specimens were collected with the help of fishermen who they are fishing along the coastal waters nearby the project area. Fish sample collection was made by use of drifted gill net, trammel-net and line & hook fishing. Identification was made by FAO (2012) and Fishbase 2015.

Collection and preservation of zooplankton samples

To be collected the zooplanktons, a total of 75 liters of water was being filtered with plankton net (mesh size 190µm) carried out in each sampling site (Figure 5.22 and 5.24). The hauling distance was 60cm long near the surface water. At each study sites triplicate samples were carefully transferred to a small vial. The inside of the net was washed so as to collect any sticking plankton. A few drops of formalin were put to narcotize the animals and when they became motionless and settled down, the supernatant water was discarded slowly and concentrated samples were collected. All samples were preserved in 5% formaldehyde solution (Nauwerk 1963; Anderson and Green 1976). The taxonomical identification and numbers of population abundance of water sample were done by drop count method under the microscope. Taxonomic identification was carried out following Sharma(1999a) and Khan (2003).

Data analysis

Data analysis is made by descriptive statistical analysis through Microsoft excel. Impact analysis is conducted followed by the standard guideline. Identification and
determination of the potential impacts such as impact levels such as magnitude, extent and duration on biodiversity caused by the proposed project is made. Based on the type of the project, impact levels are identified into three categories such as low, moderate, high and very high for the proposed project. The factors are used in determining impact significance and magnitude, these factors are 1. area of influence, 2. percentage of resource affected, 3. persistence of impacts, 4. sensitivity of resources, 5. status of resources, 6. regulatory status, and 7. social values.

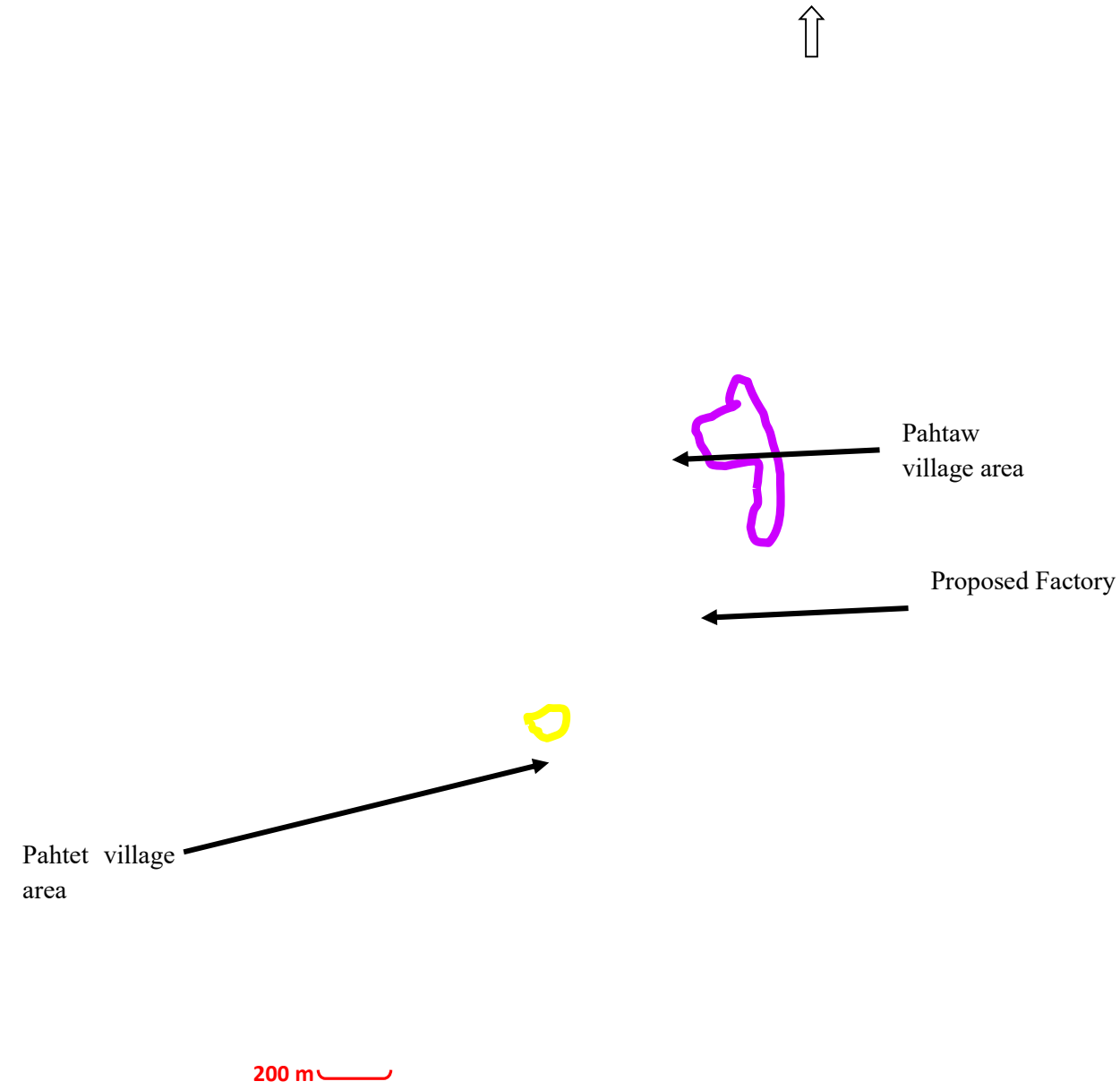


Figure 5.21 – Map of the project site and its environment

Index: = Project site; = Industries = Villages;
= Water body; = Habitats of mangrove communities;
=Grassland vegetations; 1 to 3 = Zooplankton collection sites
= Sampling points (3m x 3m quadrat) of grassland vegetations;
= Sampling points (25m x 25m quadrat) of Phtaw and Phtet Forests

Walk-through-survey to record and list for plants (1)

Walk-through-survey to record and list for plants (2)

Plant collection

Press

Quadrat set up (25m x 25m) in the Pahtaw forest

Quadrat set up (25m x 25m) in Pahtet forest

Quadrat set up (3m x 3m) in grassland vegetation

Interviewing with local people

Figure 5.22 - Field activities of plant survey

Fish sample collection with gill net

Zooplankton and phytoplankton collection by plankton net

Specimen preservation (for zooplankton and phytoplankton) with formalin in plastic vial

Figure 5.23 - Collection fish sample and zooplankton

Table 5.6– Sampling points of grassland, Pahtaw and Pahtet vegetations

No	Latidude	Longitude
Project Site		
1	N 12º 26′ 28.14″	E 98º 35′ 10.7664″
Sampling points of Grassland vegetation (3mx3m)		
1	N 12º 26′ 10.5174″	E 98º 35′ 2.2164″
2	N 12º 26′ 13.3836″	E 98º 35′ 3.2958″
3	N 12º 26′ 16.2486″	E 98º 34′ 58.1196″
4	N 12º 26′ 20.853″	E 98º 34′ 58.1982″
5	N 12º 26′ 18.1356″	E 98º 34′ 52.2516″
6	N 12º 26′ 38.3274″	E 98º 34′ 56.8848″
7	N 12º 26′ 36.8154″	E 98º 34′ 58.4292″
8	N 12º 26′ 37.1184″	E 98º 35′ 1.9818″

9	N 12º 26′ 39.5334″	E 98º 35′ 2.6016″
10	N 12º 26′ 40.8906″	E 98º 35′ 0.438″
11	N 12º 26′ 50.0928″	E 98º 34′ 55.3398″
12	N 12º 26′ 49.4916″	E 98º 34′ 58.7382″
13	N 12º 26′ 51.45″	E 98º 35′ 3.372″
14	N 12º 26′ 52.8102″	E 98º 35′ 1.2114″
15	N 12º 26′ 52.962″	E 98º 34′ 58.1196″
Sampling points of Pahtaw Forest (25mx25m)		
1	N 12º 27′ 3.1896″	E 98º 34′ 59.2026″
2	N 12º 27′ 2.7648″	E 98º 34′ 52.2516″
3	N 12º 26′ 56.2776″	E 98º 34′ 40.818″
4	N 12º 26′ 59.5962″	E 98º 34′ 38.19″
5	N 12º 26′ 54.7686″	E 98º 36.9546″
Sampling points of Pahtet Forest (25mx25m)		
1	N 12º 26′ 16.2468″	E 98º 35′ 14.496″
2	N 12º 26′ 14.0634″	E 98º 35′ 13.4154″
3	N 12º 26′ 11.724″	E 98º 35′ 13.3404″
4	N 12º 26′ 11.2704″	E 98º 35′ 15.27″
5	N 12º 26′ 8.7072″	E 98º 35′ 10.1718″
Zooplanktons and Phytoplanktons		
1	N 12º 26′ 48.0228″	E 98º 35′ 7.659″
2	N 12º 26′ 43.9866″	E 98º 35′ 10.9818″
3	N 12º 26′ 19.5462″	E 98º 35′ 14.1504″

RESULTS (FLORA)

Plant survey was carried out for 1 km range from the core area of project site. The surroundings of project area are mainly occupied with slightly thin by grassland vegetation, mangrove vegetation and the two forests.

Vegetation was not occurred in the project site. Plant species at margins as fence, the planted species in the 1000 ton cool storage campus, natural plant species of mangrove communities, natural plant species from sampling points of grassland vegetations and Pahtaw and Pahtet forests were also recorded and listed.

In this survey, a total of (147) plant species from (52) families was recorded in which tree species were (48.29%), followed by shrub and herb (each 12.93%), small tree (11.56%), climber (6.80%), grasses (4.08%), bamboo (2.72%) and finally fern (0.68%) included. The

most significant family of the project area was Fabaceae with (16) species, followed by Malvaceae with (13) species and finally Poaceae with (11) species.

A total of (83) species from Pahtaw forest, followed by (56) species from Pahtet forest, (44) species from Pahtaw village, (38) species from grassland vegetations, (36) from Sinmayinthar village, (30) species from mangrove communities with (7) species of mangrove plants (Figure 5.23), (29) species from1000 ton cool storage campus, (27) species from Pahtet village and (22) species from fence of project site were recorded as listed plant species at present (Table 5.2).

A total of (11) phytoplankton species were collected and identified in which a total of top (3) species were mentioned with figures.

According to IUCN red list (2016), the three tree species of *Myristica malabarica* (Kywe-thwe) as vulnerable status (VU), *Vatica maingayi* (Kanyin-kyaung-che) as critical endangered status (CR) and *Dipterocarpus kerrii* King. (Sibin) as endangered status (EN) were recorded as threatened species. These species are essential to conserve for plant diversity.

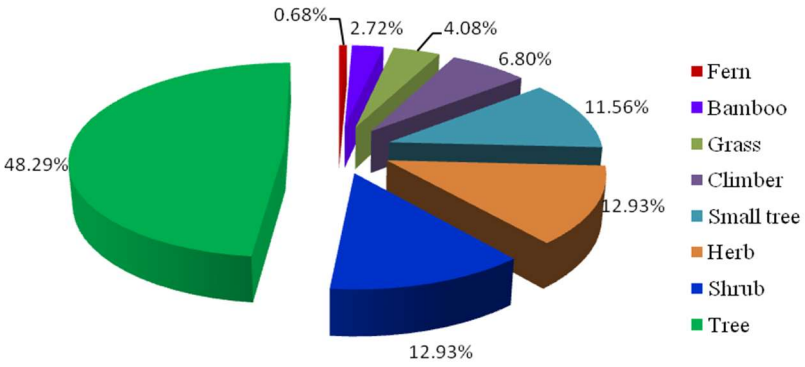
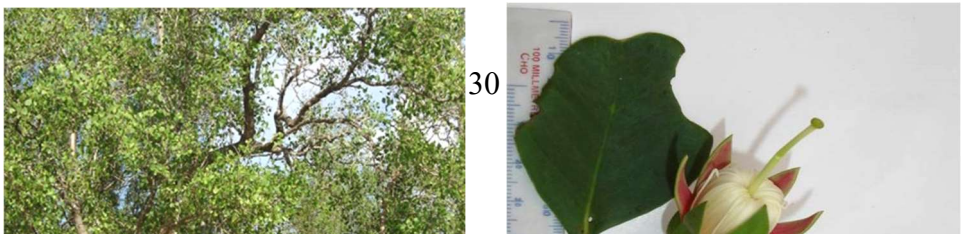


Figure - Habit Composition of Observed Plant Species

c d

Figure 5.24 - Project Site and Its Surroundings: (a) project site; (b) fence plant species (c) grassland vegetation and Pahtaw village; (d) grassland vegetation near Pahtet village; (e) mangrove community near Sinmayinthar village; (f) mangrove community at Myeik river; (g) Pahtaw forest; (h) Pahtet fores

Nypa-fruitcans – (Daisy)



Sonneratia alba **(Lame)**

Avicennia officinalis **(Thame-net)**

Rhizophora mucronata **(Byu-chidauk)**

Figure 5.25- Some Plant Species of Mangroves

Table 5.7- Recorded plant species together with the Family names, Myanmar names, Habits, their sites and IUCN status.

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
1	*Acacia auriculiformis* A.Cunn.ex Ben	Fabaceae=16	Aurishaa	Tree		√	√		√				√	NL
2	*Acacia mangium* Willd.	Fabaceae	Nil	Tree								√		NL
3	*Acanthus ilicifolius* L.*	Acanthaceae=2	Khayar	Shrub=19						√				NL
4	*Achyranthes aspera* L.	Amaranthaceae	Kyet-mauk-pyan	Herb							√			NL
5	*Acrostichum aureum* L.	Pteridaceae=1	Nil	Fern=1					√	√	√	√	√	NL
6	*Adenanthera pavonina* L.	Fabaceae	Ywe-gyi	Tree								√	√	NL
7	*Albizia procera* (Roxb.) Benth.	Fabaceae	Sit	Tree			√	√				√	√	NL
8	*Albizia saman* F. Muell.	Mimosaceae=4	Thinbaw-kokko	Tree		√	√		√					NL
9	*Alternanthera sessilis* (L.) R. Br.	Amaranthaceae=2	Pazun-sar	Herb	√						√	√		NL
10	*Anacardium occidentale* L.	Anacardiaceae=5	Thiho-thayet	Tree		√	√						√	NL
11	*Anthocephalus morirndaefolius* Korth.	Rubiaceae=1	Ma-u	Tree								√	√	NL
12	*Archidendron pauciflorum* (Jack) Nielsen.	Fabaceae	Danyin	Tree			√					√	√	NL
13	*Areca catechu* L.	Arecaceae=6	Kunthi-pin	Small tree		√						√		NL
14	*Artocarpus heterophyllus* Roxb.	Moraceae=8	Peinne	Tree		√	√		√			√	√	NL

Table (5.7) Contd. (a)

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
15	*Artocarpus lakoocha* Roxb.	Moraceae	Myauk-pa-lote	Tree								√		NL
16	*Arundo donax* L.	Poaceae=11	Kyu	Grass=6							√	√	√	NL
17	*Avicennia officinalis* L.*	Avicenniaceae=1	Thame-net	Tree						√				NL
18	*Barringtonia procera* (Miers) R.Knuth	Lecythidaceae=1	Kye	Tree			√					√		NL
19	*Bauhinia monandra* Kurz.	Caesalpiniaceae=2	Swe-daw	Tree		√	√	√	√					NL
20	*Borassus flabellifer* L.	Arecaceae	Htan	Tree			√							NL
21	*Bouea burmanica* Griff.	Anacardiaceae	Ma-yan	Tree			√					√	√	NL
22	*Bruguiera malabarica* Arnold*	Rhizophoraceae=1	Byu-kyettet	Small tree						√				NL
23	*Canavalia turgida* Wight & Arn.	Fabaceae	Nil	Climber				√						NL
24	*Carex tavoyensis* Nelmes	Cyperaceae	Nil	Herb							√			NL
25	*Carica papaya* L.	Caricaceae=1	Nget-pyaw	Small tree		√	√		√					NL
26	*Cassia alata* L.	Fabaceae	Pwesay-mezali	Shrub					√	√			√	NL
27	*Cassia fistula* L.	Fabaceae	Ngu-gyi	Tree		√	√		√					NL
28	*Ceiba pentandra* (L.) Gaertn.	Bombacaceae=1	Le-moh-pin	Tree		√	√							NL
29	*Centipeda minima* (L.) A. Br. & Asch.	Asteraceae=5	Chay-sat	Herb	√						√			NL

Table (5.7) Contd. (b)

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
30	*Cephalostachyum burmanicum* R. Parker & C.E.	Poaceae	Kyat-wa	Bamboo=4			√		√				√	NL
31	*Cephalostachyum virgatum* Kurz.	Poaceae	Wa-byauk	Bamboo					√				√	NL
32	*Chloris barbata* Sw.	Poaceae	Sin-ngo-myet	Grass	√						√			NL
33	*Cinnamomum pachyphyllum* Kosterm.	Lauraceae	Kayaway	Tree								√		NL
34	*Cinnamomum* sp.	Lauraceae=4	Nil	Tree			√					√		NL
35	*Cocos nucifera* L.	Arecaceae	Ohn	Tree	√	√	√	√	√					NL
36	*Cocos romanzoffiana* Cham.	Arecaceae	Thinbaw-ohn	Tree		√								NL
37	*Cyclea peltata* Hook. F. & Thomson	Menispermaceae=2	Gwedauk-hmwe-sok	Climber						√				NL
38	*Cynodon dactylon* (L.) Pers.	Poaceae	Mye-sa	Grass	√						√	√		NL
39	*Cyperus arenarius* Retz.	Cyperaceae=6	Nil	Herb						√	√	√		NL
40	*Cyperus compressus* L.	Cyperaceae	Wetlar-myet	Herb						√	√	√		NL
41	*Cyperus difformis* L.	Cyperaceae	Nil	Herb	√						√			NL
42	*Cyperus macer* C.B. Clarke	Cyperaceae	Nil	Herb						√	√			NL
43	*Cyperus multispicatus* Boeck.	Cyperaceae	Nil	Herb						√	√	√		NL

Table (5.7) Contd. (c)

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
44	*Delonix regia* (Boj. Ex Hook.) Raf.	Fabaceae	Seinban-gyi	Tree		√	√		√				√	NL
45	*Dendrocalamus brandisii* Kurz.	Poaceae	Wabo-gyi	Bamboo		√	√					√		NL
46	*Dinochloa macllelandii* Gamble.	Poaceae	Wa-nwe	Bamboo			√	√		√		√	√	NL
47	*Dipterocarpus kerrii* King.	Dipterocarpaceae=5	Sibin	Tree								√		**EN**
48	*Eclipta alba* (L.) Hassk.	Asteraceae	Kyeik-hman	Herb	√						√	√		NL
49	*Elaeocarpus robustus* Roxb.	Elaeocarpaceae=1	Tawmagyi	Tree								√	√	NL
50	*Emblica officinalis* Gaertn.	Phyllanthaceae=2	Zibyu	Tree			√					√		NL
51	*Eremochloa ciliatifolia* Hack.	Poaceae	Nil	Grass							√			NL
52	*Eriachne pallescens* R. Br.	Poaceae	Nil	Grass							√	√		NL
53	*Eucalpytus albens* Benth.	Myrtaceae	Eu-ca-lit	Tree		√	√	√	√			√		NL
54	*Eugenia* sp.	Myrtaceae=8	Thabye-wah	Tree								√	√	NL
55	*Euggenia oblata* Roxb.	Myrtaceae	Thabye-ni	Tree			√					√	√	NL
56	*Eupatorium odoratum* L.	Asteraceae	Bizat	Shrub	√				√				√	NL
57	*Euphorbia heterophylla* L.	Asteraceae	Kywe-kyaung-myin-si	Shrub							√			NL
58	*Excoecaria agallocha* L.*	Euphorbiaceae=5	Tayaw	Small tree=18				√		√		√	√	NL

Table (5.7) Contd. (d)

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
59	*Excoecaria oppositifolia* Griff.	Euphorbiaceae	Kalaw-ga	Small tree									√	NL
60	*Ficus chartacea* Wall.	Moraceae	Tha-phan	Shrub			√		√	√				NL
61	*Ficus glomerata* Roxb.	Moraceae	Ye-thahpan	Tree			√					√		NL
62	*Ficus oligodon* Miq.	Moraceae	Ka-aung	Tree			√			√		√		NL
63	*Ficus ribes* Reinw.	Moraceae	Nil	Tree								√	√	NL
64	*Ficus rumphii* Bl.	Moraceae	Nyaung-phyu	Tree	√		√		√				√	NL
65	*Garcinia merguensis* Wight.	Clusiaceae=1	Khet-mya	Small tree								√	√	NL
66	*Garcinia microstigma* Kurz.	Hypericaceae=1	Taung-thale	Small tree								√		NL
67	*Getonia floribunda* Roxb.	Combretaceae=2	Gyut-nwe	shrub								√		NL
68	*Gisekia phanaceoides* L.	Gisekiaceae=1	Gangala	Herb	√						√			NL
69	*Gluta renghas* L.	Anacardiaceae	Lay-tha-yet	Tree								√		NL
70	*Gmelina arborea* Roxb.	Lamiaceae=3	Yemane	Tree								√	√	NL
71	*Grewia hirsuta* Vahl.	Malvaceae=13	Kyet-tayaw	Small tree				√				√		NL
72	*Grewia serrulata* DC.	Malvaceae	Nil	Small tree				√		√		√		NL
73	*Gyrocarpus jacquinii* Gaertn.	Hernandiaceae=1	Pinle-thit-kauk	Tree								√		NL
74	*Heliotropium indicum* L.	Boraginaceae=1	Sin-hna-maung	Herb							√	√		NL

Table (5.7) Contd. (e)

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
75	*Hibiscus macrophyllus* Roxb.	Malvaceae	Taung-petwun	Small tree			√		√	√		√	√	NL
76	*Hibiscus surattensis* L.	Malvaceae	Taw-chin-baung	Shrub								√		NL
77	*Homonoia riparia* Lour.	Euphorbiaceae	Ye-chanya	Shrub				√		√	√		√	NL
78	*Hopea oblongifolia* Dyer.	Dipterocarpaceae	Tanyin-byan	Tree								√		NL
79	*Hygrophila phlomoides* Nees.	Acanthaceae	Migyaung-kunbat	Herb	√					√	√			NL
80	*Hyptis suaveolens* (L.) Poit.	Lamiaceae	Taw-pin-sein	Herb	√						√			NL
81	*Indigofera* sp.	Fabaceae	Meyaing	Shrub	√						√			NL
82	*Ipomoea aquatica*Forssk.	Convolvulaceae=1	Ye-kazun	Climber=10	√						√		√	NL
83	*Isachne dispar* (Trin.) Trin.	Poaceae	Yethe-mankha	Herb=19							√			NL
84	*Jasminum multiflorum* (Burm.f.) Andrews	Oleaceae=1	Tawsabe	Climber						√	√	√	√	NL
85	*Lagerstroemia speciosa* (L.) Pers.	Lythraceae	Pyin-ma	Tree		√	√	√	√				√	NL
86	*Leucaena glauca* (L.) Benth.	Mimosaceae	Bawsagaing	Small tree		√	√	√	√					NL
87	*Litsea laurifolia* (Jacq.) Kurz.	Lauraceae	Ondon	Tree			√					√		NL
88	*Litsea salicifolia* (Nees.) Hook. f.	Lauraceae	Tagu-shwe-wah	Tree								√		NL

Table (5.7) Contd. (f)

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
89	*Lophopetalum fimbriatum* Wight	Celastraceae=1	Taung-yemane	Tree								√	√	NL
90	*Macaranga tanarius* Muell. Arg.	Euphorbiaceae	Pada	Tree			√			√			√	NL
91	*Macaranga triloba* Muell. Arg.	Euphorbiaceae	Nil	Tree				√				√		NL
92	*Madhuca longifolia* (J. Konig) J.F. Macbr.	Sapotaceae	Kan-zaw	Tree								√		NL
93	*Maesa paniculata* A. DC.	Primulaceae=1	Nil	Small tree								√	√	NL
94	*Malvastrum coromandelianum* (L.) Garcke	Malvaceae	Taw-pilaw	Herb				√			√	√		NL
95	*Mangifera indica* L.	Anacardiaceae	Tha-yet	Tree		√	√	√	√					NL
96	*Melastoma malabathricum* L.	Melastomataceae=2	Kyet-gale	Shrub							√	√	√	NL
97	*Memecylon grande* Cogn.	Melastomataceae	Taung-phyu	Shrub						√			√	NL
98	*Mikania micrantha* H.B.K.	Asteraceae	Nil	Climber	√	√					√			NL
99	*Mimosa pudica* L.	Mimosaceae	Tikayon	Herb	√			√	√		√			NL
100	*Mimusop elengi* L.	Sapotaceae=3	Khayay	Tree		√	√	√	√			√		NL
101	*Moringa oleifera* Lam.	Moringaceae=1	Dan-da-lun	Tree	√	√		√	√			√		NL
102	*Myristica malabarica* Lam.	Myristicaceae=1	Kywe-thwe	Tree								√		**VU**

Table (5.7) Contd. (g)

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
103	*Nephelium laurinum* Blume.	Spindaceae=1	Taw-kyet-mauk	Tree								√		NL
104	*Nypa fruticans* Wurmb.*	Arecaceae	Dani	Small tree			√		√	√				NL
105	*Palaqquium obovatum* (Griff.) Engl.	Sapotaceae	Pinle-byin	Tree			√					√	√	NL
106	*Phragmites vallatoria*	Poaceae	Kyu-a	Grass						√			√	NL
107	*Phyllanthus niruri* L.	Phyllanthaceae	Yaung-ma-ywet	Shrub				√			√			NL
108	*Physalis minima* L.	Solanaceae=1	Bauk-pin	Herb	√						√			NL
109	*Pithecellobium dulce* (Roxb.) Benth.	Mimosaceae	Tayok-magyi	Tree		√			√					NL
110	*Pterocarpus macrocarpus* Kurz.	Fabaceae	Padauk	Tree		√	√	√	√					NL
111	*Ravenala madagascariensis* Sonn.	Strelitziaceae=1	Ohn-nget-pyaw	Tree		√								NL
112	*Rhizophora mucronata* Lam.*	Rhizophoraceae	Byu-chidauk	Small Tree								√		NL
113	*Sageraea elliptica* (A.DC.) Hook. f.	Annonaceae=1	Thabut	Tree								√	√	NL
114	*Salacca secunda* Griff.	Arecaceae	Yin-ngan	Small tree		√			√	√			√	NL
115	*Samadera indica* Gaertn.	Simaroubaceae=1	Ka-thae	Tree								√		NL
116	*Schima wallichii* (DC.) Korth.	Theaceae=1	Thityah	Tree								√	√	NL

Table (5.7) Contd. (h)

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
117	*Schleichera trijuga* Willd.	Sapindaceae=1	Gyo-nyin	Tree								√		NL
118	*Semecarpus* sp.	Anacardiaceae	Chee	Tree								√	√	NL
119	*Shorea gralissima* Dyer.	Dipterocarpaceae	Mi-chaung-chee	Tree								√		NL
120	*Shorea obtusa* Wall.	Dipterocarpaceae	Thit-ya	Tree								√	√	NL
121	*Sida spinosa* L.	Malvaceae	Thabyetsi-pin	Shrub	√				√		√	√		NL
122	*Sida subcordata* Span.	Malvaceae	Katsi-ne	Herb					√		√			NL
123	*Smilax* sp.	Smilacaceae=1	Nil	Climber					√				√	NL
124	*Sonneratia alba* J. Smith.*	Lythraceae=2	Lame	Tree=70						√				LC
125	*Stephania japonica* (Thunb.) Miers	Menispermaceae	Yele	Climber					√	√		√	√	NL
126	*Streblus asper* Lour.	Moraceae	Okhne	Small tree		√	√		√			√		NL
127	*Strophostyles helvola* (L.) Elliott.	Fabaceae	Taw-peyaing	Climber				√			√	√	√	NL
128	*Syzygium cerasoides* (Roxb.) Raiz.	Myrtaceae	Thabye-gyin	Tree			√					√	√	NL
129	*Syzygium cymosum* DC.	Myrtaceae	Thabye-htat-taya	Tree								√		NL
130	*Syzygium malaccense* (L.) Merr.& L.M. Perry	Myrtaceae	Thabye-phyu	Tree			√					√	√	NL
131	*Syzygium* sp.	Myrtaceae	Thabye-gyi	Tree		√						√	√	NL

Table (5.7) Contd. (i)

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
132	*Talipariti tiliaceum* (L.) Fryxell	Malvaceae	Ye-ngan-shaw	Small tree			√	√		√	√	√		NL
133	*Tamarindus indica* L.	Caesalpiniaceae	Magyi	Tree		√	√	√	√					NL
134	*Terminalia catappa* L.	Combretaceae	Banda	Tree		√	√	√	√					NL
135	*Thespesia lampas* (Cav.) Dalzell & A. Gibson.	Malvaceae	Thinbaung-shaw	Shrub			√	√		√		√	√	NL
136	*Thespesia populnea* (L.) Sol. Ex Correa	Malvaceae	Pinle-swedaw	Small tree						√			√	NL
137	*Toona ciliata* M. Roem.	Meliaceae=1	Thit-ka-toe	Tree								√	√	NL
138	*Triumfetta annua* L.	Malvaceae	Katsine	Shrub	√						√		√	NL
139	*Triumfetta rhomboidea* Jacq.	Malvaceae	Katsine-galay	Shrub	√								√	NL
140	*Uraria lagopodioides* (L.) DC.	Fabaceae	Kyaungme-pan	Shrub	√					√	√			NL
141	*Urena lobata* L.	Malvaceae	Wetchi-pane	Shrub					√			√		NL
142	*Vatica maingayi* Dyer.	Dipterocarpaceae	Kanyin-kyaung-che	Tree								√		**CR**
143	*Vigna adenantha* (G. Mey.) Marechal	Fabaceae	Pe-yaing	Climber									√	NL
144	*Vigna lutea* (Sw.) A. Gray	Fabaceae	Beach pea	Shrub						√			√	NL
145	*Vigna marina* (Burm.) Merr.	Fabaceae	Pe-dalet-yaing	Climber				√				√	√	NL

Table (5.7) Contd. (j)

No.	Scientific Name	Family	Myanmar Name	Habit	Areas of listed plant species						Study Areas			IUCN Status
					1	2	3	4	5	6	7	8	9	
146	*Vitex pubescens* Vhal.	Lamiaceae	Kyet-yo	Tree								√		NL
147	*Zizipus jujube* (L.) Mill & Lam.	Rhamnaceae=1	Zi	Tree		√	√	√	√			√		NL
	147 species	**52 family**			**22**	**29**	**44**	**27**	**36**	**30**	**38**	**83**	**56**	

1 Fence plants of the project site
2 1000 ton cool storage campus
3 Pahtaw village
4 Pahtet village
5 Sinmayinthar village
6 Mangrove habitats
√ Recorded place
* mangrove plant species
7 Data of grassland vegetations from 15 quadrats (3m x 3m)
8 Data of Pahtaw Forest Area from 5 quadrats (25m x 25m)
9 Data of Pahtet Forest Area from 5 quadrats (25m x 25m)

NL : Not listed in IUCN red list; LC: Least Concern: DD: Data Deficient; CR: Critical endangered; VU: Vulnerable; EN: Endangered

Phytoplankton

A total of (11) plankton species was collected and identified. Top three species of phytoplankton was mentioned in Figure (5.24) and Table (5.3). All recorded species are common and widely distributed in costal water. All these species are essentially important for other aquatic animals and nutrient cycle. Scientists stated that phytoplankton are unicellular and mostly microscopic in size. They are drifting photosynthesize organisms and generating much of the oxygen into their environment. They are carbon sink for the earth and form primary producer in the food chain. They are the main primary producers in the epipelagic food web. The abundance of phytoplankton deals with the abundance of herbivorous zooplankton and fishes. Moreover, phytoplankton were used as an indicator species to indicate inshore and offshore fishing ground, the occurrence of water pollution, red tides, etc. On the other hand, they are also the indicators of the condition of waters mass.

Table 5.8 - Recorded phytoplankton species from Costal water nearby the project area

Species	Rank (in abundance)
Coscinodiscus radiatus Ehrenberg	1
Thalassiosira punctigera (Castracane) Hasle	2
Melosira nummuloides Agardh	3
Odontella sinensis (Greville) Grunow	4
Thalassionema frauenfeldii (Grumow) Hallegraeff	5
Coscinodiscus gigas Ehrenberg	6
Pleurosigma normanii Ralfs	7
Dinophysis caudata Saville-Kent	8
Thalassiosira excentrica (Ehrenberg) Cleve	9
Coscinodiscus asteromphalus Ehrenberg	10
Ditylum sol (Schmidt) Cleve	11

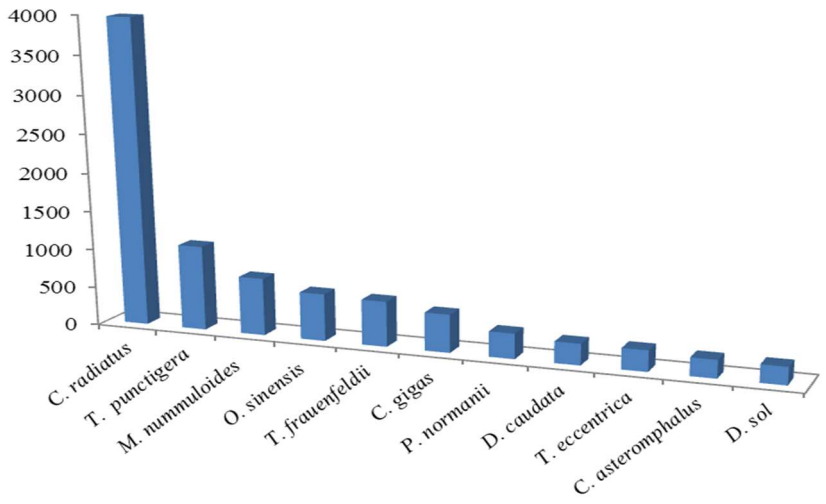


Figure - Species of phytoplanktons

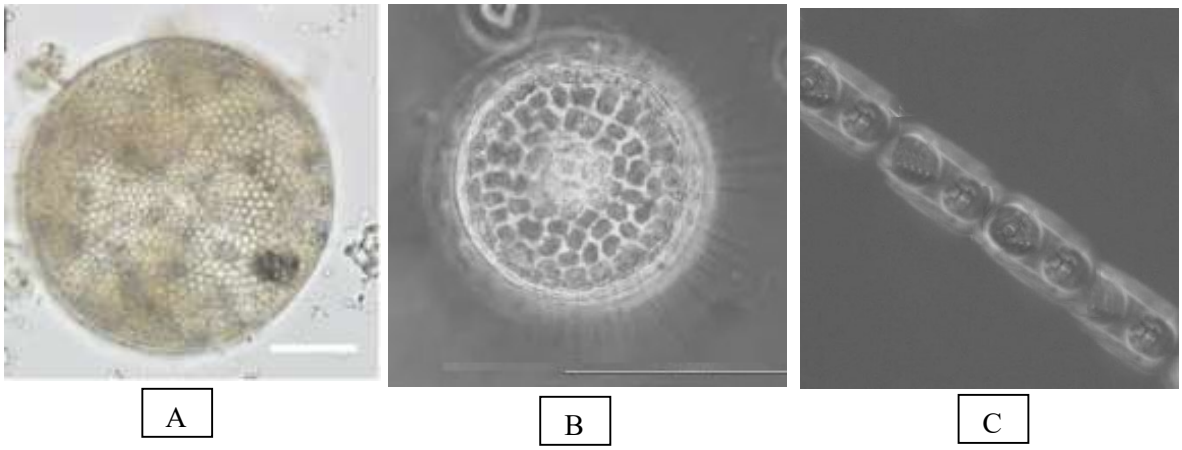


Figure 5.26 - Top (3) species of phytoplankton: (A) Coscinodiscus radiatus Ehrenberg; (B) Thalassiosira punctigera (Castracane) Hasle; and (C) Melosira nummuloides Agardh

Discussion for plants

A total of (147) plant species from (52) families was observed. Among them, (83) species from Pahtaw forest, followed by (56) species from Pahtet forest, (44) species from Pahtaw village, (38) species from grassland vegetations, (36) species from Sinmayinthar village, (30) species from mangrove communities, (29) species from 1000 ton cool storage campus, (27) species from Pahtet village and (22) species from fence of project site were recorded and listed.

The plant communities of around the project area are margins of the two forests (Pahtaw and Pahtet), grassland vegetation and mangrove communities. Plant important value index (I.V.I) from the two forests will not be described in this scoping report. A total of (83) species from Pahtaw forest and (56) from Pahtet forest are recorded from (10) sampling points (30m x 30m). Forests are nowadays played an important role in environmental protection. It has a long history of protection forests in mountain areas, where they help to prevent soil erosion, landslides and avalanches, and where they are important in maintaining the water quality of rivers draining forested catchments. Forests are very important to maintain because of their top ten reasons of absorbing and storing carbon, home to people, source of jobs and livelihoods, wood for furniture, lumber, firewood and other products, habitat for mammals, birds and insects, preventing flooding, conserving soil and water, regulating regional climate, **n**atural beauty and finally trails for hiking, snow sports, bird-watching, recreation, tourism and educational activities (Web. 1). Therefore, forests of Pahtaw and Pahtet are needed to conserve for the forest ecosystem of project area. In flora survey, the three tree species were recognized as threatened levels of IUCN red list which species are *Myristica malabarica* (Kywe-thwe)

(VU status), *Vatica maingayi* (Kanyin-kyaung-che) (CR status) and *Dipterocarpus kerrii* King. (Sibin) (EN status). Observed these species were from the margin of the Pahtaw forest. The resting plant species are not included in threatened categories of IUCN red list (2016).

In (30) plant species of mangrove communities, (7) species are recorded as mangrove plants which are *Acanthus ilicifolius* (Khayar), *Avicennia officinalis* (Thame-net), *Bruguiera malabarica* (Byu), *Excoecaria agallocha* (Tayaw), *Nypa fruticans* (Dani), *Sonneratia alba* (Lame), and *Rhizophora mucronata* (Byu-chidauk).

Actually, mangroves protect shorelines from damaging storm and hurricane winds, waves, and floods. Mangroves also help prevent erosion by stabilizing sediments with their tangled root systems. They maintain water quality and clarity, filtering pollutants and trapping sediments originating from land (Web. 2). Mangrove forests are home to a large variety of fish, crab, shrimp, and mollusk species. These fisheries form an essential source of food for thousands of coastal communities around the world. The mangrove forests also serve as nurseries for many fish species, including coral reef fish. Moreover, many animals find shelter either in the roots or branches of mangroves. Mangroves serve as rookeries, or nesting areas, for coastal birds (Web 3). Mangrove swamps act as traps for the sediments, and sink for the nutrients. The root systems of the plants keep the substrate firm, and thus contribute to a lasting stability of the coast. The ecosystem provides a source of food, breeding grounds and nurseries for many food fishes and shellfishes, and they do very often encourage and attract other kinds of wildlife. They further help in offering protection to other associated flora and fauna of the ecosystems including the islands. The mangrove ecosystems are highly productive and comparable to good agricultural land. Benefits of mangroves are 25 fold higher than that of paddy cultivation (Kathiresan *et. al*, 2005). Therefore, all these mangrove species are very important to maintain for mangrove ecosystem of the project area.

In addition, mangroves can be improved the coastal water quality. Mangroves can be removed pollutants and particulate matter from land-based sources. Mangroves are filtering these materials from water before they reach seaward coral reef and seagrass habitats because mangrove root systems slow water flow and facilitating the deposition of sediment (Web 4 and Figure 5.30). As economic benefits, the mangroves supply forestry products (firewood, charcoal, timber, honey *etc*.) and fishery products (fish, prawn, crab, mollusk *etc*.). *Nypa* leaves are used to thatch roofs, mats and baskets. Shells of mangrove molluscs are used to manufacture lime. Mangroves attract honey bees and facilitate apiculture activities in some areas. Mangrove extracts are used in indigenous medicine. *Bruguiera* species (leaves) are used

for reducing blood pressures and *Excoecaria agallocha* for the treatment of leprosy and epilepsy. Roots and stems of *Derris trifoliata* are used for narcotizing fishes, whereas *Acanthus ilicifolius* is used in the treatment of rheumatic disorders. Seeds of *Xylocarpus* species have antidiarrhoeal properties and *Avicennia* species have tonic effect, whereas *Ceriops* produce hemostatic activity. Barks of *Rhizophora* species have astringent, antidiarrhoea and antemetic activities. Tender leaves of *Acrostichum* are used as a vegetable and a beverage is prepared from the fruits of *Sonneratia* spp. Extracts from mangroves seem to have a potential for human, animal and plant pathogens and for the treatment of incurable viral diseases like AIDS (Kathiresan *et. al*, 2005). In fact, observed mangrove plant species of *Acanthus ilicifolius* (Khayar), *Avicennia officinalis* (Thame-net), *Bruguiera malabarica* (Byu), *Excoecaria agallocha* (Tayaw), *Nypa fruticans* (Dani) and *Sonneratia alba* (Lame) will be provided economic, medicinal and ecological values in accordance with Kathiresan (2005), and thus these species should be maintained and plantation should be carried out for project development.

According to observation, phytoplankton communities of costal water of the project area were good in condition and abundance with rich species diversities. Species of *Coscinodiscus radiates* Ehrenberg, *Thalassiosira punctigera* (Castracane) Hasle; and *Melosira nummuloides* Agardh. were recorded as top three species among other phytoplankton species. Based on the finding of Yin Yin Htay (2013), the phytoplankton of Pahtaw-Pahtet Waters stands the second most abundance species diversity which account for 65.92 % (comprises 89 species from the recorded 135 species of phytoplankton from Myeik Coastl Water) of phytoplankton species in Myeik Coasta Area. So it can be concluded that the environmental conditions, the water quality and nutrient of Pahtaw-Pahtet Area were favor for the survival of phytoplankton communities in this region which will in turn provide as food for other fishery resources.

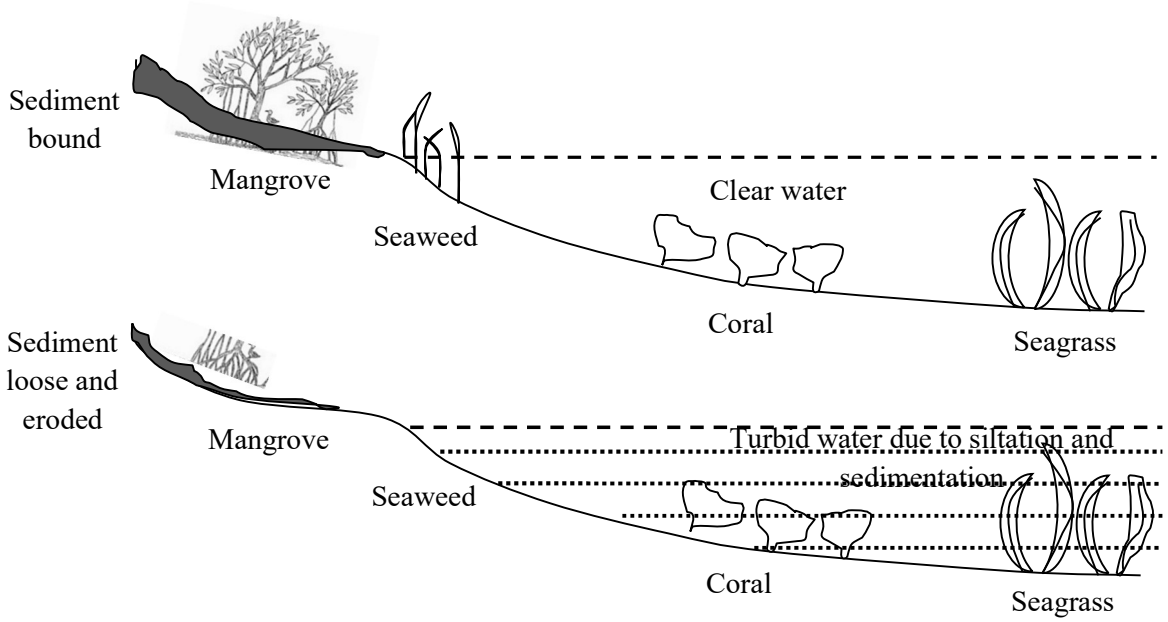


Figure 5.27 - Mangroves can be improved coastal water quality

RESULTS (FAUNA)

Five fauna groups are classified according to their presence in the surrounding area of the project site. The study is to investigate their abundance status and possible impacts caused by the project activities. According to survey result, the abundance of individual recorded species in terrestrial habitat in and around the project area is low except Black Eared Kite. However aquatic fauna species are intentionally observed as ecological important which includes fish, benthos and zooplanktons. Stingray fish was recorded which listed IUCN as nearly threatened species (NT) during the observation period. Five fauna groups are as follow,

-Herpetofauna (Reptiles and Amphibians)

-Avifauna

-Mammals

-Fish

-Zooplankton

Herpetofauna (Amphibian and reptiles)

Herpetofauna with low population and small diversity are recorded. A total of 16 species belong to 11 families were recorded during the survey (Table 5.4). The abundance status of individual species based on observed frequency was recorded as small. All recorded amphibians and reptiles are common species and a turtle of Genus *Cyclemys* are classified as Red Data species. The turtle suggested that it seem to be a leaf turtle found in the forest of

Phathaw mountain in last six month which should be protected. Regard ecology of those herpetofauna species, they are widely distributed animals and they inhabit similar habitats in this region. Amphibians and reptiles are one of the important members of aquatic and terrestrial ecosystems as they serve as both predators and prey.

Table 5.9 - Recorded amphibian and reptile species (16 species) in the buffer zone and the project area

Sr. No	Family	Common name	Scientific name	Conservation status IUCN 2016	Habitats	Abundance status
Frog and Toad						
1	Dicroglossidae	Indian cricket frog	*Fejervarya limnocharis*	LC	Grass/pond	S
2	Dicroglossidae	Chinese edible frog	*Hoplobatrachus rugulosa*	LC	Shrub/pond	S
3	Microhylidae	Painted bull frog	*Kaloula pulchra*	LC	Pond	S
4	Rhacophoridae	Common tree frog	*Polypedates leucomystax*	LC	Shrub/pond	S
5	Bufonidae	Asian common toad	*Duttaphrynus melanostatus*	LC	Under log	S
Snake						
1	Colubridae	Water snake	*Xenochrophis flavipunctatus*	LC	Pond	S
2	Colubridae	Long-nosed whip snake	*Ahaetulla nasuta*	LC	Shrub/Tree	S
3	Colubridae	Copper head racer	*Elaphis radiatus*	LC	Shrub/grass	S
4	Colubridae	Indo-Chinese Rat Snake	*Ptyas korros*	LC	Shrub/grass	S
5	Elapidae	Banded krait	*Bungarus fasciatus*	LC	Shrub/pond	S
6	Elapidae	Monocellate cobra	*Naja kaouthia*	LC	Shrub/grass	S
7	Pythonidae	Burmese python	*Python molurus*	LC	Forest/shrub	S
Lizard						
1	Agamidae	Garden fence lizard	*Calotes versicolor*	LC	Shrub	S
2	Gekkonidae	Tockay	*Gekko gecko*	LC	Tree	S
3	Veranidae	Clouded monitor	*Varanus bengalensis*	LC	Tree	S
Turtle						
1	Geoemydiae	Leaf turtle	*Cylemys* sp	NT	Forest	S

Notes: S= small number <50, M= moderate number >50, L= larger number >100

Birds

A total of 10 species of bird belongs to 8 families are recorded around the project area. Among them Black-eared Kite *Milvus lineatus* was observed as large number about 300 individuals around the area. This species is also found as widely distributed in this region. Indian pond heron *Ardeola grayii* is observed as second large number after Blackeared Kite in the project area. This species is also commonly distributed in this region verbally reported by local people. Some recorded species are mentioned in figure (5.26). No migratory and threatened species are observed during the observation period. Birds are taking play in ecological important role as they serve as in food-chain and food web, seed dispersal and propagation, pollination, pest control and rodent control.

Table 5.10 – Recorded birds (10 species) near the project area

Sr. No	Family	Common name	Scientific name	Conservation status (IUCN 2016)	Habitats	Abundance Status
1	Accipitridae	Black-eared Kite	*Milvus lineatus*	LC	Terrestrial/ aquatic	L
2	Columbidae	Spotted dove	*Streptopelia chinensis*	LC	Terrestrial	S
3	Dicruridae	Black drongo	*Dicrurus macrocercus*	LC	Terrestrial	S
4	Phalacrocoracidae	Little black cormorant	*Phalacrocorax sulcirostris*	LC	Aquatic/Freshwater	S
5	Sturnidae	Common myna	*Acridotheres tristis*	LC	Terrestrial	S
6	Pycnonotidae	Red whiskered bulbul	*Pycnonotus jocosus*	LC	Terrestrial	S
7	Passeridae	House sparrow	*Passer domesticus*	LC	Terrestrial	M
8	Ardeidae	Little egret	*Egretta garzetta*	LC	Aquatic	S
9	Ardeidae	Great egret	*Ardea alba*	LC	Aquatic	S
10	Ardeidae	Indian pond heron	*Ardeola grayii*	LC	Aquatic	M

Notes: S= small number <50, M= moderate number >50, L= larger number >100

Black-eared Kite *Milvus lineatus*

Little egret *Egretta garzetta*

Ardeola grayii

Streptopelia chinensis

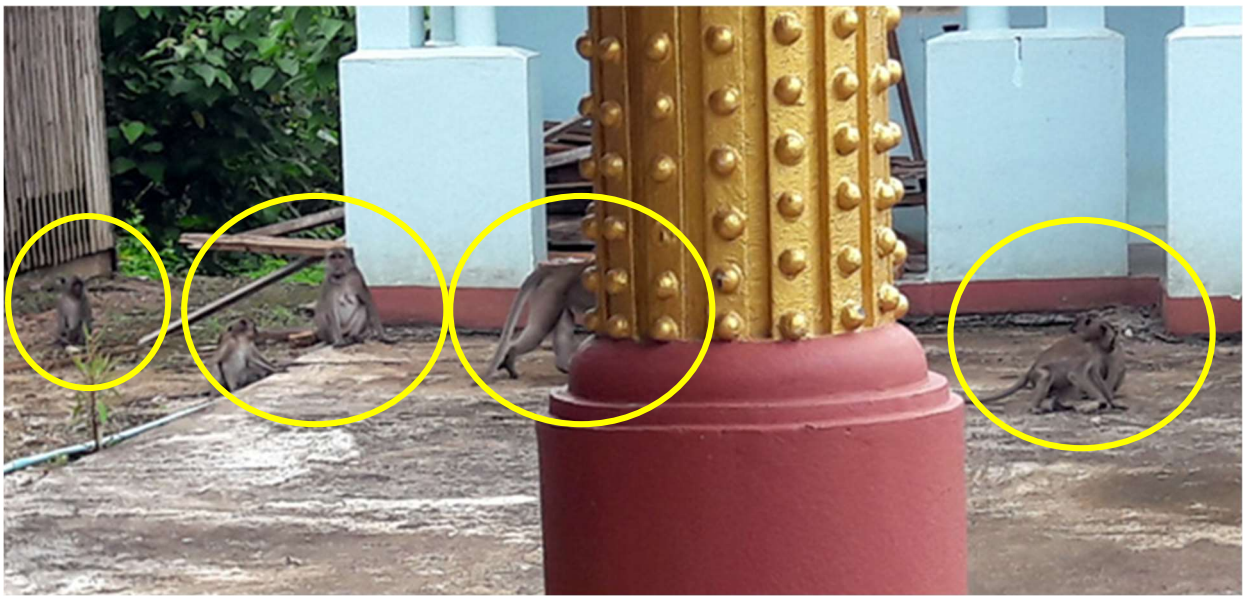
Phalacrocorax sulcirostris

Figure 5.28 - Some recorded birds around the project area

Mammals

Mammal species are not observed in the project area. But some mammal species such as monkeys known as Rhesus macaque or long tail macaque (*Macaca mulatta*) and squirrels are observed out of the range of the project site in the forest on the Pahtaw Mountain. About 75-100 individual numbers of monkey are estimated during the survey period. This species is one of the best-known species of Old World monkeys. It is listed as Least Concern in the IUCN Red List of Threatened Species in view of its wide distribution with large population, and its tolerance of a broad range of habitats. This species should be protected. Native to South, Central, and Southeast Asia, Rhesus macaque have the widest geographic ranges of any

nonhuman primate, occupying a great diversity of altitudes and a great variety of habitats, from grasslands to arid and forested areas, but also close to human settlements.



Group of monkeys at the base hill and near the pagoda

Fish

Fish sample collection was made with the help of fisherman who are fishing with gill net and, rode and hook. Those people are fishing for their home consumption. No commercial fishing was observed around this area. Both commercial fish and small fish with small population are recorded during the survey period. A total of 17 species under 15 families were recorded (Table 5.14 and Figure 5.32). Caroun croaker *Johnius carouna,* Spotted scat *Scatophagus argus,* Needlefish *Hyporhamphus limbatus,* Rayfin fish *Raiamas sp* and Gangetic mystus *Mystus cavasius* were collected as moderate and large number (Table 5.14). All recorded fishes are common species and widely distributed in this region. But the sting-ray fish or mangrove whipray (*Himantura walga*), a cartilaginous fish in the family Dasyatidae was recorded. It is a demersal fish and is found in coastal water. The IUCN has assessed it as being "near-threatened" (Figure 5.32).

Table 5.11- Recorded fish species (17 species) Myeik River nearby the project area

Sr. No	Family	Common name/local name	Scientific name	IUCN 2017)	Habitats	Abundance status
1	Disyatidae	Mangrove whipray	*Himantura walga*	NT	River	S
2	Sparidae	Goldsilk seabream/Nga Wetma	*Acanthopagrus berda*	LC	River	S
3	Polynemidae	Indian Threadfin/Ka Ku Yan	*Polinemus indicus*	LC	River	S
4	Litadae	Seabass/Kakatit	*Lates calcarifer*	LC	River	S
5	Sciaenidae	Caroun croaker/Nga Poke thin	*Johnius carouna*	LC	River	M
6	Scatophaguidae	Spotted scat/Nga pathon	*Scatophagus argus*	LC	River	L
7	Gobiidae	Golden tank goby/Kathaboe	*Glossogobius aureus*	LC	River	S
8	Hemiramphidae	Needlefish/ Nga Phaung Yoe	*Hyporhamphus limbatus*	LC	River	M
9	Mugilidae	Large scale mullet/Kabilu	*Chelon macrolepis*	LC	River	S
10	Plotosidae	Canine Catfish eel/Nga Khu	*Plotosus canius*	LC	River	S
11	Cynoglossidae	Fourlined tonguesole/Nga Hway Shar	*Paraplagusia bilineata*	LC	River	M
12	Ambassidae	Bald glassy	*Ambassis gymnocephalus*	LC	River	M
13	Gerreidae	Whipfin silver-biddy	*Gerres filamentosus*	LC	River	S
14	Terapontidae	Tiger Bass	*Threapon jarbua*	LC	River	M
15	Bagridae	Gangetic mystus/Nga Zin Yaing	*Mystus cavasius*	LC	River	L
16	Serranidae	Cloudy groper/Kyauk nga	*Epinephelus erythrurus*	LC	River& rocky shore	S
17	Dasyatidae	Dwarf whipray/leik kyauk	*Brevitrygon walga*	LC	River in bottom	S

Notes: S= small number <50, M= moderate number >50, L= larger number >100; LC= Least concerned, NT= Near Threaten

Indian Threadfin *Polinemus indicus* Seabass *Lates calcarifer*

Goldsilk seabream *Acanthopagrus berda* Spotted scat *Scatophagus argus*

Gerres filamentosus *Threapon jarbua*

Plotosus canius *Himantura walga*

Figure 5.29 - Some recorded fishes from Myiek River nearby the project area

Zooplankton

Zooplankton collection was carried out as important task to investigate the water quality in the Myeik River nearby the project area. A total of 3 species of zooplankton in microscopic were sampled from three sampling sites (Table 5.15 and Figure 5.33). Zooplanktons are heterotrophic plankton. Plankton is organism drifting in oceans, seas, and bodies of fresh water.

These organisms serve as an intermediary species in the food chain, transferring energy from planktonic algae (primary producers) to the larger invertebrate predators and fish who in turn feed on them. As well as providing an essential link in the food chain, the diversity of species, amount of biomass and abundance of zooplankton communities can be used to determine the health of an ecosystem.

Table 5.12 - Recorded zooplankton species (5 species) in the Myeik River nearby the project area.

Sr. No	Phylum	Class	Order	Family	Species
Micro-zooplanktons					
1	Arthropoda	Maxillopoda	Copepoda	Calanoidae	*Calanus finmarchicus*
2	Arthropoda			Cyclopoidae	*Cyclopoid* sp
3	Arthropoda	Malacostraca	Amphipoda	Hyperridae	*Hyperia macrocephala*

Calanus finmarchicus,

Cyclopoid sp

Hyperia macrocephala

Figure 5.30 - Recorded micro-zooplanktons from the Myeik River around the project area

Red Data Faunal Species

There were recorded for two species of nearly threatened species around the project area. The survey recorded the threatened species of the stingray fish *Himantura walga* which is described in IUCN as near threatened species (NT). Leaf turtle Genus *Cyclemys* was caught in last six month reported by a villager which is also described as Near Threatened species (NT) in IUCN Red list 2017. All these two species should be protected.

BIODIVERSITY MANAGEMENT PLAN \ MONITORING PLAN

1. Monitor on both flora and fauna (mangrove vegetation, birds and Rhesus monkey) status and reporting system should be taken bi-annually throughout the constructional and operational phases.
2. Conduct the wildlife conservation awareness activities through talks or billboard and monitor the waste management system.
3. Monitor and reporting for the natural vegetation conservation and protection of wild animals (birds and Rhesus monkey) with environmental conservation purposes.
4. Monitor and reporting of the implementation of the recommendation/mitigation measures for waste disposal system (including solid and waste particles), as the waste disposals of Dockyard could be affected on very soft aquatic organisms such as zooplankton and phytoplankton as well as fish community, when large volume of concentration of this kind of discharge may cause the bioaccumulation and biomagnification processes.

CONCLUSION

Survey resulted that the terrestrial plants and animals are very low in and around the project area. A total of (147) flora species from (52) families and (11) species of phytoplankton are recorded. Three red list species of *Myristica malabarica* (Kywe-thwe) as vulnerable status (VU), *Vatica maingayi* (Kanyin-kyaung-che) as critical endangered status (CR) and *Dipterocarpus kerrii* King. (Sibin) as endangered status (EN) were recorded as threatened species which all species should be protected. These species were collected from the forest of Pahtet mountain which is located about 0.3 km from the project site. These plants should be maintained for plant conservation. Seven species of mangrove plants are recorded and the forest status are scattered forests. Nevertheless, these mangrove communities are essentially important to conserve for their ecological and environmental health. Mangrove plants have the ability to filtrate the water contamination (include water toxic) and absorb the carbons from the atmosphere larger than other plant species because of their peculiar root system. Moreover, they are important nursery ground for aquatic organisms and shelter or housing for the birds. Recorded mangrove species are *Acanthus ilicifolius* (Khayar), *Avicennia officinalis* (Thame-net), *Bruguiera malabarica* (Byu), *Excoecaria agallocha* (Tayaw), *Nypa fruticans* (Dani), *Sonneratia alba* (Lame), and *Rhizophora mucronata* (Byu-chidauk) around the project area. In

phytoplankton observation, a total of (11) species was recorded. Phytoplankton species can be said that fairly population so that water quality will be favorable condition for other aquatic animal survivals. Among these (11) species, Species of *Coscinodiscus radiates* Ehrenberg, *Thalassiosira punctigera* (Castracane) Hasle; and *Melosira nummuloides* Agardh. were recorded as top three species.

In fauna (45) species comprises of (15) amphibian and reptile, (10) species of birds, (17) species of fish, (3) species of zooplankton are recorded during the survey. Stingray fish species *Himantura walga* and Box tortoise were recorded which are described as near threatened species (NT) in IUCN Red List. A number of the bird, Black Eared Kite *Milvus lineatus* is about 300 found in and surrounding area of the project site. This species is indicator and top predator species which need to protect for ecological process. 3 species of zooplanktons were recorded with fairly population density. They are taking part as an important role in aquatic ecosystem and to investigate water quality. The survey result showed that the water quality in the present situation is favorable condition for aquatic organisms in food chain and food web system. As a conclusion, the proposed project is considered may be affected with low significant impact on terrestrial and aquatic environment. However, the discharges of Dockyard such as solid and liquid wastes will be polluted in the sea water near the project site in turn of which will be affected on aquatic plants and organisms in the water, when large volume of concentration of this kind of discharge may cause the bioaccumulation and biomagnification processes. The extent of the impact on fauna and flora is investigated as only in the site specific and duration of the impact is assumed as temporal or permanent.

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5.12. Cultural & Heritage

(a) Introduction

In this Pathaw-Pathat island, the most interesting factors are different types of floral and fauna on behalf of cultural heritage places. There are some pilgrims who cross the water to go to the religious places on the island. There is a popular edifice of reclining Buddha images in colossal size at the foot of the Pathat Mountain. The assessment shows that the landmark of Myeik coastal area is these two points of Pathaw and Pathat mountains on the island. The landfill area between these two points cannot be related to the ancient cultural heritage like archaeological or historical context. But the local community should be considered that their spiritual and religious traditions would continuously depend on the religious landscapes shown the seven potential points in the map.

Most of the religious landscapes are totally reconstructed by the new donation plan or specific donors. In this assessment, the seven main points are mainly focus on the Pathat Mountain at the south of the island. The project area is located along the seashore and the parameter demarcated for the assessment area extends to reach the foot of Pathaw Mountain. Within the parameter the nearest point to the project boundary is the site of *P4*, Sin Ma Yin Thar stupa and monastery complex. Likewise, the farther points are not outstanding for the cultural heritage assessment as well as the impact threat.

(b)Assessment and Measurement of Cultural Significance and Impact Threat

According to the cultural map shown in the scope, there are seven main points and now, the rapid assessment shows particularly for the value of cultural heritage and degree of impact as follows:

(1) P1 = Shwe Thar Hlaung Colossal Reclining Buddha

It is located at the southern part of the island and at the foot of Pathat Mountain. Buddha image is reclining towards the south and facing towards the east. The colossal Buddha image was newly renovated at the foot of the Pathat Mountain and the pilgrims mostly come by boat and pay homage to the Buddha. Assessment shows that the cultural significance is minimal but the religious pilgrimages of local communities. The impact threat cannot be challenged by the project operation stage due to the 800m away from this shrine.

Figure - Shwe Thar Hlaung Reclining Buddha Image

(2) P2 = Ye Le Phaya (Pagoda on the small island)

It is located at the south of reclining Buddha image. Traditionally it is known as Ye Le Phaya meanth the pagoda built on the small island. It is totally surrounded by water and one small bridge connecting to the main shrine. This pagoda place was totally new donated by the local community. The cultural significance is low but religious dedication can also be considered for the local peoples.

Figure- Ye Le Phaya (Pagoda on the small island)

(3) P3 = Pathat Stupa

Pathit Mountain is located in the southern part of the island. It is smaller that the Pathaw Mountain located in the north. By the time of assessment fieldwork, it was not yet renovated or reconstructed by recent peoples. Although a monastery located at the foot of this pagoda, it was not yet maintained. In this site, assessment shows the age of this religious complex as the last donation was of 1991s. The cultural significance was measured as the minimum while the impact threat is reversible and limited.

Figure - Pathat Pagoda Complex in the Lack of Maintenance

Figure - The Last Donation Records of Pathat Pagoda Complex

(4) P4 = Sin Ma Yin Thar Stupa

This pagoda complex is the nearest to the northwest of the project area and it is 175m away from the project area. The mound it is located is likely a small island at the middle of waterlogging area between Pathaw and Pathit mountains. Later, this area was landfilled by the recent developers to become the settlement area of local community. Nowadays the entire landfilled area is already changed to be village and settlement area as well as some project areas. Only in the Sin Ma Yin Thar pagoda complex, some big trees could be seen as the woodland together with the natural mound composed by the stone and artificial platform.

Sin Ma Yin Thar pagoda complex involves the monastery and stupa donated by the local community. Recently the Naga Buddha was already built by the recent donors. The cultural significance shows the minimum value with the impact threat is reversible and limited.

Figure- The Religious Site of Sin Ma Yin Thar Pagoda Complex

(5) P5 = *Mahavisuddhi* Pagoda

It is located on the slop at the foot of the Pathaw Mountain. It is c.1200m away form the project boundaty. Although it could be the old one in previous time, nowadays it was totally changed as the new architectural composition of pagoda. The developers who planned some construction and business projects donated this pagoda in 2008. Recently the local people usually come to this place for their religious purposes. Some pilgrims are willingly coming to this environment and celebrate their religious ceremony. The tangible cultural value is low but the intangible value can mostly be considered. The cultural value is minimum and threat can easily be reversible and limited.

Figure- The Mahavisuddhi Pagoda newly built in 2008

(6) P6 = *Htan Nyi Naung* Monastery

This monastery is locally known as Htan Nyi Naung (twin-palm-trees). It is c.1300m away from the northern boundary of the project area. It is located on the high cliff like the rock cape. It is protruding toward the seashore in the east. In this monastery complex, there are some small stupas, huge standing Buddha image, and some other iconographic composition of spiritual and religious tradition. Cultural heritage cannot be measured as high level because of the recent dedication of local community. It shows the low in cultural value and threat is reversible and limited.

Figure- Htan Nyi Naung Monastery Complex

Figure- Htan Nyi Naung Monastery Complex

(7) P7= Christian Church

The place of Christian community was found in the territory of Pathaw village. It is 800m away from the northern boundary of the project area. This religious site is located on the higher mound. The catholic missionary built this complex and crucified cross was founded at the top of the mound. Depending on the religious purpose, the place of Catholic Church is important for the local Christian society. But, assessment shows that the cultural significance of Catholic Church cannot be measured as the high value. It is also minimum value and threat is reversible and limited.

Figure-The Place of Roman Catholic Church in Pathaw Village

Matrix Information

Matrix I is the measurement of cultural significance or attributes and threat that can be collected as baseline information about cultural heritage. It shows the low or minimum in value. Them, Matrix II_ the measurement of the severity impact_ shows the degree of minimal level. Finally, Matrix III_ the measurement of the acceptability_ shows the acceptable indicators with the references of value of heritage asset and the degree of impact.

(c) Conclusion

The final assessment report shows the *acceptable* indicator in the situation of heritage asset that can be measured as the low or minimum value while the degree of impact is minimal. In contrary, there are seven potential points around the territory of project area to be considered with the local community and their religious places. Although the heritage matrixes show the

acceptable indicator, the intangible cultural heritage can be realized that the relationship of local community and their religious purposes like seasonal festivals or donation ceremonies. These seven places of religious complexes should carefully be considered to maintain and support the local ceremonies and festivals. If some threats or negative impacts may happen on these places by some cases of the project operation and decommissioning stages, developers and authorities should be responsible to compensate for lost or damage or the aggrieved suffering. Additionally, in the near future, the more religious complexes may be come out, the more the developers should be responsible for their local religious purposes.

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6. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities. Impacts therefore may be positive (beneficial) or negative (adverse). They may also be direct or indirect, long-term or short-term, and extensive or local in effect.

6.1. Phases for IEE Study

This IEE study aims to identify the potential positive and negative impacts (both biophysical and social) associated with the proposed project. Anticipated environmental impacts for the proposed fish mill will be conducted into the entire life of the project. To cover the entire life of the project, it is necessary to conduct impact assessment for four major phases as follow:

(a) Phase I: Pre-construction Phase (during the pre-construction period),
(b) Phase II: Construction Phase (during the construction period),
(c) Phase III: Operation Phase (during the operation period), and
(d) Phase IV: Decommissioning Phase (after the operation period).

6.2. Impact Assessment Methodology

(a) Impact Identification

Impacts were identificed during screening process and combined with environmental baseline study and site survey to make clear.

(b) Impact Evaluation

Professional judgment will ideally be used in conjunction with the different value judgments expressed by various stakeholders. The choice of significance criteria needs to be aligned with a country's political culture and socio-economic framework. The three broad forms of recognition or determination of impact significance are summarized in Table below.

Table 6.1. Determination of Impact Significance

Forms of Recognition	Criteria
Technical recognition	The importance of an environmental resource or attribute is based on scientific or technical knowledge or judgment of critical resource characteristics.
Public recognition	Segments of the public recognize the importance of an environmental resource or attribute. Public recognition may take the form of support, conflict or opposition.

	Public action may be expressed formally (e.g. letters) or informally (e.g. protest action).
Institutional recognition	The importance of an environmental attribute or resource is acknowledged in the laws, plans or policy statements of government agencies or private groups.

Source: Canter (1996)

The significances of the impacts were determined by using an index matrix that is based on four criteria of magnitude (M), Duration (D), Extend (E) (area) and Probability (P). According to the association of impact assessment – IAIA guidelines, the following terms are used to determine the effects and degrees of the impact.

Significant Point = (Magnitude+Duration+Extend) ×Probabililty

Significant Point (SP)	Impact Significance
< 15	No impact (-)
15-29	Low impact (U)
30-44	Moderate significant (C)
45-59	High significant (B)
> 60	Very high significant (A)

Magnitude

- If the impact is only insignificant, the index value is 1.
- If the impact is small and will have no effect, the index value is 2.
- If the impact is moderate and will result in minor changes, the index value is 3.
- If the impact is high and will result in significant changes, the index value is 4.
- If the impact is very high and will result in permanent changes, the index value is 5.

Duration

- If the impact is between 0-1 year in limited time of the project duration, index value is 1.
- If the impact is between 2-5 year in limited time of the project duration, index value is 2.
- If the impact is between 6-15 year in limited time of the project duration, index value is 3.
- If the impact is the life of operation in the project duration, index value is 4.
- If the impact is over the project duration, index value is 5.

Extend (Area)

- If the impact occurs within the site, the index value is 1.
- If the impact occurs nearby limited area, the index value is 2.
- If the impact is limited to the local area, the index value is 3.
- If the impact is limited to the national stage, the index value is 4.
- If the impact is limited to the international stage, the index value is 5.

Probability

- If the impact is not going to happen, the index value is 1.
- If the impact is improbable, the index value is 2.
- If the impact is probable, the index value is 3.
- If the impact is highly probable, the index value is 4.
- If the impact is definite, the index value is 5.

(c) Criterion for Impact Mitigations (Hierarchy for Mitigation Measures)

Practicable mitigation and management measures were recommended in accordance with the IFC's management hierarchy. Management measures sought to avoid, and if avoidance is not possible, then reduce, restore, compensate/offset negative impacts, enhance positive impacts and assist project design. Requirement of mitigation measures will be considered by the intensity of impact significance as follow:

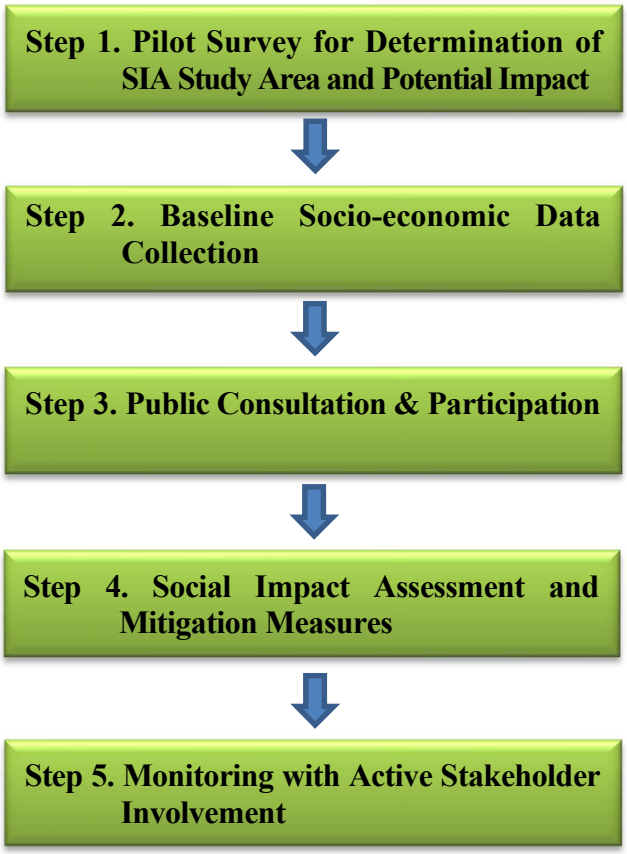
Mitigation Requirement for Impact Significance

No.	Impact Significance	Mitigation Requirement
1	Very Low (Negligible)	Minor or no mitigation required
2	Low	Required minor mitigations
3	Low to Moderate	Require more or less additional mitigations
4	Moderate	Require a number of additional mitigations
5	Moderate to High	Require a number of additional mitigation or modification of the project design
6	High	Require additional mitigations plus modification of the project design or alternative action may be required

6.2.1. Social Impact Assessment Methodology

The first phase of the Social Impact Assessment (SIA) will provide a baseline description of the study area, specifically focusing on the communities living and working in close proximity to the proposed development. The potential impacts of the proposed development on the social

environment will be identified and assessed in terms of an agreed assessment methodology in the IEE phase. Mitigation measures will be proposed to enhance the positive impacts and reduce the significance of the negative impacts. Socioeconomic impact assessment for proposed project was conducted by the following procedures.



Main Steps in SIA Study

Step I: Pilot Social Survey for Determination of SIA Study Area and Potential Socio-economic Impacts

Pilot survey was done for determination of SIA study area and study area was considered after the discussions with key informers project managers from PPT and the heads of Village General Administrative Offices of nearest villages. Google Map and census are also used for the determination of SIA study area during pilot survey.

Step 2: Baseline Socio-economic Data Collection

To assess the baseline socio-economic conditions that may result from the development of the proposed project, the SIA team employed both quantitative and qualitative approaches as follow:

Primary Data Collection by Household Survey

The collection of primary data consisted of focus group discussions and household surveys in the target study areas. Household sample survey was conducted to evaluate primary socio-economic conditions of the project area and to understand the mood, perceptions and extent of preparedness of the people towards the proposed project. The household survey was carried out to tap the baseline socio-economic conditions of project area and to assess project perceptions and attitudes of the local people over a period of five days. The accuracy of primary data collection was based on the accuracy, number of surveyed household and experiences of surveyors. To get the accurate data, primary data collection was conducted by social specialist, social consultants, local authorities and local people.

(a) Survey Team

The team was formed with researchers from social, medical, and engineering sciences having research experiences in the field of social impact assessment and social management planning.

(b) Development of Survey Questionnaire

Socioeconomic aspects to be included in questionnaire were based on site visits and issues identified by interviews with local people and village heads during pilot survey. Items were formulated by the consultants and reviewed by social assessment team members as to clarity of item wordings and relevance to the socioeconomic domains measured. The survey questionnaire was designed to collect information as to the following household characteristics:

- household composition (age, gender, educational status, religion, ethnicity, language used and marital status);
- occupations;
- ownership of agricultural fields and livestock;
- energy sources and facilities;
- agricultural and other economic activities;
- daily movement patterns;
- income and expenditure patterns;
- access to and use of community services/facilities and natural resources;
- health and nutrition; and
- views/concerns/suggestions on the proposed project.

(c) Recruitment and Training

The enumerators were received a training program prior to commencing with the fieldwork. The training program included a briefing on the objectives of the survey, socioeconomic aspects to be measured, interview techniques as well as a detailed explanation of each question and its relevance to the survey objectives, how to pose the question and how to code the answer. Discussions were also held among participants about the socioeconomic conditions and initial questionnaire items were revised based on the discussion results. A set of guidelines were given to each enumerator for administration of survey questionnaire. In the field data collection activities, the enumerators were supervised by experienced supervisors with household survey.

(d) Data Collections

The project related data, factory layout plans and design parameter are will be provided by Pyi Phyo Tun International Co., Ltd (PPT). Secondary data on demographic distribution in the area will be collected from Head of Local Administration Office (Kyunsu) and data on public health will be collected from Public Health Department (Kyunsu/Myeik). Primary data for public concerns, socio-economic and health profiles will be conducted by household survey.

(e) Data Analysis

In household survey data collection period, field supervisors checked and ensured the control of data quality. During field surveys, information obtained through household survey and interviews was corroborated through direct observation by the study team aiming at assessing social and cultural infrastructure existed in the project area, physical assets of people, and living conditions. Observations were backed up by photographic records. Quantitative data were coded and processed using SPSS statistical package. Qualitative data were coded using standard methods.

6.2.2. Health Impact Assessment Methodology

There is no universally agreed formula for assessing public health significance, although assessments are mostly based on a subjective judgment about the magnitude of the potential health impacts (size of the affected population and scale of the positive or negative health impact); its likelihood of occurrence; and the degree of confidence in the impact actually occurring (based on scientific and other evidence of the health impact occurring in similar circumstances elsewhere).

Health Impact EvaluationTechniques

	Likelihood of Occurrence of Health Impact			Health Impact Rating
	Low	Medium	High	
Magnitude of Health Impact	Unlikely to occur	Likely to occur sometimes	Likely to occur often	
None	No significance	No significance	No significance	0
Low	Very Low	Low	Medium	1
Medium	Low	Medium	High	2
High	Medium	High	Very High	3

When analyzing health impacts, it is important to consider the magnitude, likelihood and public health significance of the potential impacts. This analysis involves expert judgment based on a consideration of the evidence gathered and its applicability to the local context and the specific project.

Distributional, health equity and inequality impacts are analyzed by examining how particular sub-groups within a population, particularly vulnerable groups, are likely to be affected by the project. The scoping and community profiling steps are likely to have already identified potentially vulnerable groups through existing local information on these individuals/groups or through community surveys and meetings with key informants e.g. community leader, community health worker or local NGO.

Health equity/inequality impacts occur when the project's benefits and harms are unevenly distributed. This includes where the risk is equally distributed, such as air pollution, but the impact is disproportionate – affecting particularly children, older people and those with existing ill health.

Analysis of health impacts involves systematically determining the range of potential impacts, their relative importance and where, when and how likely they are to occur. The information for the HIA was obtained from the primary data collection (household survey), literature review, community profile and Health Data from Pubic Health Department (Myeik) as well as knowledge and expertise of the HIA Consultant of IEE Team.

6.3. Anticipated Impacts and Mitigation Measures during Pre-construction Phase

As the proposed project is about 40 acres, it is unnecessary to much site clearing and ground levelling. So, the environmental impacts during pre-construction phase of proposed factory will not significant due to the requirement of low number of workforce and heavy machinery

(approximately 10 workers, 2 trucks and 1 dozer) for minor site clearing activities. The pre-construction phase will long approximately as 3 months and all of the impacts during pre-construction phase are short-term, temporary and will not be significance. However, the proposed project will cut some trees in the project area and some wet land area for construction of jetty.

No.	Pre-constructionactivities	vehicles	workers	Duration
1	Minor Site/ land clearing	Dozer (1)	(10)	15 days
2	Sand levelling	Track (3)	(15)	2month
3	Manpower site clearing	-	(30)	1 month

6.3.1. Impacts on Air Environment during Pre-construction Phase

The impacts on air quality during pre-construction phase will be fugitive dust generationvehicular emissions and noise as follow:

(a) Fugitive Dust Generation

During pre-construction phase, the main source of air pollution will be dust generation due to the operation of dozer and trucks for site clearing and earth filling activities. The nearest residents will have impact of particulate matter smaller than 10 microns (such as $PM_{2.5}$). Dust generation can cause temporary public nuisance and impact on workers' health. The sensitive receptors are considered to be within a 100m radius of the proposed site due to minor site clearing and leveling activities. But the impact is not significant because the nearest resident is 1580 m and these distances will be enough distance for dust despression. moreover the soil type in the project site is sandy and not too much PM are experceted to emmit during the pre-construction activities. The nature of dust generation during pre-construction phase will be short term, temporary and will not significant.

(b) Vehicular Emissions

The gaseous emissions (CO_2, CO, and SO_2) will emit into the atmosphere from the operation of vehicles (dozer & trucks) and machineries during the pre-construction phase (including both on-site and off-sideof the project).

(c) Increase in Noise Level

Site clearing and earth working vehicle (1 dozer) and delivery vehicles (2 trucks) traveling to and from the site will produce noise which increase existing noise in pre-construction phase. All of the predicted noise level during pre-construction phase will be based on Patrick Breysse, and Peter S.J. Lees., School of Public Health, Johns Hopkins University, Bloomberg, 2006. The calculations also based on the noise levels of typical construction equipments prepared by "Handbook of Noise Control" as follow:

Typical Construction Equipment Noise Emission Levels

Equipment Type	Noise Level (dBA at 50 Feet)
Dozer	87
Truck (Medium and Heavy)	84

Source: Harris, C.M. "Handbook of Noise Control," McGraw Hill, New York, 1979

The predicted noise level at nearest residents can be calculated by the addition of existing noise level and additional noise from pre-construction phase. Based upon a 6-dBA drop-off rate per doubling of distance, the existing noise level from the project and predicted noise level at nearest receptors are as follow:

$$L_2 = L_1 - |20 \cdot \log\left(\frac{r_1}{r_2}\right)|$$

Where, r_1 = reference distance,in decibels (dB)

r_2 = another distance

L_1 = sound pressure level at reference distance (r_1)

L_2 = sound pressure level at another distance (r_2)

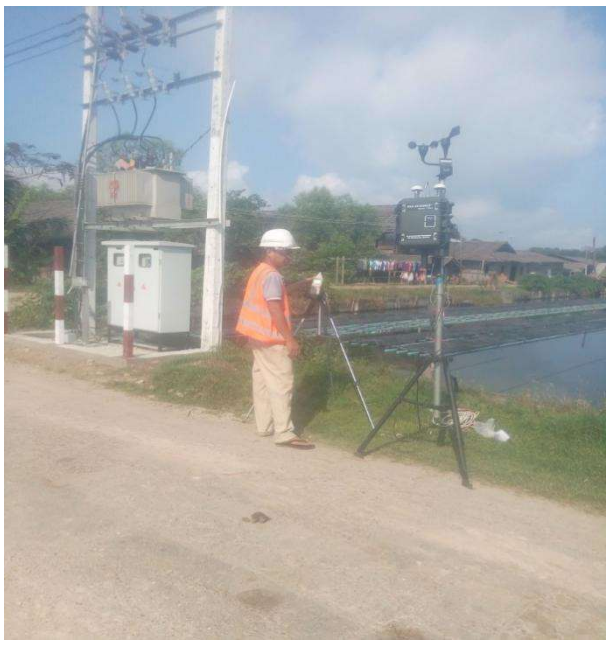
Figure 6.1- Distance between the Project Site and nearest Residents

Predicted Noise Levels during Pre-construction Phase

Receptors and distances from project	Existing noise levels monitored by integrated noise level meter (dBA)		Calculated noise level at site (dBA)		Reduced noise level at receptors due to Distance (dBA)	Predicted cumulative noise level at receptors (dBA)		Allowable noised level (existing noised level + 3dBA) (dBA)	
	Day Time	Night Time	Day Time	Night Time		Day Time	Night Time	Day Time	Night Time
Pahtaw Village 1.7 km	48.7	40.9	85.2	-	44.1	49.2	40.9	51.7	43.9
PahtetVillage 2.1 km	50.4	41.6			42.3	51.0	42.2	53.4	44.6

According to the above table, there is no impacts of noise on nearest residents (residents in Pahtaw and Pahtet Vilages) and all of the predicted noise levels during day time and night time are lower than the allowable limit (existing noise level plus 3dB).

Although the predicted noise levels are based on calculations and the actual noise level may a little change due to the other factors (seasonal wind direction and wind speed), these changes will not be expected to will not affect on nearest local residents. However, nosie level will be impact on pre-construction workers.



Noise Level Monitoring in Pathaw Village

Noise Level Monitoring in Pahtet Village

Significant of Impacts on Air Environment during Pre-construction Phase

According to the impact assessment of air environment (the nature of low impact in pre-construction state, number of machineries used, the distance from local residents and minor earth works), the nature of impact on air quality during pre-construction phase will be temporary and will not significant as follow:

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Fugitive dust generation	Sand filling and vehicles movement	2	1	2	3	15	Low Impact (U)
Vehicular emission	vehicles movement	2	1	3	4	24	Low Impact (U)
Noise	Noise from dozer and trucks	2	1	1	4	16	Low Impact (U)

Consideration of Mitigation Measures Requirement for Air Environment

The requirement of mitigation measures for air environment due to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Receptor	Impact Rating	Public concern during public consultation process	Mitigation requirement	Mitigation Scale	Responsibility
1.	Fugitive Dust Generation	Local residents	Low Impact (U)	No	Yes	Minor	Pre-construction service provider(s)
2.	Vehicular Emission	Global warming	Low Impact (U)	No	Yes	Minor	Pre-construction service provider(s)
3.	Noise	Workers	Low Impact (U)	No	Yes	Minor	Pre-construction service provider(s)

Mitigation Measures for Impacts on Air Environment

PPT will do or will ensure the construction service providers(s) to do the following mitigation measures as part of contract agreements.

(a) Mitigation Measures for Dust Generation

Dust will be efficiently countered by sprinkling of water during pre-construction phase. The nearest source of water for dust control is sea water from the sea. The dust control strategies are as follow:

Actions for Dust Control during Pre-construction Phase

Fugitive Dust Source Category	Dust Control Actions
Earth-moving	▪ For any earth moving which is more than 30 m from all property lines, conduct watering as necessary to prevent visible dust emissions from exceeding 100 cm in length in any direction.
Disturbed surface areas (except completed grading areas)	▪ Apply dust suppression in a sufficient quantity and frequency to maintain a stabilized surface; ▪ Areas, which cannot be stabilized, as evidenced by wind driven dust, must have an application of water at least twice per day to at least 80 percent of the unstabilized area. Damping down shall take place on a continual basis.
Disturbed surface areas (completed grading areas)	▪ Apply water to at least 80 percent of all inactive accessible disturbed surface areas on a daily basis when there is evidence of wind driven fugitive dust.
Track-out control	▪ Downwash of trucks (especially tyres) prior to departure from site.

(b) Mitigation Measures for Vehicular Emission

Due to the impact rating and public concern on vehicular emission, there will require minor mitigation measures such as plan to reduce in loading and unloading time and plan to reduce in idle time during working hours. All of the vehicles used during pre-construction phase will be in good conditions and will use good quality fuel (low sulphur content).

(c) Mitigation Measures for Noise

According to the requirement of minor mitigation measures for noise during pre-construction phase, mitigation measures will only require to avoiding working at night. Impats of noise on workers will be minimized by providing earplug to all workers and prepare awareness program about the impacts of noise to human health.

6.3.2. Impacts on Surface Water Environment dring Pre-construction Phase

During pre-construction phase, impacts on water environment may be surface water pollution in nearest water body (sea water) due to soil erosion and sedimentation of earth working activities. Leakage of fuel oil and lubricants from vehicles used in pre-construciton phase will also impact on surface water pollution.

Insignificant of Impacts on Surface Water Environment during Pre-construction Phase

There will have very little impact on surface water pollution due to the high permeability of sand earth filling material (sand filling) and the nearest surface water body is sea water. So, impact on surface water will be low probability and not significant as follow:

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Increase in turbidity, oil in surface water	Erosion, sedimentation and oil leakage	2	1	2	2	10	No Impact (-)

Consideration of Mitigation Measures Requirement for Surface Water Environment during Pre-construction Phase

The intensity requirement of mitigation measures surface water environment according to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Receptor	Impact Rating	Public Concern during Public Consultation	Mitigation Requirement by Impact Evaluation	Mitigation Scale	Responsibility
1.	Sedimentation and oil leakage	Nearest sea water	No Impact (-)	Yes	Yes	Minor	Pre-construction service provider(s)

Mitigation of Impact on Surface Water Quality during Pre-construction Phase

No mitigation measures are required for surface water pollution during pre-construction phase according to the impact evaluation on surface water environment.

6.3.3. Impacts on Soil and Ground Water Environment during Pre-construction Phase

Impacts on soil and ground water environment during pre-construction phase of proposed plant will include the following:

(a) Impacts of Soil Quality

A small amount of domestic wastes will be produced from workers. Moreover, some biomass (unsuitable soil materials) will produce from tree cutting and site clearing activities during pre-construction phase. All of these solid wastes will have impact on soil quality. Leakage of fuel oil and lubricant will also impact on soil quality during pre-construciton phase.

(b) Impacts on Ground Water Quality

Impact on ground water will be low probability and negligible because of the nature and duration of pre-construction activities.

Significant of Impacts on Soil and Ground Water Environments during Pre-construction Phase

Domestic wastes from pre-construction workers will be minimal due to the small number of workforce (about 20 people). Amount of scrub produced will also be minimal because of the small project area (about five acres) and there is very little number of trees to fell down. Moreover, leakage of fuel and lubricant will be low probability and small amount. So, impacts

on soil and ground water environment during pre-construction phase will be negligible as shown in the following table.

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Potential to soil contamination	Domestic wastes unusable materials in soil, lubricant	3	2	1	2	10	No Impact (-)
Potential to ground water pollution	Domestic wastes, unusable materials in soil, lubricant	3	2	3	2	16	Low Impact (U)

Consideration of Mitigation Measures Requirement for Soil and Ground Water Environment during Pre-construction Phase

The intensity requirement of mitigation measures for soil and ground water environment according to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Receptors	Impact Rating	Public Concern during Public Consultation	Mitigation Requirement by Impact Evaluation	Mitigation Scale	Responsibility
1.	Potential to soil contamination	Soil in project site	No Impact (-)	No	Yes	Minor	Pre-construction service provider(s)
2.	Potential to ground water pollution	Ground water at project site	Low Impact (U)	No	Yes	Minor	Pre-construction service provider(s)

Mitigation Measures for Impact on Soil and Ground Water Environment during Pre-construction Phase

According to the need of the minor mitigation measures, PPT will systematically dispose solid wastes according to the rules and regulations of CDC (Myeik) and CDC (Kyun Su). Fuel oil and lubricant will be stored over concrete floor and handle with care not to leakage. If leakage occurs, fabrics would be cleared and disposed of carefully.

6.3.4. Impacts on Biodiversity Environment during Pre-construction Phase

Anticipated Impacts on biodiversity environment during pre-construction phase will be as follow:

(a) Impacts on Flora Diversity

In pre-construction phase, significant points are very low as the initial stage of the project activities. However, there will necessary to cut mangrove for the purpose of jetty construction.

(b) Impacts on Fauna Diversity

Cutting down of some trees at the project site can affect the habitats of birds, butterflies, and reptiles. Increase in noise during pre-construction phase may affect the feeding, breeding and movement of wildlife in near area. Human activities such as site clearing, land filling and transportation of materials will disturb the animal behavior and movement.

(c) Impacts on Aquatic Lives

There will have impact on aquatic lives for a short time if domestic waste and debris during pre-constructoin phase are disposed directly to the sea. Improper handlings of fuel oil will leakage to the sea and impact on aquatic lives. Moreover, cutting of mangrove for construction of jetty will also impact on living of aquatic lives in the sea near jetty.

Significant of Impacts on Biodiversity Environment during Pre-construction Phase

Significant points will be anticipated based on the presence of flora and fauna status in and around the project area. The points are assumed with the respective measuring factors in the left column of the following table. According to the analysis, the points are non-significant affected on flora and fauna as shown in the following table.

Table - Significant Points in the Respective Flora and Fauna Groups through Measuring Factors

Factors affected on biodiversity	M	S	ST	Amphibians & Reptiles	Fishes	Birds	Small mammal	Zooplankton
Area of influence	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%

percentage of resource affected	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%
sensitivity of resources	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%
status of resources	Impor-tant	normal	normal	normal	normal	normal	normal	normal
regulatory status	normal	Normal	normal	normal	normal	normal	normal	normal
Social value	normal	Normal	normal	normal	normal	normal	normal	normal

Notes: M=Mangrove vegetation, S=Shrub vegetation, ST= Scatter trees, A&R=Amphibian and reptiles,

Significant points

Low=1-25%, Moderate= 26-50%, High= 51-75%, Very High=>76%

According to the impact assessment for biodiversity environment, mangrove area is the most ecologically sensitive area.

Anticipated Impact	Sources	Magnitude	Extend	Duration	Probability	Total	Category
Impacts on Flora Diversity	Site clearing and tree cutting	3	1	5	4	36	Moderate Significant (C)
Impacts on Fauna Diversity	Tree cutting, Noise	2	2	1	2	10	No Impact (-)
Impacts on aquatic lives	Solid waste, fuel oil leakage and mangrove clearing	3	2	5	4	40	Moderate Significant (C)

(c) Consideration of Mitigation Measures Requirement for Biodiversity Environment during Pre-construction Phase

The requirement of mitigation measures for biodiversity environment according to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Receiptor	Impact Rating	Public Concern during Public Consultation	Mitigation Requirement by Impact Evaluation	Mitigation Scale	Responsibility
1.	Impacts on Flora Diversity	Flora species	Moderate Significant (C)	Yes	Yes	Sensible	Pre-construction service provider(s)

2.	Impacts on Fauna Diversity	Fauna species	No Impact (-)	No	Yes	Minor	Pre-construction service provider(s)
3.	Impacts on aquatic lives	Aquatic species	Moderate Significant (C)	Yes	Yes	Sensible	Pre-construction service provider(s)

(d) Mitigation Measures for Impacts on Biodiversity Environment during Pre-construction Phase

According to the impact evaluation, minor to sensible mitigation measures are required for biodiversity environment during pre-construction phase. So, PPT will (i) avoid tree cutting as much as possible or will replantation if there will have to cut down trees, (ii) replantation of mangrove species along the jetty (iii) avoid working at night, and (iv) raise environmental conservation awareness among the workers.

6.3.5. Impacts on Socio-economic during Pre-construction Phase

During pre-construction phase, the following positive and negative socio-economic impacts will occur.

(a) Positive Socio-economic Impacts during Pre-construction Phase

The potential positive socio- impacts during pre-construction phase are as follow:

Job Creation

The proposed project will provide about 50 temporaries directly or indirectly jobs (site clearing, tree cutting, transportation, services for food and soft drink, etc.) related to the proposed project during pre-construction phase.

Impact Significance of Job Creation without Enhancement Measures during Pre-construction Phase

According to the primary data collection, most of the young people in Pathaw and Pahtet villages are going to the foreign boarder city (Thailand) for working before the project development. So, most of the pre-construction workers will be migrant workers (not from

nearest villages) and so job creation during pre-construction phase can be considered as very low without enhancement measures as follow:

Anticipated Impact	Sources	Impact Type	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Potential to Increase in household income	Jobs opportunities in pre-construction site	Positive (+)	2	1	2	3	10	No Impact (-)

Enhancement Measures for Job Creation during Pre-construction Phase

PPT will appoint or will encourage pre-construction contractor and sub-contractors to use local labor force (at least 50%). This factory will be included in contract agreement.

Impact Significance of Job Creation after Enhancement Measuresduring Pre-construction Phase

The impact will become very low to low after enhancement actions as follow:

Anticipated Impact	Sources	Impact Type	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Potential to Increase in household income	Jobs opportunities in pre-construction site	Positive (+)	2	1	2	3	15	Low Impact (U)

6.4. Anticipated Impacts and Mitigation Measures during Construction Phase

The construction period is expected to be about one year. Construction of proposed project will include (1) foundation works for concrete and steel structure and (2) erection of steel structures and minor earth works for internal drainage system. Therefore, the major activities during construction phase will include:

(g) Vehicular movement,
(h) Loading and unloading construction materials,
(i) On site storage of construciton materials,
(j) Erection of boiler and fish meal powder factory,

(k) Connection of power supply system,

(l) Maintenance of construction machinery, and

(m) Disposal of solid wastes from both construction site and workers etc.

According to the above activities, construction of proposed project can potentially affect the natural environment and local communities. Moreover, construction activities will be disturbed to wildlife.

The following construction operations and considerations, which could have a particularly significant impact, have been included in the assessment of disruption due to construction:

(a) The scale of earth movements;

(b) The storage and treatment of surplus material before removal;

(c) The likelihood of night-time working;

(d) Number, type and routes of vehicle movements;

(e) Storage and re-use of materials;

(f) Duration and nature of construction activities;

(g) Advance works by utilities if required;

(h) Materials logistics such as origin of materials and routes to site;

(i) Quantities of materials required and an estimate on quantities to be discarded;

(j) Identification of wastes that will be generated including sources; and

(k) The likelihood of contaminants being encountered.

6.4.1. Impact on Air Environment during Construction Phase

Impacts on air quality during construction phase will be as follow:

(a) Fugitive dust generation from transportation and construction activities,

(b) Vehicular emissions related to the transportation of personnel and construction materials, and

(c) Noise from construction machineries.

(a) Fugitive Dust Generation

The fugitive dust emissions (very fine particulates) will be emitted from transportation of construction materials and construction activities. These activities will affect neighborhoods

(especially for local residents beside the public road to the project site) though construction is not a long term.

(b) Gaseous Emissions

The gases emissions (CO_2, CO, and SO_2) will be emitted from the operation of vehicles and machinery into the atmosphere during the construction phase (including both on-site and the public roads).

(c) Increased in Noise Level

For the proposed project, the major noise generating sources during the construction phase will be movement of trucks, operation of concrete mixer, welding and generator. If most of the construction machineries (concrete mixer, generator, truck etc.) are running at the same time, this cumulative noise level can increase to 91.7 dB(A) at 15 m (about 50 feet) distance as follow:

$$Leq = SPL_{site} = 10 \log \left(\frac{10^{8.5} + 10^{8.4} + 10^{9.0} + 10^{8.5}}{4} \right)$$

$$= 91.7 \text{ dBA}$$

Table - Typical Construction Equipment Noise Emission Levels

Equipment Type	**Noise Level (dBA at 50 Feet)**
Concrete Mixer	<85
Truck (Medium and Heavy)	84
Welding	90
Generator	<85

Source: EPA, 1 971; "Noise from Construction Equipment and Operations, Building Equipment,and Home Appliances". NTID 300.1

The predicted noise level at nearest villages during construction phase can be predicted as follow:

Receptors and distances from project	Existing noise levels monitored by integrated noise level meter (dBA)		Calculated noise level at site (dBA)		Reduced noise level at receptors due to Distance (dBA)	Predicted cumulative noise level at receptors (dBA)		Allowable noised level (existing noised level + 3dBA) (dBA)	
	Day Time	Night Time	Day Time	Night Time		Day Time	Night Time	Day Time	Night Time
Pahtaw Village 1.7 km	48.7	40.9	91.7	-	47.1	50.9	40.9	51.7	43.9
Pahtet Village 2.1 km	50.4	41.6			45.2	51.6	42.2	53.4	44.6

Significant of Impacts on Air Environment during Construction Phase

Impacts on air environment during construction phase will not be significant because the proposed project will only use 2 trucks for transportation of construction materials, one concrete mixer, two welding machines and one generator for construction and no heavy machinery (pilling machine, crane, backhoe etc.). Most of the brickwork and steel structure work will be carried out by human activities.

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Fugitive dust emission	Construction activities	2	1	1	3	12	No Impact (-)
Vehicular emission	Construction activities	2	1	1	4	16	Low Impact (U)
Noise	Noise from construction equipment	2	1	2	4	20	Low Impact (U)

Consideration of Mitigation Measures Requirement for Air Environment during Construction Phase

The requirement of mitigation measures for air environment according to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Receptor	Impact Rating	Public Concern through Public Consultation Processes	Mitigation Requirement by Impact Evaluation	Mitigation Scale	Responsibility
1.	Dust generation	Workers at site	No Impact (-)	No	Yes	Minor	Construction service provider(s)
2.	Gaseous emissions	Local communities	Low Impact (U)	No	Yes	Minor	Construction service provider(s)
3.	Noise	Workers at site	Low Impact (U)	No	Yes	Minor	Construction service providers

Mitigation Measures for Air Environment during Construciton Phase

PPT will do the following mitigation measures of air environment during construction phase.

(a) Mitigation Measures for Dust Generation

PPT will control dust by sprinkling of water at site during construction phase. Moreover, water spraying will makeby water spraying truck outside of the project site (along the public road) twice a day.

(b) Minimizing of Gaseous Emissions

Certain mitigation measures will be adopted to limit atmospheric impacts to as great an extent as possible during construction phase. For instance, the transportation of personnel and materials will be scheduled such as to avoid periods of peak flow where congested conditions are more likely, and to reduce the overall number of vehicular movements. In addition to careful traffic management, close adherence to the recommended maintenance regime will be applied to both on-site and off-site vehicles.

Reduction of SO_2 and CO Emissions: Low sulphur content and good engine condition vehicles will be used.

Improved Maintenance: Significant emission reduction will achieve through regular equipment maintenance.

Reduction of On-site Construction Time: Rapid on-site construction will reduce the duration of traffic interference and therefore, reduce emissions from traffic delay. Off-site fabrication of structural components will also enhance the quality of work, as the production takes place in controlled settings and external factors such as weather and traffic do not interfere.

(c) Mitigation Measures for Noise

For minor mitigation measures, it is necessary to avoid the following activities:

- running construction machineries at the same time; and
- working at night.

6.4.2. Impacts on Surface Water Environment during Construction Phase

Potential construction-induced impacts to surface water quality will be soil erosion and sedimentation resulting from excavation and grading activities necessary for the construction of infrastructure especially in rainy seasons. Drainage and seepage from construction waste dumping site will have potential to surface water pollution. Mobilization and transport of soil particles due to construction activities may result in sedimentation of surface drainage networks, which may result in impacts to the water quality in nearest sea water via drains. In addition, handling of fuel oil, other oil products, chemicals and lubricants may constitute a risk for pollution of surface water. It will be more evidence in rainy seasons (June to September). Waste generated from construction activity will also have potential to surface water pollution and will include construction debris and waste from construction workers.

(a) Construction Debris

Waste materials (pallets, packing crates, steel structure off-cuts, and waste concrete) will be produced during construction period. The unsuitable soil material from foundation preparation will also produce. All of the construction wastes will have potential to soil and water pollutions if they are not properly managed. Drainage and seepage from construction waste dumping site will have potential to surface water pollution.

(b) Oil and Grease

Trucks and cars can leak fuel oil during transportation of construction materials and workers during construction phase. Moreover, lubricants and grease from construction machineries can also leak during construction phase. All of the fuel oil and lubricants can cause surface water pollution (increase in oil and grease content in sea water) for a while.

(c) Domestic Wastes from Construction Workers

A small amount of domestic waste will be generated from construction workforce (about 30 workers). The establishment of labour camps will also effect on environment through improper waste (solid & garbage /sewage) disposal. A man can produce 0.4 kg per day of solid waste and the total waste produced from construction workers will be as follow:

Total Domestic Waste Produced during Construction Phase $= 30 \times 0.4$ kg

$= 12$ kg / day

(d) Construction of Jetty

Jetty will have to construct so the fishermen who would like to sell the raw material for this factory berth on this jetty. Before the starting of the jetty, the proposed place was included in the mangrove forest area of the island. There were abundant of mangrove tree species such as *Nypa fruticans* (Dani), *Sonneratia alba* (Lame), *Avicennia officinalis* (Thame-net), *Rhizophora mucronata* (Byu-chidauk) etc. Impact on the marine water in vicinity occurs due to hydrodynamic characteristics of the area, increase in turbidity of sea water, degradation in water and sediment qualities. However, it would be short-term and stabilize with time. During construction period, the water quality is likely to be affected due to the construction work and loosening of topsoil in the shore area in vicinity. The soil erosion at site during heavy precipitation contributes to the increase in suspended solids in the sea water. Further, wastewater from vehicle and construction equipment maintenance will contribute to oil and grease concentration.The main predicted impacts on the biophysical environment include the following;

- Sedimentation on immediate reef and turbid seawater for short term;

- Direct affect to the habitats such as corals due to removal. Furthermore, sedimentation in lagoon and changes in hydrodynamics of immediate area leading to increase in turbidity of sea water.
- Physical damage on benthic sessile fauna in proposed jetty area. The effect of this would be in the immediate to short term with the migration of benthic sessile and burrowing fauna living on sand.
- A short-term turbidity of sea water.
- Damage to the reef habitat due to toxic effect of the oil and the marine water quality would be deteriorated.

Significant of Impacts on Surface Water Environment during Construction Phase

Impact on water environment during construction phase will not be significant due to the amount of wastewater produced during construction phase (the volume of nearest surface water body, sea water body, is very much greater than the volume of wastewater disposed by construction site). Moreover, soil type within the project site is sandy with high porosity.

Anticipated Impacts	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Surface Water Pollution	Construction Debris	2	1	2	2	10	No Impact (-)
	Oil and Lubricants	2	1	2	2	10	No Impact (-)
	Domestic Wastes	2	1	2	2	10	No Impact (-)
	Jetty	2	1	2	2	10	No Impact (-)

Consideration of Mitigation Measures Requirement for Surface Water Environment during Construction Phase

The intensity of mitigation measures for surface water environment according to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Impact Rating	Public Concern through Public Consultation Processes	Mitigation Requirement by Impact Evaluation	Required Mitigation Scale	Responsibility
1.	Construction Debris	No Impact (-)	No	Yes	Minor	Construction Service Provider(s)
2.	Oil and Grease	No Impact (-)	No	Yes	Minor	Construction Service Provider(s)
3.	Domestic Wastes	No Impact (-)	No	Yes	Minor	Construction Service Provider(s)
4.	Jetty	No Impact (-)	Yes	Yes	Moderate	Construction Service Provider(s)

Mitigation Measures for Surface Water Pollution

(a) Mitigation Measures for Impacts of Solid Wastes on Surface Water Quality

According to the above impact identification and evaluation on surface water quality, there will need minor mitigation measures. PPT will not start construction in rainy seasons. PPT will construct settling pond if construction is started in rainy seasons. Moreover, PPT will prevent sea water pollution during construction phase as follow:

No	**Construction Activities**	**Mitigation Measures**
1.	Earth Working	- Avoid earth working and excavation during monsoon season. - Limit unnessary earthwork - Prevent over excavation - Temporary sediment pond on the water way to the sea
2.	Stacking and Loading Areas	- All stacking and loading areas will be provided with proper drains to prevent run off from the site to enter any water body.

3.	Waste Water from the Site	- Waste water channels from the site should be connected to septic tank during pre-construction to prevent wastewater from entering the nearest water bodies.
4.	Leakage of Oil and Lubricants	- Avoid any leakage of oil and lubricant from vehicles and machineries used in pre-construction phase
5.	Stacking and Loading Areas	- All stacking and loading areas should be provided with proper drains to prevent run off from the site to enter any water body.
6.	Waste Water from the Site	- Waste water channels from the site should be connected to septic tank during construction to prevent wastewater from entering the nearest water bodies.
7.	Phase Wise Construction	Working in a small area at a point of time (phase wise construction)
8.	Vegetation	Vegetation of bare areas after the construction state

(b) Mitigation Measure for Impacts of Jetty Construction on Surface Water Quality

The following measures will be undertaken in order to reduce the anticipated impacts during the construction phase of the project.

- Avoid cutting of mangrove trees as much as possible;
- Undertaking the excavation during the low tide and on calm days in order to minimize the spread of the sediments to the immediate vicinity;
- Clearly marking the area which require excavation which will enable to prevent the spreading of the sediments and impacting large area
- Undertake excavation activity in the shortest time possible so that presence of the environmental impact will be short-lived due to short exposure period.
- Efforts will be made to avoid accidental spillages from machinery including overtopping leading to severe spillages;
- Machines will be operated by experienced operators and made sure machines are clean all the time;

- Do not throwing of cleaning materials and changed oils into the sea.
- Safety measures during the construction phase will have to place on a sign board near the jetty to avoid potential accidents;
- Oil confinement equipment such as oil boom will be made available in a case of oil spill; and
- No excavation will be conducted during rough weather so that the possibilities of oil spill will be reduced.

6.4.3. Impacts on Soil and Ground Water Environment during Construction Phase

Impact of soil and groundwater environment during construction phase will be leakage of fuel oil, leakage of lubricants and disposal of wastes.

(a) Leakage of Fuel Oil and Lubricants

Potential contamination of soil and groundwater during construction phase could possibly occur as a result of leaking of fuel and lubricants from construction equipment and/or temporary on-site storage facilities. Handling of fuel oil, other oil products, chemicals and lubricants may constitute a risk for pollution of soil and ground water.

(b) Construction Debris and Domestic Wastes

During construction phase, construction debris such as packing materials and domestic wastes from construction workers will produce. There will have potential to soil contamination and ground water pollution if these solid wastes are not properly disposed. Moreover, seepage and drainage from construction waste dump site will also impact on soil and ground water qualities.

Significant of Impacts on Soil and Ground Water Environment

Construction related impacts to soil and groundwater in project site will be minor, temporary low possibility due to the construction period and not necessary to built just one steel structure building as power plant and small jetty for fish buying as follow:

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Soil and Ground	Leakage of fuel oil and lubricants	2	1	1	2	8	No Impact (-)

Water Pollution	Construction debris and Domestic Wastes	2	1	2	2	10	No Impact (-)

Intensity of Mitigation Measures for Soil and Ground Water Quality

The requirement of mitigation measures for soil and ground water environment according to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Impact Rating	Public Concern through Public Consultation Processes	Mitigation Requirement by impact evaluation	Required Mitigation Scale	Responsibility
1.	Leakage of fuel oil and lubricants	No Impact (-)	No	Yes	Minor	Construction Service Providers
2.	Construction debris and domestic Wastes	No Impact (-)	No	Yes	Minor	Construction Service Providers

Mitigation Measures for Impacts on Soil and Ground Water Environment

According to the above consideration for required mitigation measures, there will be minor mitigation measures such as disposed of solid wastes according to the rules and regulations of CDC (Myeik) and/or rules to reduce impacts of solid wastes during construction phase. Care should be taken not to leak during the handling of fuel oil and lubricants. All of the fuel tank and lubricants container have to store over concrete floor or impermeable pad. Every machinery used in construction phase have to good conditions.

6.4.4. Impacts on Biodiversity Environment during Construciton Phase

The anticipated impacts on biodiversity during construction phase of proposed project will be as follow:

(a) Impact on Flora Diversity

Intent heat from boiler will affect on nearest flora diversity. Moreover, PM from wood fired boiler will also impact on respiration system of nearest flora diversity. Generation of dust, lighting and noise will disturb the animal behavior and movement, land contamination by the

construction activities will disturb the animals' behavior. If waste disposal during construction is not properly done, there would be increased in the habitat loss of native species. In addition, herbaceous and grass communities in the project site will be removed from as a result of clearance for construction.

(b) Impact on Fauna Diversity

Clearing away trees and natural vegetation can cause hazards to the habitats of birds and butterflies. Noise due to construction activities at the site involving human and vehicular movement will disturb aril and wild animals in the area. If waste disposal during construction is not properly done, there would be increased in the habitat loss of native species. Terrestrial micro flora and fauna at the site are also affected. Although the project is adjacent to sea, there will be no impact on aquatic lives in the sea because waste water produced from construction site will be little amount from small area and will be sink into the sandy soil.

Significant of Impacts on Biodiversity Environment

Significant of Impacts on Flora Diversity

Unmanaged grassland is a frequent habitat in the area and is not of any particular conservation importance. The project site is near the settlement area; therefore, there will be no concerns for wild life disturbance as there is no suitable habitat in terms of suitable natural flora cover and related fauna. The various areas of improved grassland do not have any conservation value. The total carbon sequestration of herbs and grass communities in proposed factory will be very little. So that loss of carbon stock by proposed project is very low.

Significant of Impacts on Fauna Diversity

The impact on fauna diversity will be minimal due to the site had already cleared by human activities for proposed factory area and no fauna species are found within the project site (direct impact zone). However, there will be a little impact on surrounding fauna diversity (indirect impact zone), due to the construction noise.

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Impact Rating
Impacts on flora and fauna diversities	Cutting of trees	2	4	1	2	14	No Impact (-)
	Cutting of trees, wastes and noise	2	1	2	2	10	No Impact (-)

Consideration of Mitigation Requirement for Biodiversity Environment

The requirement of mitigation measures for soil and ground water environment according to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Impact Rating	Public Concern through Public Consultation Processes	Mitigation Requirement by impact evaluation	Required Mitigation Scale	Responsibility
1.	Cutting of trees	No Impact (-)	No	Yes	Minor	Construction Service Providers
2.	Cutting of trees, wastes and noise	No Impact (-)	No	Yes	Minor	Construction Service Providers

Mitigation Measures for Impacts on Biodiversity Environment during Construction Phase

It is necessary to avoid tree cutting, dispose wastes properlyand avoid working at night to reduce impacts on flora and fauna diversities.

Mitigation measures should be carried out during the constructional and operational phase as below:

- Conserve the plants and vegetation as possible as which existing around the project area,
- Create the green belt (mangrove tree in the water and native plants on the land) in surrounding area of the project site for recreational and habitat conservation for terrestrial animals (birds, Rhesus monkey) as well as for the aquatic organisms (water birds, fish, crab).
- Raise environmental conservation awareness among the visitors and workers (not to kill the birds and monkey which are protected by law,
- Manage the waste disposals which should be conducted systemically with the purpose in conserve aquatic ecosystem in healthy level for environmental protection.

6.4.5. Impact on Human Environment during Construction Phase

Impacts on human environment will include socio-economic and health impacts. The anticipated socio-economic and health impacts on human environment during construction phase are as follow:

6.4.5.1. Anticipated Socio-economic Impacts during Construction Phase

During construction phase, the following positive and negative socio-economic impacts will occur.

(a) Positive Socio-economic Impacts during Construction Phase

The potential positive social impacts during construction phase are as follow:

Job Creation

The proposed project will provide about 50 temporary employment opportunities for local people during construction phase.

Significant of Impact on Job Creation without Enhancement Measures

Local people in Pahtaw and Pahtet Villages have limited condition for job creation rather than fishing and manufacturing works. Most of the young people are going to Thailand (Boarder City) for seeking job. As construction workforce for fish powder mill will be foreign workers (Chinese and Japanese), job opportunities for local people in Pathaw and Pahtet Villages can be considered as low due to small number of without enhancement measures as follow:

Anticipated Impact	Impact Type	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Potential to Increase in household income	Positive (+)	2	1	3	3	18	Low Impact (U)

Enhancement Measures for Job Creation

PPT will ensure job opportunities for local people by the following enhancement measures.

(a) PPT will ensure construction contractor to use local labor force in concrete structure and other facilities as part of tender requirements.

(b) As there is no costruction company or skillful workforce steel structure in nearest villages, most of the skillful construction workers will be foreign workers (own workers from fish mill powder construction company may be Chinese and Japanese), semi-skilled and no-skill jobs will be offered to the local communities as much as possible.

(c) As the population of females is slightly higher than that of males in the nearest villages (most of the male partaner are going to Thailand (Htee Khee) for jobs), employment opportunities for construction works will also be created to ensure that the local female population also has equal chance for these opportunities (Gender Equality).

Impact Significance of Job Creation after Enhancement Measures

Anticipated Impact	Impact Type	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Potential to Increase in household income	Positive (+)	3	1	3	4	28	Low Impact (U)

According to the above impact rating for job opportunities during construction phase, the positive impact for job opportunities can be boosted after enhancement measures. Moreover, job opportunities are one of the most public needs according to the primary data collection. So, PPT will ensure job opportunity for local people during construction phase.

Skill Development for Local People

Local people hired by the proposed project would remain in communities with skills acquired during project construction including construction, woodwork, concrete work, steel/metal work and masonry. Communication skills for local people will also improve in office works during construction period. This is a positive and long-term socio-economic benefit.

Impact Significance of Skill Development without Enhancement Measures

Most of the sub-contractors for minor construction works in nearest villages are not too familiar with modern construction technique. So, the impact significance of local skill development during construction phase without enhancement measures can be considered low as follow:

Components	Sources	Impact Type	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Local skill development	Construction works	Positive (+)	3	4	3	2	20	Low (+30)

Enhancement Measures for Skill Development after Enhancement Measures

PPT will do enhancement measures for local skill development as follow:

(a) Training programs (e.g. maintaining of vehicles, welding, wiring, masonry building etc.) will be implemented prior to and during the construction phase because majority of the local people may not be adequately skilled to qualify for positions requiring skilled labor, if required.

(b) Local construction sub-contractors will be chosen as first priority during tender process.

(c) PPT will encourage construction contractors and sub-contractors to stimulate local skill development as part of tender requirement.

Impact Significance of Skill Development after Enhancement Measure

Skill development for local people will be great benefit for local engineers at Myeik Township. However, it will be a little hard to ensure local skill development for nearest villages during construction phase because most of the young people are willing to work in boarder city (Thailand). So, the impact significance of local skill development during construction phase can be considered as low to moderate after enhancement measures as follow:

(b) Potential Negative Socio-economic Impacts during Construction Phase

The potential negative socio-economic impacts during construction phase are as follow:

Components	Sources	Impact Type	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Local skill development	Construction works	Positive (+)	3	5	3	3	33	Moderate Significant (C)

Impacts Associated with Population Influx

The increase of population during construction phase will increase temporary pressure on existing infrastructure and services including health, food, shelter, water, transport and recreational facilities in Pathaw-Pahtet Island.

Significant of Impacts Associated with Population Influx without Mitigation Measures

As proposed project is very close to urban area (Myeik) and little number of workers (about 50 people), there will have little impact on local health care facilities and local food consumption. However, the proposed project will not use in the existing facilities in Phthaw-Pahtet Island and all of the workers from other region are going to Myeik by ferry. However, there will be a little impact on local food availability durig construction time. Impact significances related to population influx during construction period will be as follow:

Anticipated Impact	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Increase pressure on housing, recreational facilities, and water	2	1	1	2	8	No Impact (-)
Increase pressure on health care facility	3	1	3	3	21	Low Impact (U)
Increase pressure on adequate amount of local food	2	1	2	2	10	No Impact (-)

Mitigation Measures for Impacts Associated with Population Influx

No mitigation measures is required for pressure on housing, recreational facilities and water for additional workers because the impact rating is very low. Similarly, impact significant of pressure on local food consumption is low and it can be solved by providing food to workers during construction time. All of the impacts associated with population influx will be minimized by the use of local labor force. Own health care facilities will be supported to additional workers during construction period.

Significant of Impacts Associated with Population Influx after Mitigation Measures

All of the impacts due to increase in population can be mitigated by appointing local construction workers and it will also reduce pressure on health care facilities for

construction workers. So, impact on health care facility due to population influx will be very low after mitigation measures as follow:

Components	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Increase pressure on health care facility	2	1	3	2	12	No Impact (-)

6.4.5.2. Potential Health Impact and Mitigation Measures for Construction Phase

During construction phase, the anticipated health related impacts are as follow:

(a) Increased Infection of Air-borne Diseases

An influx of construction workers from other places (Chinese and Japnese) can lead to overcrowded conditions where air-borne diseases such as tuberculosis, influenza and meningitis can spread easily.

Significant of Impact for Infection of Air-borne Diseases

According to the secondary health data collection, infections of TB is one of the common disease in Myeik Region. So, impact rating for air-borne diseases will be considered as follow:

Who will affected?	Magnitude/Consequence of impact			Likelihood/Probability of impact			Health Impact Significance Rating		
	Low	Medium	High	Unlikely to occur	Likely to occur sometimes	Likely to occur often	Low	Medium	High
People in nearest residents	√	-	-	-	√	-	√ (HIR 1)	-	-
Construction workers	-	√	-	-	√	-	-	√ (HIR 2)	-

Mitigation Measures for Infection of Air Borne Diseases

This potential impact will be minimized by providing medical check for workers who are susceptible infection of air-borne diseases for both local and foreign workers.

(b) Fugitive Dust Emissions

Dust will expose the construction workers and some local people in nearest villages to bronchial and other respiratory tract diseases.

Significant of Impacts for Fugitive Dust Emissions

The impact will be mainly on construction workers within the project and very little on local people in nearest villages.

Who will affected?	Magnitude/Consequence of impact			Likelihood/Probability of impact			Health Impact Significance Rating		
	Low	Medium	High	Unlikely to occur	Likely to occur sometimes	Likely to occur often	Low	Medium	High
People in nearest residents	√	-	-	-	√	-	√ (HIR 1)	-	-
Construction workers	-	√	-	-	√	-	-	√ (HIR 2)	-

Mitigation Measures for Fugitive Dust Emission

Dust during construction phase will be controlled by:

(a) Restricting vehicle speeds;
(b) Watering roadways; and
(c) Wheel or body washing.

(c) Increase Infection of Water Borne Diseases

The incidence rate of water borne diseases such as cholera and diarrhea will increase if there will be no proper sanitation practices at the construction site. Improper waste disposal of construction debris will also have potential to increase water borne diseases.Project activities could become sources of pollution, as a result of infiltration into the surface stream. The possible negative impacts considered significant are:

- Loose soil from earthworks may be washed into stream.
- Irresponsible dumping of domestic solid waste can lead to underground water contamination, due to contaminants emanating from various products into the groundwater and filtering through to the aquifers. This will be a particular problem during the rainy season.
- Potential surface water pollution can emanate from waste products generated by construction activities entering the surface drainage.

Impact Significance for Increase Infection of Water Borne Diseases

According to the secondary data collection, infections of water borne diseases such as diarrhea are still the most public healthcare problems in Myeik Region and so the impact will be considered as medium as follow:

Who will affected?	Magnitude/Consequence of impact			Likelihood/Probability of impact			Health Impact Significance Rating		
	Low	Medium	High	Unlikely to occur	Likely to occur sometimes	Likely to occur often	Low	Medium	High
People in nearest residents	√	-	-	√	-	-	√ (HIR 1)	-	-
Construction workers	-	√	-	-	√	-	-	√ (HIR 2)	

Mitigation Measures for Increase Infection of Water Borne Diseases

According to the rural area, proper sanitation system has to be provided for construction workers during construction period. Construction debris will be disposed at suitable location that does not impact on local water resources. Construction activities will ensure that no loose soil is permitted into watercourses and stockpiles are located away from surface water (Sea water). All mixing of cement will be carried out in a designated area away from surface water and areas of potential runoff. All areas of fuel storage will be banned to prevent hydrocarbon pollution of surface water.

(d) Potential to Increase Infections from Mosquito

The blockage of drainage system (especially in front of project site) during construction phase will cause bleeding zone for mosquitoes and can cause potential to cause infections from mosquitoes especially in rainy season.

Impact Significance of Infections from Mosquito

The impact can be rated as medium because malaria is still a health problem in Myeik Region.

Who will affected?	Magnitude/Consequence of impact			Likelihood/Probability of impact			Health Impact Significance Rating		
	Low	Medium	High	Unlikely to occur	Likely to occur sometimes	Likely to occur often	Low	Medium	High
People in nearest residents	√	-	-	√	-	-	√ (HIR 1)	-	-

Construction workers	-	√	-	-	√	-	-	√ (HIR 2)	

Mitigation Measures for Infections from Mosquito

Proper temporary or permanent drainage system will be compensated as the blocked of drainage system during construction phase. Ensure that there are no stagnant pools of water during the construction phase. Provide local people with impregnated mosquito nets and/or better access to malaria prophylaxis and treatment as part of compensation program to reduce infections from mosquito.

(e) Increase Risk of Sexually Transmitted Infections

During construction phase, the improved economic status of the area and the influx of new people, living away from their families, can also lead to an increased risk of sexually transmitted infections such as HIV/AIDS, gonorrhoea and chlamydia. Major outbreaks of infectious diseases can have a devastating effect not only on or near the project site but also on local communities.

Impact Significance of Increase Risk of Sexually Transmitted Infections

Impact rating for sexually transmitted infection can be considered as moderate in Myeik Region.

Who will affected?	Magnitude/Consequence of impact			Likelihood/Probability of impact			Health Impact Significance Rating		
	Low	Medium	High	Unlikely to occur	Likely to occur sometimes	Likely to occur often	Low	Medium	High
Local people in Myeik Region	-	√	-	-	√	-	-	√ (HIR 2)	-

Mitigation Measures for Increased Risk of Sexually Transmitted Infections

Review sexually transmitted infection clinic access and education to reduce spread of sexually transmitted infections within the community. Provide information and education to workers about safe sex and implement HIV control for migrant construction workers.

(f) Health Impact Related to Increase in Noise Level

Construction activities normally generate a lot of noise. Noises will also arise from various construction machineries at site. Both acute loud noise and chronic lower level noise have been associated with a variety of negative health effects. Hearing loss and impairment are known to occur as a result of exposure to acute, high decibel noise (greater than 85 dB). Noise annoyance can lead to stress related impacts on health such as feelings of displeasure, interference with thoughts, feelings, and activities and disturbed sleep and can have impacts on mood, performance, fatigue, and cognition.

Impact Significance of Increase in Noise Level

The impact will be considered as low for local people due to the distance of nearest villages and medium to construction workers inside the construction site as follow:

Who will affected?	Magnitude/Consequence of impact			Likelihood/Probability of impact			Health Impact Significance Rating		
	Low	Medium	High	Unlikely to occur	Likely to occur sometimes	Likely to occur often	Low	Medium	High
People in nearest residents	√	-	-	-	√	-	√ (HIR 1)		-
Workers at site	-	√	-	-	-	√	-	-	√ (HIR 2)

Mitigation Measures Health Impact Related to Increase in Noise Level

1. Reduce speed limits for trucks in the project area to reduce noise level.
2. Alert residents of anticipated noise, including time, duration, decibel levels, and machinery to be used to protect public health.
3. Avoid working at night.

6.5. Anticipated Impacts and Mitigation Measures in Operation Phase

The anticipated environmental impacts during operation phase of the propsded factory will be as follows:

6.5.1. Impacts on Air Environment during Operation Phase

Gaseous emissions from wood fired boiler, wood dust and volatile organic compounds from kiln dryer are the main concerns in impacts on air environment of the value added wood factory. And also paint particles (from spraying process) are emitted, but to a lesser extent.

(a) Impacts of Gaseous Emissions

In the proposed project, PM (fly ash) will be generated mainly from wood fired boiler and fugitive dust will be generated from vehicles for transportation of logs and delivered supplies to and from the factory. The receptors will be residents along the public road. The wood fired boiler has the potential to cause an environmental nuisance and to impact human health by the discharge of particulate matter. Wood fired boiler emits carbon monoxide (CO), nitrous oxide (NOx), carbon dioxide (CO_2), sulphur dioxide (SO_2) and particulate matter. These gases have impact on atmosphere both directly or indirectly. The kiln dryer emits a litte amount of VOCs from wood while drying. The emission of wood dust and paint powder has an effect on respiratory system of the workers.

(b) Impacts of Wood Dust

The wood dust is created when machines are used to cut or shape wood materials and the dust becomes a potential health problem when the wood particles from these processes are inhaled. Exposure to wood dust in sawmills, band saws, and edger machine may result in external and internal health problems which may be immediate, short term or long term. Wood dust in sawmill environment is high and it could cause the incidence of respiratory diseases. High prevalence of respiratory symptoms, increased nose and eye irritations, and skin symptoms have been observed among workers exposed to wood dust. The national institute for occupational safety and health considers both hardwood and softwood dust to be potentially carcinogenic to humans.

Impact Significance on Air Environment during Operation Phase

Significant of impact on air environment during operation phase will be considered as follow:

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Air pollution	Particulate Matter from boiler	3	4	2	4	36	Moderate Significant (C)
	Fugitive dust from transportation	2	4	2	4	32	Moderate Significant (C)
	Gaseous emissions from boiler	4	4	3	4	44	Moderate Significant (C)
	Gaseous emissions from vehicle meovement	2	4	3	4	36	Moderate Significant (C)
	Noise from vehicles	2	4	2	4	32	Moderate Significant (C)
	Noise from factory machines	3	4	2	4	36	Moderate Significant (C)

Consideration of Mitigation Measures Requirement for Air Environment during Operation Phase

The requirement of mitigation measures for air environment according to the consideration of impact evaluation and public concerns are as follow:

No.	Parameters	Impact Rating	Public Concern through Public consultation Processes	Mitigation requirement by impact evaluation	Required Mitigation Scale	Responsibility
1.	Fly ash from boiler	Moderate Significant (C)	No	Yes	Sensible	PPT
2.	Fugitive dust from transportation	Moderate Significant (C)	No	Yes	Slight	PPT
3.	Gaseous emissions from boiler	Moderate Significant (C)	No	Yes	Sensible	PPT
4.	Gaseous emissions from vehicle meovement	Moderate Significant (C)	No	Yes	Slight	PPT

5.	Noise from vehicles	Moderate Significant (C)	No	Yes	Slight	PPT
6.	Noise from factory machines	Moderate Significant (C)	No	Yes	Sensible	PPT

Mitigation Measures for Impacts on Air Environment

PPT factory will do these following mitigation measures to reduce impacts on air environment during operation phase.

(a)Mitigation Measures for Gaseous Emissions

To reduce gaseous emissions from wood fired boiler, PPT will do as follow:

(a) Install Proper Stake Height for Gases Dispersion; and

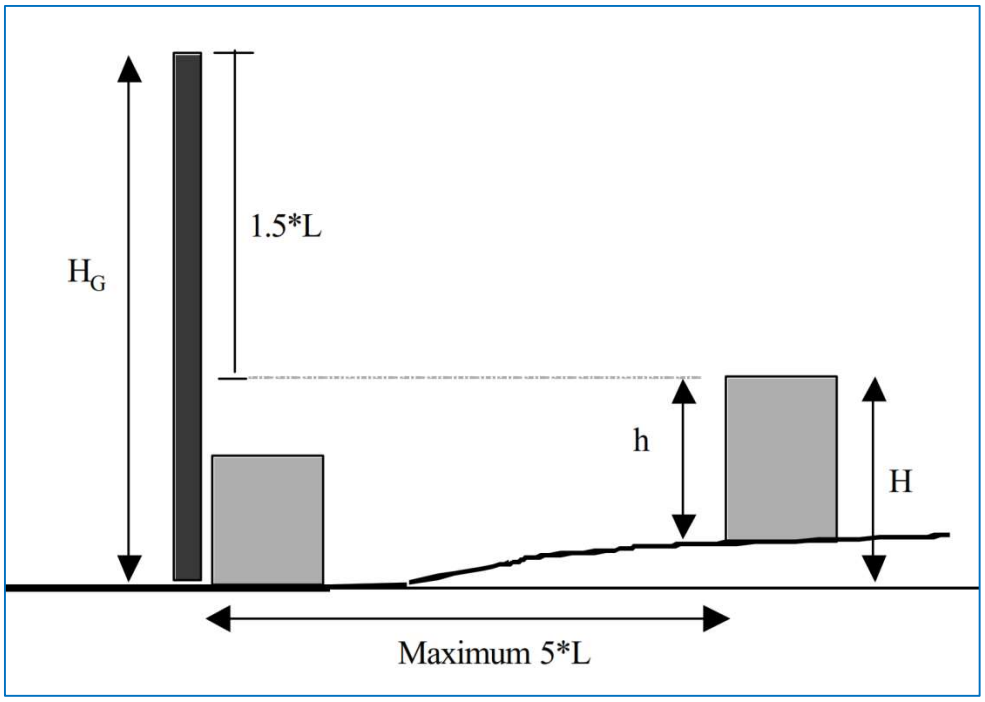
(b) Conduct Boiler Maintenance.

Proper Stake Height for Gases Dispersion

Proper Stake Height as per the GIIP (Good International Industrial Practice) Guideline

The stack height for all point sources of emissions, whether 'significant' or not, will be designed according to GIIP (see Figure below) to avoid excessive ground level concentrations due to downwash, wakes, and eddy effects, and to ensure reasonable diffusion to minimize impacts. According to GIIP, stack heights should be:

$$H_G = H + 1.5L$$



[Source: General EHS Guidelines]

Where:

H_G = GEP stack height measured from the ground level elevation at the base of the stack

H = Height of nearby structure(s) above the base of the stack

L = Lesser dimension, height (h) or width (w), of nearby structure

"Nearby structures" = Structures within/touching a radius of 5L but less than 800 m.

According to the calculation, the stack height will be equipped 90 ft for the bottom of the wood fired boiler.

Boiler Maintenance

A key to minimizing emissions is proper boiler maintenance. PPT will regularly remove bottom ash. In addition, PPT will also clean boiler tube regularly. The pneumatic tube cleaning helps to minimize the soot buildup on the heat exchange surfaces of the boiler and therefore helps to maintain the optimum boiler efficiency. Continual ash removal and routine maintenance can ensure optimum performance and reduce ash entrainment since this increases PM emissions. In addition, maintenance will not overlook the seal between the fly ash collection device and its ash hopper. On these smaller systems, the hopper is typically a metal drum that will be periodically emptied and/or replaced with an empty drum. After changing out the drum, system operator will make sure there are no leaks where the collection drum is connected to the exhaust system. There is negative pressure in the exhaust system at this location and any air leaks will tend to re-entrain the fine PM.

Boiler operations will be significantly influenced by the boiler operator. While automated systems can minimize some issues, in adequate operator training will likely compromise boiler availability, emissions, and efficiency.

(b)Mitigation Measures for Impact of Wood Dust

Wood dust in sawmill environments is high and it could damage to respiratory organs. Therefore, it is very important that wood dust emitted could be controlled and passed through diverted channels with relative equipment during operation phase and will maintain on a regular basis. Wood dust can be controlled by the following methods.

- Using local exhaust ventilation (LEV) to capture dust from cutting and shaping either by hand or machine.
- Providing washing facilities and advising workers to wash their face and hands immediately after finishing the task and before eating, drinking or smoking.
- Advising worker to wear respiratory production equipment (eg- mask)

6.5.1.1 Impacts of Noise Emission

Noises are generated by operational activities of a diversity of machine tools and equipment. Sources of noise emissions from the factory includes mechanically driven transport and handling equipment, cutting, machine tools such as lathes, milling machines, planers, shaping, dust extractor installations and electric motors. Sawmills are noisy environment in which to work. Damage to personal hearing, resulting in hearing loss and sometimes the discomfort of ringing in the ears is likely, if suitable precautions are not taken. One of the unique features of the noise associated with wood machinery is the level of exposure and duration. In sawmills, the majority, and sometimes all, of the workers are exposed to daily personal noise exposures varying from 80dB up to 120dB. With noise, OSHA's permissible exposure limit (PEL) is 90 dBA for all workers for an 8-hour day. The following table shows allowable Noise Exposures Limits with level of exposure.

Table- Allowable Noise Exposures Limits

OSHA	
Noise Level (dBA)	Time (Hours)
90	8
95	4
100	2
105	1
110	1/2
115	1/4

Mitigation Measures of Noise Emission

No mitigation measures for vehicle movement during operation phase according to the impact evaluation. But it is necessary to control noise from wood machinery with relative equipment during operation phase and will maintain on a regular basis. Noise control method can be classified as noise control at source, during transmission and at the receiver. Noise is best reduced by controls at the source of the noise. Source controls can include measures such as enclosures, mufflers, silencers, barriers and restricting the time of operation. Since noise levels are still likely to remain high, even when engineering controls have been implemented, appropriate hearing protection equipment is required to provide to all persons in the vicinity of the operations. Depending on the source, noise can be reduced as the following:

- Maintaining milling machinery and equipment routinely
- install isolation dampers (springs, cork, etc.)
- tighten parts or panels
- use flexible connections for electrical, compressed air or hydraulic piping
- Muffling engine and compressed air noise/ attaching of silencers
- Reducing machinery and equipment vibration in which vibration can be controlled by mounting the machinery on special rubber pads or springs, or with noise damping rubber joints between parts within the machinery.
- replacing or modifying noisy machines better installation of machines with advanced technologies
- Isolating the noise source in an insulated room or enclosure that is built by two layers- an outer layer made of heavy stiff material like wood, metal or concrete and an inner noise-absorbing from layer to treat very noisy areas

In situations where it is no longer possible to reduce the noise, it is necessary to ensure the protection of the people whose noise dosage was found to be above 100%. This may be done, for example, by prescribing wearing of earplugs or ear muffles or rotation of personnel working at the most noise posts with personnel in quieter areas.

(a) Mitigation Measures for Vehicular Emissions

For minor mitigation measures, PPT will do the following to reduce gaseous emissions from vehicles.

(i) Use good engine condition;
(ii) Conduct regular engine check and maintenance;
(iii) Use low sulphur content diesel and petroleum.

Impact Significance on Air Environment after mitigation measures

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Air pollution	Particulate Matter from boiler	2	4	2	3	24	Low Impact (U)
	Fugitive dust from transportation	2	4	2	3	24	Low Impact (U)
	Gaseous emissions from boiler	3	4	3	3	30	Moderate Significant (C)

	Gaseous emissions from vehicle meovement	2	4	3	3	27	Low Impact (U)
	Noise from vehicles	2	4	2	3	24	Low Impact (U)
	Noise from factory machines	3	4	2	3	27	Low Impact (U)

Residual Impact on Air Environment during Operation Phase

After mitigation measures, gaseous emission from boiler will have residual impact during operation phase and further mitigation measures for residual impact will be carried out.

6.5.2. Impacts on Surface Water Environment during Operation Phase

The environmental issue regarding the use of kiln drying is the release of condensate which contains organic contaminants. Therefore, discharging condensate into the environment directly is harmful not only to the soil, but also to the surface water and ground water environment. But the emission of VOCs is to a lesser extent. And few solid wastes (domestic wastes and packing materials) will be released during operation phase. Moreover, solid waste (ash slurry) and liquid wastes (boiler blowdown water and domestic wastes from workers' dormitories) will have potential to surface water pollutions if they are not properly managed.

Impact Significant of Surface Water Quality

Although there will produce wastewater with high organic load, the receiving water is sea water and so the severity of impact will be low as follow:

	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Surface water pollution	Contaminated water from factory operations	3	4	2	4	36	Moderate Significant (C)

Consideration of Mitigation Measures Requirement for Surface Water Environment during Operation Phase

Even if the sea water effluent represents by far the largest part of the total liquid pollution, it usually causes no problem, as the polluting components are easily decomposed, as their concentration is normally low and as the receiver conditions in the sea are generally favourable.

The requirement of mitigation measures for surface water environment according to the consideration of impact evaluation and public concerns are as follow:

No.	Parameters	Impact Rating	Public Concern through Public Consultation Processes	Mitigation Requirement	Required Mitigation Scale	Responsibility
1.	Surface water pollution	Moderate Significant (C)	Yes	Yes	Very Sensible	PPT

Mitigation Measures for Impact on Surface Water Quality

The ash slurry from the boiler is used as fertilizer in agriculture. The treatment of condensate from kiln dryer can be done by using activated carbon (if needed). The water output will be monitored so as to meet with the water quality of National Emission Guidelines before discharge to normal drain or reapplied inother places.

Impact Significance on Surface Water Environment after mitigation measures

	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Surface water pollution	Contaminated water from factory operations	2	4	2	3	24	Low Impact (U)

Residual Impact on Surface Water Environment during Operation Phase

After proper mitigation measures, the significance level will remain Low so there will be no residual impact.

6.5.3 Impacts on Soil and Ground Water Environment during Operation Phase

Destruction of forest covers during tree harvesting results in the loss of the protection, which the plant cover gives to the soil. Wood harvesting also interrupts the normal nutrient cycle of the forest, promotes nitrification and increases nutrient leaching thereby leaving the top soil impoverished and susceptible to erosion. Eroded soil are often deposited in rivers and fish ponds thereby causing siltation and contamination of such water body. Surface erosion is the result of exposing mineral soil to rain or severely disturbing or compacting surface soil. These adversely affect the aquatic ecosystem and disrupt biodiversity by killing fish and other organisms. Also, solid residue from wood fire boiler will have an effect on soil and ground water environment.

(a) Impacts of Solid Wastes on Soil and Ground Water Environment

Most of the solid wastes (unwanted wood pieces) from manufacturing process are used as fuel in wood fired boiler. Bottom ashes will leave as by-product after the burning of wood from wood fired boiler. If these residues are not disposed properly, there will be impact on surface water and ground water quality from improper waste dumping site. Other solid wastes are also generated and these solid wastes include plastics, containers, metal rods, and empty cans of sprays.

(b) Domestic Wastes

Solid wastes will be produced from wokers' dormitories during operation phase of proposed project.

Significant of Impact on Soil and Ground Water Quality

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Soil and Ground Water Pollution	Bottom ash from wood fired boiler	4	4	2	4	40	Moderate Significant (C)
	Domestic solid waste	2	4	1	4	28	Low Impact (U)

Consideration of Mitigation Requirement for Soil Quality

Intensity of mitigation measures for soil and ground water environment during operation phase according to the public concerns and impact evaluation are as follow:

Parameters	Impact Rating	Public Concern through Public consultation Processes	Mitigation requirement by impact evaluation	Mitigation Intensity	Responsibility
Bottom ash from wood fired boiler	Moderate Significant (C)	Yes	Yes	Very sensible	PPT

Domestic solid waste	Low Impact (U)	No	Yes	Slight	PPT

Mitigation Measures for Impacts on Soil and Ground Water during Operation Phase

PPT will do the following mitigation measures for impacts on soil and ground water environment.

(a) Mitigation Measures for Impacts of Solid Wastes

To reduce the impacts of soil erosion, replantation must be intensified and the wood harvesting should be sustainable harvesting. Unwanted wood pieces are used as fuel in wood fire boiler. Bottom ash from wood fired boiler will reuse in making fertilizer. Wood ash will also used on some agricultural soils to enhance crop production by raising soil pH (liming). Few solid wastes should be disposed of properly and these wastes shall be collected in separate bins and empty on day to day basis to avoid any undesirable working condition and environmental impacts.

(b) Mitigation Measures for Domestic Waste

Recycle process wastes that can be recycled. Domestic wastes and from factory will be collected in separate bins and empty on day to day basis to avoid any undesirable working condition and environmental impacts. Based on the different waste types, these solid wastes will be collected and segregated in their dedicated rubbish bins, and regular and proper disposal will be done in accordance with Kyunsu Township Municipal guidelines.

The philosophy of solid waste management will be to encourage the four R (4R) of waste i.e. waste reduction, reuse, recycling, and recovery (materials & energy). Impacts on domestic solid waste will be reduced by the segregation, storage at source and collection of the waste management system.

Segregation and Storage at Source: Segregation or sorting waste at its source will be practiced in order to encourage reuse/recycling. With segregation at source, recyclables do not lose their commercial value due to cross contamination. Waste generated at the proposed factory will be

segregated as inert cum mixed waste, recyclables and waste from changing lubricant oil. The entire waste stream from the complex will be stored and collected separately.

Collection: The recyclables from proposed fabrication factory will be given to the waste itinerant buyers or rag pickers, whereas segregated bio-degradable waste and inert cum mixed waste will be sent to the nearest landfill site for processing and final disposal.

Impact Significance on Soil and Groundwater after mitigation measures

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Soil and Ground Water Pollution	Bottom ash from wood fired boiler	3	4	2	3	27	Low Impact (U)

Residual Impact

After mitigation measures, the significance level for soil and ground water pollution due to wasted crab shells will remain low.

Water and Energy required in Project Circulation (Utilization Consumption)

Water Usage Pattern

The main water use in the proposed factory is for operation use of odour control scrubber system, cleaing purpose, boiler water and for domestic usage. Approximatelly, the factory uses 2000 m^3 per day as sea water that is pumped from the sea to cleaing purpose and odour control scrubber system. For operation use boiler water is 24m^3 per day. Domestic water (80 m^3 per day) such as for personal washing, food preparation, and washing of utensils will be provided by tube well water in which ground water will be pumped (50kw) with 4 inches PVC pipe from water storage tank. Drinking water will be providing by outsource suppliers.

Energy Required

The proposed project is intended to get required electricity supply form 350 kVA generators. Electric power will be used for the purpose of to run the production machinery and to provide lighting.. The total estimated demand for electricity will be 160 KVA.

Wood Fired Boiler

Wood Fired boiler is used for operating the fish meal cooking process. The fuel for steam boiler is wood. General information of proposed boiler information is mentioned in below table.

Table - Utilities of Wood Fired Steam Boiler

Description	**Process**
Brand Name	Yuanda Boiler
Output	steam
Rated steam temperature	184 ℃
Fuel consumption (wood)	176 kg/hr
Water Consumption	1m^3/hr
Wastewater discharge	0.13m^3/hr
Bottom Ash released	17 kg/hr (10% of fuel usage)

Anticipated Impact	Parameters	Magnitude	Duration	Extend (Area)	Probability	Total	Category
High Utilities Consumption	Electricity	4	4	3	4	44	Moderate Significant (C)
	Wood	3	4	2	4	36	Moderate Significant (C)
	Water	2	4	2	4	32	Moderate Significant (C)

Consideration of Mitigation Measures for Utilities Consumption

Intensity of mitigation measures for high utilities consumption during operation phase according to the public concerns and impact evaluation are as follow:

Parameters	Impact Rating	Public Concern through Public consultation Processes	Mitigation requirement by impact evaluation	Mitigation Intensity	Responsibility
Electricity	Moderate Significant (C)	Yes	Yes	Major	PPT

Water	Moderate Significant (C)	No	Yes	Minor	PPT
Wood	Moderate Significant (C)	Yes	Yes	Major	PPT

Mitigation Measures for Impacts of Utilities Consumption

According to the intensity of impact requirement, there will need mitigation measures for water and electricity consumption as follow:

(a) Water Consumption

PPT will need to install water meter to inspect the water usage. Domestic water consumption will be minimized by implementing water efficient fixtures such as 3 liters WC flushing cistern, sensor operated urinals and taps to minimize the wastage of water together with other water conservation measures if feasible. Furthermore, to ensure ongoing water conservation, an employee education and awareness programm will be introduced for the employees. Dry type urinals will also be used selectively. The following are specific measures:

(a) Awareness campaign to disseminate knowledge on strategies and technologies that can be used for water conservation;
(b) New employees will be issued standard water information packed. The information should include water conservation plans, water conservation methods being adopted in the complex and a list of essential and nonessential water uses;
(c) Manager of proposed factory shall periodically remind the staff for water conservation efforts; and
(d) Proper methods of water use will be placed in the toilets and other areas of water consumption.

(b) Electricity Consumption

PPT will need to install electricity meter, timers and thermostats, and use LED lights. A reduction in energy consumption is also an important consideration in a pollution prevention program and in lowering the operational cost. There are several methods that can be employed to help conserve electricity, which include:

(a) Install energy and water meters to measure and control consumption throughout the facility;

(b) Implementing good housekeeping measures such as turning off equipment and lights when not in use;

(c) Use LED lights and/or lower wattage lamps;

(d) Using more efficient equipment when replacing old equipment (such as motors and pumps); and

(e) Preventative maintenance of operational processes and pipes so as to improve efficiency and minimize losses.

Impact Significance on Utility Comsumption after mitigation measures

Anticipated Impact	Parameters	Magnitude	Duration	Extend (Area)	Probability	Total	Category
High Utilities Consumption	Electricity	2	4	3	3	27	Low Impact (U)
	Water	2	4	2	3	24	Low Impact (U)
	Wood	3	4	2	3	27	Low Impact (U)

Residual Impact

After mitigation measures, the significance level for utility consumption will remain low so there will be no residual impact.

6.5.4. Impacts on Biodiversity Environment

Lighting and noise from operation phase of the proposed value added wood factory will impact on behavior and movement of animal and aquatic lives nearby. Fly ash from boiler will also affect respiration problem for plants neighboring for several meters. Moreover, soil and water pollution due to solid and liquid wastes disposed will affect on fish diversity and population, mangrove vegetation and other aquatic life forms.

Significant of Impacts on Biodiversity Enivornment during Operation Phase

Impact significance was anticipated based on the presence of flora and fauna in and around the project area. According to the analysis, the points are low-significant affected on flora and fauna in this stage. The points are assumed with the respective measuring factors in the left column of the following table.

Table - Significant Points in the Respective Flora and Fauna Groups through Measuring Factors

Factors affected on biodiversity	M & P	S & G	T & ST	Amphibians & Reptiles	Fishes	Birds	Small mammal	Benthos & Zooplankton
Area of influence	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%
percentage of resource affected	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%
sensitivity of resources	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%	1-25%
status of resources	Important	normal	normal	normal	normal	normal	normal	normal
regulatory status	Normal	normal	normal	normal	normal	normal	normal	normal
Social value	Normal	normal	normal	normal	normal	normal	normal	normal

Notes: M & P=Mangrove vegetation and phytoplankton, S & G=Shrub vegetation and grass land, T & ST= Tree and small trees, A&R=Amphibian and reptiles,

Significant Points

Low=1-25%, Moderate= 26-50%, High= 51-75%, Very High=>76%

So, impacts are low status on existing flora and fauna according to result of analysis. Impacts are investigated in site specific (SP) and short term (St) as follow.

Table Impact levels, extent and duration on flora and fauna in the proposed project area

Sr. No	Biological groups	Impact Levels				Extent			Duration		
		L	Mo	H	VH	R	L	Sp	Lt	Mt	St
1	Amphibian and reptiles	✓	-	-	-	-	-	✓	-	-	✓
2	Birds	✓	-	-	-	-	-	✓	-	-	✓
3	Fishes	✓	-	-	-	-	-	✓	-	-	✓
4	Mammals	✓	-	-	-	-	-	✓	-	-	✓
5	Benthos - Zooplankton	✓	-	-	-	-	-	✓	-	-	✓
6	Mangroves & Phytoplankton	✓	-	-	-	-	-	✓	-	-	✓
7	Shrubs & grasses	✓	-	-	-	-	-	✓	-	-	✓
8	Trees & small trees	✓	-	-	-	-	-	✓	-	-	✓

L = Low, Mo = Moderate, H = High, VH = Very High, L = Local, Sp = Site Specific, Lt = Long Term, Mt = Medium Term, St = Short Term (National Planning Commission, GON and IUCN-The World Conservation Union, 1993)

Consideration of Mitigation Requirement for Biodiversity Environment during Operation Phase

Even if the sea water effluent represents by far the largest part of the total liquid pollution, it usually causes no problem, as the polluting components are easily decomposed, as their concentration is normally low and as the receiver conditions in the sea are generally favourable.

Mitigation Measures for Impacts on Biodiversity Environment during Operation Phase

In this stage, the following mitigation will be carried out:

- Removing the rubbishes, plastics and other pollutants from the land of project area,
- Land fill and improve the land form with native vegetation and plants.
- Replantation inside the projct area.

6.5.5. Impact on Human Environment

Visual Impact

Although the value added wood factory was built in the north-east of the island and it can't be easily visible from the shoreline of Myike Township (nearest urban area), it will still impact on the natural beauty of Pathaw Island as follow:

Before the Project in Plan View

After the Project in Plan View

As shown in the above figures, the original landscape before the construction of factory is fully covered with trees and the island didn't get the damage of the human effect. The new building and roads along the shoreline of the project will cause caused significant changes visual along the shore of island.

Mitigation Measure Visual Impacts

The colour of the buildings within the factory will be changed to green colour. The factory campus will be keep clean every day and implement suitable waste management system. Plantation to cover the factory along the shoreline will be done. At the end of the project, the whole area must be replanted and rehabilitated with the native plant species. The shoreline of the factory will be managed of safe and clean for every day.

6.6 Impacts on Human Environment

6.6.1 Impacts on Workers' Safety and Health during Construction Phase

In addition, vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazard, such as physical contact, spill, dust emission and noise.

Mitigation Measures

To mitigate occupational impacts on workers, PPT will prepare health and safety management plan for the construction workers based on the EMP. Posters shown in the following figures in Myanmar language and any other language appropriate will be displayed at the site.

Safety Sign

Personal protective equipment such as safety shoes, safety gloves, helmet, goggles, earmuffs etc., will be provided during construction. For the safety of construction staff, adequate safety measures including availability of first-aid facilities are made available on the project site.

Table - Personal Protective Equipment (PPE) and their Functions

Function of PPE	**FeatureandCharacteristics**
Protective Goggles (Suitable for protection from dust, particle, chips, chemicalsplattering)	
Goggleswithdirectventsarenotsuitablefor Protection from chemical lsplattering or smoke.	
HearingProtection	
Cotton earplugs:disposable earplugs for short-term use – not suitable for high noise levels	
Earmuffs:They offer a high level of sound reduction and are suitable for high noise levels.They can be used in combination with a safety helmet.	 
RespiratoryProtection	
Dust mask: lightweight mask that is fitted over the nose and mouth and secured behind the head with elastic.	
HeadProtection	
Use head gearwhichconformsto recognized safety Standards	

Glovesforcommontasks(cotton/leather)	
FootProtection	
Select footwear that fits the purpose and Conformsto recognized safety standards.	
BodyProtection	
Reflective clothing: For working in busy traffic: brightly-coloredreflectiveclothingcanincrease the visibility of employees and reduce theirchances of beingstruckbyvehiclesormachinery	

PPT will design and constructed in careful consideration of physical stability, structural load capacity, proper ventilation, lighting, fire prevention, sanitation and general safety issues, and will comply with all relevant health and safety requirements, mainly issued by Ministry of Industry. To prevent and reduce of occupational health and safety, anti-slip stair tape treads will be equipped along the stair for highlighting step edge and avoid slipping. Qualified first-aider will be provided at all times. A good ventilation system will be arranged at labor concourse for employees. For food handling, preparation and storage areas for dry and wet food will be arranged for workers and guests' food hygiene.

PPT will do the following mitigation measures for odour control.

(a) Workers at fish mill factory will be rotated at every 4 hours to reduce inhalation of odour and will be taken a rest in rest room at least 30 minutes.
(b) PPT will construct workers' rest room with air conditioning system.
(c) Regular medical check will be provided for all workers at project site quarterly.

6.6.2. Impacts on Workers' Safety and Health during Operation Phase

Staff and workers of the factory are susceptible to cuts and amputations, electric shock, thermal burns, noise and small injuries (slips and falls, accidents and injuries) could happen operation phases as well.

Occupational health and safety is a minor impact during the operation of factory primarily include physical hazards such as slip, trip and fall accidents in carrying boxes for raw materials, injury or illness due to repetitive exposure towork activities.

Mitigation Measures

General safety and health impacts on the employee may include slip, trip and fall in the factory during carrying loads and sometimes food poison and other minor health problems can happen while working at the factory.

PPT believes that commitment on health and safety of staffs and employees is the most important parameter to make its business with a great success. To avoid or minimize health and safety risks, daily housekeeping and cleaning services around factorys' lobbies and even outdoor greening and landscaping will be carried out regularly. For the health and emergency medical care of all employees, the first aid kits will be kept ready at all public places of the factory and a car or boat kept 24-hour standby to send to the nearby hospitals or clinics within the few minutes, in case of injury.

6.7. Anticipated Impacts and Mitigation Measures during Decommissioning Phase

The decommission of the proposed project will include (1) dismantling of equipment like pumps, filetrs and electrical equipment, (2) removing rocks and other debris from the bottom of the pond, (3) removing the pond lining, (4) disposal of resulting materials, and (5) filling the hole with a mix of topsoil , or materials such as sand or stone to aid drainage.

6.7.1. Impact on Air Environment during Decommissioning Phase

Impacts on air environment during decommissioning phase will be as follows:

(a) Fugitive dust generation from transportation and demolition activities;
(b) Vehicular emissions related to the transportation of personnel and solid construction wastes; and
(c) Noise from the machineries.

(a) Fugitive Dust and Gaseous Emissions

Dust will be generated from the vehicular movement. Vehicular emissions from the movement of trucks, vehicles and mototrcycles and dust from the ground can occur during the decommissioning phase. The operation of machinery and construction equipment is also likely to generate gaseous emissions. These activities will affect neighborhoods (especially for local residents beside the public road to the project site) though the decommissioning period is not a long term.

(b) Increased in Noise Level

Construction noise is expected to generate at the demolition site. The activities that are ear marked to generate noise are loaders, excavators and cranes among others. If most of the construction machineries (generator, trucks, etc.,) are running at the same time, this cumulative noise can increase to 85.9dB (A) at 15m (about 50 feet) distance as follow:

$$Leq = SPL_{site} = 10 \log \left(\frac{10^{8.4} + 10^{9.0} + 10^{8.5}}{4} \right)$$

$$= 85.9 \text{ dBA}$$

Table - Typical Construction Equipment Noise Emission Levels

Equipment Type	Noise Level (dBA at 50 Feet)
Truck (Medium and Heavy)	84
Welding	90
Generator	<85

Source: EPA, 1 971; "Noise from Construction Equipment and Operations, Building Equipment,and Home Appliances". NTID 300.1

Significance of Impacts on Air Environment during Decommissioning Phase

The significance of impacts on air environment during decommissioning phase will be as follow:

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Gaseous emission	Decommissioning activities	2	1	2	3	15	Low Impact (U)
Noise	Noise from construction equipment	2	1	1	4	16	Low Impact (U)

Consideration of Mitigation Measures Requirement for Air Environment during Decommissioning Phase

The requirement of mitigation measures for air environment according to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Receptor	Impact Rating	Public Concern through Public Consultation Processes	Mitigation Requirement by Impact Evaluation	Mitigation Scale	Responsibility
1.	Gaseous emissions	Local communities	Low Impact (U)	No	Yes	Minor	Construction service provider(s)
2.	Noise	Workers at site	Low Impact (U)	No	Yes	Minor	Construction service providers

Mitigation Measures for Air Environment during Decommissioning Phase

PPT will do the following mitigation measures of air environment during decommissioning phase.

(a) Mitigation Measures for Gaseous Emissions

Certain mitigation measures will be adopted to limit atmospheric impacts to as great an extent as possible during decommissioning phase. For instance, the transportation of personnel and materials will be scheduled such as to avoid periods of peak flow where congested conditions are more likely, and to reduce the overall number of vehicular movements. In addition to careful traffic management, close adherence to the recommended maintenance regime will be applied to both on-site and off-site vehicles.

Reduction of SO_2 and CO Emissions: Low sulphur content and good engine condition vehicles will be used.

(b) Mitigation Measures for Noise

For minor mitigation measures, it is necessary to avoid the following activities:

- running construction machineries at the same time; and
- working at night.

6.7.2. Impacts on Surface Water Environment during Decommissioning Phase

Waste generated from demolition activities will have potential to surface water pollution and will include construction debris and wastes from the workers. Drainage and seepage from construction waste dumping site during decommissioning phase will have impact on surface water pollution. Mobilization and transport of soil materials may result in impacts to the water quality in nearest sea water. It will be more evidence in rainy seasons (June to September).

(a) Wastes from Demolition

Waste materials (pallets, steel structure off-cuts, and concrete waste) will be produced during this decommissioning phase. If those wastes are not properly managed, there will have potential to imapcts on surface water pollutions.

(b) Oil and Lubricants

Fuel oil from trucks and cars, and lubricants and grease from machineries can leak during decommissioning phase. This leakage can cause surface water pollution for a while.

(c) Domestic Wastes from Workers

A small amount of domestic waste will be generated from demolition workforce. The establishment of labour camps will also affect on environment through improper waste (solid & garbage /sewage) disposal.

Significance of Impacts on Surface Water Environment

Impact on water environment during decommissioning phase will not be significant since the volume of nearest surface water body, sea water body, is very much greater than the volume of wastewater disposed from the site. Moreover, soil type within the project site is sandy with high porosity.

Anticipated Impacts	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Surface Water Pollution	Construction Debris	2	1	2	2	10	No Impact (-)
	Oil and Lubricants	2	1	2	2	10	No Impact (-)
	Domestic Wastes	2	1	2	2	10	No Impact (-)

Consideration of Mitigation Measures Requirement for Surface Water Environment

The intensity of mitigation measures for surface water environment according to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Impact Rating	Public Concern through Public Consultation Processes	Mitigation Requirement by Impact Evaluation	Required Mitigation Scale	Responsibility
1.	Construction Debris	No Impact (-)	No	Yes	Minor	Construction Service Provider(s)
2.	Oil and Lubricants	No Impact (-)	No	Yes	Minor	Construction Service Provider(s)
3.	Domestic Wastes	No Impact (-)	No	Yes	Minor	Construction Service Provider(s)

Mitigation Measures for Impacts on Surface Water Environment

PPT will conduct the following measures to prevent surface water pollution during decommissioning.

(a) Wastes from Demolition

The demolition activites should not start during monsoon season. All stacking and loading area will be provided with proper drains to prevent run off from the site to enter any water body. The wastes must be disposed in accordance with the rules and regulations from CDC (Myeik).

(b) Oil and Lubricants

Any leakage of oil and lubricants from vehicles and machineries used in decommissioning phase should be avoided. Regular maintenance of those machineries should be conducted.

(c) Domestic Wastes from Workers

Waste water channels from the site should be connected to the septic tank during the decommissioning to prevent wastewater from entering the nearest water bodies.

6.6.3. Impacts on Soil and Ground Water Environment during Decommissioning Phase

Impact of soil and groundwater environment during decommissioning phase will be leakage of fuel oil, leakage of lubricants and disposal of wastes.

(a) Leakage of Fuel Oil and Lubricants

Potential contamination of soil and groundwater during decommissioning phase could possibly occur as a result of leaking of fuel and lubricants from machineries and/or temporary on-site storage facilities. Handling of fuel oil, other oil products, chemicals and lubricants may constitute a risk for pollution of soil and ground water.

(b) Demolition Wastes and Domestic Wastes

During decommissioning phase, there will have potential to soil contamination and ground water pollution if the solid wastes from demolition activities are not properly disposed. Moreover, seepage and drainage from waste dump site will also impact on soil and ground water qualities.

Significance of Impacts on Soil and Ground Water Environment

Wastes produced from the demolition have potential to impacts on soil and groundwater in project site. This will be minor, temporary low possibility due to the decommissioning period, and the significance of impacts is shown in the following table:

Anticipated Impact	Sources	Magnitude	Duration	Extend (Area)	Probability	Total	Category
Soil and Ground Water Pollution	Leakage of fuel oil and lubricants	2	1	1	2	8	No Impact (-)
	Demolition wastes and Domestic Wastes	2	1	2	2	10	No Impact (-)

Consideration of Mitigation Measures Requirement for Soil and Ground Water Quality

The requirement of mitigation measures for soil and ground water environment according to the consideration of impact rating and public concerns are as follow:

No.	Parameters	Impact Rating	Public Concern through Public Consultation Processes	Mitigation Requirement by impact evaluation	Required Mitigation Scale	Responsibility
1.	Leakage of fuel oil and lubricants	No Impact (-)	No	Yes	Minor	Construction Service Providers
2.	Demolition wastes and domestic wastes	No Impact (-)	No	Yes	Minor	Construction Service Providers

Mitigation Measures for Impacts on Soil and Ground Water Environment

According to the above consideration for required mitigation measures, there will be minor mitigation measures such as disposed of solid wastes according to the rules and regulations of CDC (Myeik) and/or rules to reduce impacts of solid wastes during decommissioning phase. Care should be taken not to leak during the handling of fuel oil and lubricants. All of the fuel tank and lubricants container have to store over concrete floor or impermeable pad. Every machinery used in decommissioning phase should be in good conditions.

7. ANTICIPATED RESIDUAL AND CUMULATIVE IMPACTS

7.1 Cumulative Impacts and Mitigation Measures

(a) Depletion of Mangrove Area as Cummulative Impact

Although the project will merely use 4.95 acres, there will have deforestation and depletion of mangrove area as cummulative impact because there already had other industires and will be used 70.63 acres of the whole island (at least 25% of the whole project area). Therefore, a lot of forest areas will have to be removed for other industrial purposes. According to those actions, deforestation and depletion of mangrove area will emerge as cumulative impacts. The gradually changes of forest area near the proposed project is shown in the following figures.

Figure 7.1. Forest Area before the Project in 2001

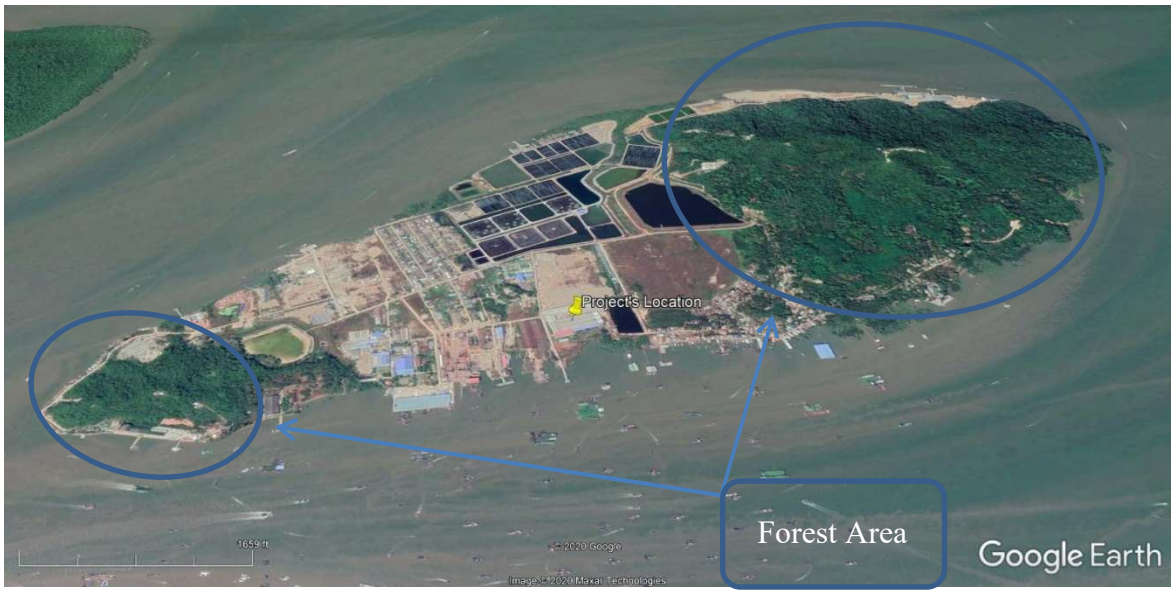


Figure 7.2. Forest Area after the Projects in 2019

(b) Surface Water Pollutionas Cumulative Impact

Although there will have very little impact on surface water environment during operation phase (the volume of waste water compared to the volume of sea water). Waste water from various industires in Pathaw and Pahtet Islands will be impact on surface water quality (sea water quality) around the islands.

(c) Soil Contamination as Cumulative Impacts

Solid wastes generate from various industries at Pathaw and Pahtet Islands will be combined as cumulative impact for soil contamination if they are not properly disposed.

(d) Visual Impact as Cumulative Impact

All of the factories located in Phathaw-Pahtet Island will need to cut trees and mangrove and so there will have impacts on visual as cumulative in both plan view and side view from the sea.

Mitigation Measures for Cumulative Impacts

(a) Mitigation Measures for Deforestation

PPT will give attention about deforestation of the whole Pahtaw-Pahtet island. It needs to implement forest plantation as 30% of the area that developer used for the project in the island.

(b) Mitigation Measures for Wastewater

PPT will implement wastewater treatment system not only for the value added wood factory but also for the other factories located in Pathaw-Pahtet Island.

(c) Mitigation Measuers for Soil Contamination

Solid wastes generated from the factories will be disposed off properly in accordance with the rules and regulations of CDC (Myeik) and CDC (Kyun Su).

(d) Mitigation Measures for Visual Impacts

Visual impacts will be prevented during the planning process for the proposed project and managed during operations through the installation of natural visual barriers such as vegetation. Landscape management and site restoration plans will be in place with recommended mitigation measures such as replacement planting, and vegetation barriers. The location and color of bulk storage facilities will be selected with consideration of visual impacts.

7.2. Anticipated Residual Impacts and Mitigation Measures

According to the impact examination, all of the environmental impacts related to pre-construction, construction, operation and decommissioning phases can be reduced by proper mitigation measures. However, gaseous emission from wood fired boiler and odour from fish mill will still left as residual impacts inside acceptable levels after mitigation measures as follow:

(a) CO_2 as Residual Impact

Although PPT will control gaseous emissions from wood fired boiler, there will be still left residual impacts to existing air quality because gaseous emission from wood fired boiler cannot be controlled to zero emission.

Mitigation Measures for Residual Impacts

All of the residual impacts will be controlled by plantation (green belt development). Plants can serve as a sink for noise, gaseous pollutants and reduce the flow of dust and so green belt will be considered as compensatory plantation for residual impact of dust, noise and gaseous emissions. The following are the advantages of greenbelt development:

(a) Green belts insure a minimum distance between the industrial sources of pollution and the receptors/ residential areas, prone to the health hazards of industrial pollution.
(b) Green belts can absorb noise caused by the industry.
(c) Trees not only assimilate carbon dioxide and release oxygen but also play an important role in trapping some obnoxious gases and particulate matters in the air. Hence, green belt functions both as filter and sink for contaminants.
(d) Green belts can improve the local microclimate. These occur mainly through their influence on wind, temperature and humidity.
(e) Green belts provide picnic spot and recreation grounds.
(f) In the dryer part of the area, the trees reduce the effect of dryness, desiccate hot wind, and increase the availability of soil moisture.

Greenbelt Development for the Proposed Factory

(a) Plant Selection for Proposed Factory

Any particular species of plant which may be needed in that area from the point of view of soil conservation, moisture conservation, pollution control, dust control, wildlife habitat etc. may

also be given preference while deciding the species to be included in the greenbelt. The following aspects are important while selecting the plant species:

(a) The species will be fast growing and having thick canopy cover,
(b) It will be perennial and evergreen and should have large area index,
(c) It will be indigenous and suitable to local climatic conditions,
(d) It will be efficient in absorbing pollutants without significant effects on plant growth, and
(e) It will be fruit yielding trees, if possible, especially in wasteland areas.

The appropriate plants for value added wood factory are Yae-Ta-Ma (*Polyalthislongifoia*), Kha-Yae *(Mimusops elengi L.)* and Mango (*Mangifera indica*). All of these species have relatively high noise and gas absorbance index and can be available in local market. Heat tolerance species will be planted near boiler due to the intense heat and recommended heat tolerance species is Ban-da (*Terminalia catappa* L.).

(b) Proposed Layout Plan for Greenbelt Development

Under plantation programme, it will be developed plantation all along the boundary of project area and all free space around the project site. Development of lawns, small ornamental flowering plants, seasonal plants etc. will not be counted as a part of greenbelt in the conservation plan. Plantations will be done at a spacing of 5 x 5 m of at least two rows in zip-zap shape. The efforts to improve the survival of the saplings and their healthy growth will be taken up like watering, fencing, keeping watch and ward and seeking guidance from the Forest Department (KyunSu/Myeik) and Environmental Conservation Department (Myeik). The detailed plan for greenbelt development for at least five years will be taken guidelines from Forest Department (Myeik). The following figure shows the conceptual plan for green belt development.

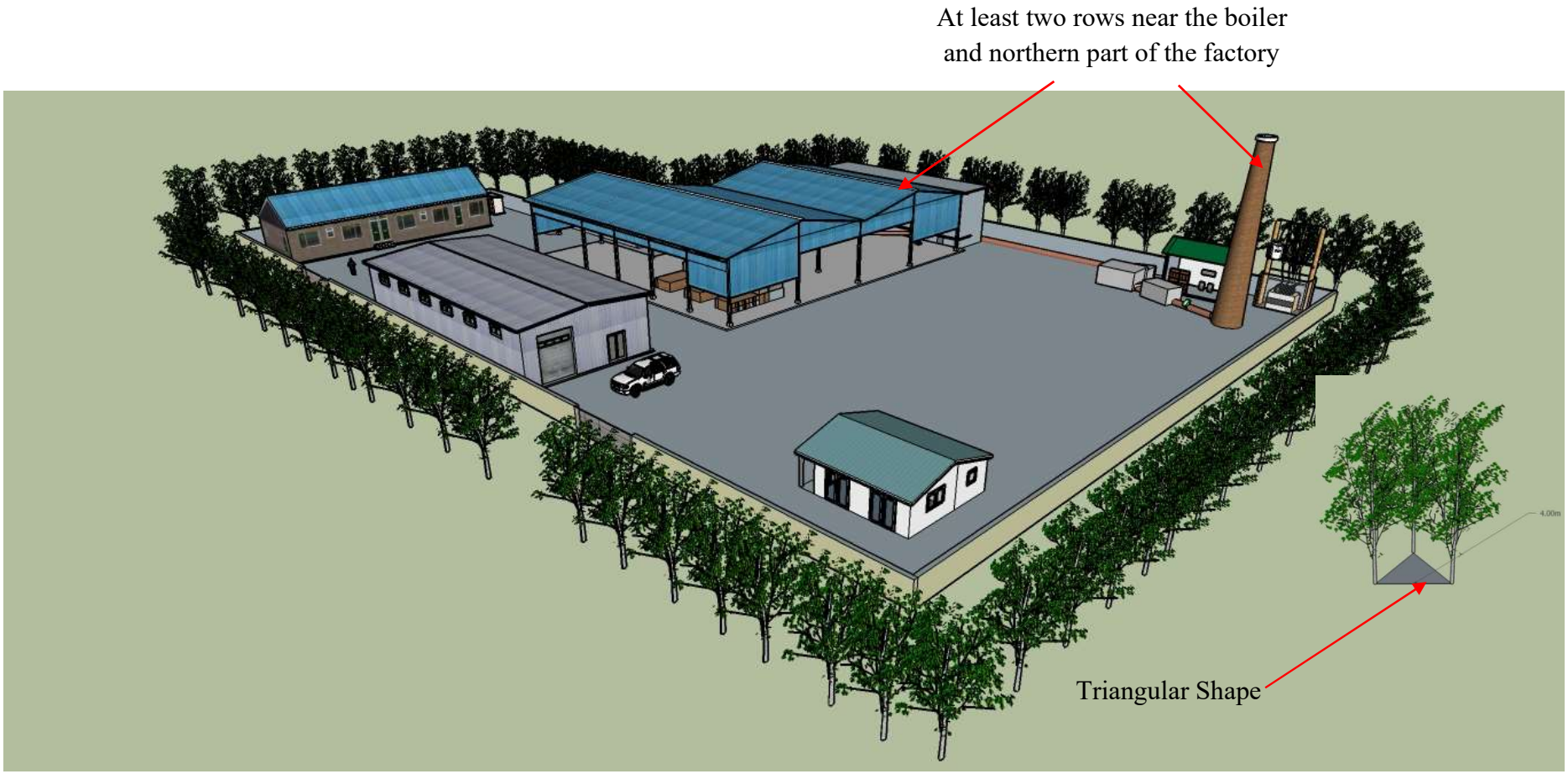


Figure 7.3. Conceptual Layout Plan for Green Belt Development

7.3. Medical Checkup Program for Cumulative and Residual Impacts

Regularly medical checkup for short and long terms effect of gaseous emissions with the cooperation with Department of Public Health (Kyun Su) will conduct regularly for workers and nearest local residents as part of the compensation program for residual impacts.

8. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

In order to manage the physical, biological and sociological impacts identified in the impact assessment, Pyi Phyo Tun International Company Limited (PPT) has committed to implement an environmental management plan of the project (EMP). This management plan will form the basis for the development of an integrated management system for environmental and community issues. EMP is a site-specific plan developed to ensure that the project is implemented in an environmental sustainable manner where all contractors and subcontractors, including consultants, understand the potential environmental impacts arising from the proposed project and take appropriate actions to properly manage that risk. EMP also ensures the project implementation is carried out in accordance with the design by taking appropriate mitigation actions to reduce adverse environmental impacts during its life cycle. EMP for proposed factory will include the following essential parts.

(a) Environmental Management and Monitoring Plan;
(b) Disaster Management Plan;
(c) Emergency Response Procedure for Odor Emission
(d) Occupational Safety and Health Management Plan
(e) Waste Management Plan
(f) Traffice Management Plan
(g) Plant Restoration Plan and
(h) Community Development Plan

8.1 Environmental Management Plan

Detailed of environmental impacts and mitigation measures during pre-construciton phase, construction phase, operation phase and decommissioning phase were described in Section 7. This chapter will only be described summary of environmental impacts, mitigation measures, responsibilities and estimated costs in all phases as shown in the following table.

Table 8.1 - Summary of Anticipated Impacts, Mitigation Measures and Estimated Cost

The following table shows estimated cost for mitigation measures for anticipated impacts in all phases

Anticipated Impacts	Source	Mitigation Measures	Intensity of Mitigation	Responsibility	Estimated Cost/Frequency
Pre-Construction Phase					
Impacts on Air Environment	Fugitive dust emissions	-Watering the site regularly by using handheld spray to suppress dust emissions during truck movement; -Prohibiting the burning of vegetation or waste on site	Minor	Pre-construction services provider	Cost of handheld spray = 20000 kyats
	Gaseous emission	- Use machineries with good engine with low sulphur content fuel	Minor	Pre-construction services provider	-
	Noise level in dB(A)	- Use sound proof machines – Provide earplug to all workers	Minor	Pre-construction services provider	-
Impacts on Surface Water Environment	- Increase turbidity, oil and grease in Sea - Blockage of drainage due to earth filling	-Avoid earth working and excavation during rainy seasons, waste water channels, avoid leakage of oil & lubricant, vegetation of bare areas. -Earth filling will ensure not to block natural drainage system	Minor	Pre-construction services provider	-
Impacts on Soil and Ground Water Environment	Potential to soil contamination	Proper waste management system	Minor	Pre-construction services provider	-
	Potential to ground water pollution	Dispose solid wastes according to CDC (Myeik) and CDC (Kyunsu)	Minor	Pre-construction services provider	-
Impacts on Biodiversity	Impacts on flora diversity	Avoid tree cutting as much as possible and replanting the trees	Minor	Pre-construction services provider	Cost of replanting trees cannot be identified accurately.

	Impacts on fauna diversity	Avoid working at night	Minor	Pre-construction services provider	-
	Impacts on aquatic lives	Raise environmental awareness to workers	Minor	EMMT	Estimated cost for holding awareness environmental program = 200000 kyats
Impacts on Socio-Economic Environment	Potential to Increase in household income	Job creation	Minor	EMMT	-
Construction Phase					
Impacts on Air Environment	Dust generation	- Water spraying of or covering all exposed areas and access roads;	Minor	Construction services provider	Estimated cost of petrol used in vehicles to spray access roads = 10000 kyats/day
	Gaseous emissions	- Regular equipment maintenance, reduce construction time, good engine vehicles will be used.	Minor	Construction services provider	-
	Noise level in dB(A)	- Avoid running construction machineries at the same time. - Avoid working at night.	Minor	Construction services provider	-
Impacts on Surface Water Environment	Construction Debris	Temporary settling pond, limit uncessary earth works	Minor	Construction services provider	Estimated cost for building sedimentation pond & septic tank = 2,000,000 kyats
	Oil and Grease	Avoid any leakage of oil and lubricant	Minor	Construction services provider	-
	Domestic Wastes	Use proper waste management system	Minor	Construction services provider	-
Impacts on Soil and Ground Water Environment	Leakage of fuel oil and lubricants	- Care should be taken not to leak during the handling of fuel oil and lubricants - Store over concrete floor or impermeable pad	Minor	Construction services provider	-

	Construction debris and domestic Wastes	Solid wastes according to the rules and regulations of CDC (Kyunsu)	Minor	Construction services provider	-
Impacts on Biodiversity	Impacts on flora diversity	-Conserve the plants and vegetation as possible as which existing around the project area	Minor	Construction services provider	-
	Impacts on fauna diversity	-Raise environmental conservation awareness among the visitors and workers (not to kill the birds and monkey which are protected by law)	Minor	Construction services provider	Estimated cost = 50000 kyats/time
Impacts on Socio-Economic Environment	Increase pressure on health care facility	Unskilled and semi-skilled job opportunities should be offered to the locals as much as possible	-	EMMT	-
	Population influx	Providing training programs	-	EMMT	Estimated cost for holding training programs = 500,000 kyats/program
	Pressure on local food consumption	Population influx can be minimized by the use of labor force	-	EMMT	-
	Health Impacts (a) Air-borne diseases	Providing medical check-up for workers who are susceptible of air-borne diseases	Minor	EMMT	5000 kyats/time
	(b) Dust emission exposing locals and workers with bronchial and other respiratory tract diseases	- Spraying water - Restricting vehicle speeds	Minor	EMMT	The cost has been already mentioned above
	(c) Water borne diseases	- Avoid construction during rainy seasons - All areas of fuel storage will be banned to prevent hydrocarbon pollution of surface water	Major	EMMT	-
	(d) Infection from mosquito	- Avoid construction during rainy season	Moderate	EMMT	-

		- Proper temporary or permanent drainage system will be compensated			
	(e) Sexually transmitted infections	Provide information and education about safe sex and implement HIV control program for migrant construction workers	Minor	EMMT	5000 kyats/time
Operation Phase					
Impacts on Air Environment	Gaseous emissions	-Install bag filters to reduce the stack emissions -Maintain vehicle and equipment according to manufacturers' specifications	Major	EMMT	Estimated price of bag filter = 100000 kyats/one
	VOCs emissions	Use biofiltration process	Moderate	EMMT	-
	Noise	-Install of sound suppressive devices on factory machines such as Band Saw -Check hearing protection measures are working	Minor	EMMT	Estimated cost of sound suppressive devices installing = 600,000 kyats
Impacts on Surface Water Environment	Condensate from kiln dryer	Implement adequate sanitary facilities for onsite personnel; -Liquid effluents arising from operations will be treated to the applicable national emission guideline prior to discharge -Use adsorption process on activated carbon	Moderate	EMMT	Estimated price for septic tank to store effluents has been mentioned above.
Impacts on Soil and Ground Water Environment	Wood Ash from boiler	- Install cyclone system and bag filter -Reuse bottom ash as fertilizer in agriculture	Major	EMMT	Estimated overall price for cyclone system cannot be identified accurately as the cost varies with size.

	Domestic solid waste	Segregation, storage at source and collection of the waste management system	Minor	EMMT	-
	Liquid waste	-Use activated carbon to treat condensate from boiler -Recycle treated water as boiler blowdown water	Mirnor	EMMT	Estimated overall price for activated carbon cannot be identified accurately but 1 ton of activated carbon costs about 1,000,000 kyats.
Impacts on Biodiversity	Impacts on fauna diversity	-Proper waste management system as it has effect on fish diversity and population	Minor	EMMT	100000 kyats
	Impact on flora diversity	-Proper waste management system, wind-break tree species -Replantation inside the project area	Minor	EMMT	100000 kyats
Impacts on Socio-Economic	Visual Impact	- Keep clean the area near the farming every day and implement suitable waste management system.	Minor	EMMT	-
	General health and safety impacts	- First aid kits will be kept ready at all public places - A car or boat kept 24-hour standby to send to the nearby hospitals or clinics within the few minutes, in case of injury	Minor	EMMT	Estimated cost of first aid kit = 50000 kyats/kit
Utilities Consumption	Electricity	Install energy and water meters, Use LED lights, Installation of timers and thermostats,	Major	EMMT	-
	Domestic water	Implementing water efficient fixtures, Awareness campaign, Proper methods of water use	Minor	EMMT	-
Decommissioning Phase					
Impacts on Air Environment	Fugitive Dust generation	Spraying water	Minor	EMMT	The estimated cost has been already mentioned above.

	Gaseous emissions	Use machineries with good engine with low sulphur content fuel	Minor	EMMT	-
	Noise level in dB(A)	Avoid working at night	Minor	EMMT	-
Impacts on Surface Water	Wastes from demolition	- Avoid doing demolition activities during monsoon season	Minor	EMMT	-
	Oil and Lubricants	- Avoid any leakage of oil and lubricant - Check machineries maintenance on regular basis	Minor	EMMT	-
	Domestic wastes from workers	- Connect wastewater channel to the septic tank	Minor	EMMT	The estimated cost has been already mentioned above.
Impacts on Soil and Ground Water	Leakage of fuel oil and lubricants	- Store fuel tank and lubricant container over concrete floors - Use machinery of good condition and check maintenance	Minor	EMMT	-
	Demolition wastes and domestic wastes	Waste disposal according to the rule and regulations of CDC (Mawlamyine), administrative office of industrial zone	Minor	EMMT	-
Total Estimated Cost = 6,350,000 kyats					

8.2. Environmental Monitoring Plan

The parameters based on EMP to be monitored; location of the monitoring sites; frequency and duration of monitoring, responsibilities and estimated cost for each of the monitoring parameters are presented in the following table.

Table 8.2 - Environmental Monitoring Plan

Discharge Source	Parameter	Monitoring Frequency	Proposed Monitoring Locations	Responsibility	Estimated Cost/Frequency	Available Third-Party Agency
Pre-Construction Phase (3 months)						
Air Pollution	PM_{10}, $PM_{2.5}$, CO, CO_2, NO_2, SO_2	Once	One monitoring point at nearest resident	EMM Team	100000 kyats	Every Third-Party Monitoring Agency
Noise	Noise level in dB(A)	Once	One monitoring point at nearest resident	EMM Team	50000 kyats	Every Third-Party Monitoring Agency
Water Quality	Ph, Colour, Turbidity, Suspended Solid, Oil and Grease	Once	Two monitoring points at seawater and tube well near the project	EMM Team	100000 kyats	-
Construction Phase (1 year)						
Air Pollution	PM_{10}, $PM_{2.5}$, CO, CO_2, NO_2, SO_2	Once	One monitoring point at nearest resident	EMM Team	100000 kyats	Every Third-Party Monitoring Agency
Noise	Noise level in dB(A)	Once	One monitoring point at nearest resident	EMM Team	50000 kyats	Every Third-Party Monitoring Agency
Water Quality	Ph, Colour, Turbidity, Suspended Solid, Oil and Grease	Once	Two monitoring points at seawater and tube well near the project	EMM Team	100000 kyats	-
Operation Phase (1 year)						

Ambient air quality	PM 10, PM2.5, CO, CO_2,NO_2, Volatile Organic Compound, Wood Dust	Twice a year	One monitoring point at nearest resident	EMM Team	100000 kyats	Every Third-Party Monitoring Agency
Noise	Noise Level Meter	Twice a year	One point at the entrance of the project (as receptor)	EMM Team	50000 kyats	Every Third-Party Monitoring Agency
Water Quality (Effluent Level)	pH,Biological OxygenDemand(BOD), Chemical Oxygen Demand(COD), Flouride, Copper, Total Suspended Solids, Phenols, Total residual Chlorine, Oil and Grease, Pesticides, Polycylic Aromatic Hydrocarbons, Temperature increase, Chromium (total and hexavalent), Arsenic	Twice a year	Treated water output form waste water treatment plant	EMM Team	100000 kyats	-
Overall Estimated Cost = 910,000 kyats						

Note: If monitoring results show constantly (3 consecutive years) and significantly (e.g. less than 75 percent) better than the required levels, frequency of monitoring can be reduced (IFC, World Bank, 2007).

8.3. Management and Monitoring Sub-Plans

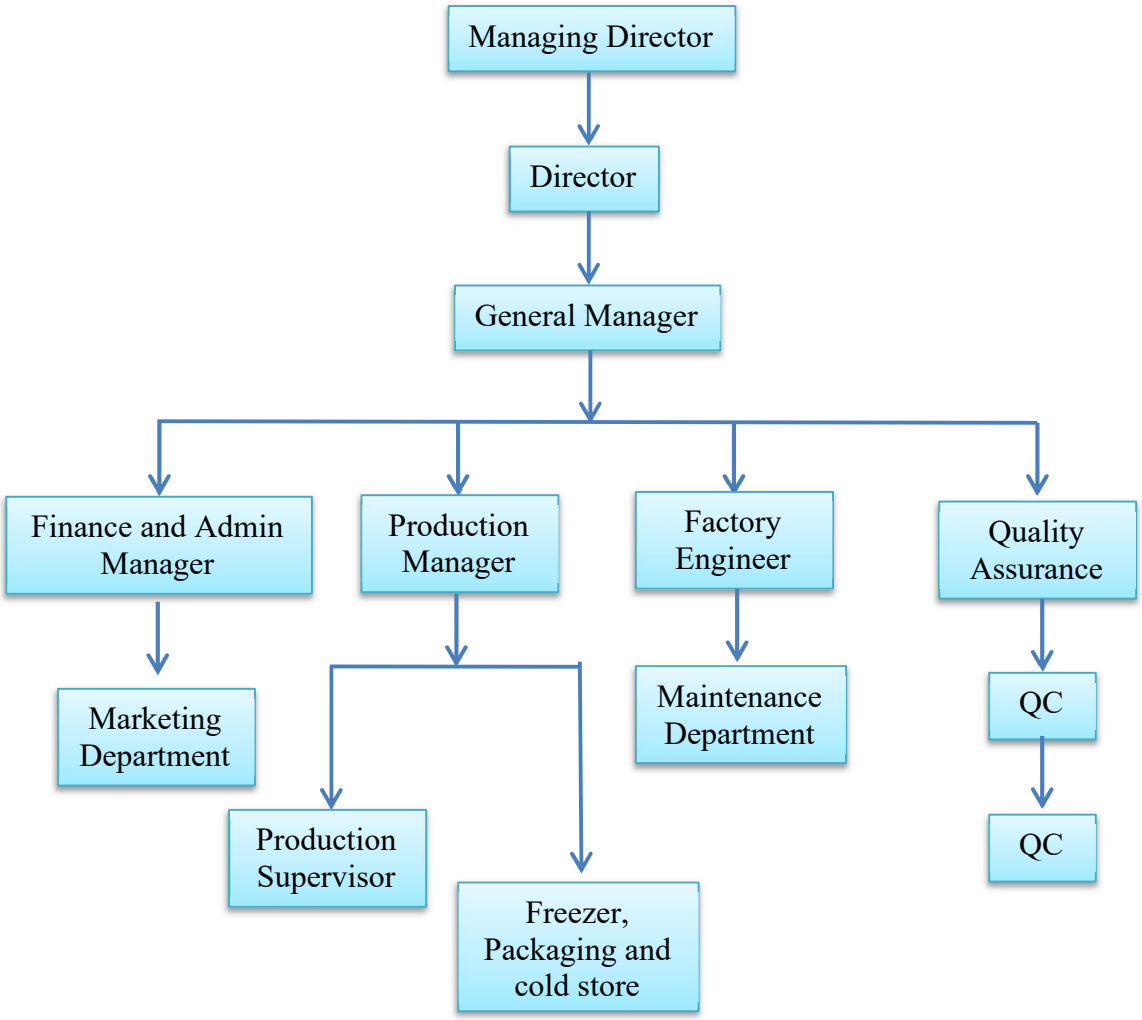
8.3.1. Environmental Management and Monitoring Program

The purpose of environmental monitoring is to evaluate the effectiveness of implementation of Environmental Management Plan (EMP) by Environmental Management and Monitoring Team (EMMT) in order to periodically monitor the important environmental parameters within the impact area, so that any adverse effects are detected and timely action can be taken. Main objectives of environment monitoring plan include:

(1) Identify all environment changes which may cause adverse effects on environment by the project implementation;
(2) Monitor discharge sources (gas emission, waste water and solid waste) and operation of environmental protection equipment in order to ensure that these activities will comply with legislative requirements;
(3) Check monitoring process and inspect installation system and equipment in respect of pollution prevention and control;
(4) Prevent potential incidents;
(5) Propose appropriate environment protection measures based on results of environmental monitoring;
(6) Overcome and repair all weak-points based on results of environment monitoring program.

8.3.1.1. Environmental Management Team

Apart from having an Environmental Management Plan, it is necessary to have a permanent staff charged with the task of ensuring its effective implementation of mitigation measures.



Current Organization Structure for Value Addded Wood Factory

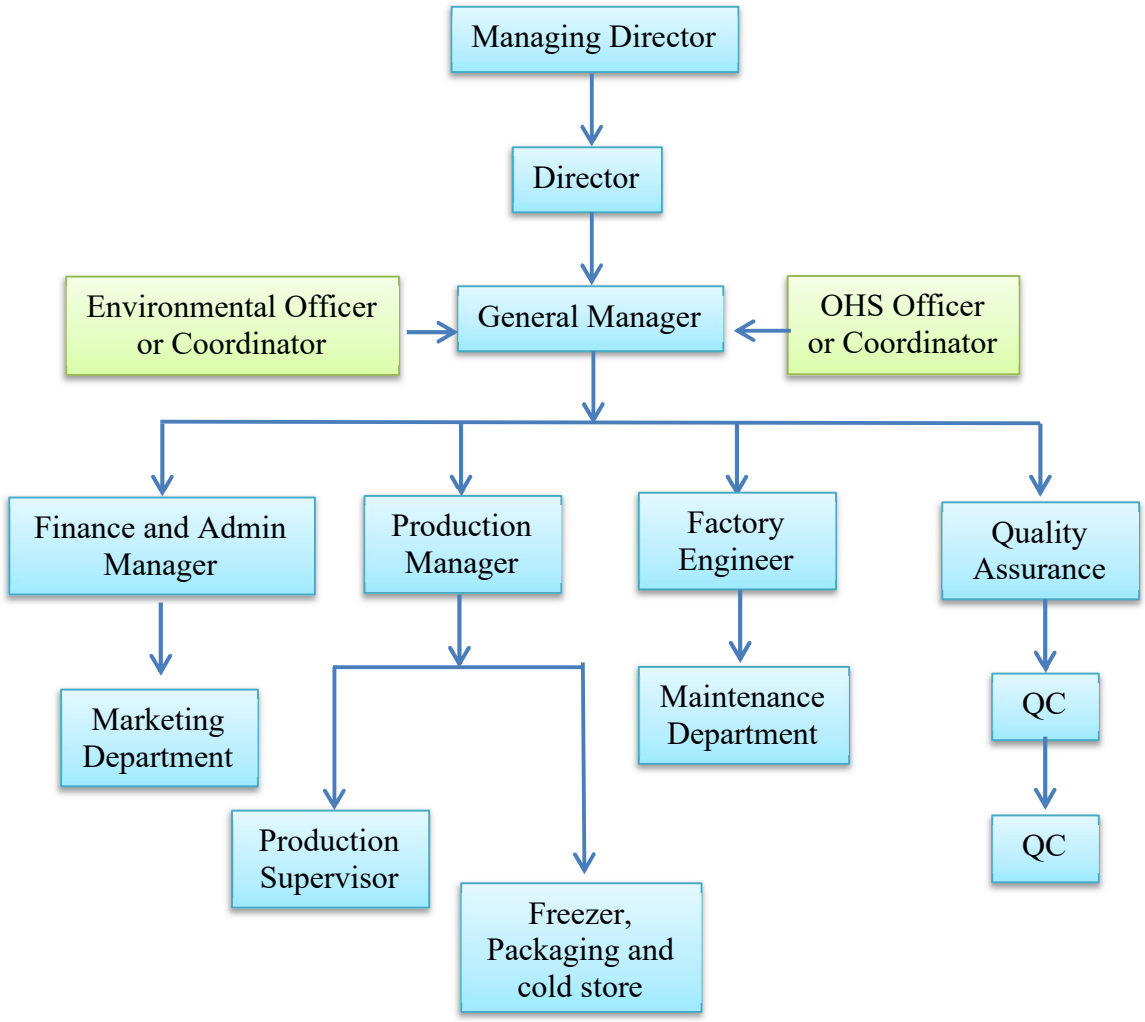
PPT will organize the environmental management team for environmental management during construction and operation phases. The environmental officer or environmental coordinator will have to be fully responsible for environmental affair and environmental management. The following management team will be organized for the proposed factory. According to the above table, PPT will have to necessary to reorganized the current organization structure of as follow:

Table 8.3 - Environmental Monitoring Team

No.	Group Member	Quantity	Remark
1.	Environmental Officer (or) Coordinator	1	To be appointed
2.	Occupational Health and Safety Officer (or) Coordinator	1	To be appointed

3.	Factory Manager	1	Appointed
4.	Supervisor	1	Appointed
5.	Helpers	2	Appointed

According to the above table, PPT will need to be reorganized the current organization structure of as follow:



Current Organization Structure for Value Addded Wood Factory

(a) Environmental Officer

PPT will be appointed environmental officer not only for soft shell crab farming but also for all the factories in Pathaw-Pahtat Isands.The major duties and responsibilities of the environmental officer or person-in-charge for environmental monitoring of proposed project will be as given below:

(a) To implement the environmental management plan,

(b) To assure regulatory compliance with all relevant rules and regulations,

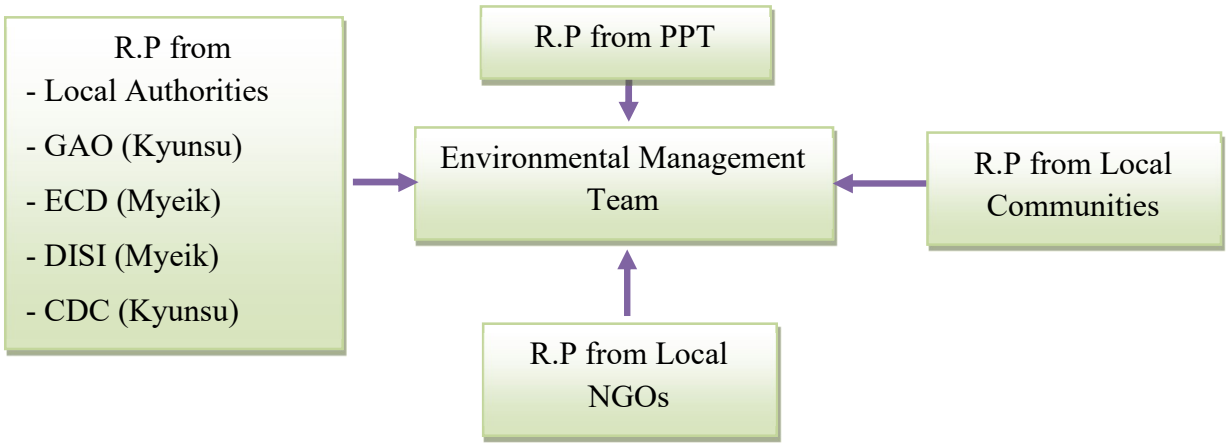
(c) To ensure regular operation and maintenance of pollution control devices,
(d) To minimize environmental impacts of operations by strict adherence to the EMP.
(e) To initiate environmental monitoring as per approved schedule.
(f) Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit,
(g) Maintain documentation of good environmental practices and applicable environmental laws as ready reference,
(h) Maintain environmental related records,
(i) Coordination with regulatory agencies, external consultants, monitoring laboratories,
(j) Maintain of log of public inconvenience and the action taken,
(k) Ready to solve any complaints from local people about environmental and social issues especially in waste water and traffic.

(b) OHS Coordinator

Factory manager will be assigned factory manager of soft-shell crab farming as OHS coordinator. Training program will be completed.

8.3.1.2. Environmental Monitoring Team

Environmental monitoring team will be organized representatives from environmental management team, representative persons from General Administrative Office (GAO, Kyunsu/Myeik), Environmental Conservation Department (ECD, Myeik), Directorate of Industrial Supervision and InspectionDepartment (DISI, Kyunsu/Myeik), City Development Committee (CDC, Kyunsu/Myeik), local communities and local NGOs as proposed as follow:



Note: should participate , R.P = Representative Persons

Environmental Monitoring Team for Monthly Monitoring

8.3.1.3. Parameters, Responsibilities, and Estimated Cost for Mitigation and Monitoring

Monitoring will be conducted daily by the regular environmental monitoring team of proposed factory. Moreover, monitoring will also be done monthly or quarterly by monitoring team for monthly or by the registered third party monitoring agency. Monitoring frequency will be sufficient to provide representative data for the parameter being monitored. Monitoring data will be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken. Monitoring will be carried out throughout all project implementation phases and the responsibilities for monitoring for construction and operation phases.

8.3.1.4. Important Factors for Environmental Monitoring

The following issues will be considered during the environmental monitoring.

(a) Monitoring will be done by registered third party monitoring agency or proposed environmental monitoring team of the proposed team. At least three representatives from proposed monitoring team will be participated in every monitoring process.

(b) By studying the wind rose, the most dominant wind direction and wind speed for every season can be predicted and monitoring for dust, noise and gas emissions will be carried out at that wind direction.

8.3.1.5. Environmental Management Training Program

Environmental management training program is an important part in EMP. Training and human resource development is an important link to achieve sustainable operation of the facility and environmental management.

(a) Training Program for Construction Phase

During construction phase, PPT or construction contractor(s) will ensure that project staffs are trained on labor safety and environment protection during construction phase.

(b) Training Program for Operation Phase

In operation phase, all staff of proposed project will be trained on environment safety throughout training courses to be familiar with operation processes and guidelines, fire fighting exercises and practices, etc. Project Management Board will be established and maintain

training programs that are regularly updated to help staff at all levels and related functional departments are aware of their responsibility on environment protection. For successful functioning of the project, relevant EMP's will be communicated to the following groups of people:

Employees

Employees will be made aware of the importance of safety, waste segregation and storage, and energy conservation. This awareness will be provided through leaflets and periodic in house meetings. They will be informed about their responsibilities for successful operation of various environmental management schemes inside the premises.

Site Staff

Relevant personnel at site will be trained for:

(a) Collection, segregation and storage of the solid and waste generated during operation,
(b) Operation and maintenance of sewage treatment plant and reclamation system,
(c) Requirements of the emergency response plan in case of an emergency,
(d) Techniques for waste minimization, water conservation and energy conservation,
(e) Applicable environmental, health and safety regulations and compliance requirements,
(f) Functioning of the environmental management system including environmental monitoring, reporting and documentation needs.

8.3.1.6. Record Keeping

Record keeping and reporting of performance is an important management tool for ensuring sustainable operation. Records will be maintained for regulatory, monitoring and operational issues. Typical record keeping requirements for the site is summarized in following table.

Table 8.4 - Record Keeping Requirements

Parameter	Particulars
Resources used	- Daily quantity of electrical power consumption through power meter - Daily quantity of fishes use through cooking process

	- Daily quantity of water use for fish meal factory and domestic use through water meter
Solid waste handling and disposal	- Weekly quantity and management of residue from water treatment system - Daily quantity and management of domestic solid waste from workers' dormitory
Monitoring and survey	-Records of all monitoring carried out as per the finalized monitoring protocol.
Complaints from nearest residents	- Records of all complanints about the wastewater and odour from the nearest villages
Employee health and safety record	- Daily record for accidents at the workplace
Others	- Equipment inspection and calibration records, where applicable - Vehicle maintenance and inspection records

8.3.1.7. Environmental Audits and Corrective Action Plans

To assess whether the implemented EMP is adequate, PPT will conduct periodic environmental audits. Environmental audit is an independent and objective oriented examination of whether the practice complies with expected standards. Broadly, environmental audit means a check on some aspects of environmental management, and implies some kind of testing and verification. There are two levels of Environmental Audits, i.e. Environmental Impact Audit and Environmental Management Audit. Environmental Impact Audit involves comparing the impacts predicted in an IEE with those that actually occur after implementation of the project while Environmental Management Audit involves checks against adherence to plans, mitigation measures and general compliance of terms and conditions. These audits will be followed by Corrective Action Plans (CAP) to correct various issues identified during the audits.

8.3.1.8. Reporting Monitoring Results

Results of recorded in files to monitor and audit monitoring will be carried out strictly as required by the related national regulations and the monitoring results of required parameters

will be reported monthly to ECD (Myeik), General Administrative Office (GAO, KynuSu), MOI (Myeik), and Department of Fisheries (Myeik).

8.3.2. Disaster Management Plan

1. Objectives

The overall objective of a disaster management plan is to make use of the combined resources created or available at the site and/or off-site services to achieve the following:

- To minimize the effects the accident on people and property;
- Effect the rescue and medical treatment of casualties;
- Safeguard other people, outside the project boundary
- Evacuate people to safe areas with utmost care and with minimum casualties;
- Inform and collaborate with statutory local and state authorities;
- Initially contain and ultimately bring the incident under control;
- Preserve relevant records and equipment for the subsequent enquiry into the cause and circumstances of the emergency;
- Investigate and take steps to prevent recurrence of similar incidents

2. Legal Requirements

The laws and regulations relevant to the disaster risk and management plan include:

Laws and Regulations	Legal Requirements
Natural Disaster Management Law, 2013	
Section 9 (a)	The project proponent has to follow the National Committee in the case of natural disaster and implementing natural disaster management.
Myanmar Fire Force Law, 2015	
Section 25	The project proponent has to comply according to law no. 25 of Myanmar Fire Force Law by forming the reserve fire brigade and providing fire safety equipment.

3. Overview Map

The tidal flood can be occurred near the proposed project area, it should be consicious and thoroughly made any structures that must be resisted the flood. The satellite image of proposed project in shown in the figure below.

Figure – Satellite Image of the Proposed Project Area

4. Type of Disasters

Dangerous conditions or events that threaten or have the potential for causing injury to life or damage to property or the environment is called hazard. Hazards can be categorized in various ways, but based on the origin, they worldwide are basically grouped in two broad headings:-

1. Natural Hazards (hazards with meteorological, geological or even biological origin)
   e.g. Tidal Flood, Tsunamis, Cyclone, Lightning strikes etc.
2. Manmade Hazards (hazards with human-caused or technological origin)
   e.g. Fire & Explosions

(a) Vulnerability

Vulnerability may be defined as the probability of exposure of a village, city or a community to a hazard. A society or project may be vulnerable to various hazards to different extents depending upon various reasons including environmental, geographical, social, economic etc.

(b) Disaster

A disaster occurs when a hazard such as earthquake, flood or windstorm coincides with a vulnerable situation. It is hence the product of are two main components: Hazard and Vulnerability. A disaster seriously disrupts the normal functioning of a society, causing

widespread human, material, economic or environmental losses that exceed the society's capability to cope without external relief.

8.3.2.1. Standard Operating Procedures

Standard Operating Procedures have been laid down to guide project authorities and staff to be prepared for disasters and act positively in times of disasters. As disasters can be of various types, separate standard operating procedures have been developed for each kind. These procedures have been prepared with the aim to guide the authorities and staff through the following stages with regards to disaster:

1) Precautionary measures
2) Disaster Preparedness Onsite
3) Disaster Preparedness Offsite
4) Emergency response in the event of disaster
5) Relief and Rehabilitation
6) Evacuation

(1) Precautionary Measures

Precautionary measures for any disaster are to be taken by all the users/visitors of the proposed factory. Hence the measures mentioned below are to be meticulously followed by occupants of the Factory. To be well informed about such precautions a printed booklet will be kept in each factory.

Flood Hazard

The proposed project is situated at the shoreline of the island so that the floods can potential affect for the worse case. Tidal variation at Myeik is relatively low. The tide at the project site will only depend on the situation of the moon (especially in full moon day). Tidal flood is also the potential risk for the proposed project area.

Mitigation Measure

- Sewerage and storm water systems to be checked at regular intervals for their proper functioning.
- Provision will be made to harvest most of the rain water from the proposed site. This will reduce the water shortage as well as runoff water on the site.

Cyclones

Tanintharyi region has a tropical climate. The region has only slight changes in temperature. Myeik has temperate weather, as it is located in the low latitude zone and near the sea. The proposed project will have potential hazard of cyclone at the start and the end of rainy sesason.

Mitigation Measure

Periodical checking of all factory buildings for structural faults and carry out timely repair as to,

- Keep some wooden boards ready so that glass windows can be boarded if needed.
- Periodical removal of dead wood or dying trees close to the villas to be undertaken.
- Hurricane lanterns filled with kerosene, battery operated torches and enough dry cells will always be made available during emergencies.
- Keep some extra batteries for transistors.
- Keep some dry non-perishable food always ready for emergency use.
- Periodic checking of all buildings for structural faults, to secure loose tiles, not to carry out timely repairs, will be restored to.

Tsunamis

Tsunamis are caused by earthquakes or other seismic eruptions on ground of an oceans and can cause massive tidal waves, which run with enormous force on land, causing great devastation. The proposed factory is located on Pahtaw-Pahtet island, one of the main islands in Myeik Archipelogo, suituated near Myeik township and connected with Andamen Sea.Thus, this area is comparatively more vulnerable to the tsunami hazard.

Mitigation Measure for Tsunami

Although a tsunami cannot be prevented, the effect of a tsunami can be reduced through community preparedness, timely warnings, and effective response.In general, if you think a tsunami may be coming, the ground shakes under your feet or you hear there is a warning, tell your relatives and friends, and move quickly to higher ground.

Actions Before: Determine Risk, Increase Knowledge, Safeguard, Plan

General All-Hazard Actions:

- Determine the disaster risks in your locale and the hazards that accompany them.

- Increase your knowledge about the emergency warning signals and alert notifications used in your community.
- Instruct family members how to shut off water, gas and electricity to your house.
- Make the necessary property preparations to reduce the damage from the hazard.
- Acquire a backup generator in case of a prolonged power failure.
- Check into insurance (property, health, life, and hazard type).
- Make the necessary financial arrangements in case of a sudden evacuation and power outage that shuts down local ATMs and banks.
- Organize important documents and records and store them in a portable lock box or safe-deposit box.
- Perform home inventory video taping and store tape in a portable lock box or safe-deposit box.
- Develop an Emergency Communication Plan with evacuation plan and ask an out-of-state person to serve as the "family contact".
- Assemble a shelter-in-place Emergency Supplies Kit.
- Assemble a mobile Emergency Supplies Kit that can serve as a “grab and go” bag?
- Get a family member trained in first aid and CPR.
- Make the necessary preparations and arrangements for pets, seniors, and the disabled.
- Familiarize yourself with the emergency plans of your family member's employment building, school, day care center, or nursing home.

Hazard Specific Actions:

- Find out if your house is in danger and know the height of your street above sea level.
- Be familiar with warning signs (earthquakes, ground rumbling, or rapid rise and fall of coastal waters).
- Ensure all family members know how to respond.
- Make evacuation plans with more than one route and pick an elevated inland location.

Actions During: Safety Basics, Evacuation, Shelter in Place

- Listen to radio for emergency and evacuation information.
- Climb to higher ground as soon as warning of a tsunami is released.
- Stay away from the beach - if you can see the wave, you are too close to escape it.

- Do not assume that one wave means the danger is over - the next wave may be larger than the first.
- Stay out of the area and do not return until authorities say it is safe to do so.

Actions After: Get Disaster Relief, Clean-up, Salvage

- Stay tuned to radio for emergency information.
- Help injured or trapped persons and give first aid where appropriate.
- Do not move seriously injured persons unless they are in immediate danger of further injury.
- Stay out of damaged buildings.
- Enter home with caution, checking for electrical shorts and live wires.
- Do not use appliances or lights until properly checked by an electrician.
- Open windows and doors to help dry the building.
- Shovel mud while it is still moist to give walls and floors an opportunity to dry.
- Check food supplies, throwing out all fresh food that may be contaminated and have tap water tested by local health department.

Lightning Strikes

As mentioned above in the cyclone, the proposed factory will have the potential hazard as lighting strikes during the raining season.

Mitigation Measure

If Outdoors

- Seek shelter in a hardtop (metal-bodied) vehicle or solid building but not open structures or tents
- Do not take shelter under trees
- Fishing rods, Umbrellas and other metal rods to be avoided
- Distance should be maintained from fences, metal poles, clotheslines etc.
- If on boat or swimming, one should aim to reach the shore as soon as possible

If Indoors

- Disconnect external aerial and power leads to radios and television sets. Disconnect computer s and power leads.
- Draw all curtains and keep clear of windows, electrical appliances, pipes and fixtures (e.g. avoid using bath, shower and electrical equipment's)

- Avoid using telephones, in case of emergency, calls should be brief.
- Avoid touching metal, brick or concrete or tiled floors.

Fire & Explosions hazard

There will increase in potential to fire and exploration hazard due to the nature of industry. It can cause the fire hazard due to the industry near the project area.

Figure – Other Industries near the proposed project site

Mitigation Measures for Fire & Explosions

- Good house-keeping.
- Compulsory use of ashtrays while smoking.
- Welding /Cutting jobs to be carried out under strict supervision.
- Fire Rescue drills to be carried out at regular intervals.

Since fires of different classes require specific precautionary measures to be taken in each case, precautionary measures to be taken for different classes of fires are listed below.

Mitigation Measures for Electrical Fires

The following basic precautions are recommended:

- Install only appliances that have the label of a recognized testing laboratory.
- Switches and fuses to conform to correct rating of circuit.

- Use only surge protectors or power strips that have internal overload protection and have ISI or BEE label
- Use light bulbs that match the recommended wattage on the lamp or fixture.
- High voltage points and instruments to be secured and labeled prominently.
- Avoid putting cords where they can be damaged or pinched by furniture, under rugs and carpets, or across doorways.
- Replace any electrical tool if it causes even small electrical shocks, over heats, shorts out or gives off smoke or sparks.
- Routinely check your electrical appliances and wiring. Replace all worn, old or damaged appliance cords immediately. Do not try to repair them.
- Electrical work should be done only by a qualified electrician. Call an electrician if you have any of the following:
    - Recurring problems with blowing fuses or tripping circuit breakers
    - A tingling feeling when you touch an electrical appliance
    - Discolored or warm wall outlets or switches
    - A burning smell or rubbery odor coming from an appliance
    - Flickering lights
    - Sparks from a wall outlet
    - Cracked or broken wall outlets
- Keep clothes, curtains, and other items that can catch fire at least three feet from all portable electric motors.

(2) Disaster Preparedness Onsite

The plan will include alarm equipment's and other measures and the budget for capital and running cost of the plan.

(a) Fire Alarms/Other Measures

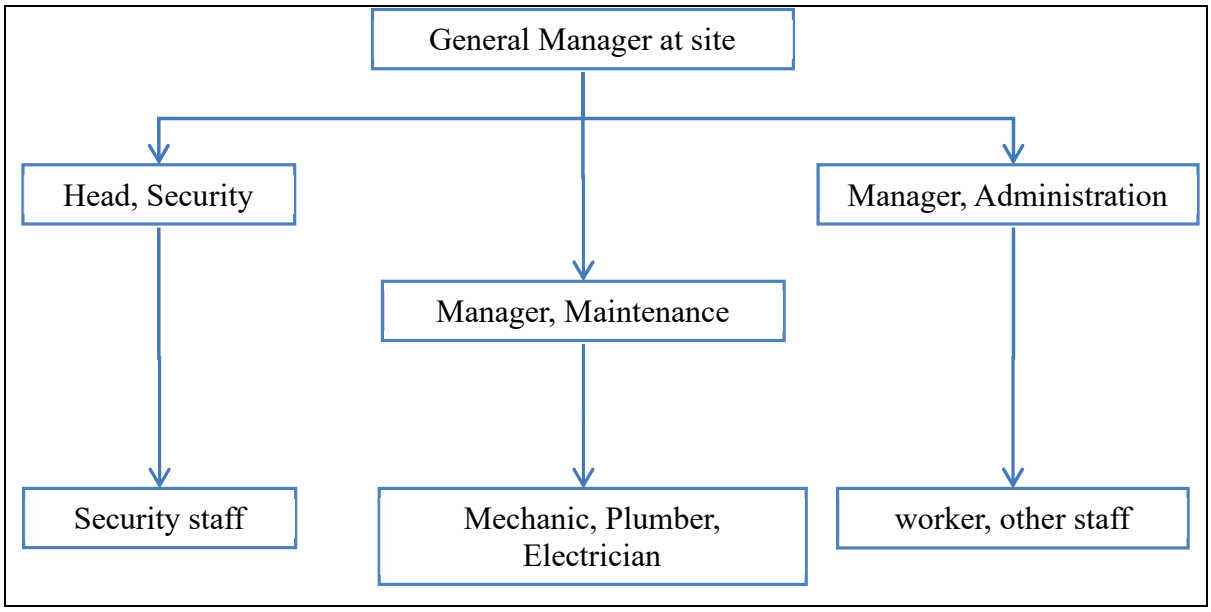
Given the location of the factory, it is important to have a proper fire management system. Fire could take place from various accidents; one of them being faulty electrical materials. Hence all electrical wiring of the proposed building would be made as per Government standards. Also maintenance of the wiring will be carried out at regular intervals through a professional electrician. Fire alarm will be installed in every factory building. An alarm system will be developed so that all the worker/staff will be informed and trained with regard to the actions

taken and operations necessary to efficiently use the system. To meet the requirements, the following measures will be taken:

- Posters indicating evacuation routes will be displayed in all rooms/factory building etc. of the factory clearly indicating the position of the poster with 'You are here' mark. Route of evacuation will be indicated by way of arrows, leading to the assembly point.
- Fire and smoke alarms will be installed in all covered places such as rooms, working area, offices, etc. The functioning of these fire alarms will be checked every week by the factory security staff.
- Courtyard will be paved suitably to bear the load of fire engines.
- Electrical meter room will be sealed with non-combustible materials.
- The lighting in all fire escape routes will be based on independent circuits backed by DG sets.
- Underground and overhead water storage tanks having appropriate capacity will be provided for fire fighting.
- Automatic water sprinklers will be installed in all internal covered spaces.
- Fire Hydrants, Fire Hoses and Fire Extinguishers will be installed throughout the factory as mandated by the Fire Fighting Department (Myeik).
- Portable fire extinguishers of dry chemical powder will be provided in the electric meter rooms and basements.
- Lightning conductors and other equipment's mandatory as per existing Government Rules will be installed.

(b) Onsite DMP Team

The structure of the team is given below. During the operational phase of the factory, name of the authority and their contact details will be included in the following chart. This will be part of DMP kit which will prominently placed and accessible to all.



Onsite DMP Team

(3) Emergency Equipment's

The site security officer will maintain a list of emergency handling equipment including details of fire extinguishers their validity and potency, protective clothing, and personal protective equipment for emergency handlers etc. The major hospitals, clinics, emergency services will be kept in the knowledge of all concerned. Fire fighting related water tank with adequate water quantity and system with fire hoses will be kept readily available. All the location of fire extinguisher will be displayed by a notice board.

(a) Disaster Emergency Kit

An emergency kit will be prepared which will have following items:

Table 8.5- Emergency Kit and Items and Numbers

Sr. No.	Emergency Kit Item	Numbers
1.	First aid kit and Whistle	1 for each room/boiler/warehouse/Q.C Lab /control room/working area
2.	Portable fire extinguisher	1 on 75 ft apart of each floor of each building
3.	Safety ropes	5

The emergency kit will be augmented frequently after its check regularly. The project proponent will provide a disaster emergency kit which will consist of:

1. Battery operated torch
2. Extra batteries
3. Battery operated radio
4. First aid kit and manual
5. Candles and matches in a waterproof container
6. Knife
7. Chlorine tablets or powdered water purifiers.
8. Can opener
9. Essential medicines
10. Thick ropes and cords
11. Sturdy shoes

(b) Medical and Related Resources

The medical managements for the possible emergency situation essentially consist of First Aid facility. The Security manager must maintain the staff including sweepers, security persons, etc. so that during medico emergency equal weight age will be given to all the members of the society.

Also, Security manager will keep the numbers of emergency. Hospitals, so that doctors will be connected at the earliest at the time of medical emergency. These numbers will be prominently displayed on the notice board and can be accessed by the members in absence of security manager.

(c) Drills

Mock drills activating the Disaster Preparedness Plan will be conducted periodically for ensuring its efficiency during emergency as well as refinement and updation. These drills based on the plan will help achieve its objectives. Head, Security will be the main coordinator for making people aware of the situation and emergency condition response.

Fire extinguishers will be placed in all floors of all factory building. Every member of staff will be given training on how to use these fire extinguishers. Working of these fire extinguishers will be evaluated every year by a qualified and trained person. If any faulty equipment is observed or any further improvement is needed then it will be repaired. Proper evacuation plan will be chalked for the factory. The map for the evacuation plan for each factory will be displayed in the respective places. A mock demonstration for evacuation of

workers/ staffs will be carried out at interval of every six months. These mock drills would be performed in presence of qualified professional. Information will be given to all the members of staff on how react in case of disaster.

(4) Emergency Response in the Event of Disaster

In case of emergency due to any type of disaster, a quick and immediate response is essential. This response depends on the actions taken by individuals to avoid or mitigate the adverse effects of a disaster and to undertake search and rescue operations. Following are the actions which will be taken in various emergent situations.

(i) Action in the event of Fire

Extinguishing fires: A small fire at the point of leakage will be extinguished by enveloping it with a water spray or a suitable smothering agent such as CO_2 or DCP (Dry Chemical Power). Trained staff will be engaged in combating fire. Fire fighting personnel working close to un-ignited vapour clouds or close to fire, will be protected continuously by water sprays.

(ii) Actions in case of Flood

The factory management will take all necessary precautions in consultation with the State weather and disaster management authorities.

(iii) Lightning strike

Apply immediate heart massage and mouth-to-mouth resuscitation to lightening victims until medical help arrives.

(5) Relief and Rehabilitation

Relief authorities at the site will:

• Encourage self-help in every activity of their day-to-day living.
• Provide assistance for identification/assessment of human and material loss.
• Provide assistance in maintenance of law and order.
• Provide assistance in maintaining sanitation standards and in disposal of waste.
• Promote cultural and recreational activities for mental health.

(i) Measures during Earthquake

- Relief authorities will: Conduct a week-long survey to locate quake related hazards/damages in the factory.

- Work with local emergency services and officials to help affected people and those likely to be affected.
- Provide tips for conducting earthquake drills.

(ii) Actions to be taken to prevent impact of Cyclone

- All of employeeandstaff will be advised to stay tuned to weather advisories broadcast on radio or TV. Radios and TVs in factorycanteen/restaurants etc. will also be activated for the benefit of residents/guests.
- All windows and external doors of the factory complex will be shut and appropriately secured to withstand high wind speeds.
- Hurricane lanterns, torches and other emergency lights will be made available.
- All loose and unsecured materials which can fly and cause damage due to strong winds, will be removed to safe locations and/or securely fastened.
- Electrical mains will be switched off except for emergency utilities.
- The management will be continuously in touch with the State Disaster Management Authority and scrupulously follow its instructions with respect to the need for evacuation of the factory or any other eventuality.

8.3.2.2. Evacuation Plan for the Factory

A standard response plan that is to be following by any personal that comes across an emergency situation such as fire needs to follow RACE.

RACE method of Evacuation Plan:

R -*Remove All Persons In Danger!*

A -*Always Pull The Alarm and Call the Emergency Services*.

C -*Contain The Fire By Closing the Windows and Doors*.

E -*Extinguish the Fire Only if You Are Trained and Confident*.

Followed by this primary response, the evacuation of public vulnerable to fire hazard is the most important step during any emergency fire. Proper co-ordination, prior basic knowledge on how to act is a situation is also essential. The guidelines given below are for the local evacuators and evacuees as well as planners and designers of the emergency response.

- Guidelines for Evacuation In-charge
- Evacuation and Exit Routes for each working area

An assigned on-duty employee will be evacuation in-charge who will command and coordinate the situation.

- The number of exit routes will be adequate, normally two or more depending on: Exit discharge will lead directly outside or to a street, walkway, refuge area, public way, oropen space with access to the outside and the area will be large enough.
- Exit stairs that continue beyond the level on which the exit discharge is located will be interrupted at that level by doors, partitions, or other effective means that clearly indicate the direction of travel leading to the exit discharge.
- Exit doors will be able to open from the inside at all times without keys, tools, or special knowledge.
- Exit route will support the maximum permitted occupant load for each floor served.
- Capacity must not decrease in the direction of exit route travel to the exit discharge.
- Ceiling will be at least 7-1/2 ft. high with no projection reaching a point less than 6 ft. - 8 in. from floor.
- An exit access will be at least 28 in. wide at all points.
- Objects that project into the exit route will not reduce the width of the exit route to less than the minimum width requirements for exit routes.
- The assembly point has sufficient area to accommodate persons (0.3 m^3/person)
- The plans given below shows the refuge area that can be preferred and the service area that can be useful as a junction for escape route.
- The terrace area shown in the plan is open to sky that can accommodate sizable people in case of disaster, also the fire escape passage is provided as an exit route.

Training Program for Emergency Response Plan

Table 8.6 – Training Program for Emergency Response Plan

No.	Category	Number of Staff to be trained	Frequency
1.	Fire	All staffs must be trained.	Once before construction phase and twice a year throughout the operation.

8.3.3. Emergency Response Procedure for Odor Emission (Ordor Management Plan)

As odour is the most public concern and so it is necessary to control odour during emergency case when odour emission control devices in place are out of work. The odour response procedure will include analysis of actions in the case of odour control techniques or devices

breakdown or malfunction. Immediate arrangements will be made to divert odour streams to other suitable arrestment plant. Failure to provide suitable temporary arrestment plant may lead to the suspension of the process and consequently emergency standby arrangements should be detailed in the odour response procedure. This may include:

- suspending process operations;
- reducing the scale of high odour intensity process operations, for example stopping cooking operations or reducing throughput;
- used odor absorber or effective odor eliminator such as odor absorbing air sponge during emergency case.

Moreover, the following odour management measures will be done during emergeny case of odour.

1. Objectives

The purpose of OdourManagement Plans (OMPs) and outlines the elements consider to be essential. Odour management at some sites which have a high potential for odour pollution can be a major challenge. Accordingly, OMPs for these sites will need to be detailed and robust. Conversely, sites with a low odour potential will require comparatively simple and concise OMPs.

OMPs should be designed to:

- employ appropriate methods, including monitoring and contingencies, to control and minimise odour pollution;
- prevent unacceptable odour pollution at all times;
- reduce the risk of odour releasing incidents or accidents by anticipating them and planning accordingly.

All OMPs will need to consider sources, releases and impacts, and use these to identify cost-effective opportunities for odour management.

2. Legal Requirements

Laws and Regulation	Legal Requirements
National Environmental Quality (Emission) Guidelines, 2015	
Section 2.3.1.3	Section 2.3.1.3The project proponent has to comply with the National Environmental Quality (Emission) Guidelines.

3. Overview Map

The satellite image for the proposed project is shown in the figure below.

4. Monitoring, investigating and reporting

The operator should monitor emissions, make tests and inspections of the activity. The need for and scope of testing, (including the frequency and time of sampling), will depend on local circumstances.

- The operator should keep records of inspections, tests and monitoring, including all non-continuous monitoring, inspections and visual assessments. Records should be:
  - kept on site;
  - kept by the operator for at least two years; and
  - made available for the regulator to examine.
- If any records are kept off-site they should be made available for inspection within one working week of any request by the regulator.

(a) Information required by the regulator

The regulator needs to be informed of monitoring to be carried out and the results. The results should include process conditions at the time of monitoring.

A summary of the data from continuous monitoring of the performance of the odour arrestment plant and the particulate matter arrestment plant should be submitted to the regulator at least every 6 months, identifying the times, dates and duration of alarm events.

(b) Emissions of odour

Whilst problems are ongoing, a boundary check should also be made at least once per day/shift, by the operator, when an installation is being operated. The time, location and result of these checks, along with weather conditions such as indicative wind direction and strength, should be recorded. Once the source of the emission is known, corrective action should be taken without delay and where appropriate the regulator may want to vary the permit in order to add a condition requiring the particular measure(s) to be undertaken.

Where it is installed any odour arrestment equipment should be inspected at least once a day to verify correct operation and to identify any malfunctions. Depending upon the type of any arrestment plant used this inspection should include:

- identification of any leaks in air handling equipment and ductwork
- in the case of scrubbing equipment, thermal oxidisers and other combustion equipment, the inspection should include verification of the operation of any continuous monitoring equipment, the presence of any blockages and also identification of any leaks of either odorous air or liquid.

(c) Start up and shutdown

Higher emissions may occur during start-up and shut-down of a process. These emissions can be reduced, by minimising, where possible, the number of start-ups and shut-downs and having adequate procedures in place for start-up, shut-down and emergency shut-downs.

- The number of start-ups and shut downs should be kept to the minimum that is reasonably practicable.
- All appropriate precautions must be taken to minimise emissions during start-up and shutdown.

(d) Summary of best available techniques

The following table provides a summary of the best available techniques that can be used to control the process in order to meet the emission limits and provisions.

Table- Summary of control techniques		
Substance	**Sourcesofodour**	**Controltechniques**
Odour	Rawmaterials, effluent and waste storage	Control of rawmaterial quality Within buildingsunder negative pressureand vented to odourarrestment plant. Within enclosedsilos orstoredunder negative pressureand ventedtoodourarrestmentplant. Preservation of fishrawmaterialsunless usedwithin 12hoursofarrival atsite Spillage management including tanklevel management
Odour	Loadingand unloadingprocesses	Within buildings Enclosed vehicles and containers
Odour	Cookingprocess	Within equipmentunder negative pressureand vented to odourarrestment plant Spillage management Appropriateconstruction • imperviousand easyto clean surfaces
Odour	Vehicles	Washingofvehicle surfaces (material contact)within buildingsas above
Odour	Ventilatedair (from both wetanddry processoperations)	Venttosuitablearrestmentplant: • thermal oxidisers/combustionplant; • scrubbers; • located totake account ofsensitive receptors.
Particulate matter	Meal storage	Potentiallydustymaterialsshould bestoredin buildings,silos orappropriatecontainers
Particulate matter	Coolingandgrinding processes	Processcontrol Spillage management Dustarrestment: • bag/cartridgefilters
Odour Sulphuroxides Carbon monoxide	Wastegas from odourarrestment plant	Odour - Final dispersionto ensure nooffensive odour atsensitive receptors. Sulphuroxides-Limitsulphurinfuel. Carbon monoxide- Good combustion

(e) Training

Staff at all levels need the necessary training and instruction in their duties relating to control of the process and emissions to air. In order to minimise risk of emissions, particular emphasis should be given to control procedures during start-up, shut down and abnormal conditions.

- All staff whose functions will impact on air emissions from the activity should receive appropriate training on those functions. This will include:
  - awareness of their responsibilities under the permit;
  - steps that are necessary to minimise emissions during start-up and shutdown;
  - actions to take when there are abnormal conditions, or accidents or spillages that could, if not controlled, result in emissions.
- The operator will maintain a statement of training requirements for each post with the above mentioned functions and keep a record of the training received by each person. These documents will be made available to the regulator on request.

(f) Maintenance

Effective preventative maintenance plays a key part in achieving compliance with emission limits and other provisions. All aspects of the process including all plant, buildings and the equipment concerned with the control of emissions to air will be properly maintained. In particular:

- The operator will have the following available for inspection by the regulator:
- a written maintenance programme for all pollution control equipment; and
- a record of maintenance that has been undertaken.

8.3.4. Occupational Safety and Health Management Plan

1. Objective

The primary objectives of this plan are:

- To secure the health, safety and welfare of employees and other people at work.
- To eliminate workplace risks at the source, and
- To involve employers, employees and the organizations that represents them in the formulation and implementation of health, safety and welfare standards.

2. Legal Requirements

Laws and Regulations	Legal Commitment
Public Health Law, 1972	
Section 3	The project proponent has to allow the government to improve the health of the working population and advising on the health issues described in section

	3 of 1972 Union of Myanmar Public Health Law to protect the health of the working population.
Section 5	The project proponent has to follow the organizations formed under this law to inspect and instruct the project at any time.
Occupational Safety and Health Law. 2019	
Section 12	(A) The project proponent has to appoint the person in charge of occupational safety and health to closely monitor the safety and health of the workers according to the type of work. (B) The project proponent has to form occupational safety and health committee, consisting of workers' representatives, in accordance with the provisions of the Ministry.
Section 14	The project proponent has to follow Rules and regulations issued under this law.
Section 16	The project proponent has to allow the inspection officers for inspection of safety and health conditions of the workplaces.
Section 17	The project proponent has to allow inspectors for conducting the actions described in section 17 of Occupational Safety and Health Law.
Section 18	The project proponent has to report the inspection officers any injuries to the workplace for reasons described in section 18 of Occupational Safety and Health Law
Section 26	The project proponent has to perform the tasks described in section 26 of Occupational Safety and Health Law.
Section 27	The project proponent does not have to dismiss or demote an employee for the reason described in section 27 of Occupational Safety and Health Law.
Section 34	The project proponent has to be responsible for occupational injury, dangerous event, in case of serious work injury and if an employee suffers from a specified occupational disease.
Section 36	The project proponent has to follow the inspecting officer for any workrelated injuries, dangerous events, occupational diseases, workplace poisoning

3. Overview

This occupational health and safety management plan consists of emergency and first-aid procedures, medical precautionary measures, maintenance and troubleshooting precautions, housekeeping, safety awareness and safety training.

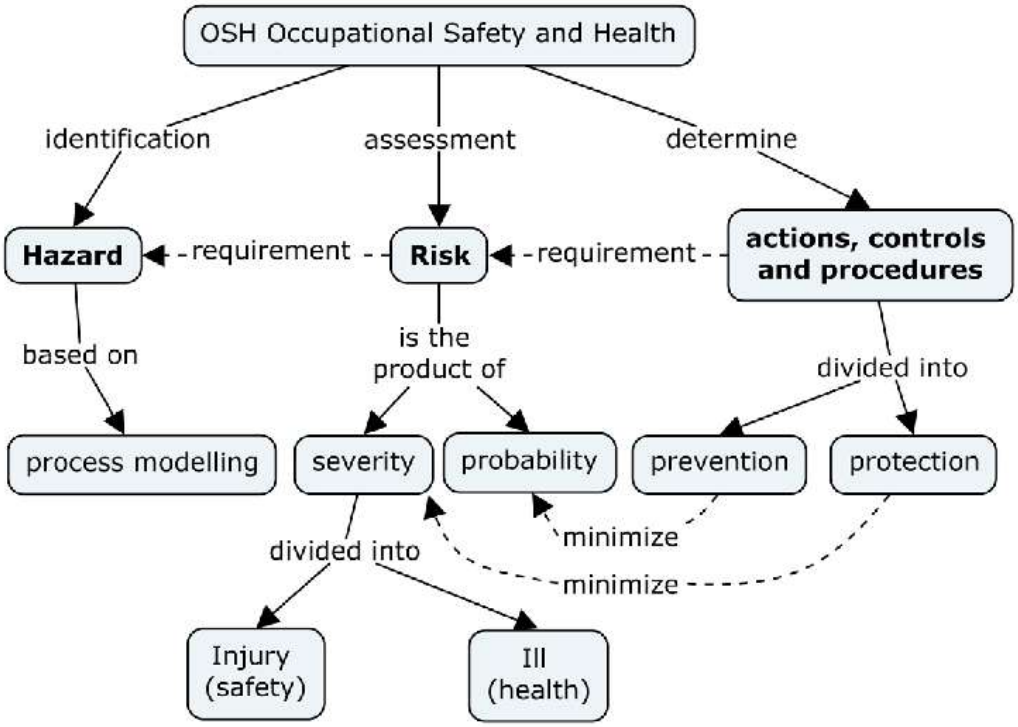


Figure – Mind Map of Occupational Health and Safety Risk

4. Occupational Health and Safety Management Plan

Occupational health and safety management plan for the proposed project will include the following:

(ii) Emergency and First-aid Procedures

(iii)Medical Precautionary Measures

(iv)Maintenance and Troubleshooting Precautions

(v) Housekeeping

(vi)Safety awareness

(vii) Safety training

(i) Emergency and First-aid Procedures

When an accident occurs at the work site, it is essential that the proper steps are taken to secure the safety of the injured person. These steps include:

Getting medical care: The first and most important steps to follow after a work site injury are assessing and treating the damage. Even if the injury seems minor, a medical professional should diagnose and treat the injury before the injured person attempts to

return to work. A minor bump on the head could mask a concussion, or a bruised abdomen could be a sign of internal injuries.

Taking note of where, when, and how the accident occurred: If the victim is physically capable, he should make sure to record the significant aspects of the accident, including time, place, and potential cause.

Reporting the injury: The injured person absolutely must inform his supervisor, or superior of the accident as soon as possible. Make sure to record the name and position of the person who accepted the report and the date the report was submitted.

First-aid program should include the following elements:

- **Emergency medical services (EMS) response time**: Contact local EMS or nearest hospital to assess the response time to the facility in an emergency. This will help to determine whether or not employees should be trained in first-aid on site. If an EMS or ambulance from nearest hospital can reach workers at the site within 3 to 4 minutes in a life-threatening emergency, then the EMS is considered "in near proximity" to the workplace. If this is the case, then employees trained in first-aid are not required (but are still recommended) on site.
- **Trained personnel**: Employees who have taken first-aid training course should be assigned responsibility for providing first aid. Employers should ensure that at least one of their employees takes a first-aid course or arrange for such a program to be taught at the workplace. It is recommended that 15 to 20 percent of the workforce should be trained in first aid.
- **Written procedure**: Have a qualified medical professional provide written "standing orders" for basic first-aid treatment procedures. Have the doctor designate what is to be done in the case of a serious injury and what hospitals are to be used for emergency treatment. Local police and fire telephone numbers should be prominently displayed in enough places so that all employees can access them.
- **First-aid kit**: First-aid supplies must be easily accessible when they are required. The contents of the first-aid kit must be stored in a sealed weatherproof container with individual sealed packages for each type of item and must be checked by the employer before being sent out on each job and at least weekly to ensure that expended supplies are replaced.

- **Communications**: Let everyone in the organization know who the trained first-aid personnel are; state that these persons are the only ones who should render first-aid assistance. Be sure to keep the list up-to-date. Also, publicize the names and phone numbers of local police and fire departments, as well as others outside the organization who should be called.
- **Medical log**: Maintain a medical or first-aid log convenient to your first-aid kits; ensure that every use of the first-aid kit, even for giving out a bandage, is noted, including: date, time, person receiving treatment, person giving treatment, what injury or symptom was treated, what treatment was given, and first-aid materials used.
- **Appropriate means of transporting injured workers to medical aid**: If a worker is injured, after the first-aid procedure, choose the transportation mode to transport the injured worker to be able to arrive at a medical aid as fast as possible.

First aid is immediate, temporary treatment given in the event of accident or illness.

Eye: Contact lenses, if worn, should be removed. Irrigate the eyes immediately with large amounts of water for 15 minutes. Occasionally hold the eyelids apart to insure complete irrigation. Apply a dry protective dressing. Call for emergency medical assistance.
For “flash burns” cover the eye with cold (preferably iced) compresses for 5 to 10 minutes; then repeat. Apply a dry protective dressing. Call a physician. Don’t rub the eye. Don’t use ointments or drops unless prescribed by a physician.

Skin: For skin contact with irritants, flush the areas with large amounts of water, and then wash with soap and water. Remove contaminated clothing. If mucous membranes are irritated, flush with water. Wash cuts and scrapes with mild soap and water. Avoid contamination. Apply a dry sterile dressing.
For thermal bums, cold water is an effective first aid measure. If skin is not broken, immerse bum part in clean cold water or apply clean ice to relieve pain. Do not disturb or open blisters. Prevent contamination. Bandage loosely with a clean dry dressing. Call for emergency medical assistance.
Electrical Shock and Electrical Burns: Disconnect and turn off power. Remove victim from contact. Use no conducting materials if the rescuer must resort to pulling the victim from the live contact. The rescuer must first protect himself by use of insulated materials such as gloves. If not breathing, administer CPR as soon as electrical contact is broken. Call for emergency

medical assistance. Continue CPR until spontaneous breathing has been restored or until a physician arrives. Administer oxygen. Keep comfortably warm. Keep horizontal until there is no further evidence of shock. Treat electrical bums as thermal bums. For electrical bums apply clean, cold (iced) compresses. Prevent contamination. Cover with a clean, dry dressing. Call for emergency medical assistance.

(ii) Medical Precautionary Measures

The following medical precautionary measures are recommended for the proposed project.

(a) Periodic health examinations are recommended with the cooperation with Public Health Office (Myeik). The potential health effects of nonwork related factors, such as smoking, must be considered.

(b) An effective educational, training, and industrial hygiene program should be instituted. The program should cover the following: (a) the nature and potential hazards of welding, cutting and gouging; (b) proper and safe use of equipment; and (c) emergency and first aid procedures.

(c) Medical personnel should be available on-site or by phone for advice and consultation. Emergency phone numbers should be posted near the telephones. At least one person on each shift should be trained in first aid, as well as qualified to administer oxygen and cardiopulmonary resuscitation (CPR).

(d) The following should be readily available: (a) first aid supplies approved by a physician; (b) stretchers and blankets for transportation; (c) oxygen inhalation equipment; and (d) approved instant acting eye washes and showers.

(e) Good personal hygiene practices are very important. Employees should wash their face and hands before eating, and it is recommended they not be permitted to eat, drink, or smoke in the work area. Food and beverages should not be stored in the work area. Contaminated clothing should be changed.

(f) Protection against skin conditions, such as chemical burns, rashes, and dermatitis can be provided by appropriate protective clothing and equipment, as well as the use of protective creams or lotions.

(iii) Maintenance and Troubleshooting Precautions

Faulty or improperly maintained equipment can cause property damage, physical injury, or possibly death by fire or electrical shock. Here is a list of some important items to check when troubleshooting or maintaining equipment.

(a) Stop operating immediately if equipment is malfunctioning.
(b) Do not perform any maintenance unless you are qualified to perform such work.
(c) Make test readings carefully.
(d) Protect the equipment from heat, excessive wet conditions, oil or grease, corrosive atmospheres, and inclement weather.
(e) Replace parts only with manufacturer's recommended replacement parts.
(f) Keep all protective devices and covers in position.

(iv) House Keeping

The following measures shall be practiced at the proposed factory.

(a) Regular cleaning of the floors with service water.
(b) Keeping all de-dusting systems in perfect working conditions to avoid dust accumulation inside and outside the plant.
(c) Avoid dumping of wastes, damaged equipment and items anywhere inside the plant affecting aesthetics and increasing risk of fire and other hazards.
(d) Keeping ventilation systems of premises in perfect working condition to avoid ingress of dust inside the pressurized room.
(e) Maintaining hygienic conditions in areas like canteens, near drinking water sources and toilets.
(f) Maintaining green belt along the factory boundaries to suppress noise, fugitive dust and to improve the aesthetics.
(g) Developing a positive outlook in the employees for improving the working place, both in factory and office or laboratory clean and well maintained.

(v) Safety Awareness

Safety awareness must be promoted among project managers and employees by:

(a) Imparting regular training.
(b) Installing/displaying safety caution boards and safety posters mentioning Do's & Don'ts at different vulnerable locations.

(c) Arranging safety & housekeeping competition etc.

(d) To procure and maintain personal protective equipment in good working condition.

(vi) Safety Training

Training programmes in safety and accident prevention will be organized at all levels of employees with a view to familiarize them with the general safety rules, safety procedures in various operational activities and to update their knowledge in safety and accident prevention, industrial hygiene and emergency equipment. These training programmes will be conducted periodically in a planned manner to refresh their knowledge. Training shall be imparted for:

(a) Safe working and maintenance practices.

(b) Use of proper tools and tackles.

(c) Use of personal protective equipment.

(d) Handling emergency situation.

8.3.5. Waste Management Plan

1. Objectives

The purpose of the waste management plan is the following:

- To develop action plans for achieving the objectives of the waste management plan;
- Monitor discharge sources (waste water and solid waste) and operation of environmental protection equipment in order to ensure that these activities will comply with legislative requirements; and
- To provide guidance on how to minimize, handle, contain, control, re-use, recycle and dispose of all waste generated.

2. Legal Requirements

Laws and Regulations	Legal Commitments
The Prevention of Hazard from Chemical and Related Substances Rules, 2013	
Section 15	The project proponent has to carry out inspection and training according to section15 of Prevention of Hazard from Chemical and Related Substances Law.
Section 16	The project proponent has to comply Section 16 of Prevention of Hazard from Chemical and Related Substances Law.
Section 17	The project proponent has to put the insurance in accordance with the prescriptive stipulations to be able to pay the compensation, if the impact and damage is occurred on the Human Being and Animals or the environment in respect of the chemical and related substances businesses.

Section 20	The project proponent has to comply Section 20 of Prevention of Hazard from Chemical and Related Substances Law.
Section 22	The project proponent has to abide the regulations consisted in the registration certificate furthermore shall also abide the order and instructions issued occasionally by the Central Supervisory Board.
Section 23	The project proponent has to comply Section 23 of Prevention of Hazard from Chemical and Related Substances Law.
Conservation of Water Resources and Rivers Law, 2006	
Section 8	The project proponent shall not be carried out any act or channel shifting with the aim to ruin the water resources and rivers and creeks.
Section 11 (a)	The project proponent has to follow the prohibitions from the section 11 of Conservation of Water Resources and Rivers Law.
Section 13	The project proponent has to follow the prohibitions from the section 13 of Conservation of Water Resources and Rivers Law.
Section 19	The project proponent shall not be disposed of any substance into river- creek that may cause damage to waterway or change of water course from the bank.
Section 24 (b)	The project proponent has to follow the prohibitions from the section 24 (b) of Conservation of Water Resources and Rivers Law.
Section 30	The project proponent has to follow the prohibitions from the section 30 of Conservation of Water Resources and Rivers Law.

3. Overview Maps

The proposed waste dumping sites for the waste management plan is shown below.

Figure – Waste Dumping Sites for the proposed factory

4. Management and Monitoring Plans

The waste management plan will thus have a positive contribution in reducing disposal costs and an overall contribution to integrated waste management according to the rules and

regulations of CDC. Adherence to the waste management plan should be exercised by all employees, contractors and service providers to ensure proper waste management is applied. This will be undertaken when appointed and through regular auditing. Service providers and contractors are required to furnish evidence of proper waste management (i.e. classification, quantities and disposal).

To help manage waste effectively, the Project has committed to implementing the "hierarchy of waste management" with a focus on waste prevention; and then a decreasing focus on waste reuse; recycling; recovery and elimination.

Generation of Waste and Emission

(i) Soild Waste Disposal

Construction and decommissioning activities contribute to increased solid wastes including stones, wood, glasses, plastics, containers, metal rods, pieces of iron sheets, sharp objects (nails) and other wastes of constructed and demolished materials etc...

During Operation phase -Bottom ash will be left as by-product after the burning of wood from wood fired boiler. Bottom ash from wood fired boiler will be reused as fertilizer. Wood ash can be used on some agricultural soils to enhance crop production by raising soil pH (liming). Some soils that are acidic and normally receive liming applications for the growing of agricultural commodities may be good candidates for ash use as a liming agent. The amount of major solid wastes releases from value added wood production is low because all the raw materials are used as a fuel in boiler. Few solid wastes (such as plastics, packaging material) are released. Domestic wastes will be produced from wokers' dormitories during operation phase of proposed project. These wastes shall be collected in separate bins and empty on day to day basis to avoid any undesirable working condition and environmental impacts. Based on the different waste types, these solid wastes will be collected and segregated in their dedicated rubbish bins, and regular and proper disposal will be done in accordance with Myeik Township Municipal guidelines.

(ii) Liquid and Sanitary Waste Disposal

During construction and decommissioning phase, liquid waste will produce from the maintenance and cleaning of the machineries and equipment and toilet facilities for the onsite labors. However, these impacts may not be large extent because the time is very limited.

Wastewater will be generated from the toilet facilities and workers accommodation (sewage). The sewage generated onsite will be collected through underground pipes into a holding tank, from where the sewage will be routed to an onsite septic tank.

During Operation phase - Pollution of fresh water from factory operations occurs from domestic wastem, boiler blowdown water and condensate from kiln dryer. The water output from the treatment plant will be monitored so as to meet with environmentally friendly water quality before discharge to normal drain or reapplied in other places.

Lubricants

Handling

- Prevent small spills and leakage to avoid slip hazard.
- Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source).
- When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations).
- Use proper bonding and/or earthing procedures. However, bonding and earthing may not eliminate the hazard from static accumulation.
- Consult local applicable standards for guidance.

Storage

- Do not store in open or unlabeled containers.
- Store in cool, dry, ventilated area, away from heat and ignition sources. Use good personal hygiene. Always keep the container close and the type of container used to store the material may affect static accumulation and dissipation.

Diesel Oil

Handling

- Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk. DO NOT reuse empty containers without commercial cleaning or reconditioning. Ground/bond line and equipment during pumping or transfer to avoid

accumulation of static charge. Do not breathe gas/vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment.

- If ingested, seek medical advice immediately. Avoid contact with skin and eyes. Practice good personal hygiene. Wash hands after handling and before eating. Launder work clothes frequently. Discard saturated leather goods.
- Diesel is a flammable liquid and is dangerous unless handled and stored properly. Children and pets should have no access to the storage tanks to avoid accidents. Adult access to the tanks should be limited to only those who need access for refueling or maintenance of the tanks.
- The fuel should be stored in an isolated area away from residences. An above-ground container may be installed in a building or under a lean-to. This location helps prevent water from harming the tank and prevents radiant heat from evaporating the diesel.

Storage

- Store at cool, ventilated and specified place.
- Store in tightly closed containers in cool, dry, isolated, well-ventilated area, and away from incompatibles. Ground all equipment containing material.
- Keeping the fuel away from ignition sources is important. While diesel has a higher ignition point than gasoline, it is still flammable. Any electrical outlets nearby should be rated for explosions. No smoking should be allowed within 50 to 100 feet of the storage area.
- If a small amount of diesel fuel needs to be restored, keep it in portable 5-gallon gas cans that can take to the gas station. For larger amounts, store in special storage containers, such as 55-gallon drums or a stand-alone tank.
- Larger diesel tanks, made of metal or specially formulated polyethylene, can be installed above ground or below ground, depending on the site and local regulations. These tanks can also be mounted on the back of trucks when necessary. The exact size of the tank is, of course, dependent on how much fuel needs to be stored.

Disposal Considerations

- Preferred waste management priorities are: (1) recycle or reprocess; (2) incineration with energy recovery; (3) disposal at licensed waste disposal facility. Ensure that disposal or reprocessing is in compliance with government requirements and local disposal regulations. Consult local or regional authorities.
- On large scale absorb and landfill, allow for atmospheric evaporation.

Fuel Oil

Handling

- Precautions for safe handling: Provide adequate ventilation. Use personal protective equipment as required.
- Do not breathe vapor/aerosol. Avoid contact with skin, eyes and clothing. Take any precaution to avoid mixing with combustibles. Ensure proper process control to avoid excess waste discharge (temperature, concentration, pH, time).
- Do not allow to enter into surface water or drains. Obtain special instructions before use. (Do not handle until all safety precautions have been read and understood.).
- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ensure equipment is adequately earthed. Use explosion-proof equipment. Use only non-sparking tools.
- Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank head spaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances.
- Hygiene measures: Keep good industrial hygiene. Wash hands immediately after handling the product. When using, do not eat, drink or smoke. Keep away from food, drink and animal feeding stuffs. Separate working clothes from town clothes. Take off contaminated clothing. Wash contaminated clothing before reuse.

Storage

- Conditions for safe storage, including any incompatibilities
- Technical measures: Store in a dry, cool and well-ventilated place. Bund storage facilities to prevent soil and water pollution in the event of spillage.
- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank head spaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances.

- Packaging materials: Keep only in the original container. Suitable material: Carbon steel. Stainless steel.
- Unsuitable material: synthetic material.

Disposal Considerations

- Do not allow to enter into surface water or drains. Dispose of empty containers and wastes safely. Refer to manufacturer/supplier for information on recovery/recycling. Recycling is preferred to disposal or incineration.
- If recycling is not possible, eliminate in accordance with local valid waste disposal regulations.
- Additional information: Handle contaminated packages in the same way as the substance itself. Dispose of contaminated materials in accordance with current regulations. Do not pierce or burn, even after use. Never use pressure to empty container.

Transport and Disposal

Evidence presented that the transporter is a registered licensed professional driver. Transport to an approved treatment, storage, or disposal facility (TSDF) is required. Transported by truck should be over public highway. Highway shipment is the most common because road vehicles can gain access to most industrial sites and approved TSDFs.

Environmental Precautions

Keep out of drains, sewers, ditches, and waterways. Minimize use of water to prevent environmental contamination Do not flush to sewer or allow entering waterways. Use appropriate Personal Protective Equipment (PPE). Methods for Clean-Up: Scoop up material and place in a disposal container. Provide ventilation. Any concerns should be documented and fixed. If there are any spills, clean up and disposed of properly. Waste analysis and waste determination records should be kept. Among several options available for hazardous waste management, the most desirable method is to reduce the quantity of waste at its source or to recycle the materials for some other productive use.

Table 8.7 - Waste Inventory

Waste type	Waste characteristic	Source	Likely treatment/disposal
Oil and lubricants	Regulated waste	Machinery oil changes and lubrication	Recycling
Sewage	Regulated waste	Factory workers	Sewage Treatment
By-product of the factory such as heads of the fish and shells of the prawn	General waste	Production process	Fish meal factory
solid wastes like fish viscera, skin and bones	General waste	Production process	Waste Dumping site

8.3.6. Traffic Management Plan

1. Objective

The primary objectives of this Traffic Management Plan are:

- To ensure efficiency and safety of the movement of people, goods, or vehicles.
- To manage potential adverse impacts on traffic flows and pedestrian movements to ensure road and pedestrian network performance is maintained at an acceptable level.

'Traffic' in this sense refers to the interaction of vehicles, mobile plant (machinery) and pedestrians. Areas where pedestrians are exposed to the risk of a collision between mobile plant and vehicles should be identified, for example, in a warehouse where forklifts and workers both operate.

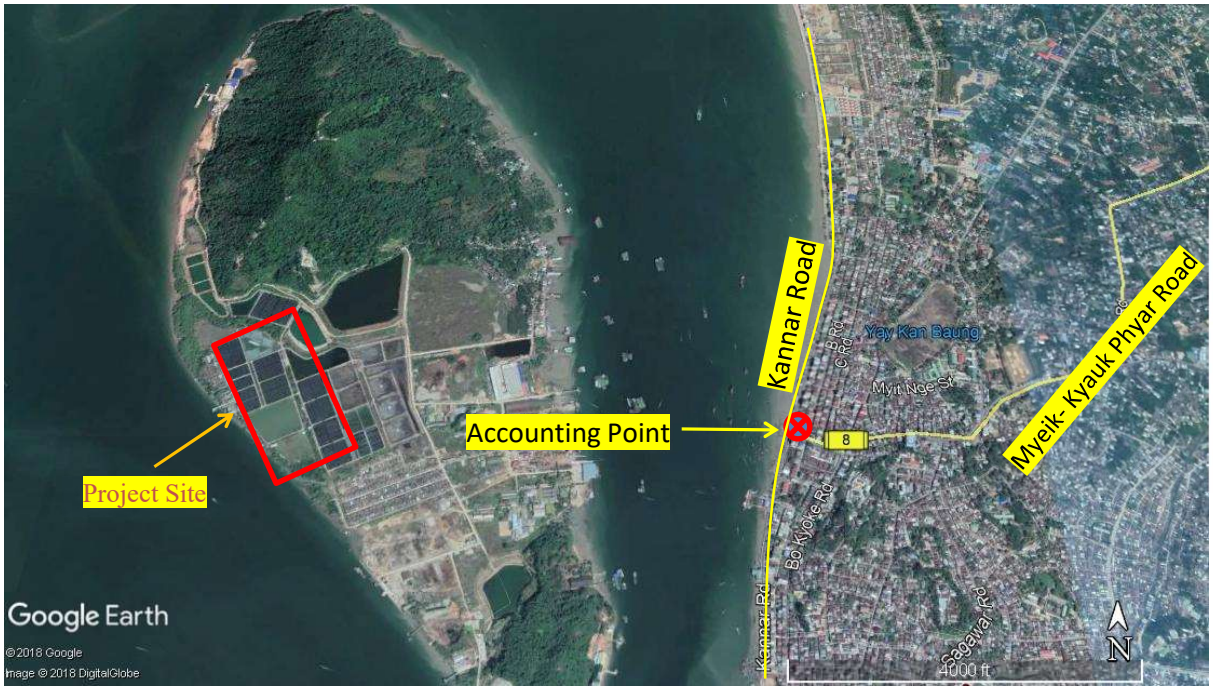
2. Legal Requirements

Laws and Regulations	Legal Commitments
The Highways Law, 2015	
Section 7 (i)	The project proponent has to get approval for the construction of billboard for constructing something by crossing the highways and construction within the boundaries of the highway.
Automobile Law, 2015	
Section 49	Project proponent has to comply with section 49 of Automobile Law in driving at the public area.
Vehicle Safety and Motor Vehicle Management Law, 2020	
Section 9 (a)	The project proponent has to follow the Ministry for determining and restricting the areas where motor vehicles used in the country are allowed to travel.

Section 12 (c)	The project proponent has to follow the Ministry in relation to the initial registration of motor vehicles.
Section 14 (r)	The project proponent has to set the speed for the safe movement of vehicles traveling on public roads.
Section 18 (a)	The project proponent has to maintain the vehicle and repair in accordance with the standards prescribed by the Department in order to drive safely.
Section 81 (g)	The project proponent has to carry out the loading or transporting of dangerous goods in the motor vehicle in accordance with the stipulations.

3. Overview Map

The traffic management plan consideration combined with the geographical location of the project is shown in the following figures.



4. Management Plan

(i) Construction Phase

Construction site vehicle incidents should be prevented by the effective management of transport operations throughout the construction process. Key issues in dealing with traffic management on site are:

- Keeping pedestrians and vehicles apart
- Minimizing vehicle movements
- People on site
- Turning vehicles

- Visibility
- Signs and instructions

Keeping pedestrians and vehicles apart

The majority of construction transport accidents result from the inadequate separation of pedestrians and vehicles. This can usually be avoided by careful planning, particularly at the design stage, and by controlling vehicle operations during construction work.

The following actions will help keep pedestrians and vehicles apart:

Entrances and exits – separate entry and exit gateways for pedestrians and vehicles should be provided;

Walkways – firm, level, well-drained pedestrian walkways that take a direct route should be provided where possible;

Crossings – where walkways cross roadways, a clearly signed and lit crossing point should be provided where drivers and pedestrians can see each other clearly;

Visibility – drivers driving out onto public roads should be made sure that they can see both ways along the footway before they move on to it;

Obstructions – walkways should not be blocked so that pedestrians have to step onto the vehicle route; and

Barriers – a barrier should be installed between the roadway and walkway.

Minimizing vehicle movements

Good planning can help to minimize vehicle movement around a site. For example, landscaping to reduce the quantities of fill or spoil movement.

To limit the number of vehicles on site:

Car and van parking for the workforce and visitors should be provided away from the work area;

Entry to the work area should be controlled; and

Storage area should be planned so that delivery vehicles do not have to cross the site.

People on site

Employers should take step to make sure that all workers are fit and competent to operate the vehicles, machines and attachments they use on site by, for example:

Checking when recruiting drivers/ operators or hiring contractors;

Training drivers and operators;

Managing the activities of visiting drivers.

People who direct vehicle movements (signalers) must be trained and authorized to do so. Accidents can also occur when untrained or inexperienced workers drive construction vehicles without authority. Access to vehicles should be managed and people alerted to the risk.

Turning vehicles

The need for vehicles to reverse should be avoided where possible as reversing is a major cause of fatal accidents. One-way systems can reduce the risk, especially in storage areas. A turning circle could be installed so that vehicles can turn without reversing.

Visibility

If vehicles reverse in areas where pedestrians cannot be excluded, the risk is evaluated and visibility becomes a vital consideration. The following list should be considered:

Aids for drivers – mirrors, CCTV cameras or reversing alarms that can help drivers to see movement all around the vehicle;

Lighting – so that drivers and pedestrians on shared routes can see each other easily. Lighting may be needed after sunset or in bad weather;

Clothing – pedestrians on site should wear high-visibility clothing.

Sign and instructions

All drivers and pedestrians must know and understand the routes and traffic rules on site. Standard road signs should be used where appropriate. Induction training for drivers, workers and visitors should be provided and instructions should be sent out to visitors before their visit.

Pedestrian routes should be:

Kept clear and free of tripping hazards

Segregated from vehicle routes

Adequately signed

Provided with crossing points that have a clear view

Vehicle routes should be;

Segregated from pedestrian routes

Designed to minimize reversing

Suitable for the vehicles that need to use them with appropriate speed limits

Designed to avoid steep gradients and sharp bends

Designed with ramps, signage, and berms as required

Designed to take into account loading and unloading areas

Hoarding, barriers, lighting and signs will be required at startup. As construction progresses, pedestrian and traffic routes will change and barriers, traffic cones, and signs will need to be moved to ensure that there is adequate pedestrian and vehicle separation. Fixed barriers should be used to separate vehicles from pedestrian walkways and to protect loading and unloading areas on site.

Injuries from construction site vehicles can be quite serious; an injured worker may be out of commission for weeks, months, or even longer.

Trucks, earth-moving equipment, and other heavy vehicles are essential on construction sites. These vehicles not only help workers with large scale projects but also make their jobs a little less strenuous. Unfortunately, these vehicles, when placed in the hands of other workers, can also be dangerous. Furthermore, dangerous vehicles that pass-through construction zones can also threaten the lives of those working nearby.

Distracted and inattentive drivers can easily run over or back over road construction workers or collide with other vehicles. Similarly, unsafe drivers on public roads pose their own threats while passing through construction zones.

The following are meant to control and limit the following common vehicle accident types:

- **Collisions and rollovers.** The most common type of accidents with any kind of vehicle is a collision or rollover. These occur as a result of erratic driving, failure to pay attention, and reckless driving. These types of accidents are extremely dangerous to construction workers who aren't protected inside vehicles. Also, because construction vehicles are significantly larger and heavier than normal vehicles, they can inflict even greater damage when they collide with workers or other vehicles.
- **Back-up accidents.** A back-over incident occurs when a vehicle strikes a worker who is standing, walking, or kneeling behind the vehicle. Nearly 70 workers a year die from back-over incidents that could have been avoided. These kinds of incidents can happen for a variety of reasons. Drivers may not be able to see workers in their blind spots, injured workers may fail to hear backup alarms, drivers may fail to check their surrounding properly, etc.

- **Cargo spills.** Unsecured cargo can pose an extreme threat when it spills or falls out of a vehicle. In addition to causing debris that can affect the safety of other drivers, the weight of the cargo could potentially crush nearby workers.
- **Pinning.** When drivers fail to pay attention or inadvertently leave vehicles in motion, workers on the ground can become stuck or pinned between the vehicle and other objects. This pinning can result in severe crush injuries.

According to the traffic study data done on NH_3 Road along the railway, morning peak hour occurs at 7am to 10am, midday peak at 11am to 2pm, evening peak at 4pm to 7pm and night peak at 7:30pm to 9:30pm.

According to the traffic study, the vehicle movements in work day is greater 1.7% generation rate of in weekend day vehicles volume.

To avoid traffic accidents as much as possible, transportation vehicles to and from the construction site should not be operated during peak hours if possible.

(ii) Operation Phase

A traffic management plan is needed to minimize inconvenience and help ensure road users and workers remain as safe as possible.

- To avoid crowding in parking area, parking fees should be charged based on how long one uses the parking.
- The speed of vehicles will be limited inside the station compound to avoid accidents.
- Pedestrian roadways will be provided to avoid accidents.
- Drop off/ pickup areas should also be provided and passenger cars should be allowed to stop in these areas for only limited amount of time.
- Road markings and signs will be installed. The road markings are a tool to provide guidance and information for drivers to drive safely and smoothly and for pedestrians to walk safely.
- On-street parking will be restricted outside the station to avoid traffic congestion and unwanted accidents.
- Traffic officers will be assigned to solve any problems regarding traffic. They are greatly important roles to ensure safety and smooth traffic flow and the assigned officers should be trained properly before assigning to the post.
- CCTV cameras should be installed outside the station for safety purposes.

8.3.7. Plant Restoration Plan

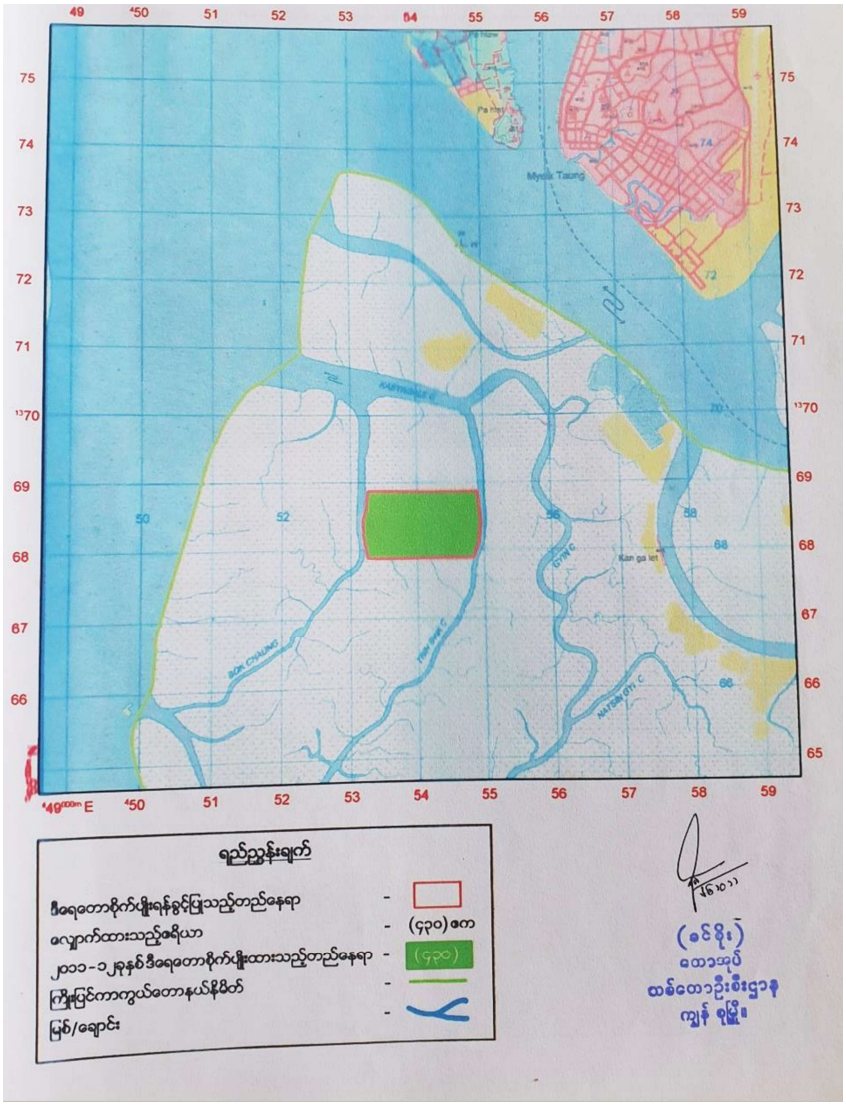
1. Objective

The objective of plant restoration plan is to recover biodiversity and important ecological processes nearby the proposed project area that has been degraded due to its temporary land use and other activities. PPT has also prepared private mangrove replantation near the seashore.

2. Legal Requirements

Laws and Regulations	Legal Commitments
Forest Law, 2018	
Section 12	The project proponent has to get approval of the Ministry to carry out any development work or economic scheme within forest land or forest covered land

3. Overview Map and Cost Estimation for Mangroves Replantation



The following are the cost estimation for mangrove plantation.

No.	Description	Cost/Acre (Kyat)	Total Acre	Total Cost (Kyat)	Remark
1.	Site clearing	3000	430	1290000	
2.	Preparation for plantation	6000	430	2580000	
3.	Seed and plants	50000	430	21500000	
4.	Planting	35000	430	15050000	
5.	Transportation	-	-	90000	
			Total cost	40510000	

4. Suitable Plant Selection

Any particular species of plant which may be needed in that area from the point of view of soil conservation, moisture conservation, pollution control, dust control, wildlife habitat etc. may also be given preference while deciding the species to be included in the greenbelt. Mangrove species will also be planted near the seashore area.

The following aspects are important while selecting the plant species:

(f) The species should be fast growing and having thick canopy cover,

(g) It should be perennial and evergreen and should have large area index,

(h) It should be indigenous and suitable to local climatic conditions,

(i) It should be efficient in absorbing pollutants without significant effects on plant growth, and

(j) It should be fruit yielding trees, if possible, especially in wasteland areas.

5. Implementation Schedule

The startup time of plant and forest restoration is during the rainy season of startup year. Detail implementation schedule is determined with the help of Ministry of Forest.

6. Implementation Plan

Plant and forest restoration area is determined according to Forest Rule described below.

(A) Cultivation in watersheds and tropics where forests have been destroyed.

(B) Watershed area and planting with suitable local plants to re-establish natural habitats and habitats.

(C) Co-ordination with land use and appropriate cultivation methods depending on climate, region and soil conditions.

For temporary land use, the restoration area is its temporary land use areas and for permanent land use, the restoration area is determined with the help of Ministry of Forest and it can be commonly along its railway alignments.

7. Rule and Responsibilities

All land preparation activities will be conducted by field coordinator with the assistance field assistants and hired local workers from the local communities. In order to prepare the land for restoration, an initial soil analysis would need to be conducted to assess the soil quality. Poor quality soil that are compacted and low in organic matter will require more time, money, water and fertilizer to maintain plants. Poor soil conditions also contribute to water quality issues by shedding runoff during rainfall events.

Production of planting lines and holes will be conducted by engaged technical workers from the community, led by the field assistant and it will involve the following activities:

Information signs will be constructed, and the area will be marked out with bamboo poles along with planting lines for holes to be dug

- Weeding of land and digging of planting holes
- Water barriers will be built along sloping grounds to prevent over-drainage
- The land will be fertilized with a chemical organic treatment

(a) Field Coordinator

Field coordinator has direct responsibility for the field assistants who will report to them. Field coordinator is responsible for undertaking the following aspects of implementation.

- Lead field works (planting)
- Make routine field visits into the restoration sites for ongoing monitoring

(b) Field assistant

Field assistants will be responsible for managing inputs from the local workers, and will report to the field coordinators. Field assistants may be recruited from the local workforce but are expected to have experience of managing a nursery and managing a restoration planting plan. Specific responsibilities of the field assistants include:

- Organizing nursery management by local workers
- Organizing tree planting by local workers
- Inputs to the field coordinators' reports

(c) Local workers

Local workers will be recruited from local communities. These local residents already have typically high levels of knowledge about the forest, native species, and tree planting. The local workers will be guided and supervised by field assistant.

Core responsibilities of the local workers will be:

- Seedlings and tree sapling production
- Watering and weeding saplings
- Preparation of restoration sites including making planting holes
- Tree sapling planting
- Identification and replacement of dead saplings as required.

8. Monitoring and Evaluation

Monitoring of the implementation is planned and organized in two phases:

● Short-term monitoring – year one to five after planting

● Long-term monitoring – year five onwards to year fifteen after planting

(i) Short-term Monitoring

Short-term monitoring will be undertaken over a minimum of five years. The aim of the monitoring is to assess the survival rate of the plants.

Monitoring Focus	Target	Monitoring Location	Frequency	Responsibility
Planting survival rate	Plant survival rate >90%	At areas undergoing rehabilitation	For periods after planting: First six months –daily Six to 18 months after planting - monthly Second to fifth year - quarterly	Field coordinator to be appointed by project developer

(ii) Long term Monitoring

The long-term monitoring should be undertaken over a minimum period of fifteen years. The objectives of long-term monitoring are similar to short-term monitoring. The monitoring frequency is quarterly.

8.3.8. Community Development Plan

1. Objectives

A community development plan aims to:

- supporting people with disabilities to maximize their physical and mental abilities, to access regular services and opportunities, and to become active contributors to the community and society at large;
- activating communities to promote and protect the human rights of people with disabilities for example by removing barriers to participation;
- Facilitating capacity building, empowerment and community mobilization of people with disabilities and their families.

2. Legal Requirements

Laws and Regulations	Legal Requirements
Village Regional Development Law, 2019	
Section 11	Project proponent has to comply with the right of rural people in accordance with section 11 of Village Regional Development Law.

3. Overview Map

The nearby residential areas along the proposed project are shown in the following figure.

Figure – Residential Areas near the Proposed Project

The community development plan will include (i) capacity building program and (ii) Corporate Social Responsibility (CSR) program.

8.3.8.1. Capacity Building Program

PPT will conduct the following capacity building program for local community development.

(a) Animal Husbandry

Villages near the factory mostly raise chicken for eggs and meat. Modern animal husbandry will be introduced to the villagers. Modern animal husbandry can produce more and earn much more.

- Well-fed animals grow more quickly, they become bigger, yield more meat. They can be sold at a better price.
- Animals produce manure. Your soil will become richer and better. Your harvests will be better. You will make more money.
- Animals that are well fed and looked after are healthy. They have more young ones and your herd will be better and bigger. You can sell animals and earn more money.

How to improve animal husbandry

If animal husbandry is to produce more, the animals must be raised in a different way.

- A farmer who wants to earn more money must look after his animals himself.
- He must both grow crops and look after his animals.
- The farmer must learn to look after animals.
- Chicken must be raised in a stress-free environment so that they can produce larger eggs and higher quality meat.
- There should be enough space for them to roam so that they can forage for bugs and other critter.

He must:

- Feed them better: especially the young animals; he must lay in reserves for the dry season; give the animals enough to drink.
- look after them better:
- Build a shelter for them, protect the animals against parasites and diseases, and look after them if they are hurt.

(b) Training Program for Job Opportunities

All training programs for the locals will be based on the employment opportunities and the training will be mainly associated with construction techniques and machinery works that should be done before the actual construction phase. Since the location of the project is in the industrial area and most nearby locals will be given more employment opportunities on construction site.

In the awareness of unemployment for local people, the training associated with construction techniques and heavy machinery driving will be done before the actual construction phase because the lack of the experience can be substituted by the other experienced labor workers.

The villagers will be given more job opportunities mainly work on construction site. However, women in the villages will not be suitable for construction works. So, job opportunities will also be created for women.

Unskilled or semi-skilled men and women are hired from nearby villages and are trained to handle day-to-day work procedures. To become a certified heavy machine operator, there should be at least 12 weeks training program and 2-week practical work. If villagers are not trained beforehand, they will not be certified for such works and only get manual labor works. When they are certified, they can also work in large construction sites in the future as well.

The special training program such as making handicrafts, sewing clothes, broom making, etc. will be given to women. After the training program, they will be capable of making handicrafts, clothes and broom which can be sold in the market.

8.3.8.2. Corporate Social Responsibility (CSR) Program

Contribution at random places with no records will have some social problem due to the lack of transparency. So, PPT will have CSR program to contribute and manage CSR fund effectively.

Developer's Policies for Socio-economic Development of Local People

The PPT's policies for local socio-economic development are shown in the following table.

No.	Description	Company's Policy
1.	Local Community Development Policy	Appoint local people with relevant skills as much as possible and at least 50% of local people will be appointed during operation phase.

2.	Corporate Social Responsibility (CSR) Policy	Contribute at least 2 percent of the annual net profit after tax as CSR fund

(i) CSR Fund

PPT will set up fixed CSR fund for local community development. CSR activities will be accomplished not only by financial assistance but also by technical assistance and manpower in some donations to retain good relationship with local communities.

(ii) CSR Officer (or) Coordinator

PPT will assign CSR officer who is closely communicate with local people in order to manage the contributions of CSR fund effectively. CSR officer is not only intended for the proposed soft-shell crab farming but also for the whole factories in Pathaw-Pahtet Island. HR manager may be assigned as CSR officer. CSR officer will donate CSR fund after the discussion with representative people from nearest villages, local authorities not only for Kyunsu but also for Myeik, local CBOs and NGOs. Allocated percent of CSR fund is based on local community needs according to the public survey as follow:

(iii) Allocated CSR Budget

The following development activities are based on the needs of the local people for the socio-economic development during the public consultation meetings. The proposed development activities will be beneficial to the nearby areas. The following development activities are as follow:

Table 8.8 - Allocated CSR Budget

No.	Activities	Proposed allocated percent of CSR budget	CSR Activities
1.	Supporting to upgrading of village road	15%	.A good transportation route is one of important task during the community development as transportation plays a huge role in every towns and villages. PPT will help in maintaining the roads and bridges for the locals in order for them to travel conveniently and will also take part in constructing new roads and bridges. Moreover, PPT will help local communities by making free transportation to Myeik Township and Pathaw-Pahtet Island. So, they can also reduce transportation fees when they go and sell their agricultural products and sea foods at Myeik Township.
2.	Supporting to improve water supply system to nearest villages	15%	To promote community health an easily accessible water supply will be provided by water pond sufficient safe water to meet community needs. Sometimes the best option for improving water quality is to treat water in the home by boiling. Bringing water to a rolling boil will destroy pathogens in the water and make it safe to drink. Therefore, the knowledge sharing will be done for improving the local people's hygiene and for avoiding the diarrhea especially in the children.
3.	Supporting to get full time electrical power to nearest villages	15%	The fuel is generally of poor quality, and energy is used inefficiently; the power supply is unreliable and access to it limited. This not only has an adverse effect on economic productivity; more importantly, it also affects people's quality of life and is having a strong impact on the environment. The unsustainable use of locally sourced biomass and an increasing dependence on fossil fuels are causing environmental degradation at local (land degradation), regional (air, water and soil pollution) and global levels (greenhouse gas – GHG emissions contributing to climate change). Providing solar energy make an improvement of rural economies with new sources of revenue, employment and business opportunities, product and policy innovation, capacity building, and, most notably, affordable energy.

4.	Supporting to improve education in nearest villages	15%	Distribution of education materials and financial aid or scholar grants to the students who are economically deprived in the nearest villages in this region will have a great benefit for students. All of the school in Pathaw-Pahtet Villages will prepare as free of charge and will provide required stationery for all students at the beginning of the school day. CSR will provide 15% of the funds for educational purposes as the nearby areas have plenty of children who are willing to attend schools. Educational facilities such as books, pencil case, bags and many more will be provided to the children and the remaining funds will go to the schools for its development.
5.	Donation to health care facilities in nearest villages	15%	Health care facilities of proposed project will be assessed to nearest local people with lowest price or free of charge as part of CSR program. Ambulance for emergency case will be provided for local people in nearest villages. PPT will hold health education program for locals to raise awareness in the community. Particularly, health issues related to population growth such as sexually infected diseases, covid and so on will be included in the program along with the ways to take precautions against those diseases. With the help of PPT and local authorities, the program will not only be beneficial to the community wellness but also create a safe environment to the community. The main objective is to avoid or minimize risks to and impacts on the health and safety of the local community during the project life cycle from both routine and non-routine. This is done by providing the local clinics, and supporting the facility requirements.
6.	Contribution to local NGOs and CBOs	5%	PT will cooperate with local NGOs and CBOs not only in nearest villages but also in Myeik Region in the activities to improve regional, religious, and all-round developments. Some percentage of CSR fund will provide regularly to NGOs and CBOs in local communities as deposit. CSR program will contribute 5% of the funds to NGOs and CBOs as those organizations are helping and doing good deeds in rural areas which are facing financial problems to carry out development for its community. NGOs and CBOs help in every corner to the locals who are in needs of help so PPT will contribute to those organizations as a helping hand to the those in needs.

7.	Supporting to free funeral service and social welfare society's aid	10%	10% of the CSR funds will go to social welfare society's aid such as free funeral services, healthcare ambulance and so on. Those services have been aiding the locals who could not afford or when they face emergency health cases.
8.	Participating Government Schemes of Welfare	10%	PPT will actively participate in implementation of government schemes for welfare of the society of the not only in Myeik but also for Kyunsu regions.
	Total	100%	

Note: Budget allocation can be changed according to the public needs and allocation will be made after the discussion with local communities.

8.3.8.3. Declare the Contribution of CSR Fund

All of the CSR activities and contribution programs will be declared to public by means of local media, company annual report or company's website on a regular basis. Audit on contribution of CSR fund will be carried out together with environmental and social audits through independent external audit team for transparency.

9. PUBLIC CONSULTATION AND DISCLOSURE

9.1 Importance of Public Consultation and Information Disclosure

The opinions of the local people, social organizations and stakeholders with the development of the proposed project have been taken into account in the IEE. The public consultation indicated the transparency of IEE's proponents to the local people. Consultation meetings were held with various stakeholders including communities near project area, administrative, community based and social organizations. The results getting from the consultations meeting and negotiations with environmentally and socially of the affected people were taken into consideration in evaluation of impacts, design of mitigation measures and monitoring plans. Negotiation with related governmental organizations was also done. All feedbacks from public consultation meetings were well addressed and considered in the formulation of EMP, environmental monitoring plan and CSR plan.

9.2. Data Collection

The primary data for environmental, social and health profiles were collected by household survey during study period. The project data, factory layout plans and design parameter are provided by Pyi Phyo Tun International Company Limited (PPT). Some secondary data on demographic distribution in the area are sourced from local government offices of Myeik and Kyunsu.

9.3. Public Consultation and Participation Process

Integral to the impact assessment is the process of stakeholder engagement which has been ongoing. The public participation process included:

(i) Identifying interested and affected parties (stakeholders);
(ii) Informing and providing the stakeholders with sufficient background and technical information regarding the proposed development;
(iii) Creating opportunities and mechanisms whereby they can participate and raise their viewpoints (issues, comments, and concerns) with regard to the proposed development;
(iv) Giving the stakeholders feedback on process findings and recommendations; and
(v) Ensuring compliance to process requirements with regards to the environmental and related legislation.

The IEE includes the activities undertaken during detailed design stage to engage the stakeholders, and planned information disclosure measures and processes for carrying out consultation with affected people and facilitating their participation during implementation stage. Three rounds of engagements have been undertaken as follow:

Table 9.1 - Public Consultation and Stakeholder Engagement Process

Round	Method	Stakeholders
Round 1: Information sharing and issues identification	(a) Conduct house hold survey (b) Leaflet were distributed during the meeting.	Village leaders and local people in project affected area, local non-government and community based organizations.
Round 2: Public Meetings (First public meeting)	(a) Invitation letters, handout, and report for current situation were distributed. (b) Posters and presentations were used during the meeting.	Key stakeholders in civil society, Government officials, supporting committees for Thanitharyi Region Government, NGO's, INGO and CBO's, community leaders, and local people
Round 3: (Second public meeting)	(a) Invitation letters, handout, and report for current situation were distributed. (b) Posters and presentations were used during the meeting.	Key stakeholders in civil society, Government officials, supporting committees for Thanitharyi RegionGovernment, NGO's, INGO and CBO's, community leaders, and local people
Round 4: Public disclosure process	(a) Distribution of executive summary and IEE report	Civil society, NGO's and CBO's, Government officials, community leaders

9.4. Household Surveys as Part of Public Consultation and Participation Process

Household survey was conducted to evaluate primary socio-economic conditions of the project area and to understand the mood, perceptions and extent of preparedness of the local people towards the proposed project. The household survey was carried out to tap the baseline socio-economic conditions of project area and to assess project perceptions and attitudes of the local

people over a period of five days. To get the accurate data, primary data collection was conducted by social specialist, social consultants together with local authorities and local people as follow:

No.	Participants	Degree	Responsibilities
1.	Dr. Kyaw Swar Tint	Ph.D. (Mining)	Team Leader
2.	Dr. Thein Tun	Ph.D. (Metallurgy)	Public Relation
3.	U Aung Naing Tun	L.L.B	Legal Requirement
3.	Ma Nandar Nwe	M.S. in EAM (YTU)	Social Consultant
4.	Ma Thazin Htew	M.S. in EAM (YTU)	Social Consultant
5.	Mg Yaw Ma Nar	B.Sc. (Forestry); Dip. in EIA/EMS	SIA Team Coordinator

Sample Size Determination

The number of households selected to take part in the survey was determined using the Pagoso Formula (Lauraya & Sala, 1995). The method estimates sample size n from, population size N and sampling error E using the following formula:

$$n = \frac{N}{1+NE^2}$$

In order to have a clear understanding about the sampling error "E" value, the correlation between sample size and "E" value were presented in the following table.Gay(1978) as cited by Sevilla et al (1978) offers some minimum acceptable sizes descriptive research, 5% for a smaller population as small as 500 and below and 4% of the population for a larger population as large as 1,500.

Table: Correlation between Sample Size and Sampling Error

Population	MarginofError					
	1%	2%	3%	4%	5%	10%
500	NA	NA	NA	NA	222	83

1,500	NA	NA	638	441	316	94
2,500	NA	1,250	769	500	345	96
3,000	NA	1,364	811	517	353	97
4,000	NA	1,538	870	541	364	98
5,000	NA	1,667	909	556	370	98
6,000	NA	1,765	938	566	375	98
7,000	NA	1,842	959	574	378	99
8,000	NA	1,908	976	580	381	99
9,000	NA	1,908	989	584	383	99
10,000	5,000	2,000	1,020	588	388	99
50,000	8,333	2,333	1,087	617	387	100

Source: Acceptable Sizes & Error- Updated from Glenn D. Israel, 2003

The sampling error will be considered depending upon the percentage of confident level set. This study aimed to set the confident level at 95% and the sampling error at 5% accordingly for small population size of below and around 500.According to the above calculation, approximately a total of 149 households took part in the study as follow:

Table - Stratified Systematic Sample for Study Strata

No	Quarter	No. of Households	Sample Size
1.	Pahtaw	120	43
2.	Pahtet	180	52
3.	Kan Nar(Myeik)	157	52

Figure 9.1- Some Recorded Photos during Household Survey

Most Public Needs and Concerns during Household Survey

During household survey, the most important positive outcomes from the project expected by the local people and most of their concerns about proposed project are as follow:

Village Name	Most Public Needs	Most Pubic Concerns
Pahtaw	• Expanding and upgrading of village road • Supporting for health care facilities, water supply and electricity • Maintenance of the Pagoda on the Hill	• Odour
Pahtet	• Supporting for health care facilities and water supply • Electricity on full time • Maintenance to the Shwethalyaung Pagoda	No public concern
Kan Nar(Myeik)	• Maintenance of the Kan Nar road • Provice rubbish bin along the Kan Nar Road	Odour Increased in traffic

9.5. Public Meetings

Public meeting ware held two times as essential part of the public participation process as follow:

9.5.1. First Public Meeting

First public meeting was held in (14.5.2018) at Department of Fishery (Myeik). There were about 80 people from local communities who are directly or indirectly affected by the proposed project are attended in this meeting. The aims of the first public meeting are:

(i) To knowledge share about the process and procedure of IEE;

(ii) To disclose publicly about the potential environmental and social impacts of the proposed project;

(iii) To discuss about the alternative ways and possible mitigation measures to avoid the potential impacts;

(iv) To clarify about the public needs and concerns.

Attendance list, meeting minuts and suggestion letters of first public meeting are shown in Appendix A.

Figure 9.2- Recorded Photos during First Public Meeting

Summary of First Public Meeting

We held the first Public Meeting at Department of Fishery (Myeik) in (14.5.2018). There are about 80 people from local communities who are directly or indirectly affected by the proposed project. The key discussions during public meetings are about the environmental impacts and

monitoring plans, not to use woods from mangrove forest, discharge wastewater away from the residential areas and about the CSR program.

9.5.2. Second Public Meeting

Second public meetingwas held in (15.5.2018) Pahtet village. There were about 270 people from Government officials, supporting committees for Thanitharyi Region Government, NGO's, INGO and CBO's, community leaders, and local people who are directly or indirectly affected by the proposed project are attended in this meeting. The aims of the first public meeting are:

(i) To discuss the alternative ways to avoid environmental impacts;

(ii) To announce-the anticipated impacts of proposed projects;

(iii) To discuss about mitigation measures for these impacts; and

(iv) To discuss about the management and monitoring plan.

Attendance list, meeting minuts and suggestion letters of first public meeting are shown in Appendix B.

Figure 9.3- Recorded Photos during Second Public Meeting

Summary of Second Public Meeting

We held the second Public Meeting at Pahtet Village (Myeik) in (15.5.2018). There are about 270 people from Government officials, supporting communities from Thanitharyi Region Government, NGO's, INGO and CBO's, community leaders, and local people who are directly or indirectly affected by the proposed project. The key discussions from the public meetings are about the odor for the boiler and environmental impacts from factory.

Results of Consultations

Key Findings from the Public Meetings Related to the Proposed Project

The followings are the summary of key findings from public meetings:

- Wastewater discharge system
- Not to discharge the wastewater near the residential areas
- Raise the chimney to control the odors
- Not to release the hot water from the boiler to the environment directly

9.5.3. Public Disclosure Process

Meeting minutes was distributed to all participants during second public meeting. Summary of IEE report in Myanmar Language was also distributed to all key stakeholders as public disclosure process.

Draft IEE report was distributed to all key stakeholders and will be made available for public comment for a period of 30 days in the following ways:

- By raising comments during a series of public meetings where the content of the draft IEE Report will be presented;
- By completing a comment sheet made available together with the report at the public places, and by submitting additional written comments, by email or fax, or by telephone, to the Green Tech Office.

All comments and issues raised during the comment period on the draft IEE report will be added to the comment and response report that will accompany the Final Report.

10. CONCLUSION

The IEE study will describe the key anticipated environmental and social impacts of proposed project. Moreover, proper mitigation measures for all anticipated impacts and good environmental management practices are also described. The most public concerns about the proposed project is noise and that can be mitigated by proper mitigation measure. Moreover, minor to moderate environmental and social impacts that are anticipated by IEE team and appropriate mitigation measures are also described in this IEE report. So, it can be concluded that the proposed project need not to conduct comprehensive EIA and the findings in this IEE report will cover all of the environmental and social impacts related to the proposed project. According to the IEE study, the proposed project can be allowed to operate if the developer (PPT) will do all of the mitigation and enhancement measures described in this report. Although the proposed project does not have significant impacts, PPT also knows and take care about the effect of cumulative impacts on deforestration and surface water pollution (cumulative and long term effect on sea water) as there have some other factories in Pathaw-Pathat Island.

APPENDICES

APPENDIX A
FIRST PUBLIC MEETING

ATTENDANCE LIST OF FIRST PUBLIC MEETING

နေရာ - [illegible] ရက်စွဲ - [illegible]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၁	[illegible]	[illegible]	zarni 2480 @ gmail.com 09445097172	
၂	[illegible]	[illegible]	09889788405	
၃	[illegible]	ECD. Myeik District / SO	09-408540057	
၄	[illegible]	" / DSO	09-798044557	
၅	[illegible]	[illegible]		
၆	[illegible]	" "		
၇	[illegible]	" "		
၈	[illegible]	"		
၉	[illegible]	"		
၁၀	[illegible]	[illegible]	09258108108	

နေရာ - [illegible] ရက်စွဲ - [illegible]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၁၁	[illegible]	[illegible]	09-250461640	
၁၂	[illegible]	[illegible]	0941005990	
၁၃	[illegible]	[illegible]	09252222749	
၁၄	[illegible]	[illegible]	09-422193545	
၁၅	[illegible]	"	09796700177	
၁၆	[illegible]	[illegible]	09/795809162	
၁၇	[illegible]	[illegible]	09-472213029	
၁၈	[illegible]	Sea View Condo	09-26482292	
၁၉	[illegible]	PPT	09-261665867	
၂၀	[illegible]	PPT	0926077 1400	

နေရာ - [illegible] ရက်စွဲ - [illegible]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၂၁	[illegible]			
၂၂	[illegible]	[illegible]	09498714 32	
၂၃	[illegible]	[illegible]	09254823465	
၂၄	[illegible]	MCN TV media	09 422215489	
၂၅	[illegible]	[illegible]	09 8769538	
၂၆	[illegible]	[illegible]	09503317 1	
၂၇	[illegible]	[illegible]	09790190987	
၂၈	[illegible]	[illegible]	09795471249	
၂၉	[illegible]	[illegible]	0925449 66312	
၃၀	[illegible]	[illegible]	09427770985	

နေရာ - မြိတ်ခရိုင်[illegible] ရက်စွဲ - ၀၄-၅-၂၀၂၀

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၃၁	ဦးဟိန်းမင်းဦး	မြိတ်ရွာ / [illegible]	09-401551545	[signature]
၃၂	ဦး [illegible]	[illegible]	09 871 97284	[signature]
၃၃	ဦး [illegible]	[illegible]		[signature]
၃၄	[illegible]	ပတော် / ပတော်		[signature]
၃၅	[illegible]	"		[signature]
၃၆	[illegible]	"		[signature]
၃၇	ဦး[illegible]	[illegible]	0942404104	[signature]
၃၈	ဦး [illegible]	[illegible]	09449319047	[signature]
၃၉	[illegible]	မြိတ် [illegible]	09453105199	[signature]
၄၀	ဦး[illegible]	" " "	09 798289100	[signature]

နေရာ - မြိတ်ခရိုင်[illegible] ရက်စွဲ - ၀၄-၅-၂၀၂၀

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၄၁	ဦးဇော်ဝင်းကျော်	မြိတ်ရွာ၊ [illegible]	09 445560015	[signature]
၄၂	[illegible]	[illegible]	09426328655	[signature]
၄၃	[illegible]	Asst manager (operating) (service)	09-254772281	[signature]
၄၄	[illegible]	PPT [illegible]	09259447686	[signature]
၄၅	[illegible]	PPT [illegible]	09781522427	[signature]
၄၆	[illegible]	PPT [illegible]	09254374389	[signature]
၄၇	[illegible]	PPT [illegible]	09795269271	[signature]
၄၈	[illegible]	[illegible]	09-254698298	[signature]
၄၉	[illegible]	PPT [illegible]	09970794527	[signature]
၅၀	[illegible]	Senior Reporter/Dawei Watch [illegible]	- 42222 ~~645~~ 6245	[signature]

နေရာ - မြိတ်ခရိုင်[illegible] ရက်စွဲ - ၀၄-၅-၂၀၂၀

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၅၁	[illegible]	P-PT	0926 2268228	[signature]
၅၂	[illegible]	PPT	09 78-1524421	[signature]
၅၃	[illegible]	OFI / ED	09422196803	[signature]
၅၄	ဦး[illegible]	AMP Fishmeal		[signature]
၅၅	[illegible]	"		[signature]
၅၆	[illegible]	"		[signature]
၅၇	[illegible]	"		[signature]
၅၈	[illegible]	"		[signature]
၅၉	[illegible]	"		[signature]
၆၀	[illegible]	"		[signature]

နေရာ - [illegible] နေ့စွဲ - ၁၄-၅-၂၀၂၀

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၆၁	ဦးအောင်ကောင်းသွင်	[illegible] ရွာ	09-445613057	[signature]
၆၂	ဦး [illegible]	-	၀၉ ၄၀၁၈၄၁၉၈၈၄	[signature]
၆၃	ဦး [illegible]	[illegible]	0973130233	[signature]
၆၄	Zaw Moe OO	Eleven Media	09254494181	[signature]
၆၅	ဒေါ်ခင်ခိုင်ဦး	AMP. Fishmeal	09254824510	[signature]
၆၆	ရိုရိုဝင်း	AMP. Fishmeal	09254799745	[signature]
၆၇	ပိုပိုမြင့်	AMP. Fishmeal	09254824507	[signature]
၆၈	[illegible]	AMP. Fishmeal	09401103999	[signature]
၆၉	ဇော်ဝင်းထက်	AMP Fishmeal	094045824558	[signature]
၇၀	အေးဝင်း	AMP. Fishmeal		[signature]

Meeting minutes for First Public Meeting

Pyi Phyoe Tun Co., Ltd. မှ ပထော်ပထက်ကျွန်းပေါ်တွင်တည်ဆောက်မည့် သစ်အချောထည် စက်ရုံလုပ်ငန်းအတွက် ကနဦး ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) ဆိုင်ရာ ပထမအကြိမ်လူထုတွေ့ဆုံပွဲ ဆွေးနွေးမှု မှတ်တမ်း

ငါးလုပ်ငန်းဦးစီးဌာန ၁၄/၅/၂၀၁၈

ပထော်ပထက်ကျေးရွာအနီးတွင် တည်ဆောက်လည်ပတ်မည့် ငါးအမှုန့်ကြိတ်စက်ရုံအတွက် ကနဦး ပတ်ဝန်းကျင်ဆိုင်ရာ စုံစမ်းစစ်ဆေးခြင်း (Initial Environmental Examination, IEE) ဆိုင်ရာ လူထုတွေ့ဆုံပွဲတွင် ပညာရှင်များ၊ ဌာနဆိုင်ရာအကြီးအကဲများ၊ ရပ်မိရပ်ဖများမှ ဆွေးနွေးခဲ့မှုများမှာ-

ဦးမင်းဦး(ဥက္ကဌ၊မြို့နယ်အုပ်ချုပ်ရေးမှူး၊ ကျွန်းစုမြို့နယ်)

- တက်ရောက်လာသော ဌာနဆိုင်ရာတာဝန်ရှိသူများ၊ ရပ်မိရပ်ဖများ၊ ဒေသဆိုင်ရာ လူမှုအဖွဲ့အစည်း များမှ ပုဂ္ဂိုလ်များအား အထူးပင်ကျေးဇူးတင်ရှိပါကြောင်း၊
- ပတ်ဝန်းကျင်နှင့် စက်မှုလုပ်ငန်းများစပ်ဆက်အရေးပါမှုအား အများသိရှိပြီးဖြစ်သဖြင့် ယခုကဲ့သို့ ဆန်းစစ်မှုများ ဆောင်ရွက်ခြင်းအား ဝမ်းသာပါကြောင်း
- အများအတွက် အကောင်းဆုံးဖြစ်စေမည့် နည်းလမ်းများအား ဝိုင်းဝန်းဆွေးနွေးပေးကြပါရန် တိုက်တွန်းပါကြောင်း ပြောကြားပါသည်

ဦးမြင့်ဦး (မန်နေဂျာ၊ ငါးအမှုန့်စက်ရုံ)

- ကုမ္ပဏီစတင်တည်ထောင်သည်မှ လက်ရှိအချိန်အထိ ဆောင်ရွက်လျှက်ရှိသော လုပ်ငန်းများ အကြောင်းအား ရှင်းလင်းတင်ပြခြင်း၊

- ငါးမှုန့်ကြိတ်စက်ရုံတည်ဆောက်လည်ပတ်မှုနှင့်ပတ်သက်၍ ဆောင်ရွက်ထားရှိမှုများဖြစ်သော အနှံ့အသက်ဆိုးများ ထွက်ရှိမှု လျော့နည်းစေရေး၊ ငါးကုန်ကြမ်းများ စီစစ်ဝယ်ယူသည့် အစီအစဉ်၊ မီးခိုးခေါင်းတိုင်တွင် ရေဖြန်းစနစ်တပ်ဆင်ထားရှိမှုများအား ရှင်းလင်းတင်ပြပါသည်။
- ကုမ္ပဏီမှ ဒေသတွင်းလူမှုဖွံ့ဖြိုးတိုးတက်ရေးအတွက် ဆောင်ရွက်ထားရှိမှုများ တင်ပြဆွေးနွေး ပါသည်။

ဒေါက်တာကျော်စွာတင့် (Ever Green Tech;)

- ပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်မှု ပြုလုပ်ရခြင်း ရည်ရွယ်ချက်
- ထိခိုက်မှုဆန်းစစ်ခွင့်ရှိသော တတိယအဖွဲ့အစည်းများ၏ လိုက်နာရမည့်ကျင့်ဝတ်များနှင့် လုပ်ထုံး လုပ်နည်းများ
- ပတ်ဝန်းကျင်မူလအရည်အသွေးများအား မှတ်တမ်းတင်ထားရှိခြင်း
- အကောင်အထည်ဖော်မည့် စီမံကိန်းတွင် ပါဝင်မည့် အမျိုးအစားများ၊ ထိခိုက်နိုင်မှုများနှင့် လျော့နည်းအောင်ဆောင်ရွက်ရမည့် နည်းလမ်းများအား ဆွေးနွေးတင်ပြခြင်း၊
- စက်ရုံကြောင့် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင်ထိခိုက်နိုင်မှုများ၊(ယာဉ်ေကြာရှုပ်မှု၊ အသံဆူညံမှု၊ အနှံ့အသက်၊ စွန့်ပစ်ပစ္စည်း၊အစရှိသည်များ)
- ပတ်ဝန်းကျင်ထိခိုက်မှုများ လျော့နည်းသက်သာစေရန် လုပ်ဆောင်ရမည့် လုပ်ငန်းစဉ်များနှင့် စီမံခန့်ခွဲမှုအစီအစဉ်များ
- လူထုပူးပေါင်းပါဝင်နိုင်ရန် ဆောင်ရွက်ခဲ့မှု မှတ်တမ်းများ၊ ကွင်းဆင်းလေ့လာမှု ရလဒ်များ၊
- ပတ်ဝန်းကျင်ထိခိုက်မှုစောင့်ကြည့်ရေးအစီအစဉ်များနှင့် စောင့်ကြည့်ရေးအဖွဲ့ ဖွဲ့စည်းခြင်းများအား ရှင်းလင်းတင်ပြပါသည်။

ဒေါက်တာမျိုးမင်းထွန်း (အကြံပေး၊ Ever-Green Tech)

- ငါးအမှုန့်ကြိတ်စက်ရုံလည်ပတ်ခြင်း လုပ်ငန်းစဉ်များအား ရှင်းလင်းခြင်း
- ထိခိုက်မှုရှိနိုင်သော အခြေအနေများအား ဖော်ထုတ်တင်ပြခြင်းနှင့် ဆောင်ရွက်ထားသော ကာကွယ်မှုအခြေအနေများ၊
- ဆက်လက်ဆောင်ရွက်ရမည့် ထိန်းချုပ်မှုအခြေအနေများအား ရှင်းလင်းတင်ပြပါသည်။

ဒေါက်တာကျော်စွာတင့် (Ever Green Tech;)

- ရေဆိုးစွန့်ပစ်စနစ် တပ်ဆင်လည်ပတ်နေမှုအခြေအနေများနှင့် ဆက်လက်ဆောင်ရွက်ရန် အကြံပြုထားချက်များ
- ဘွိုင်လာတပ်ဆင်လည်ပတ်မှုနှင့်ပတ်သက်၍ လက်ရှိဆောင်ရွက်ထားသော အခြေအနေများနှင့် ထပ်မံဆောင်ရွက်ရန် အကြံပြုထားချက်များ

ဒေါက်တာသိန်းထွန်း (အကြံပေး၊ Ever-Green Tech)

- လူမှုစီးပွားထိခိုက်မှု ကွင်းဆင်းမေးမြန်းမှုမှ တွေ့ရှိချက်များ တင်ပြခြင်း
- ဒေသခံများ၏ လိုလားချက်များ၊ စိုးရိမ်မှုများအား ဖြည့်ဆည်းဆောက်ရွက်ရမည့် အခြေ အနေများအား ဆွေးနွေးတင်ပြပါသည်။

ဒေါက်တာကိုမြင့် (အကြံပေး၊ Ever-Green Tech)

- အပင်နှင့် သတ္တဝါမျိုးစိတ်များ၊ ရေသယံဇာတများ၏ လက်ရှိဖြစ်တည်မှု အခြေအနေများ
- စီမံကိန်းများကြောင့် ထိခိုက်လာနိုင်မှုများ
- ကာကွယ်ဆောင်ရွက်ရမည့် အခြေအနေများအား တင်ပြဆွေးနွေးပါသည်။

ဒေသခံရပ်မိရပ်ဖများ၊ ဌာနဆိုင်ရာတာဝန်ရှိသူများမှ မေးမြန်း ဆွေးနွေးချက်များ

ဦးတင်ကိုကိုဦး (OSI)

- ဆွေးနွေးတင်ပြမှုများမှာ ပြောစရာမရှိအောင် ကောင်းမွန်ပါကြောင်း၊ လုပ်ငန်းရှင်ဖက်မှ လိုက်နာ ဆောင်ရွက်နိုင်ရန်လိုအပ်ပါကြောင်း
- လိုက်နာဆောင်ရွက်ရန် တာဝန်ယူမှု၊ တာဝန်ခံမှုရှိသော လုပ်ငန်းရှင်ဖြစ်မဖြစ် စောင့်ကြည့်ရန် လိုအပ် ပါကြောင်း၊ ယနေ့ပွဲတွင် လုပ်ငန်းရှင်ဖက်မှအဓိကတာဝန်ရှိသူ မတက်ရောက်သဖြင့် ယုံကြည်မှု တည်ဆောက်ပြရန်လိုအပ်ပါကြောင်း ဆွေးနွေးပါသည်။

ဒေါက်တာကျော်စွာတင့် (Ever Green Tech;)

- ဆွေးနွေးပေးမှုအား ကျေးဇူးတင်ရှိပါကြောင်း၊ လုပ်ငန်းရှင်ဖက်မှ တာဝန်ရှိသူ တက်ရောက်ရန် လိုအပ်ပါကြောင်း
- အစီရင်ခံစာ အကြမ်းအား လုပ်ငန်းရှင်သို့ ပေးပို့ရာတွင် လုပ်ငန်းရှင်မှ လိုက်နာဆောက်ရွက်ပါမည် ဟု ခံဝန်ကတိလက်မှတ်ရေးထိုးရပါကြောင်း၊
- ထို့အပြင် စောင့်ကြည့်လေ့လာရေးအဖွဲ့များ ဖွဲ့စည်းပြီး စောင့်ကြည့်သွားရမည်ဖြစ်သဖြင့် ဆောင်ရွက်မှုမရှိပါက ဒဏ်ကြေးသတ်မှတ်ချက်အတိုင်း ပေးဆောင်သွားစေရန် ထိန်းကြောင်းမှု ပြုလုပ်ထားသဖြင့် တာဝန်ယူမှု တာဝန်ခံမှု ပြုနိုင်ရန် စီမံထားပါကြောင်း ဆွေးနွေးပါသည်။

ဦးမြတ်ကိုကို(စည်ပင်သာယာရေးကော်မတီ၊ မြိတ်မြို့နယ်)

- လုပ်ငန်းရှင်အနေဖြင့် လူမှုစီးပွားဖွံ့ဖြိုးရေးများဆောင်ရွက်နေသည်ကို တွေ့ရှိရပါကြောင်း၊ အခြားလုပ်ငန်းရှင်များမှ ပူးပေါင်းမှု နည်းနေသည်ကို တွေ့ရပါကြောင်း
- ဒေသဖွံ့ဖြိုးရေးအား တာဝန်ယူမှုအပြည့်ဖြင့် ဆောင်ရွက်ပေးကြစေလိုကြောင်း ဆွေးနွေးပါသည်။

ဦးဇာနည် (ခရိုင်ဦးစီးမှူး၊ စက်မှုကြီးကြပ်၊ မြိတ်ခရိုင်)

- တင်ပြဆွေးနွေးမှုများကောင်းမွန်ပါကြောင်း၊ ရေ၊လေ၊မြေ၊အသံ ထိခိုက်မှုများ စောင့်ကြည့်ရေးအဖွဲ့ ဖွဲ့စည်းရာတွင် ဆောင်ရွက်ရမည့် လုပ်ငန်းစဉ်များ ထည့်သွင်းပေးရန် လိုအပ်မည်ဖြစ်ပါကြောင်း၊
- ပတ်ဝန်းကျင် ဒေသခံများ ပိုမိုနားလည်နိုင်ရန် ဖြန့်ဝေပေးစေလိုပါကြောင်း
- ထိခိုက်မှု စံချိန်စံညွှန်းများ၏ သတ်မှတ်ချက်များ သိရှိနိုင်ရန် ဆွေးနွေးပေးစေလိုပါကြောင်း၊
- အသံထိခိုက်မှု တိုင်းတာရေး နည်းစနစ်များ၊ ရေထုထိခိုက်မှု နှင့် ပါဝင်မှုများသန့်စင်မှု နည်းစနစ်များ၊ လေထုထိခိုက်မှုနှင့် သန့်စင်မှုနည်းစနစ်များ သိရှိနိုင်ရန် ဖြန့်ဝေပေးစေလိုကြောင်း ဆွေးနွေးပါသည်။

ဒေါက်တာကိုမြင့် (အကြံပေး၊ Ever-Green Tech)

- ရေအရည်အသွေးနှင့်ပတ်သက်၍ ပင်လယ်ရေ၏ သဘောသဘာဝအရ ရေထုကြီးမားသော ပင်လယ်အနေဖြင့် pH ပြောင်းလဲမှုအား ခံနိုင်ရည်ရှိပါကြောင်း၊ ထုထည်သေးသော ချောင်း ကန်များ အနေဖြင့် ခံနိုင်ရည်မရှိပါကြောင်း ဆွေးနွေးပါသည်။

ဒေါက်တာကျော်စွာတင့် (Ever Green Tech;)

- ထိခိုက်မှုစံချိန်စံညွှန်းများအား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ ထုတ်ပြန်ထားမှုများ ရှိပါကြောင်း၊
- အသံဆူညံမှုအား နေ့ နှင့် ည ခွဲခြားထားပါကြောင်း၊
- ရေ အရည်အသွေးသတ်မှတ်ချက်များအားလည်း လုပ်ငန်းအမျိုးအစားအလိုက် ခွဲခြားထုတ်ပြန်ပေးထားပါကြောင်း၊ လက်ခံမည့်ရေထုအပူချိန်ထက် ၃ ဒီဂရီထက်ပို၍ မပူရန် သတ်မှတ်ပါကြောင်း၊
- အချိန်ငဲ့ကွက်သောအားဖြင့် အားလုံးရှင်းမပြနိုင်သည်ကို တောင်းပန်ပါကြောင်း၊ ပတ်/ထိန်း ဦးစီးဌာန web site တွင် လေ့လာနိုင်ရန် တင်ထားပါကြောင်း၊
- စောင့်ကြည့်ရေးအဖွဲ့ ဖွဲ့စည်းနိုင်ရန် သက်ဆိုင်ရာအဖွဲ့အစည်းများမှ ပူးပေါင်းပေးရန် လိုအပ်ပါကြောင်း ဆွေးနွေးပါသည်။

ဦးမြင့်ဦး (မန်နေဂျာ၊ ငါးအမှုန့်စက်ရုံ)

စီမံကိန်းတာဝန်ရှိသူမှ ကျေးဇူးတင်စကားပြောကြားရာတွင် တွေ့ဆုံပွဲသို့တက်ရောက်ပေးပါသော တာဝန်ရှိလူကြီးမင်းများ၊ ရပ်မိရပ်ဖများအား ကျေးဇူးအထူးတင်ရှိပါကြောင်းနှင့် ကိုယ်စိတ်နှလုံး ချမ်းသာကြပါစေကြောင်း၊ လိုအပ်ချက်များအား ထောက်ပြပေးသဖြင့် ကျေးဇူးတင်ပါကြောင်း၊ ကုမ္ပဏီအနေဖြင့် ပထော်ပထက်ကျွန်းပေါ်တွင် လုပ်ငန်းဆောင်ရွက်နေသော လုပ်ငန်းများအတွက် ပတ်ဝန်းကျင်ဆန်းစစ်မှုများ ဆောင်ရွက်သွားမည်ဖြစ်ပါကြောင်း၊ နောက်နေ့တွင်ပြုလုပ်မည့် ပွဲတွင် ဒါရိုက်တာတစ်ဦးတက်ရောက်ရန် စီစဉ်ထားပါကြောင်း၊ အဆင်မပြေမှု များရှိပါက ပွင့်ပွင့်လင်းလင်း လာရောက်ဆွေးနွေးနိုင်ပါကြောင်းပြောကြားသွားပါသည်။

COMMENTS BY SUGGESTION LETTERS DURING FIRST PUBLIC MEETING

စဉ်	အကြံပြုချက်	အကြံပြုဆွေးနွေးသူ
၁။	၁။ ကုမ္ပဏီ၏ လုပ်ငန်းစဉ်မှုကို အမှုန်တကယ် ကျမ်း ရွေးချယ် ကြိုတင်ခဲ့ရန် ၂။ Ever green မှ အစီပြုထားသည့် ပါ-ကာ ပြင်ရန် ကောင်းတိုင် ဖြင့် တင်ရန် conveyors များ closed type ဖြစ်ရန်၊ အညစ်အကြေး ကင်း၍ လာ ထည့်ရန် မစင်ရှိသည့်များကို မပိုင်ဖြေ ကိုက်ရာ ဆောင်ရွက်ရန်။ ၃။ စင်းကောင်စာ အသုံးပြုရာ တွင် ဒီရေတော ထင်းများ လုံးဝ အသုံးမပြုခြင်း ကို အကောင်အထည် ဖော်ဆောင်ရွက်ရန်။ ၄။ အိုင်လာ အလိုးပေါင်း ရေပူကို ထိုက်ထိုက်ခွင့် ထုတ်ခြင်း မပြုဘဲ ကန်တွင်း ဒိုင်းချွေး တိုက် အသုံးပြု၍ ပြန်လည် မြေ ပြင်ပသို့ စွန့်ပစ်ရန်။	(လက်မှတ်) [signature] 5.18 အမည် - ဦးဇော်ဝင်းကျော် အလုပ်အကိုင် - မန်နေဂျာ ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ် - 09 445560015

၂။	AMP [illegible handwritten letter in Burmese]		(လက်မှတ်) [signature] အမည် - [illegible] တာဝန်/အလုပ်အကိုင် - [illegible] ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ် - ၀၉-898526245

၃။		(လက်မှတ်) အမည် - အလုပ်အကိုင် - ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ် -
၄။		(လက်မှတ်) အမည် - အလုပ်အကိုင် - ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ် -
၅။		(လက်မှတ်) အမည် - အလုပ်အကိုင် - ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ် -

APPENDIX- B
SECOND PUBLIC MEETING

ATTENDANCE LIST OF SECOND PUBLIC MEETING

ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းစဉ်များအတွက်ဆွေးနွေးတိုင်ပင်ပွဲတက်ရောက်သူများစာရင်း

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထောက်) ရက်စွဲ - [illegible]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၁။	ဦးမိုးမင်းဝင်း			
၂။	ဦးအောင်ရှိ			
၃။	ဦးတေဇော်			
၄။	ဦးနေမင်းထွန်း			
၅။	ဦးနေမျိုးဇော်			
၆။	ဦးမင်းဦး			
၇။	ဦးရဲသူဦး			
၈။	ဦးသူရရှိ			
၉။	[illegible]			
၁၀	[illegible]			

ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းစဉ်များအတွက်ဆွေးနွေးတိုင်ပင်ပွဲတက်ရောက်သူများစာရင်း

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထောက်) ရက်စွဲ - [illegible]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	ဦးကျော်ဝင်း	ပထောက်		
	ဦးနှင်းကျော်	ပထောက်		
	ဦးကျော်သီဟ	ပထောက်		
	ဦးထွန်းမြင့်	ပထောက်		
	ဦးဝေမြင့်	ပထောက်		
	ဦးမြင့်ဦး	[illegible]		
	ဦးသိန်းဇေနောင်	ပထောက်		
	ဦးအေးကြွယ်	ပထောက်		
	ဒေါ်ရီခွဲ	ပထောက်		
	ဒေါ်ဒွေး [illegible]	ပထောက်		

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထောက်) ရက်စွဲ - [illegible]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	ဒေါ်ခင်ရွှေ	ပထောက်		
	ဒေါ်ဦးကြည်	〃		
	ဒေါ်ပန်းမြ	〃		
	ဦးထွန်းကောင်း	〃		
	ဒေါ်ရီလှိုင်	〃		
	ဦးသန်းညွန့်	〃		
	[illegible]	〃		
	[illegible]	〃		
	[illegible]	〃		
	[illegible]	〃		

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအခွဲအစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအခွဲအစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအခွဲအစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) ရက်စွဲ - ၁၅-၅-၂၀၂၂

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	ဒေါ်ဂီဂီသန်း	ပထဆ		နှင်း
	" ဝေဝေမာနှင်း	"		နှင်း
	ကျိုင်းမြမြ	"		မြ
	ဒေါ်ဖွေးသန့်ဘိုင်	"		ဘိုင်
	" အိခိုင်ထ	"		ထ
	" ခိုင်ဇာဝင်း	"		ဝင်း
	" ဖွေးဖွေး	"		ဖွေး
	ဖွေးဖွေးအိ	"		အိ
	[illegible] မြင့်	"		မြင့်
	ဒေါ်ဝေဝေ	"		[illegible]

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) ရက်စွဲ - ၁၅-၅-၂၀၂၂

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	ဒိုးဇေ့နွယ်	မထဆ		နွယ်
	" ဖောင်ဖြူနိုင်	"		နိုင်
	" ဇော်ဇော်ဦး	"		ဦး
	မမြ လယ်	"		လယ်
	ဒိုးနှင်းရီ	"		ရီ
	ဒိုးမြင့်နွယ်	"		နွယ်
	" မြင့်မိုး	"		မိုး
	ဒေါ်ဖွေးနွဲ့	"		နွဲ့
	ဇူဇူဦး	"		ဦး
	ဇူဇင်ဝင်း	"		ဝင်း

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) ရက်စွဲ - ၁၅-၅-၂၀၂၂

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	ဒေါ်စန်းရီ	ဒုထဆ		ရီ
	" ဝေယုမွန်	"		ယု
	" သန္တာဝေ	"		ဝေ
	" ကြည်ဒိုနှင်	"		[illegible]
	ဒေါ်ရင်မြ	"		မြ
	ဒိုးဖွေးဇင်	"		ဇင်
	ဒေါ်မြင့်ဝေ	"		ဝေ
	ဒေါ်ရှိုးဆွေ	"		ရှိုး
	" မြိုးမြိုး	"		[illegible]
	ဒိုးဝေမောင်	"		မောင်

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - ၁၅-၅-၂၀၂၁

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	မိုမိုအောင်	ပထက် (A.M.P)		[illegible]
	မသဲမာဦး	ပထက် (A.M.P)		[illegible]
	မဒွေးသိင်္ဂီ	ပထက် (A.M.P)		Theingi
	ဒေါ်ရီးလှ	ပထက်		[illegible]
	ဒေါ်မြင့်နွယ်	ပထက်		[illegible]
	ဦးအောင်းလှ	ပထက်	09876092604	[illegible]
	ဦးသန်းစိုး	ပထက်	098760863	[illegible]
	ဒေါ်ချိုချို	ပထက်		[illegible]
	" ခင်မူ	ပထက်		[illegible]
	" ယုရီ	"		[illegible]

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - ၁၅-၅-၂၀၂၁

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	ဒေါ်ဆွေဇွန်	ပထက်		[illegible]
	" စန်းသီ	"		[illegible]
	" စိုးဖက်	"		[illegible]
	" နှင်းဝေ	"		[illegible]
	" တင်ဦးမီး	"		[illegible]
	" ဇော်ဝင်း	"		[illegible]
	ဒေါ်တင်နု	"		[illegible]
	" တင်ကြည်	"		[illegible]
	ဒေါ်ချို	"		[illegible]
	မာဦး	"		[illegible]

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - ၁၅-၅-၂၀၂၁

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	ဒေါ်ချိုချို	ပထက်		[illegible]
	ဦးမင်းဝေ	ပထက်		[illegible]
	ဒေါ်ဇွန်သန်း	ပထက်		[illegible]
	ဒေါ်စိမ်းမာဝေ	"		[illegible]
	ဒေါ်တင်ယု	"		[illegible]
	ဒေါ်ချို	"		[illegible]
	ဒေါ်ယု	"		[illegible]
	ဦးကျော်	"		[illegible]
	ဦးစင်ဝေ	"		[illegible]
	ဒေါ်ခင်မြင့်	"		[illegible]

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - ၁၅-၅-၂၀၂၂

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	ဒေါ်မြမြချော်	ပထက်		[illegible]
	ဦးအောင်ဦး	"		ဦး
	ဒေါ်ငွေမြနှင်း	"		[illegible]
	ဒေါ်ခင်ခင်မူ	"		[illegible]
	ဒေါ်ရွှေတင်	"		[illegible]
	ဒေါ်ခင်ဝင်း	"		[illegible]
	ဒေါ်အေးခင်	"		[illegible]
	ဒေါ်ငွေသက်	"		သက်
	ဒေါ်ငွေသန်း	"		[illegible]
	ဦးအောင်ကျော်			ကျော်

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - ၁၅-၅-၂၀၂၂

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	ဦးကျော်ကျော်ကိုင်	[illegible]	09788344922	[illegible]
	ဦး[illegible]	[illegible]		[illegible]
	[illegible]	[illegible]		[illegible]
	[illegible]	[illegible]	09780384256	[illegible]
	[illegible]	[illegible]		
	[illegible]	ပထက်		
	ဒေါ်မြင့်ကြူ	"		[illegible]
	[illegible]	"		[illegible]
	ဒေါ်မိုးယဉ်	"		ယဉ်
	[illegible]	"		[illegible]

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - ၁၅-၅-၂၀၂၂

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
[illegible]	[illegible]	ပထက်		[illegible]
[illegible]	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	ဒေါ်ငွေဝင်း	"		ဝင်း

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - [illegible]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	[illegible]	ပထက်		[illegible]
	[illegible]	ပထက်		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	"		[illegible]
	[illegible]	ပထက်		[illegible]
	[illegible]	"		[illegible]
	[illegible]			[illegible]
	[illegible]	"		[illegible]
	[illegible]			[illegible]
	[illegible]			[illegible]
	[illegible]			[illegible]
	[illegible]			[illegible]
	[illegible]	"		[illegible]
	[illegible]			[illegible]
	[illegible]			[illegible]
	[illegible]			[illegible]
	[illegible]	ပထက်		[illegible]
	[illegible]	"		[illegible]

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - [illegible]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၁။	[illegible]			[illegible]
၂။	[illegible]			[illegible]
၃။	[illegible]			[illegible]
၄။	[illegible]			[illegible]
၅။	[illegible]			[illegible]
၆။	[illegible]			[illegible]
၇။	[illegible]			[illegible]
၈။	[illegible]			[illegible]
၉	[illegible]			[illegible]
၁၀	[illegible]			Mey

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - [illegible]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	[illegible]	ပထက်		[signature]
	[illegible]	"		[signature]
	[illegible]	PPT [illegible]	09422198822	[signature]
	[illegible]	PPT [illegible]	0945039/461	[signature]
	[illegible]	[illegible]	09254829965	[signature]
	[illegible]	[illegible]	09453105199	[signature]
	[illegible]	[illegible]	0978190 7807	[signature]
	[illegible]	[illegible]	09 250463640	[signature]
	[illegible]	[illegible]	094 000 5998	[signature]
	[illegible]	[illegible]	09 253536515	[signature]

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - [illegible]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	[illegible]		[signature]

[illegible]	ပထက်	[signature]
[illegible]	"	[signature]
[illegible]	"	[signature]
[illegible]	"	
[illegible]	"	[signature]
[illegible]	"	[signature]
[illegible]	"	[signature]
[illegible]	"	[signature]
[illegible]	"	[signature]
[illegible]	"	[signature]
[illegible]	"	[signature]
[illegible]	"	[signature]

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - ၁၅-၅-၂၀၂၂

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	[illegible]		[signature]

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - ၁၅-၅-၂၀၂၂

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
	[illegible]	ပထက်		[signature]
	[illegible]	"		[signature]
	[illegible]	"		[signature]
	[illegible]	"		[signature]
	[illegible]	ပထက်	[illegible]	[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	[illegible]		[signature]
	[illegible]	ပထက်		[signature]
	[illegible]	"		[signature]
	[illegible]	ပထက်		[signature]

နေရာ - အခြေခံပညာအထက်တန်းကျောင်း (ပထက်) နေ့စွဲ - ၁၅-၅-၂၀၂၂

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
1	[illegible]	[illegible]	095640847	[signature]
၂	[illegible]	Senior Reporter Dawei Watch / [illegible]	09422226245	[signature]
၃	[illegible]	[illegible]	၀၉ 254224521	[signature]

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုခဲ့သောအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုခဲ့သောအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
		ပထမ		
		ပထမ		
		ပထမ		
		ပထမ		
		ပထမ		
		"		
		"		
		"		
		"		
		"		

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုခဲ့သောအဖွဲ့အစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်
၁		ပထမ	09261685127	
၂		"		
၃		"		
၄		"		
		"		
		"		
		"		
		"		

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအခွဲအစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်

	ပထော်	
	ပထော်	
	"	
	"	
	"	
	"	
	"	
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	"	

စဉ်	အမည်	ရာထူး/ကိုယ်စားပြုအခွဲအစည်း	ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ်	လက်မှတ်

ဒုတိယအကြိမ်လူထုတွေ့ဆုံပွဲ ဆွေးနွေးမှု မှတ်တမ်း

နေ့ရက် - ၁၅/၅/၂၀၁၈

နေရာ- အခြေခံပညာအထက်တန်းကျောင်း (ပထက်)

ပထော်ပထက်ကျေးရွာအနီးတွင်တည်ဆောက်လည်ပတ်မည့်ငါးအမှုန့်ကြိတ်စက်ရုံအတွက်ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (Initial Environmental Examination, IEE) ဆိုင်ရာလူထုတွေ့ဆုံပွဲပညာရှင်များ၊ ဌာနဆိုင်ရာအကြီးအကဲများ၊ ရပ်မိရပ်ဖများမှ ဆွေးနွေးခဲ့မှုများမှာ-

ဦးစံမွေး(ဦးစီးမှူး၊ငါးလုပ်ငန်းဦးစီးဌာန၊)

- ငါးအမှုန့်ကြိတ်စက်ရုံ အတွက် ကနဦး ပတ်ဝန်းကျင်ဆိုင်ရာ စုံစမ်းစစ်ဆေးခြင်း (Initial Environmental Examination, IEE) ပတ်ဝန်းကျင်ထိခိုက်မှု လေ့လာဆန်းစစ်ခြင်း (EIA)ဆိုင်ရာ တွေ့ရှိချက်များအား အများသိရှိနိုင်ရန် တတိယအဖွဲ့အစည်းမှ ဆွေးနွေးတင်ပြခြင်းဖြစ်ပါကြောင်း၊
- သိရှိလိုသည်များမေးမြန်းပေးရန်နှင့်လိုအပ်သည်များအားဝိုင်းဝန်းဆွေးနွေးပေးကြပါရန်တိုက်တွန်းပါကြောင်း ပြောကြားပါသည်။

ဦးမြင့်ဦး (မန်နေဂျာ၊ ငါးအမှုန့်စက်ရုံ)

- ကုမ္ပဏီစတင်တည်ထောင်သည်မှ လက်ရှိအချိန်အထိ ဆောင်ရွက်လျှက်ရှိသော လုပ်ငန်းများ အကြောင်းအားရှင်းလင်းတင်ပြခြင်း၊
- ငါးမှုန့်ကြိတ်စက်ရုံတည်ဆောက်လည်ပတ်မှုနှင့်ပတ်သက်၍ ဆောင်ရွက်ထားရှိမှုများဖြစ်သော အနှံ့အသက်ဆိုးများ ထွက်ရှိမှု လျော့နည်းစေရေး၊ ငါးကုန်ကြမ်းများ စီစစ်ဝယ်ယူသည့် အစီအစဉ်၊ မီးခိုးခေါင်းတိုင်တွင် ရေဖြန်းစနစ်တပ်ဆင်ထားရှိမှုများအား ရှင်းလင်းတင်ပြပါသည်။
- ကုမ္ပဏီမှ ဒေသတွင်းလူမှုဖွံ့ဖြိုးတိုးတက်ရေးအတွက် ဆောင်ရွက်ထားရှိမှုများ တင်ပြဆွေးနွေး ပါသည်။

ဒေါက်တာကျော်စွာတင့် (အကြံပေး၊ Ever Green Tech)

- ပတ်ဝန်းကျင်ထိခိုက်မှုလေ့လာဆန်းစစ်မှု ပြုလုပ်ရခြင်း ရည်ရွယ်ချက်
- ထိခိုက်မှုဆန်းစစ်ခွင့်ရှိသော တတိယအဖွဲ့အစည်းများ၏ လိုက်နာရမည့်ကျင့်ဝတ်များနှင့် လုပ်ထုံး လုပ်နည်းများ
- ပတ်ဝန်းကျင်မူလအရည်အသွေးများအား မှတ်တမ်းတင်ထားရှိခြင်း
- အကောင်အထည်ဖော်မည့် စီမံကိန်းတွင် ပါဝင်မည့် အမျိုးအစားများ၊ ထိခိုက်နိုင်မှုများနှင့် လျော့နည်းအောင်ဆောင်ရွက်ရမည့် နည်းလမ်းများအား ဆွေးနွေးတင်ပြခြင်း၊
- စက်ရုံကြောင့် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင်ထိခိုက်နိုင်မှုများ၊(ယာဉ်ေကြာရှုပ်မှု၊ အသံဆူညံမှု၊ အနံ့အသက်၊ စွန့်ပစ်ပစ္စည်း၊အစရှိသည်များ)

- ပတ်ဝန်းကျင်ထိခိုက်မှုများ လျော့နည်းသက်သာစေရန် လုပ်ဆောင်ရမည့် လုပ်ငန်းစဉ်များနှင့် စီမံခန့်ခွဲမှုအစီအစဉ်များ
- လူထုပူးပေါင်းပါဝင်နိုင်ရန် ဆောင်ရွက်ခဲ့မှု မှတ်တမ်းများ၊ ကွင်းဆင်းလေ့လာမှု ရလဒ်များ၊
- ပတ်ဝန်းကျင်ထိခိုက်မှုစောင့်ကြည့်ရေးအစီအစဉ်များနှင့် စောင့်ကြည့်ရေးအဖွဲ့ ဖွဲ့စည်းခြင်းများအား လုပ်ငန်းစဉ် တခုခြင်းအလိုက် ခွဲခြားရှင်းလင်းတင်ပြပါသည်။

ဒေါက်တာမျိုးမင်းထွန်း (အကြံပေး၊ EverGreen Tech)

- ငါးမှုန့်ကြိတ်စက်ရုံ လည်ပတ်ခြင်းလုပ်ငန်းစဉ်များအား ရှင်းလင်းတင်ပြခြင်း
- ထိခိုက်မှုရှိနိုင်သော အခြေအနေများအား ဖော်ထုတ်တင်ပြခြင်းနှင့် ဆောင်ရွက်ထားသော ကာကွယ်မှုအခြေအနေများ၊
- ဆက်လက်ဆောင်ရွက်ရမည့် ထိန်းချုပ်မှုအခြေအနေများအား ရှင်းလင်းတင်ပြပါသည်။

ဒေါက်တာကျော်စွာတင့် (အကြံပေး၊ Ever Green Tech)

- ငါးမှုန့်ကြိတ်စက်ရုံနှင့်ပတ်သက်၍ရေဆိုးစွန့်ပစ်စနစ် တပ်ဆင်လည်ပတ်နေမှုအခြေအနေများနှင့် ဆက်လက်ဆောင်ရွက်ရန် အကြံပြု ထားချက်များ
- ဘွိုင်လာတပ်ဆင်လည်ပတ်မှုနှင့်ပတ်သက်၍ လက်ရှိဆောင်ရွက်ထားသော အခြေအနေများနှင့် ထပ်မံဆောင်ရွက်ရန် အကြံပြုထားချက်များအား ရှင်းလင်းတင်ပြပါသည်။

ဒေါက်တာသိန်းထွန်း (အကြံပေး၊ EverGreen Tech)

- လူမှုစီးပွားထိခိုက်မှု ကွင်းဆင်းမေးမြန်းမှုမှ တွေ့ရှိချက်များ တင်ပြခြင်း
- ဒေသခံများ၏ လိုလားချက်များ၊ စိုးရိမ်မှုများအား ဖြည့်ဆည်းဆောက်ရွက်ရမည့် အခြေ အနေများအား ဆွေးနွေးတင်ပြပါသည်။

ဒေါက်တာကိုမြင့် (အကြံပေး၊ EverGreen Tech)

- အပင်နှင့် သတ္တဝါမျိုးစိတ်များ၊ ရေသယံဇာတများ၏ လက်ရှိဖြစ်တည်မှု အခြေအနေများ
- စီမံကိန်းများကြောင့် ထိခိုက်လာနိုင်မှုများ
- ကာကွယ်ဆောင်ရွက်ရမည့် အခြေအနေများအား တင်ပြဆွေးနွေးပါသည်။

ဒေသခံရပ်မိရပ်ဖများ၊ ဌာနဆိုင်ရာတာဝန်ရှိသူများမှ မေးမြန်း ဆွေးနွေးချက်များ

ဒေါ်မြင့်မြင့်ခိုင် (အထက်တန်းပြ၊ အ.ထ.က၊ ပထက်)

- ရောက်ရှိတာဝန်ထမ်းဆောင်သည်မှာ ၅ နှစ်ရှိပြီး တိုးတက်မှုများသာ တွေ့ရှိရ
- ပုဇွန်ကန်များမှ အနှံ့အနည်းငယ်ထွက်သည်ကို ဖြေရှင်းပေးသည်ကို တွေ့ရပါကြောင်း
- စွန့်ပစ်ပစ္စည်းများအား စနစ်တကျစွန့်ပစ်သည်ကို တွေ့ရပါကြောင်း
- နိုင်ငံခြားပညာရှင်များဖြင့် ဆောင်ရွက်သည်ကို တွေ့ရပါကြောင်း
- ဒေသဖွံ့ဖြိုးရေးများလည်း ဆောင်ရွက်သည်ကို တွေ့ရကြောင်း ဆွေးနွေးပါသည်။

ဦးတင်ကိုကိုဦး (OSI)

- ဒေသဖွံ့ဖြိုးရေးအတွက် အရေးပါသောအခန်းမှ ပါဝင်နေသော လုပ်ငန်းဖြစ်နေပါကြောင်း
- ဒေသတွင်း စံပြကုမ္ပဏီတခု ဖြစ်နေသည်ကိုတွေ့ရပါကြောင်း
- ၎က ၂၀ ကျော်သည်အထိ သစ်ပင်များ ထပ်မံစိုက်စေလိုပါကြောင်း
- အနှံ့အသက်ဆိုးများသည် ခေါင်းတိုင်ရင်းမှမနံသော်လည်း အဝေးမှ အနှံ့ရနိုင်ပါကြောင်း
- မျိုးဆက်သစ်လူငယ်များမှ ဦးဆောင်နေကြသဖြင့် နိုင်ငံတကာနှင့် ရင်ပေါင်တန်းနိုင်ရေး ဆက်လက်ကြိုးစားစေလိုပါကြောင်း
- လုပ်ဆောင်မှုများအပေါ် စောင့်ကြည့်ဝေဖန်မှုများ ဆက်လက်ပြုလုပ်သွားမည်ဖြစ်ကြောင်း ဆွေးနွေး ပါသည်။

ဦးအောင်မြင့် (ဒါရိုက်တာ)

စီမံကိန်းတာဝန်ရှိသူမှ ကျေးဇူးတင်စကားပြောကြားရာတွင် တွေ့ဆုံပွဲသို့တက်ရောက်ပေးပါသော တာဝန်ရှိလူကြီးမင်းများ၊ ရပ်မိရပ်ဖများအား ကျေးဇူးအထူးတင်ရှိပါကြောင်းနှင့် ကိုယ်စိတ်နှလုံး ချမ်းသာကြပါစေကြောင်း၊ လိုအပ်ချက်များအား ထောက်ပြပေးသဖြင့် ကျေးဇူးတင်ပါကြောင်း၊ ကုမ္ပဏီအနေဖြင့် ပထော်ပထက်ကျွန်းပေါ်တွင် လုပ်ငန်းဆောင်ရွက်နေသော လုပ်ငန်းများအတွက် ပတ်ဝန်းကျင်ဆန်းစစ်မှုများ ဆောင်ရွက်သွားမည်ဖြစ်ပါကြောင်း၊ ဒေသဖွံ့ဖြိုးရေးလုပ်ငန်းများအား ထပ်မံဆောင်ရွက်သွားမည်ဖြစ်ပါကြောင်း၊ ငါးမှုန့်စက်ရုံမှ အနှံ့မထွက်စေရန် ကုန်ကြမ်းလတ်ဆတ်မှုရှိစေရန် ငါးဖမ်းလှေများနှင့်ညှိနှိုင်းဆောင်ရွက်လျှက် ရှိပါကြောင်း၊ အဆင်မပြေမှု များရှိပါက ပွင့်ပွင့်လင်းလင်း လာရောက်ဆွေးနွေးနိုင်ပါကြောင်း ပြောကြားသွားပါသည်။

COMMENTS BY SUGGESTION LETTERS DURING SECOND PUBLIC MEETING

စဉ်	အကြံပြုချက်	အကြံပြုဆွေးနွေးသူ
၁။	အကြံပြုချက်များ - Waste water treatment Plan Factory ကို [illegible] ပါသည်။ - [illegible] conveyer belt [illegible] vibrating machine [illegible] manudrive [illegible] Automachine [illegible] ပါသည်။ - [illegible] Japanese technology ကို [illegible] ပါသည်။	(လက်မှတ်) အမည် - အလုပ်အကိုင် - ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ် -

၂။	**အကြံပြုချက်များ** [illegible]	(လက်မှတ်) အမည် - ဒေါ်စိန် [illegible] အလုပ်အကိုင် - , ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ် - 09 4 2221 0462.
၃။	**အကြံပြုချက်များ** - အနံ့ထွက်ရှိမှုကို ထိန်းချုပ်နိုင်ရန် ဆက်လက် မီးနိုးဓါးတိုင်တွေ ဖြစ်မြဲထားရန်။ - မီးဖိုချောင်တွေကို အမိုးပိတ်ထားရှိမှသာ အနံ့ထွက်ရှိမှုကိုထိန်းချုပ်နိုင်ပါသည်။	(လက်မှတ်) အမည် - ဒေါ်ခင်သန်းမြင့် အလုပ်အကိုင် - ဝန်ထမ်း ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ် -
၄။	**အကြံပြုချက်များ** - အနံ့ထွက်ရှိမှုကို ထိန်းချုပ်နိုင်ရန် ဆက်လက် မီးနိုးဓါးတိုင်တွေ ဖြစ်မြဲထားရန်။ - မီးဖိုချောင်တွေကို အမိုးပိတ်ထားရှိမှသာ အနံ့ထွက်ရှိမှုကိုထိန်းချုပ်နိုင်ပါသည်။	(လက်မှတ်) အမည် - ဒေါ်ခင်သန်းမြင့် အလုပ်အကိုင် - ဝန်ထမ်း ဆက်သွယ်ရန်လိပ်စာ/ဖုန်းနံပါတ် -

APPENDIX- C
OFFICIAL PERMISSION LETTERS

ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်

Certificate of Incorporation

ပြည့်ဖြိုးထွန်း အင်တာနေရှင်နယ် ကုမ္ပဏီလီမိတက်

PYI PHYO TUN INTERNATIONAL COMPANY LIMITED

Company Registration No. 164028682

မြန်မာနိုင်ငံကုမ္ပဏီများအက်ဥပဒေ ၁၉၁၄ ခုနှစ် အရ

ပြည့်ဖြိုးထွန်း အင်တာနေရှင်နယ် ကုမ္ပဏီလီမိတက်

အား ၁၉၉၄ ခုနှစ် ဇန်နဝါရီလ ၇ ရက်နေ့တွင်

အစုရှယ်ယာအားဖြင့် တာဝန်ကန့်သတ်ထား သည့် အများနှင့်မသက်ဆိုင်သောကုမ္ပဏီ

အဖြစ် ဖွဲ့စည်းမှတ်ပုံတင်ခွင့် ပြုလိုက်သည်။

This is to certify that

PYI PHYO TUN INTERNATIONAL COMPANY LIMITED

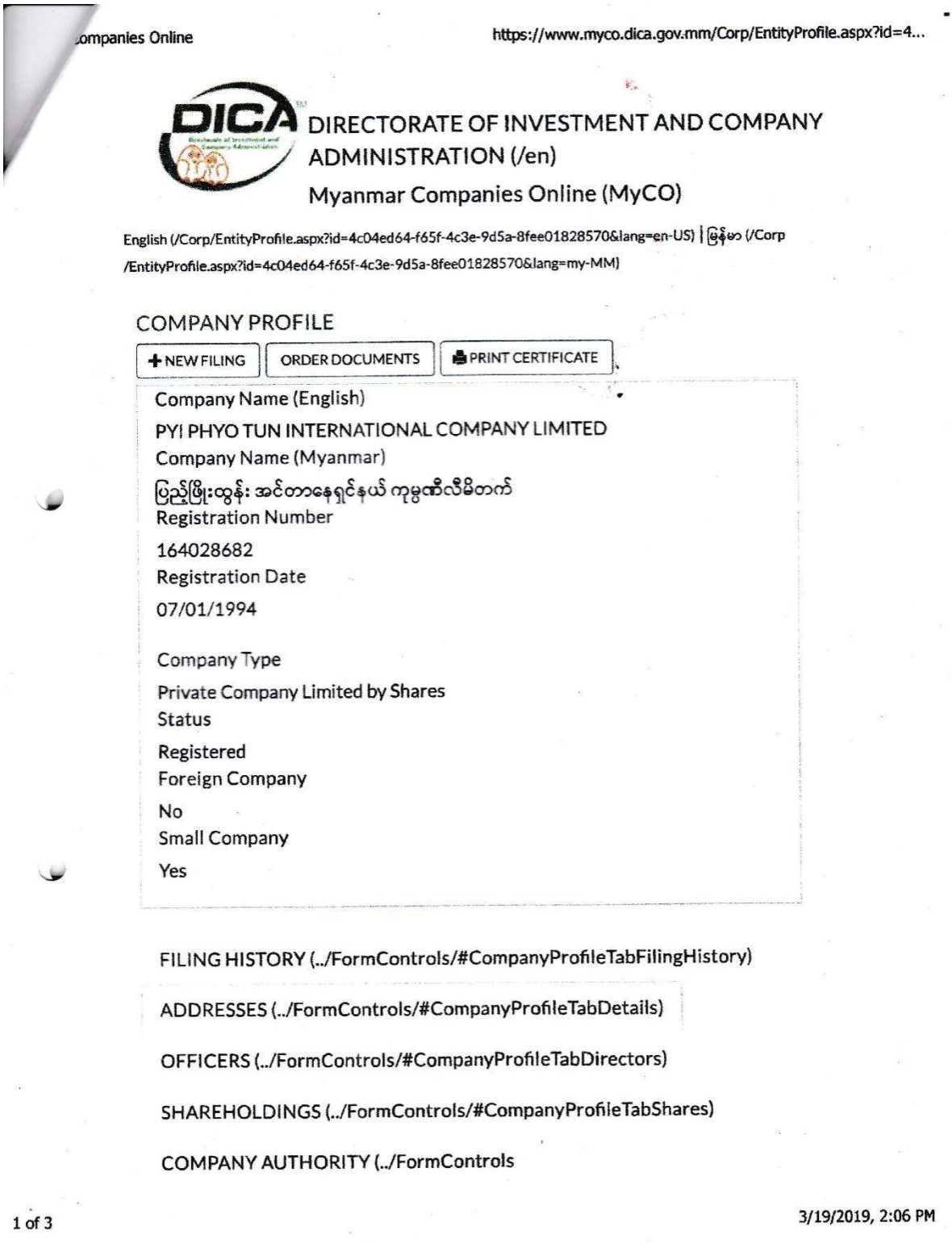
was incorporated under the Myanmar Companies Act 1914 on 7 January 1994 as a Private Company Limited by Shares.

ကုမ္ပဏီမှတ်ပုံတင်အရာရှိ

Registrar of Companies

ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန

Directorate of Investment and Company Administration



ompanies Online https://www.myco.dica.gov.mm/Corp/EntityProfile.aspx?id=4...

DIRECTORATE OF INVESTMENT AND COMPANY ADMINISTRATION (/en)

Myanmar Companies Online (MyCO)

English (/Corp/EntityProfile.aspx?id=4c04ed64-f65f-4c3e-9d5a-8fee01828570&lang=en-US) | မြန်မာ (/Corp/EntityProfile.aspx?id=4c04ed64-f65f-4c3e-9d5a-8fee01828570&lang=my-MM)

COMPANY PROFILE

+ NEW FILING | ORDER DOCUMENTS | PRINT CERTIFICATE

Company Name (English)
PYI PHYO TUN INTERNATIONAL COMPANY LIMITED
Company Name (Myanmar)
ပြည်ဖြိုးထွန်း အင်တာနေရှင်နယ် ကုမ္ပဏီလီမိတက်
Registration Number
164028682
Registration Date
07/01/1994

Company Type
Private Company Limited by Shares
Status
Registered
Foreign Company
No
Small Company
Yes

FILING HISTORY (../FormControls/#CompanyProfileTabFilingHistory)

ADDRESSES (../FormControls/#CompanyProfileTabDetails)

OFFICERS (../FormControls/#CompanyProfileTabDirectors)

SHAREHOLDINGS (../FormControls/#CompanyProfileTabShares)

COMPANY AUTHORITY (../FormControls

1 of 3 3/19/2019, 2:06 PM

/#CompanyProfileTabEntityAuthority)

MEMBERS (../FormControls/#CompanyProfileTabMembers)

DOCUMENTS (../FormControls/#CompanyProfileTabDocuments)

Type	Address	Effective Date
Principal Place Of Business In Union	No 15, 11 St Lanmadaw Tsp Yangon, Yangon, Myanmar 11131	17/09/2018
Registered Office In Union	11 St No 15, Lanmadaw Tsp, Yangon, Myanmar 11131	17/09/2018

() () ()

DICA ADDRESS:
No. 1, Thitsar Road
Yankin Township, Yangon

PROUDLY SUPPORTED BY:

ADB Japan Fund for Poverty Reduction From the People of Japan

POWERED BY: Paradigm Apps

/#CompanyProfileTabEntityAuthority)

MEMBERS (../FormControls/#CompanyProfileTabMembers)

DOCUMENTS (../FormControls/#CompanyProfileTabDocuments)

Name	Type	Nationality	N.R.C. (For Myanmar Citizens)	Effective Date
HLA THAN	Director	Myanmar	6/MAAHYA(N)057303	
KHIN THAN YI	Director	Myanmar	6/MAAHYA(N)027115	
MYAT THIRI KHAING	Director	Myanmar	12/LAMATA(N)035236	
DR. AUNG LWIN	Director	Myanmar	12/AHLANA(N)033879	
HSU THIRI NWE	Director	Myanmar	12/LAMATA(N)033421	
MYAT KO KO	Director	Myanmar	6/MAMANA(N)144704	
MYINT MYINT KYU	Director	Myanmar	6/MAAHYA(N)011598	
THET SANDAR	Director	Myanmar	12/DAGANA(N)023444	
TIN WAR	Director	Myanmar	6/MAAHYA(N)056432	

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/#CompanyProfileTabEntityAuthority)

MEMBERS (../FormControls/#CompanyProfileTabMembers)

DOCUMENTS (../FormControls/#CompanyProfileTabDocuments)

Total Shares Issued by Company
4003000
Currency of Share Capital
MMK

ULTIMATE HOLDING COMPANY

Company Name
Registration Number
Jurisdiction of Incorporation

SHARE CAPITAL STRUCTURE

Share Class	Class Title	Total No. Shares	Total Amount Paid	Total Amount Unpaid
ORD	Ordinary	4,003,000	4,003,000,000	0

000

/#CompanyProfileTabEntityAuthority)

MEMBERS (../FormControls/#CompanyProfileTabMembers)

DOCUMENTS (../FormControls/#CompanyProfileTabDocuments)

Account Number	Account Name	Status	Request Date
101740929 (/secured /ca/clientprofile.aspx?id=1017409)	Pyi Phyo Tun International Company Limited	Active	12/09/2018

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/#CompanyProfileTabEntityAuthority)

MEMBERS (../FormControls/#CompanyProfileTabMembers)

DOCUMENTS (../FormControls/#CompanyProfileTabDocuments)

Individual Members

Name	Nationality	N.R.C / Passport Number
DAW HSU THIRI NWE	Myanmar	12/LAMATA(N)033421
DAW KHIN THAN YI	Myanmar	6/MAAHYA(N)027115
DAW MYAT THIRI KHAING	Myanmar	12/LAMATA(N)035236
DAW MYINT MYINT KYU	Myanmar	6/MAAHYA(N)011598
DAW THET SANDAR	Myanmar	12/DAGANA(N)023444
DAW TIN WAR	Myanmar	6/MAAHYA(N)056432
DR. AUNG LWIN	Myanmar	12/AHLANA(N)033879
U HLA THAN	Myanmar	6/MAAHYA(N)057303
U MYAT KO KO	Myanmar	6/MAMANA(N)144704

Corporate Members

Name	Registration Number	Jurisdiction Of Incorporation

() () ()

APPENDIX – D

TEST RESULTS (WATER)

The Republic of The Union of Myanmar
Ministry of Health and Sports
Department of Medical Services
National Health Laboratory
No.(35),Hmaw Kon Daik Street,Dagon Township,Yangon
Ph . 371957 Fax : 371925

LABORATORY REPORT

WATER CHEMICAL ANALYSIS REPORT

Name : Pyi Phyo Tun Int'L Co Ltd
Lab. Code No. : 1838
Date of Receipt : 24.11.1017
Date of Report : 4.12.2017
Reg: No : 137
Reg: Vol. No : 20
Address : No.15,11th street , Lamadaw Township Yangon
Source of Water : ဓရုသန့်ဓရ

Test	Result	Unit	Maximum Permissible Limit
Colour (TCU)	Nil	Pt-Co	20
Turbidity	Nil	NTU	5
Total dissolved solvents (TDS)	30.80	mg/l	1000
Chloride	17.60	mg/l	250
Total hardness (as $Ca CO_3$)	10.00	mg/l	500
Iron	0.15	mg/l	1
pH	6.99		6.5-8.5
Sulphate	1.00	mg/l	400
Calcium	2.40	mg/l	200
Magnesium	1.12	mg/l	150
Electrical conductivity	44.00	µs/cm	1500
Arsenic	0.00	ppm(mg/l)	≤ 0.05

Remark
Within maximum permissible limit.

Technician

Dr.Swe Setk
Senior Consultant Pathologist
Head of Clinical Pathology
National health Laboratory
Yangon

The Republic of The Union of Myanmar
Ministry of Health and Sports
Department of Medical Services
National Health Laboratory
[illegible]
[illegible]

LABORATORY REPORT

WATER CHEMICAL ANALASIS REPORT

Name : Pyi Phyo Tun Int's Co,Ltd Lab. Code No. : 945
Date of Receipt : 15.6.2018 Date of Report : 21.6.2018
Reg: No : 110 Reg: Vol. No : 21
Address : Lanmadaw Township ,Yangon
Source of Water : ရေသန့် ရေ

Test	Result	Unit	Maximum Permissible Limit
Colour (TCU)	Nil	Pt-Co	20
Turbidity	Nil	NTU	5
Total dissolved solvents (TDS)	34.90	mg/l	1000
Chloride	8.60	mg/l	250
Total hardness (as Ca CO_3)	30.00	mg/l	500
Iron	0.15	mg/l	1
pH	6.86		6.5-8.5
Sulphate	5.00	mg/l	400
Calcium	4.00	mg/l	200
Magnesium	5.60	mg/l	150
Electrical conductivity	63.20	µs/cm	1500

Remark
Within maximum permissible limit.

Technician

Dr.Swe Setk
Senior Consultant Pathologist
Head of Clinical Pathology
National health Laboratory
Yangon