

ENVIRONMENTAL MANAGEMENT PLAN
FOR
RICE HUSK POWER GENERATION PROJECT

EMP REPORT

Project Proponent



**Myaung Mya FM Biomass
Power Co., Ltd.**

Prepared by



**E Guard Environmental
Services Co., Ltd.**

October, 2019

DISCLAIMER

This report has been prepared by third party, E Guard Environmental Services for Myaung Mya FM Biomass Power Co., Ltd. for the Rice Husk Power Generation Project located at No. 22, Motesoe Field, Danone Chaung Taung Village, Myaung Mya District, and Ayeyarwaddy Region, Myanmar. The report preparation was done inside the framework of Myanmar EIA Procedure 2015.

The analysis works had been done based on the provided data of the proposed plan of project from Myaung Mya FM Biomass Power Co., Ltd. and onsite observation of environmental parameters guided by Myanmar Government Environmental Authority, Environmental Conservation Department, hereinafter ECD.

The impact assessment and mitigation measures are prepared based on the facts and figures of detail plan/process of the project obtained from the Myaung Mya FM Biomass Power Co., Ltd.

Moreover, this report has been prepared in line with the prevailing active Laws, Rules, Procedures, Guidelines, and Standards etc. of Myanmar Legal System on (October, 2019).

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Report Review Form

Report Title: Environmental Management Plan (EMP) Report for Rice Husk Power Generation Project	
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Summary: EMP Report This document presents the Environmental Management Plan (EMP) report as required for Rice Husk Power Generation Project	Approved by:

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Commitment to follow and compliance with Environmental Conservation Law, Rules, Environmental Impact Assessment Procedure, National Environmental (Quality) Emission Guidelines, Standards and Mitigation Measures stated in the Environmental Management Plan (EMP) of EMP Report

With regard to the above matter, we, E Guard Environmental Services has prepared the Environmental Management Plan (EMP) Report for Rice Husk Power Generation Project of Myaung Mya FM Biomass Power Co., Ltd. Our company strongly commits that this EMP report has been prepared by following Environmental Conservation Law (2012), Environmental Conservation Rules (2014), Environmental Impact Assessment Procedure (2015), National Environmental (Quality) Emission Guidelines (2015) and relevant environmental standards through successful implementation of mitigation measures and monitoring plan stated in the Environmental Management Plan (EMP) report.



Aye Thiha
Managing Director
E guard Environmental Services

Third Party

E Guard Environmental Services



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LIST OF ABBREVIATIONS

ACF	: Activated carbon filter
As	: Arsenic
BOD	: Biochemical Oxygen Demand
BTG	: Boiler, Turbine and Generator
CN	: Cyanide
CO	: Carbon Monoxide
CO ₂	: Carbon dioxide
COD	: Chemical Oxygen Demand
CSR	: Corporate Social Responsibilities
Cu	: Copper
dB (A)	: Decibel unit
DMF	: Dual Media Filter
ECC	: Environmental Compliance Certificate
ECD	: Environmental Conservation Department
EDI	: Electrode ionization
EMP	: Environmental Management Plan
ESP	: Electrostatic Precipitator
F	: Fluoride
HSE	: Health, Safety and Environment
IEMA	: Institute of Environmental Management and Assessment
km	: Kilometer
kWh	: Kilo Watt Hour
MAPCO	: Myanmar Agribusiness Public Corporation
mg/l	: Milligram per Liter
MIC	: Myanmar Investment Commission
MOECAF	: Ministry of Environmental Conservation and Forestry
MONREC	: Ministry of Natural Resources and Environmental Conservation
MWh	: Mega Watt per Hour
NEQ	: National Emission Quality
NO ₂	: Nitrogen Dioxide
NO _x	: Nitrogen Oxide
Pb	: Lead
pH	: Potential of Hydrogen
PM	: Particulate Matter
ppm	: Part Per Million
RO	: Reverse Osmosis
SO ₂	: Sulphur dioxide
TSP	: Total Suspended Particulates
TSS	: Total Suspended Solid
WHO	: World Health Organization
%	: Percentage
µg/m ³	: Micro Gram per Cubic meter
µm	: Micro Milligram
°C	: Degrees Celsius

Executive Summary

This report is Environmental Management Plan (EMP) for Rice Husk Biomass Power Plant developed by Myaung Mya FM Biomass Power Co., Ltd. which is conducted by E Guard Environmental Services. The specific objectives of this study are:

- 1) Identify the major impacts that may arise from the activities of the proposed project on natural environment and socio-economic environment of the project area,
- 2) Describe the mitigation measures to minimize these impacts,
- 3) Prepare and implement Environmental Management Plan for the project,
- 4) Make sure that EMP is developed sufficiently and soundly for the proposed project
- 5) Implement Corporate Social Responsibility Plan (CSR Plan) which plays an essential part for the improvement of the social welfare of the community as well as the development of the region.

The power plant is located at Danone Chaung Taung Village, No.22, Motesoe Field, Myaung Mya Township, Myaung Mya District, Ayeyarwaddy Region and site area is 1.1 acre. It is inspected by Myanmar Investment Commission (MIC) and Environmental Conservation Department, Ayeyarwady (ECD) suggests implementing EMP report. Before land filling with sand and starting the civil work at the project site, soil test was done to get the baseline data of the soil condition. Currently, all the civil work and erection work were completed according to the Master Schedule **APPENDIX XIII**.

The raw materials are rice husk and Ywe river water for production of electricity which will be distributed 1.8 MW gross through off grid to the neighbored rice mill and rice brand mill by using waste to energy technology. The machinery and equipment used in the power plant are purchased from India. This project is joint venture investment (80% Fujita Corporation, 20% MAPCO) for 70 years. Moreover, Board of Directors, total amount of investment, maps of the project, organization chart and machine used for this project are described. The project will promote the environment and socio-economic development of the Ayeyarwaddy Region and provide the electricity for the local people in future.

Generally, it is a 1.8 MW gross electric power generation plant which will use rice husk as raw material nearby rice mill in the atmospheric Fluidized Bed Type Boiler to generate steam which in turn, will be rotated the Turbine generator for producing power. The power-generation technology to be used in the project will be the Boiler Turbine-Generator (BTG) method. It is a technology that has already been applied in numerous rice-husk power generation projects in other countries and can operate continuously. Required raw materials will get from the rice mill, which will use electricity distributing from the rice husk power plant by using waste to energy technology and other mills if necessary. The process flow of the rice husk power generation which is operated in Myaung Mya FM Biomass power plant is as mentioned. The stored rice husk is transferred through conveyer to the boiler and burned at the 450 °C. The emitted gas is distilled with treated water and then the steam rotates the turbine and generated the electricity by the generator. The fly ash as the byproduct of this process will be collected by the electrostatic precipitator (ESP).

This Environmental Management Plan (EMP) report is prepared for the proposed 1.8 MW Gross Rice Husk BTG Power Plant of Myaung Mya FM Biomass Power Generation Co., Ltd. has written according to the Environmental Impact Assessment (EIA) Procedure (2015) by E Guard Environmental Services Co., Ltd. This report will follow up the principles, procedures, related laws, methods and approach which need to control and mitigate environmental impacts of construction, operation and decommissioning activities. (*See detail in CHAPTER 1: DESCRIPTION OF THE PROJECT*)

The responsible persons for reporting this EMP are described in **CHAPTER 2**. Laws and regulations related to manufacturing of Rice Husk Biomass Power generation and authorized institution are currently practiced in Myanmar and also described detail in **CHAPTER 3**.

Primary data and secondary data collections are very important. Primary data collections like environmental quality measurements play an important role for conducting EMP. To test water quality, water from the Ywe River that has been existed near the project site was collected on 2017, October 26 and was tested in the ISO Tech Laboratory, SGS Laboratory and Occupational and Environmental Health Laboratory. And air, noise and vibration data were measured in the proposed project site by EPAS, Digital Sound Level Meter and Vibration Level Meter on October 27 and 28 of 2017. The observed values are compared with National Emissions Quality (NEQ) Guidelines and WHO Guidelines. In this study, air and noise data are within in guideline. In the water quality, the color of the water and total suspended solids are higher than the limit but the rest parameter are within the guideline.

For baseline data of air quality, particulate matters and gas emission are within the guidelines of NEQ and WHO. For baseline data of water quality, color, total suspended solids and turbidity are higher than the WHO guidelines for water and NEQ guidelines which mean the original water quality is undesirable for standard water quality. Baseline noise quality is also under the limit of guideline value. The secondary data for surrounding proposed environment such as weather, rainfalls, socio-economic and land use data has been used from Myaung Mya's Township data of General Administrative Department. In addition to that, since the project site is located in the Industrial Zone, there are no sensitive cultural heritage assets in this area. (*See details in CHAPTER 4: DESCRIPTION OF THE SURROUNDING ENVIRONMENTAL AND SOCIAL CONDITIONS*)

Possible impacts, such as impacts on environmental resources, ecological resources, human and waste disposal due to production processes are identified and their significance is assessed by using impact assessment methodology. Potential impacts are differentiated into three main phases, viz., **Construction phase, Operation phase and Decommissioning phase**.

As this project will be operated in 2019, the assessment of each impact is based on the criteria of the mentioned table and individual project activity causing impacts was considered by multiplication of weighting of each respective criterion.

No.	Description	Criteria	Indicators	Weighting		
				1	2	3
1	Environmental Impact	Severity	Toxicity	Low	Medium	High
			Quantity	Small	Average	Large
			Impact on human and environment	Low	Medium	High
		Occurrence	Period	Annual or never occurrence	Monthly or weekly frequency	Daily frequency or chronicle
		Level of Control	Detection	Easy	Average	No
Precaution	Important		Medium	No		
2	Business Impact	Legal compliance	Regulatory control	For existing legislation	For near future (impending or amending legislation)	No
		Stakeholder complaint	Objection	No	Potential	Serious
Overall score = Weighting of (Severity * Occurrence * Level of Control * Legal Compliance * Stakeholder Complaint)						

Severity (S)

This criterion is used to evaluate the effects on man and environment, depending on the toxicity, quantity and impact of the activities.

Weighting	Description
1	Low severity: low toxicity, low quantity, low impact on man and environment
2	Medium severity: medium toxicity, averaged quantity, low effect on environment
3	High severity: high toxicity, very important quantity, high impact on environment

Occurrence (O)

This criterion is corresponding to the frequency of the impact occurrence.

Weighting	Description
1	Low: Annual frequency or never occurred
2	Medium: Monthly or Weekly Frequency
3	High: Daily frequency or chronicle

Level of Control (C)

This criterion is used to evaluate the level of control of the aspect, depending on the detection, available means, the operating procedures and the precautions taken.

Weighting	Description
1	High, easy detection and control with operating procedures regularly checked and/or important precautions taken to lower impact
2	Medium detection and control with operation procedures not regularly checked and/or average precautions taken to lower impact
3	No control, no detection and/or no precaution taken to lower impact

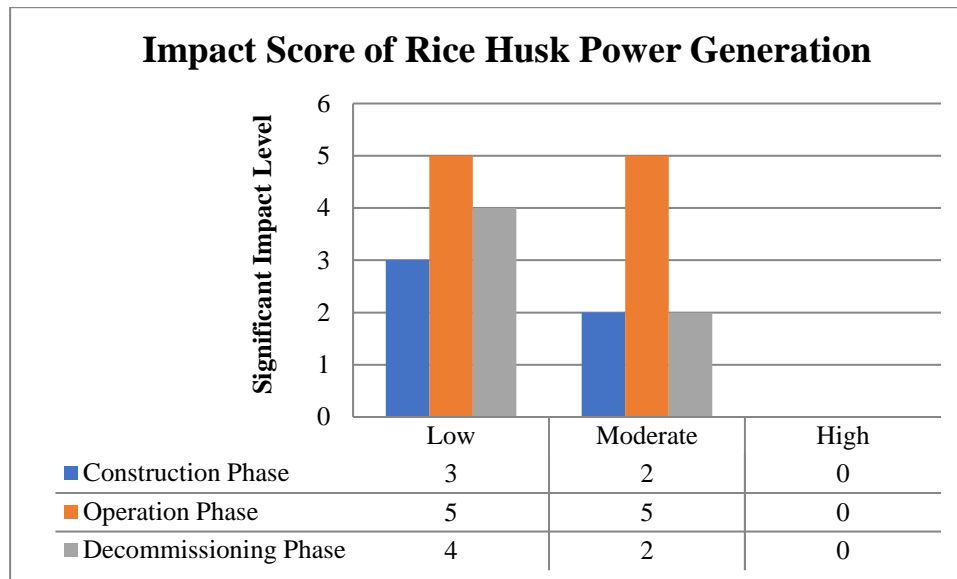
Legal Compliance

Weighting	Description
1	Subject to be existing regulatory controls (local, international and company regulations)
2	Subject to regulatory control in the near future (Impending or amending legislation within the next 5 years)
3	No regulatory control

Complaint from Stakeholders

Weighting	Description
1	No complaint
2	Potential to a cause of serious complaint
3	Complaint raised by partners, neighbors, customers, employees and communities

Score	Significance of Impact	Significance Description
1 – 60	Low	No significant impact
61 – 121	Moderate	Low impact, try to improve
122 – 182	High	Significant impact, real necessity to improve
183 – 243	Very High	Unsustainable situations



In the proposed rice husk power generation, according to the assessment method, the rice husk power generation project could not be expected to have significant impact during three phases (construction, operation and decommissioning). The plant could not be expected to have significant impacts on air pollution, noise pollution, and water pollution during construction phase because the project site is situated at the old jute factory and far from resident area and impact of construction activities are within the manageable limit. However, the operation activities of the power plant can affect moderate impacts to the air pollution, waste disposal, noise pollution and occupational health. All of these impacts are small scales site level, so as appropriate mitigation measure plan should be provided for provision of operation phase and PPE also provide for employees working with operation machinery equipment for checking boiler. (See detail in CHAPTER 5: IMPACT IDENTIFICATION AND ASSESSMENT)

It is important to disclose the information about the project during the preparation of EMP report and the opinion of all stakeholders should be considered in the preparation of the EMP report. So, public consultation meeting for the proposed project was held on 28th October, 2017 at the proposed project site. (See detail in CHAPTER 6: PUBLIC CONSULTATION)

The environmental management practices, procedures and responsibilities are defined to get full compliance with the existing environmental policy, laws, rules and regulations of the Republic of the Union of Myanmar. There are five main sections in this Environmental Management Plan (EMP):

- Environmental Mitigation Plan
- Environmental Monitoring Plan
- Emergency Response Plan
- Grievance Redress Mechanism (GRM)
- Cooperate Social Responsibility (CSR) Plan

Moreover, cost estimation for EMP and EMOP are also described. The **Environmental Management Plan (EMP)** identifies potential environmental impacts, source of impacts,

how to mitigate these impacts and residual impacts after mitigation and responsible persons for both operation and decommissioning phases. The **Environmental Monitoring Plan (EMOP)** identifies parameters, frequency and responsible persons to monitor for air and water quality and noise level for two phases. The **Emergency Preparedness and Response Plan** identifies how to overcome emergency cases and effectively. The **Grievance Redress Mechanism (GRM)** identifies the steps to solve complaints related with the proposed project. This EMP has, in brief, systematically explored all possible positive and negative environmental impacts of the proposed project and identified mitigation and monitoring measures on negative impacts which can occur in three phases. The **Corporate Social Responsibility (CSR) Plan** aims to secure social well-being of the employees and their family members, better community living and transparent and friendly relationship with neighboring communities. (*See details in CHAPTER 7: ENVIRONMENTAL MANAGEMENT PLAN (EMP)*)

In conclusion, this project can develop socio-economic conditions of the local communities by introducing the waste to energy technology (low carbon emission) in which electricity distribution during the operation phase. Even though the potential impacts for the environment are moderate in air quality, solid waste disposal and fire hazard, if the mitigation measures will be followed during three phases, the impacts will be minimized to be low to the environment and socio-economic conditions. Finally, the proponent should follow the comments and suggestions made by ECD after reviewing this EMP report. Once EMP is approved by concerned authorities, effective implementation of EMP, effective implementation of EMP by the project proponent is essential. The proponent should abide by environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar. (*See detail in CHAPTER 8: CONCLUSIONS AND RECOMMENDATIONS*)

အစီရင်ခံစာအကျဉ်းချုပ်

ဤပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီရင်ခံစာသည် Myaung Mya FM Biomass Power Co., Ltd. မှ အဆိုပြုထားသည့် Rice Husk Power Plant စီမံကိန်းအတွက် E Guard Environmental Services မှ ဦးစီးကာ ဆောင်ရွက်ထားခြင်း ဖြစ်ပါသည်။ ယခု လေ့လာဆန်းစစ်ခြင်း၏ သီးခြား သတ်မှတ်ထားသော ရည်ရွယ်ချက်များမှာ -

- သဘာဝပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားပတ်ဝန်းကျင်တို့အပေါ် စီမံကိန်း ဆောင်ရွက်ချက်များ ကြောင့် ထိခိုက်မှုများကို လေ့လာရန်။
- ထိုထိခိုက်မှုများကို လျော့ချနိုင်ရန် လျှော့နည်းစေမည့် နည်းလမ်းများကို ဖော်ပြရန်။
- စီမံကိန်းအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို ပြင်ဆင်ရန်နှင့် အကောင်အထည် ဖော်ရန်။
- စီမံကိန်းအတွက် ကနဦးပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း လုပ်ဆောင်ရာတွင် လုံလောက်မှုရှိစေရန်။
- ဒေသခံများ၏ လူမှုရေးရာ သက်သာချောင်ချိမှုများ တိုးမြှင့်ရန်နှင့် ဒေသတွင်း ဖွံ့ဖြိုး တိုးတတ်မှုများအတွက် အရေးပါသော လူမှုစီးပွားတာဝန်ယူမှုအစီအစဉ်အား အကောင်အထည်ဖော်ရန် တို့ဖြစ်ပါသည်။

ဓာတ်အားပေးစက်ရုံသည် ဧရာဝတီတိုင်းဒေသကြီး၊ မြောင်းမြခရိုင်၊ မြောင်းမြမြို့နယ်၊ မုဆိုးကွင်း၊ အမှတ် (၂၂)၊ ဓနုန်းချောင်းရွာတွင် တည်ရှိပြီး စီမံကိန်းဧရိယာသည် ၁.၁ ဧက ကျယ်ဝန်းပါသည်။ ဤပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီရင်ခံစာကို မြန်မာနိုင်ငံရင်းနှီးမြုပ်နှံမှုကော်မရှင်နှင့် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဦးစီးဌာနမှ အကြံပြုစစ်ဆေးသွားမည်ဖြစ်ပါသည်။ စီမံကိန်းဧရိယာတွင် မြေညှိခြင်း နှင့် တည်ဆောက်ရေးလုပ်ငန်းများ မစတင်မီ အခြေခံမြေအရည်အသွေးအချက်အလက်များအား စစ်ဆေးတိုင်းတာထားပြီး ဖြစ်သည်။ ယခုအချိန်တွင် တည်ဆောက်ရေးလုပ်ငန်းစဉ်များအား နောက်ဆက်တွဲ ၁၃ တွင် ဖော်ပြထားသည့် ပင်မအချိန်ဇယား (Master Schedule) အတိုင်း တည်ဆောက်ပြီးစီးခဲ့ပြီး ဖြစ်သည်။

လျှပ်စစ်ထုတ်လုပ်ရန်အတွက် ကုန်ကြမ်းပစ္စည်းများမှာ စပါးခွံ နှင့် ရွှေးမြစ်ရေကို အသုံးပြုထားပြီး စုစုပေါင်း လျှပ်စစ် ၁.၈ မဂ္ဂါဝပ် ထုတ်လွှတ်ပေးမည် ဖြစ်ပါသည်။ အနီးပတ်ဝန်းကျင်ရှိ ဆန်စက်မှ စွန့်ပစ်ပစ္စည်းများကို အသုံးပြုထားသော စက်ယန္တရားများနှင့် အသုံးပြုသွားမည်ဖြစ်သည်။ ဓာတ်အားပေးစက်ရုံတွင် အသုံးပြုထားသော စက်ယန္တရားများနှင့် ကိရိယာများကို အိန္ဒိယမှ တင်သွင်းမည် ဖြစ်ပါသည်။ ယခုစီမံကိန်းသည် Fujita Corporation မှ ၈၀ ရာခိုင်နှုန်း၊ MAPCO မှ ၂၀ ရာခိုင်နှုန်း ထည့်ဝင်ထားသော နှစ်ပေါင်း (၇၀) ဖက်စပ် ရင်းနှီးမြုပ်နှံမှု စီမံကိန်းအမျိုးအစား ဖြစ်သည်။ ထို့အပြင် ဘုတ်အဖွဲ့ဝင် ဒါရိုက်တာများ၊ စုစုပေါင်း ရင်းနှီးမြုပ်နှံမှု၊ စီမံကိန်း၏ မြေပုံများ၊

ဖွဲ့စည်းပုံဇယားနှင့် စီမံကိန်းအတွက် အသုံးပြုထားသော စက်ပစ္စည်းများကိုလည်း ဖော်ပြထားပါသည်။ ဤစီမံကိန်းသည် မြောင်းမြခရိုင်၏ ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားဖွံ့ဖြိုးတိုးတတ်ရေးကို လုပ်ဆောင် သွားမည်ဖြစ်ပြီး အနာဂတ်တွင်လည်း ဒေသခံများအတွက် လျှပ်စစ်မီးကို ထောက်ပံ့ပေးသွားမည် ဖြစ်ပါသည်။

ယေဘုယျအားဖြင့် ဤစုစုပေါင်းလျှပ်စစ် ၁.၈ မဂ္ဂါဝပ် ထုတ်လုပ်ပေးသည့် ဇီဝလောင်စာ ဓာတ်အားပေးစက်ရုံသည် စွမ်းအင်ထုတ်လွှတ်ပေးသည့် တာဘိုင်ဂျနရေတာများကို လည်ပတ်စေမည့် ရေနွေးငွေ့ကို ထုတ်ပေးသော **Atmospheric Fluidized Bed Type Boiler** အတွက် အနီးအနားရှိ ဆန်စက်မှ စပါးခွံများကို ကုန်ကြမ်းအဖြစ် အသုံးပြုသွားမည်ဖြစ်သည်။ စီမံကိန်းတွင် အသုံးပြုသော စွမ်းအင် လည်ပတ်ခြင်းနည်းပညာကို ဘွိုင်လာ-တာဘိုင်-ဂျနရေတာနည်း (**Boiler Turbine-Generator, BTG**) ဖြင့် အသုံးပြုမည်ဖြစ်ပါသည်။ ယခုနည်းပညာသည် အခြားသော နိုင်ငံများရှိ စပါးခွံသုံး ဓာတ်အားပေးစက်ရုံများတွင်လည်း တွင်ကျယ်စွာ အသုံးပြုလျက်ရှိပြီး စဉ်ဆက်မပြတ်လည်ပတ်နိုင်သော နည်းပညာဖြစ်ပါသည်။ လိုအပ်သော ကုန်ကြမ်းများကို စွန့်ပစ်ပစ္စည်းမှ စွမ်းအင်ထုတ်လုပ်သည့် နည်းပညာကို အသုံးပြုထားသည့် စပါးခွံဓာတ်အားပေးစက်ရုံမှ ဖြန့်ဝေပေးသော လျှပ်စစ်ကို အသုံးပြုနေသည့် နည်းပညာကို အသုံးပြုထားသည့် စပါးခွံဓာတ်အားပေးစက်ရုံမှ ဖြန့်ဝေပေးသော လျှပ်စစ်ကို အသုံးပြုနေသည့် ဆန်ကြိတ်စက်မှ ရရှိနိုင်ပြီး လိုအပ်ပါက အခြားသော ဆန်စက်များမှလည်း ရရှိနိုင်သည်။ မြောင်းမြဇီဝလောင်စာ ဓာတ်အားပေးစက်ရုံတွင် အသုံးပြုလည်ပတ်နေသော စပါးခွံသုံးစွမ်းအင်ထုတ်လုပ်ခြင်း၏ ဖြစ်စဉ်ပြဇယားများကို ဖော်ပြထားပါသည်။ သို့လျှောက်ထားသော စပါးခွံများကို ကွန်ဗေရာမှတစ်ဆင့် ဘွိုင်လာသို့ သယ်ဆောင်သွားပြီး အပူချိန် (၄၅၀) ဒီဂရီဆဲလ်စီးရပ်စ်တွင် မီးလောင်စေပါသည်။ ထွက်လာသော အငွေ့များကို သန့်စင်ထားသော ရေဖြင့် ပေါင်းခံပြီးနောက် ရေနွေးငွေ့ဖြင့် တာဘိုင်ကို လည်ပတ်စေကာ ဂျနရေတာဖြင့် လျှပ်စစ်မီး ထုတ်ပေးခြင်း ဖြစ်ပါသည်။ ဖြစ်စဉ်အရ ဘေးထွက်ပစ္စည်းအဖြစ် ထွက်လာသော ပြာမှုန့်များကို **electrostatic precipitator (ESP)** ဖြင့် ဖမ်းယူသွားမည် ဖြစ်ပါသည်။

Myaung Mya FM Biomass Power Generation Co., Ltd. ၏ စုစုပေါင်း လျှပ်စစ် ၁.၈ မဂ္ဂါဝပ် ထုတ်ပေးမည့် စပါးခွံသုံးလောင်စာ ဓာတ်အားပေးစက်ရုံအတွက်ဖြစ်သော ဤပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီရင်ခံစာသည် **E Guard Environmental Services** မှ ၂၀၁၅ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း (၂၀၁၅) (**Environmental Impact Assessment (EIA) Procedure (2015)**) အရ ရေးဆွဲထားခြင်းဖြစ်သည်။ ယခုအစီရင်ခံစာသည် စီမံကိန်း တည်ဆောက်ခြင်း၊ လည်ပတ်ခြင်းမှ ဖြစ်ပေါ်လာသော ပတ်ဝန်းကျင်ဆိုင်ရာထိခိုက်မှုနှင့် စီမံကိန်းဖျက်သိမ်းသည့် ကာလတွင် လုပ်ဆောင်ချက်များအတွက် ဖော်ပြထားသော အခြေခံမူ၊ လုပ်ထုံးလုပ်နည်းများ၊

သက်ဆိုင်ရာဥပဒေများနှင့် နည်းလမ်းများကို လိုက်နာသွားမည်ဖြစ်သည်။ (အသေးစိတ်ကို အခန်း ၃ တွင် ဖတ်ရှုရန်)

ဤပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှု အစီရင်ခံစာအတွက် တာဝန်ရှိသောသူများကို အခန်း ၂ တွင် ဖော်ပြထားပါသည်။ စပါးခွံလောင်စာသုံး စွမ်းအင်ထုတ်လုပ်ရေးနှင့် သက်ဆိုင်သော ဥပဒေနှင့် စည်းမျဉ်းများအပြင် မြန်မာနိုင်ငံတွင် ကျင့်သုံးလျက်ရှိသော အခွင့်အာဏာ အဖွဲ့အစည်းများ အကြောင်းကို အခန်း ၃ တွင် အသေးစိတ် ဖော်ပြထား ပါသည်။

ကနဦးစစ်တမ်းကောက်ယူခြင်းနှင့် ဒေသဆိုင်ရာအချက်အလက်များရယူခြင်းသည် အလွန် အရေးကြီးပါသည်။ ပတ်ဝန်းကျင်အရည်အသွေးတိုင်းတာခြင်းကဲ့သို့သော ကနဦးစစ်တမ်း ကောက်ယူခြင်းသည် ပတ်ဝန်းကျင်ဆိုင်ရာ စီမံခန့်ခွဲမှုအစီအစဉ်တွင် အရေးပါသော အခန်းအဖြစ် တည်ရှိနေသည်။ စီမံကိန်း လုပ်ငန်းခွင်အနီးတွင် တည်ရှိသော ရွေးမြစ်မှ ရေအရည်အသွေး ဆန်းစစ်ရန် အောက်တိုဘာ ၂၆ ရက် ၂၀၁၇ တွင် ရေကို ယူပြီး ISO Tech, SGS, Occupational and Environmental Health ဓာတ်ခွဲခန်းများတွင် စမ်းသပ်ခဲ့ပါသည်။ EPAS, Digital Sound Level Meter and Vibration Level Meter တို့ဖြင့် ၂၀၁၇ အောက်တိုဘာလ ၂၇ နှင့် ၂၈ ရက်တို့တွင် (၂၄ နာရီဆက်တိုက်) လေအရည်အသွေး၊ အသံနှင့် တုန်ခါမှုတို့ကို စီမံကိန်းနေရာတွင် တိုင်းတာမှု ပြုလုပ်ခဲ့ပါသည်။ ရရှိလာသော အချက်အလက်များကို အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (NEQEG) နှင့် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့အစည်း (WHO) အတိုင်း နှိုင်းယှဉ်တိုင်းတာခဲ့ပါသည်။ တိုင်းတာချက်များအရ လေအရည်အသွေးနှင့် ဆူညံသံသည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ အတွင်း တည်ရှိနေပါသည်။ ရေအရည်အသွေးအနေဖြင့် ရေ၏ အရောင်နှင့် စုစုပေါင်း အနည်ပါဝင်မှု သည် ကန့်သတ်ချက်ထက်ကျော်လွန်နေသော်လည်း ကျန်ရှိသော တိုင်းတာမှုများသည် လမ်းညွှန်ချက်များအတွင်း ရှိနေပါသည်။

အခြေခံတိုင်းတာချက်များအနေဖြင့် လေအရည်အသွေး၊ ဖုန်မှုန့်နှင့် အငွေ့ထုတ်လွှတ်မှုများသည် အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (NEQEG) နှင့် ကမ္ဘာ့ကျန်းမာရေးအဖွဲ့အစည်း (WHO) အတွင်း တည်ရှိနေပါသည်။ ရေအရည်အသွေးအနေဖြင့် ရေ၏အရောင်၊ စုစုပေါင်း အနည်ပါဝင်မှုနှင့် နောက်ကျိမှုများသည် ရေနှင့်ဆိုင်သော အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များထက် ကျော်လွန်နေသည်ကို တွေ့ရှိရပါသည်။ ဆိုလိုရင်းအနေဖြင့် မူလရေသည် ရေအရည်အသွေး၏ စံသတ်မှတ်ချက်နှင့် မကိုက်ညီပါ။ ဆူညံမှုတိုင်းတာချက်သည် လမ်းညွှန်ချက်တန်ဖိုးအောက် ရှိနေပါသည်။ ဒေသဆိုင်ရာ မှ ဆူညံမှုတိုင်းတာချက်သည်လည်း လမ်းညွှန်ချက်တန်ဖိုးအောက် ရှိနေပါသည်။ ဒေသဆိုင်ရာ အချက်အလက်များ ရယူခြင်းအတွက် အထွေထွေအုပ်ချုပ်ရေး ဦးစီးဌာနမှ ရရှိသော ရာသီဥတုနှင့်

မိုးရေချိန်၊ လူမှုစီးပွားနှင့် မြေယာအသုံးပြုမှုစသည့် အဆိုပြုထားသော ပတ်ဝန်းကျင်ဆိုင်ရာ အချက်အလက်များကို အသုံးပြုထားပါသည်။ ထို့အပြင် စီမံကိန်းတည်နေရာသည် စက်မှုဇုန် အတွင်း တည်ရှိသောကြောင့် မည်သည့် ယဉ်ကျေးမှုအမွေအနှစ်များကို ထိခိုက်မည်မဟုတ်ပါ။
(အသေးစိတ်ကို အခန်း ၅ တွင် ဖတ်ရှုရန်)

ထုတ်လုပ်မှုလုပ်ငန်းစဉ်များအရ ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများဖြစ်သည့် ပတ်ဝန်းကျင် ဆိုင်ရာ အရင်းအမြစ်များ၊ ဂေဟစနစ်အရင်းအမြစ်များ၊ လူသားနှင့် စွန့်ပစ်ပစ္စည်း စွန့်ပစ်ခြင်းများကို ၎င်းတို့၏ သိသာထင်ရှားမှုများအလိုက် သက်ရောက်မှုအကဲဖြတ်နည်းစနစ်ကို အသုံးပြု၍ အမျိုးအစား ခွဲခြားထားပါသည်။ အလားအလာရှိသော သက်ရောက်မှုများသည် တည်ဆောက်ရေး ကာလ၊ လုပ်ငန်းလည်ပတ်ကာလနှင့် လုပ်ငန်းဖျက်သိမ်းကာလ အပေါ်လိုက်၍ ကွဲပြားမှုရှိပါသည်။

ယခုစီမံကိန်းသည် ၂၀၁၉ တွင် လည်ပတ်မည် ဖြစ်သောကြောင့် သက်ရောက်မှုတစ်ခုခြင်းစီ အတွက် အကဲဖြတ်မှုသည် ဖော်ပြထားသော စံသတ်မှတ်မှုများဇယားနှင့် သက်ရောက်မှု ဖြစ်စေသော စီမံကိန်း၏ သီးခြားလှုပ်ရှားမှုအရ စံသတ်မှတ်ထားခြင်းတစ်ခုစီ၏ တွက်ဆချက်များ ကို မြောက်ပေးခြင်းဖြင့် စဉ်းစားထားချက် အပေါ် အခြေခံထားပါသည်။

စဉ်	ဖော်ပြချက်	လိုအပ်ချက်	ညွှန်ပြချက်	တွက်ဆမှု		
				၁	၂	၃
၁	ပတ်ဝန်းကျင် ဆိုင်ရာ သက်ရောက်မှု	ပြင်းထန်မှု	အဆိပ်အတောက်	နိမ့်	အလယ်အလတ်	မြင့်
			ပမာဏ	နည်း	အသင့်အတင့်	များ
			လူနှင့် ပတ်ဝန်းကျင် အပေါ် သက်ရောက်မှု	နိမ့်	အလယ်အလတ်	မြင့်
		ဖြစ်ပွားမှု	ကြာချိန်	နှစ်စဉ် (သို့) တစ်ခါမှ ဖြစ်ပွားမှုမရှိ	လစဉ် (သို့) အပတ်စဉ် ဖြစ်ပွားမှု	နေ့စဉ်ဖြစ်ပွား မှု (သို့) မှတ်တမ်းအရ
		ထိန်းချုပ်မှု အဆင့်	ဖော်ထုတ်ခြင်း	လွယ်	အသင့်အတင့်	မရှိ
ကြိုတင်ကာကွယ် မှု	အရေးကြီး		အလယ်အလတ်	မရှိ		
၂	စီးပွားရေးဆိုင်ရာ သက်ရောက်မှု	ဥပဒေရေးရာ လိုက်နာမှု	စည်းမျဉ်းစည်းကမ်း ထိန်းချုပ်မှု	တည်ဆဲ ဥပဒေအရ	လာမည့်အနာဂါ တ် အတွက် (ဖြစ်ပေါ်လာမည့် (သို့) ပြင်ဆင်ဆဲဥပဒေ)	မရှိ
		ကုမ္ပဏီမှ တိုင်ကြားချက်	ကန့်ကွက်ခြင်း	မရှိ	ဖြစ်လာနိုင်မှု	ပြင်းထန်

ရမှတ်စုစုပေါင်း = တွက်ဆမှု (ပြင်းထန်မှု ဖြစ်ပွားမှု ထိန်းချုပ်မှုအဆင့် ဥပဒေရေးရာ လိုက်နာမှု ကုမ္ပဏီမှ တိုင်ကြားချက်)

ပြင်းထန်မှု (S)

ဤ စံတွက်ဆမှုသည် အဆိပ်အတောက်၊ ပမာဏနှင့် လုပ်ငန်းစဉ်၏ သက်ရောက်မှုများအပေါ် အခြေခံပြီး လူနှင့် ပတ်ဝန်းကျင်အပေါ် အကျိုးသက်ရောက်မှုကို တွက်ချက်ခြင်းဖြစ်သည်။

တွက်ဆမှု	ဖော်ပြချက်
၁	အဆင့်အနိမ့် (ပြင်းထန်မှု၊ အဆိပ်အတောက်၊ ပမာဏ၊ လူနှင့် ပတ်ဝန်းကျင်အပေါ် အကျိုးသက်ရောက်မှု)
၂	အလယ်အလတ်အဆင့် (ပြင်းထန်မှု၊ အဆိပ်အတောက်)၊ အသင့်အတင့်အဆင့် (ပမာဏ)၊ အဆင့်အနိမ့် (လူနှင့် ပတ်ဝန်းကျင်အပေါ် အကျိုးသက်ရောက်မှု)
၃	အဆင့်မြင့် (ပြင်းထန်မှု)၊ အဆင့်မြင့် (အဆိပ်အတောက်)၊ အရေးကြီးအဆင့် (ပမာဏ)၊ အဆင့်မြင့် (လူနှင့် ပတ်ဝန်းကျင်အပေါ် အကျိုးသက်ရောက်မှု)

ဖြစ်ပွားမှု (O)

ဤစံတွက်ဆမှုသည် သက်ရောက်မှုဖြစ်ပွားမှုအရ တွက်ချက်ခြင်း ဖြစ်သည်။

တွက်ဆမှု	ဖော်ပြချက်
၁	အဆင့်အနိမ့် နှစ်စဉ် (သို့) တစ်ခါမှ ဖြစ်ပွားမှုမရှိ
၂	အလယ်အလတ်အဆင့် လစဉ် (သို့) အပတ်စဉ် ဖြစ်ပွားမှု
၃	အဆင့်မြင့် နေ့စဉ်ဖြစ်ပွားမှု (သို့) မှတ်တမ်းအရ

ထိန်းချုပ်မှုအဆင့် (C)

ဤစံတွက်ဆမှုသည် ရှုထောင့်၊ ရှာဖွေဖော်ထုတ်ခြင်း၊ ရရှိနိုင်သော နည်းလမ်းများနှင့် လည်ပတ်နေသော လုပ်ထုံးလုပ်နည်းများနှင့် ကြိုတင်ကာကွယ်မှုများအပေါ် ယူဆသော ရှုထောင့်များကို ထိန်းချုပ်ရန် တွက်ချက်ခြင်းဖြစ်သည်။

တွက်ဆမှု	ဖော်ပြချက်
၁	အဆင့်မြင့်၊ လွယ်ကူသောအဆင့် ဖော်ထုတ်ခြင်း၊ လုပ်ထုံးလုပ်နည်းများနှင့်အတူ ထိန်းချုပ်ပြီး မှန်၊ မမှန် စစ်ဆေးခြင်း နှင့် အရေးကြီးအဆင့် သတိထားခြင်း (သက်ရောက်မှု နိမ့် စေသည်)
၂	အလယ်အလတ်အဆင့် ဖော်ထုတ်ခြင်းနှင့် လုပ်ထုံးလုပ်နည်းများနှင့်အတူ ထိန်းချုပ်ပြီး မှန်၊ မမှန် စစ်ဆေးခြင်းနှင့် အသင့်အတင့်အဆင့် ကြိုတင်ကာကွယ်မှု (သက်ရောက်မှု နိမ့် စေသည်)
၃	ထိန်းချုပ်မှု မရှိ၊ ဖော်ထုတ်ခြင်း မရှိ (သို့) ကြိုတင်ကာကွယ်မှု မရှိ (သက်ရောက်မှု နိမ့် စေသည်)

ဥပဒေရေးရာ လိုက်နာမှု

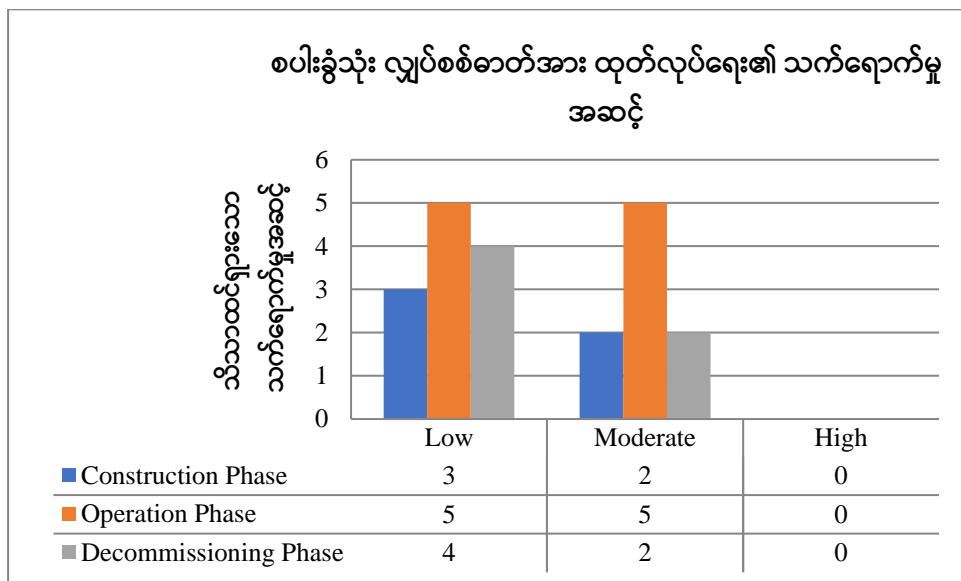
တွက်ဆမှု	ဖော်ပြချက်
၁	တည်ဆဲဥပဒေအရ စည်းမျဉ်းစည်းကမ်းထိန်းချုပ်မှု ပြုလုပ်ခြင်း (ဒေသဆိုင်ရာ၊ နိုင်ငံတကာနှင့် ကုမ္ပဏီစည်းမျဉ်းစည်းကမ်းများ)

၂	လာမည့်အနာဂတ်အတွက် စည်းမျဉ်းစည်းကမ်းထိန်းချုပ်မှု ပြုလုပ်ခြင်း (လာမည့် ၅ နှစ်အတွင်း ဖြစ်ပေါ်လာမည့် (သို့) ပြင်ဆင်ဆဲဥပဒေ)
၃	စည်းမျဉ်းထိန်းချုပ်မှုမရှိ

တိုင်ကြားချက်

တွက်ဆမှု	ဖော်ပြချက်
၁	တိုင်ကြားချက်မရှိ
၂	ပြင်းထန်သော တိုင်ကြားချက်များ ဖြစ်လာနိုင်မှု
၃	လုပ်ဖော်ကိုင်ဖက်များ၊ အိမ်နီးနားချင်းများ၊ ဖောက်သည်များ၊ ဝန်ထမ်းများ နှင့် လူမှုအသိုင်းအဝိုင်း

ရမှတ်	သက်ရောက်မှု သတ်မှတ်ချက်	ရှင်းလင်းချက်
၁ - ၆၀	နည်း	သက်ရောက်မှုမရှိ
၆၁ - ၁၂၁	သင့်	သက်ရောက်မှုအနည်းငယ်ရှိ
၁၂၂ - ၁၈၂	မြင့်	သိသာသော သက်ရောက်မှုရှိ
၁၈၃ - ၂၄၃	အရမ်းမြင့်	ရေရှည်လုပ်ဆောင်နိုင်သော အခြေအနေမရှိ



ဆန်းစစ်လေ့လာသည့် ရလဒ်များအရ ဇီဝလောင်စာသုံးစနစ် (စပါးခွံမှ လျှပ်စစ်ဓာတ်အား ထုတ်လုပ်ရေးစီမံကိန်း) သည် စီမံကိန်း တည်ဆောက်သည့်ကာလ၊ လည်ပတ်သည့်ကာလနှင့် ဖျက်သိမ်းသည့်ကာလအတွင်း သိသာထင်ရှားသော ဆိုးကျိုးသက်ရောက်မှုများ ဖြစ်နိုင်မှုမရှိပေ။ စီမံကိန်းသည် လူနေရပ်ကွက်များနှင့်ဝေးသော ဂုန်လျှော်စက်ရုံအဟောင်းတွင် တည်ရှိခြင်းကြောင့် တည်ဆောက်ဆဲကာလတွင် ဖြစ်ပေါ်နိုင်သော လေအရည်အသွေး၊ ဆူညံသံများနှင့် ရေ အရည်အသွေးအပေါ် သက်ရောက်မှုများကို လျှော့ချနိုင်ရန် စီမံခန့်ခွဲနိုင်သည်။ သို့သော်လည်း စီမံကိန်း လည်ပတ်သည့်ကာလတွင် လေအရည်အသွေး၊ စွန့်ပစ်အစိုင်အခဲစွန့်ပစ်မှု၊ ဆူညံသံနှင့်

လုပ်ငန်းခွင်ကျန်းမာရေးတို့အပေါ်တွင် သက်ရောက်မှု အတန်အသင့်ရှိနိုင်ပါသည်။ ထိုဖြစ်ပေါ်နိုင်သော သက်ရောက်မှုများသည် စီမံကိန်းဧရိယာအတွင်းတွင်သာ ဖြစ်ပေါ်နိုင်ခြင်းကြောင့် စီမံကိန်းလည်ပတ်သည့်ကာလအတွက် သင့်တော်သည့် အဆိုပြုထားသော လျှော့ချရေးနှင့် တိုးတတ်ကောင်းမွန်ရေး နည်းလမ်းများအား လိုက်နာဆောင်ရွက်သင့်သည်။ ထို့ပြင် လုပ်ငန်းခွင်တွင် ဆောင်ရွက်သော လုပ်သားများကိုလည်း လုပ်ငန်းခွင်သုံး ဘေးအန္တရာယ်ကင်းရှင်းရေး ကိရိယာများအား ထောက်ပံ့ပေးသင့်ပါသည်။ (အသေးစိတ်ကို အခန်း ၅ တွင် ဖတ်ရှုရန်)

ကနဦးပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ ပြင်ဆင်ရာတွင် စီမံကိန်းအကြောင်းအရာများကို ရှင်းလင်းတင်ပြခြင်းနှင့် ရရှိလာသော အများပြည်သူများ၏ ဆွေးနွေးအကြံပြုချက်များကို စီမံကိန်းအကောင်အထည်ဖော်ရာတွင် ထည့်သွင်းစဉ်းစားခြင်းတို့သည် အရေးပါပေသည်။ ထို့ကြောင့် အများပြည်သူ သဘောထားရယူခြင်း အခမ်းအနားကို ၂၀၁၇ ခုနှစ်၊ အောက်တိုဘာလ ၂၈ ရက်နေ့တွင် စီမံကိန်း ဆောင်ရွက်မည့် ဝန်းအတွင်း၌ ကျင်းပခဲ့ပါသည်။ (အသေးစိတ်ကို အခန်း ၆ တွင် ဖတ်ရှုရန်)

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်နှင့် ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်များ အကောင်အထည်ဖော်ရာတွင် လိုအပ်သော အခြေခံလိုအပ်ချက်များနှင့် တာဝန်ရှိသူများကို ဤအစီရင်ခံစာတွင် ဖော်ပြထားပါသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်ကို ထိခိုက်မှုများ၏ တွေ့ရှိချက်များနှင့် ၎င်းတို့၏ရလဒ်များအပေါ် အခြေခံပြီး ပြင်ဆင်ထားခြင်းဖြစ်သည်။ ဇီဝလောင်စာသုံးစနစ် (စပါးခွံမှ လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေး စီမံကိန်း)၏ စီမံကိန်း တည်ဆောက်သည့်ကာလ၊ လည်ပတ်သည့်ကာလ နှင့် ဖျက်သိမ်းသည့်ကာလ သုံးခုလုံးအတွက် တိကျသောပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုများနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေးနှင့် ကျန်းမာရေးများ အဖြစ် ရေးဆွဲထားခြင်း ဖြစ်သည်။ ထိုအစီအစဉ်တွင် အောက်ပါအပိုင်း ၅ ပိုင်း ပါဝင်သည်။

- ပတ်ဝန်းကျင်ထိခိုက်မှုလျှော့ချရေး အစီအစဉ်
- ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်
- အရေးပေါ်ကိစ္စရပ်များအတွက် ကာကွယ်မှုနှင့် တုံ့ပြန်မှု အစီအစဉ်
- မကျေလည်မှုများဖြေရှင်းပေးမည့်အစီအစဉ်
- လူမှုစီးပွားတာဝန်ယူမှုအစီအစဉ် တို့ဖြစ်ပါသည်။

ထို့အပြင် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်နှင့် ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှု အစီအစဉ်များ အတွက် ခန့်မှန်းကုန်ကျစားရိတ်ကိုလည်း ထည့်သွင်းဖော်ပြထားသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်တွင် ဖြစ်ပေါ်လာနိုင်မည့် ပတ်ဝန်းကျင်ထိခိုက်မှုများ၊ ထိခိုက်မှုအရင်းအမြစ်များ၊ ထိခိုက်မှုများကို လျှော့ချပေးနိုင်မည့် နည်းလမ်းများ၊ ကျန်ရှိမည့်ထိခိုက်မှုများနှင့် တာဝန်ရှိသူများ ပါဝင်သည့် ပတ်ဝန်းကျင်စောင့်ကြပ်ကြည့်ရှုမှုအစီအစဉ်တွင် လေနှင့်ရေအရည်အသွေး စောင့်ကြပ်

ကြည့်ရှုရန်နှင့် ဆူညံသံစောင့်ကြပ်ကြည့်ရှုရန် အမျိုးအစားများနှင့် တိုင်းတာရန် အကြိမ် အရေအတွက်များ၊ တာဝန်ရှိသူများ ပါဝင်သည်။ လူမှုစီးပွားတာဝန်ယူမှု အစီအစဉ်တွင် ဝန်ထမ်းများ နှင့် မိသားစုများ၏ လူမှုဘဝလုံခြုံစေရန်၊ အနီးအနားရှိ အဖွဲ့အစည်းများနှင့် ပိုမိုကောင်းမွန်သော နေထိုင်မှုစနစ်နှင့် ပွင့်လင်းရင်းနှီးသော ဆက်ဆံမှု ရရှိနိုင်ရန်အတွက်လည်း ရည်ရွယ်ထားပါသည်။ မကျေလည်မှုများဖြေရှင်းပေးမည့် အစီအစဉ်တွင် စီမံကိန်းနှင့် ပတ်သက်၍ မကျေလည်မှုများ ပေါ်ပေါက်လာပါက ဖြေရှင်းနိုင်မည့် နည်းလမ်းများကို ဖော်ပြထားပါသည်။ အရေးပေါ်ကိစ္စရပ် များအတွက် ကာကွယ်မှုများနှင့် တုံ့ပြန်မှုအစီအစဉ်တွင် အရေးပေါ်ကိစ္စရပ်များကို ကြိုတင် ကာကွယ်ရန်နှင့် ဖြစ်ပေါ်လာပါက တုံ့ပြန်ရန် နည်းလမ်းများ ပါဝင်သည်။ အချုပ်အားဖြင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်တွင် စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော ပတ်ဝန်းကျင်အပေါ် ကောင်းကျိုးသက်ရောက်မှုများနှင့် ဆိုးကျိုးသက်ရောက်မှုများကို စနစ်တကျလေ့လာပြီး ဆိုးကျိုး သက်ရောက်မှုများကို စောင့်ကြပ်ကြည့်ရှုရန်နှင့် လျော့ချရန်နည်းလမ်းများကို ကာလသုံးခုအတွက် သတ်မှတ်ထားပါသည်။ (အသေးစိတ်ကို အခန်း ၇ တွင် ဖတ်ရှုရန်)

နိဂုံးချုပ်အားဖြင့် ယခုစီမံကိန်းသည် စီမံကိန်းလည်ပတ်စဉ်ကာလအတွင်း လျှပ်စစ်ပေးဝေကာ စွန့်ပစ်ပစ္စည်းမှ စွမ်းအင်ထုတ်လုပ်ခြင်းနည်းပညာ (ကာဗွန်ထုတ်လွှတ်မှု လျော့နည်းခြင်း) ကို မိတ်ဆက်ခြင်းဖြင့် ဒေသခံပြည်သူလူထု၏ လူမှုစီးပွား အခြေအနေများကို ဖွံ့ဖြိုးတိုးတတ်စေလာ နိုင်ပါသည်။ လေအရည်အသွေး၊ အစိုင်အခဲစွန့်ပစ်ခြင်းနှင့် မီးဘေးအန္တရာယ်တို့တွင် ဖြစ်နိုင်သော ဆိုးကျိုးသက်ရောက်မှုများမှာ အတန်အသင့်ရှိသော်လည်း တည်ဆောက်ဆဲကာလ၊ လည်ပတ် ကာလ၊ ဖျက်သိမ်းကာလများတွင် အဆိုပြုထားသော လျော့ပါးစေရေး၊ တိုးတတ်စေရေး နည်းလမ်းများအား လိုက်နာဆောင်ရွက်ပါက ပတ်ဝန်းကျင်နှင့် လူမှုစီးပွားအခြေအနေများအပေါ် သက်ရောက်မှုများအား အနည်းဆုံးဖြစ်အောင် လျော့ချနိုင်လိမ့်ပေမည်။ နောက်ဆုံး၌ ဤ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ စစ်ဆေးပြီးနောက် ပြန်လည်ပေးပို့လာသော သဘောထားမှတ်ချက်များနှင့် အကြံဉာဏ်များကို စီမံကိန်း အကောင်အထည်ဖော်သူမှ လိုက်နာဆောင်ရွက်သင့်ပါသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် အား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ အတည်ပြုပြီးပါက ထိုအစီအစဉ်အား စီမံကိန်း အကောင်အထည်ဖော်သူသည် လက်တွေ့အကောင်အထည်ဖော်ရန် လိုအပ်သည်။ (အသေးစိတ်ကို အခန်း ၈ တွင် ဖတ်ရှုရန်)

CHAPTER 1: DESCRIPTION OF THE PROJECT

This chapter presents salient information on the project, including justification for the selected technology, project location, project facilities, arrangements for the project construction, inputs for the power plant operation, and organization for the operation of the power plant.

1.1 Objective of the Proposed Project

With the aim of generating the electric power, the company expects not only to provide electricity to the rice mills and local residents but also to introduce the waste to energy technology and support the income generation source for the national budget and partially fulfilling the critical energy need for economic growth of the rural area.

1.2 Basic project information

The proponent for the proposed project is Myaung Mya FM Biomass Power Co. Ltd, established by joint venture with 80% of Fujita Corporation (Japanese construction company established in 1910 which headquartered in Tokyo and present in 12 countries including a branch office in Yangon with experience as well as expertise in overseas real estate development, urban revitalization, transport infrastructure service and environmental engineering) and 20% of MAPCO (established in August 2012. MAPCO is formed to mobilize public savings and to foster broader investments in the agriculture and other agro-based industries in Myanmar). The basic information of the existing project is described in the following **Table 1. 1**.

Moreover, the proposed project was contributed by the Environmental Department of Japanese Government for Myanmar's economic development and environmental protection with Myanmar Company through utilizing the scheme of Joint Crediting Mechanism (JCM).

Table 1. 1 Information of Existing Project

Type of Proposed Business	Rice Husk Power Generation Business Plan
Type of investment	Joint Venture (80% Fujita Corporation, 20% MAPCO)
Type of business organization	Fujita Corporation and MAPCO
Authorized capital	Approximately USD 4 million
Name of Company	Myaung Mya FM Biomass Power Co., Ltd.
Type of Business	1.8 MW Gross Rice Husk Fire BTG Power Plant
Proposed duration of investment	50 years + extendable 10 years two times
Total land area	1.1 acre
Construction period	December, 2017 to December, 2018
Address of project location	No. 22, Motesoe Field, Danone Chaung Taung Village, Myaung Mya Township, Myaung Mya District, Ayeyarwaddy Region
Mobile	+959252179806, +959798240509
Email address	khonzi.fujita@gmail.com, naywinshein.fujita@gmail.com

1.3 Description of the Project Proponent**1.3.1 Project Proponent Information****Table 1. 2 List of Director of Myaung Mya FM Biomass Power Plant Co., Ltd**

1.	Proponent Name	Mr. Inoue Shoichi
	Citizenship	Japanese
	Residence Address Abroad	Chibaken Matsudoshi Rokoudai 5-171-14, Japan
	Name of Principle Organization	Managing Director
2.	Proponent Name	Mr. Saeki Yoshio
	Citizenship	Japanese
	Residence Address Abroad	209, Cosomo Niiza Shiki, 1-7-38 Owada, Niiza City, Saitama Pref, Japan
	Name of Principle Organization	Director
3.	Proponent Name	Mr. Ishii Tomohiro
	Citizenship	Japanese
	Residence Address Abroad	Akitsu 5-18-15, Narasino City, Chiba Pref, Japan
	Name of Principle Organization	Director
4..	Proponent Name	U Ye Min Aung
	Citizenship	Myanmar
	Residence Address Abroad	No. 38, 1 st Floor, 89 th Street, Kan Taw Kalay (West) Ward, Mingalar Taung Nyunt Township, Yangon
	Name of Principle Organization	Director

1.3.2 Organization Chart

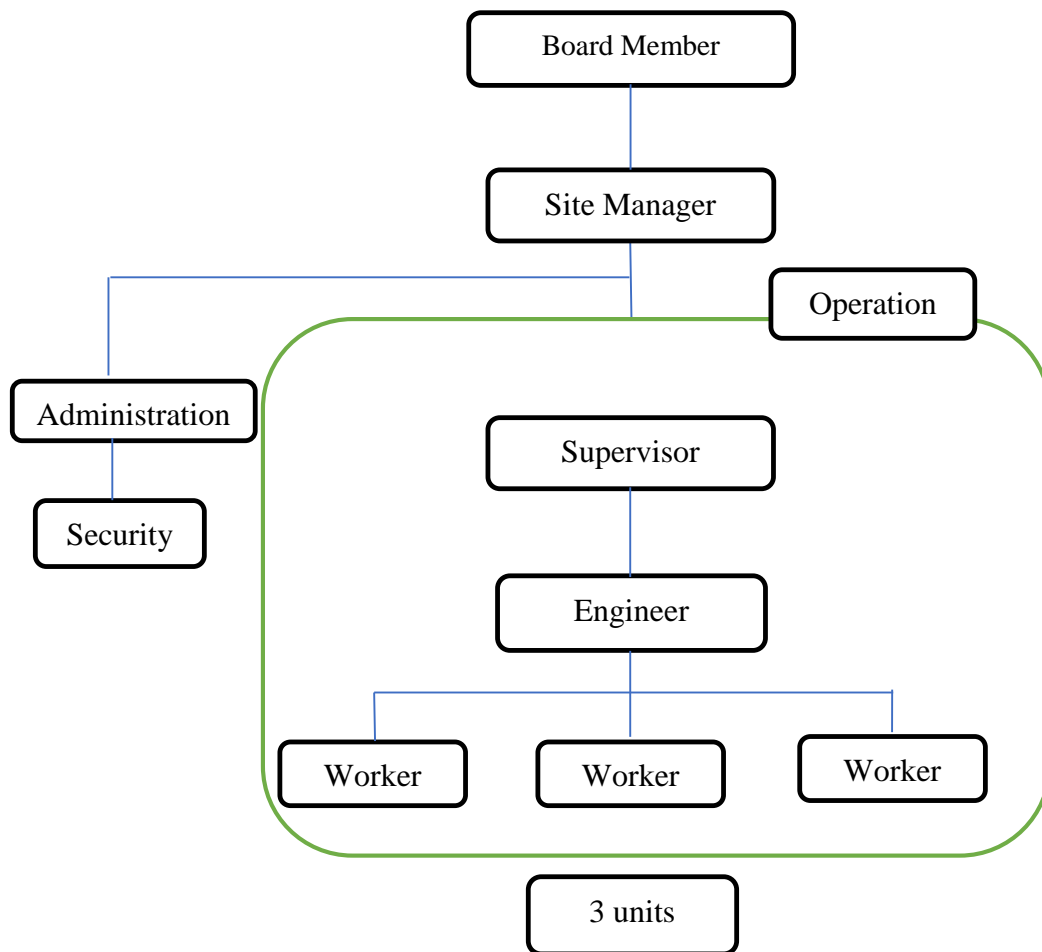


Figure 1. 1 Organization Chart of Myaung Mya FM Biomass Power Plant

1.4 Location of the Project, Overview Map and Site Layout Plan

The proposed rice husk power plant is situated at Latitude 16° 35' 51.35" N and Longitude 94° 53' 09.82" E , Danone Chaung Taung Village, No.22, Motesoe Field, Myaung Mya Township, Myaung Mya District, Ayeyarwaddy Region. The total land area of 1.1 acre will be leased for electricity distribution purpose to support electricity for rice mill and rice bran mill where will be established at the same filed with the agreement of Ayeyarwaddy Regional Government, the Republic of the Union of Myanmar and to be incorporated 80% contribution of Fujita Corporation and 20% contribution of Myanmar Agribusiness Public Corporation (MAPCO) Limited. The location of the proposed project site was shown in **Figure 1. 2**.

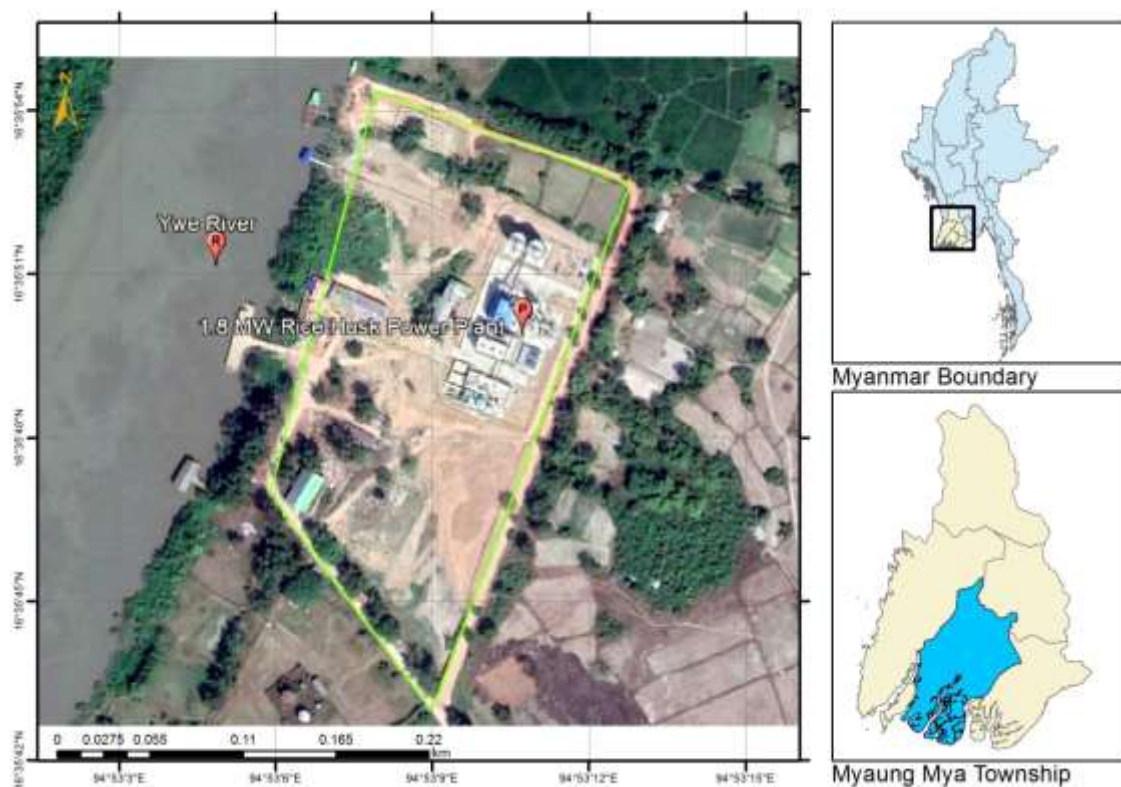


Figure 1. 2 Location of Project Area

1.5 Present Situation and Schedule of the Proposed Rice Husk Power Plant

The project site was used to have pond and this area is been land filling with sand. Moreover, soil test was done to get the baseline data of the soil condition before starting the project. The present project area is located in the Ayeyarwady Embayment (Central Lowland) and situated in delta region. The sediments in the recent condition belong to the Alluvium (Q2-Alluvium Flood plain deposits). These are composed mainly of flood plain deposit consists of clays and sand deposits which have 450 bearing capacity. There has old building near the project site that had been used for repairing of carriages.

Currently, all the civil work and erection work were completed according to the Master Schedule (see in **APPENDIX XIII**). Most of the civil works were done in August, 2018 and

other civil works such as power house construction, road and drainage construction and fence work were completed in September and December, 2018. After some civil work complement, erection works were started since August, 2018.



Source: Site Completion Report (attached in APPENDIX XIV)

Figure 1. 3 Bird's eye view of Project Components

1.6 Project Development Plan and Project Components

This proposed project has three phases of implementation activity according to the project development plan.

Construction Phase: Although construction, procurement of machineries & equipment and installations for the project phase were going to start on December 2017 according to MIC's proposal permission, the civil works and erection works were started as shown in APPENDIX XIII. The area for rice husk power plant is 4451.54 m², which has three parts of buildings mainly including rice husk unloading and storing system, boiler and turbine, generation system, ash handling system and cooling water treatment system. All these building structures were finished and the locations of the components are shown in **Figure 1. 5**. Detailed layout plan can be seen in **APPENDIX VI**.

The initial proposed plan is generated the electricity by using the waste (rice husk) from the adjacent 240 TPD Rice Mill and distributed the electricity to the rice mill and rice bran oil mill within the compound as well as to the neighboring resident area when the electricity is abundant. On the other hand, the electricity generated from the power plant will be

distributed to the Myaung Mya Substation passing through the 2-km transmission line until the operation of rice mill and rice bran oil mill will be started.



Source: Myaung Mya FM Biomass Power Co., Ltd.

Figure 1. 4 Proposed Route to Myaung Mya Substation



(a) Power House Building



(b) Water Treatment Plant Building



(c) Boiler House Building



(d) Raw Water Reservoir



(e) Guard Pond



(f) Fly Ash Silo



(g) Bottom Ash Silo



(h) Rice Husk Silo

Figure 1. 5 Site Completion Photos

Operation Phase: In the implementation program of operation phase, the power plant will be included with 7 buildings consisting of rice husk unloading and storing system, boiler building, Turbine Generator Building, Circulating Cooling Water System, ash handling system, cooling water system, raw water tank, etc.

At first, required machinery and equipment, furniture and other facilities will be installed in the above mentioned power plant layout for the implementation of proposed project.

Decommissioning Phase: Demolish activities will be prepared after completion of project investment period (70 years).

1.7 Production Process of 1.8 MW Gross Power Plant

Generally, it is a 1.8 MW gross electric power generation plant for captive use of power in nearby rice mill and rice bran oil factory and rice husk will be used as fuel in the atmospheric Fluidized Bed Type Boiler to generate steam which in turn, will be rotate the Turbine generator set producing power. The power-generation technology to be used in the project will be the Boiler-Turbine-Generator (BTG) method. It is a technology that has already been applied in numerous rice-husk power generation projects in other countries and can operate continuously. Required raw materials will get from the rice mill, which will use electricity distributing from the rice husk power plant by using waste to energy technology and other mills if necessary. The steps of the process of the electricity production will be done as the following **Figure 1. 7**.

The rice husk will be stored in silo with moisture content of about 14–15% and transferred the rice husk to the boiler which is atmospheric fluidized bed type combustion through pneumatic conveying system. The water from Ywe River storing in the reservoir will be passed through the deaerator (A deaerator is a device that is widely used for the removal of oxygen and other dissolved gases from the feedwater to steam-generating boilers) for the removal of oxygen and other dissolved gases from the feedwater to steam-generating boiler. Power boilers are used to heat water and convert it to steam. A boiler consists of: a steam pressure vessel; a circulation system consisting of boiler tubes, through which the water travels before converting into steam; a combustion system where fuel is burned; a ventilation unit for supply of combustion air and discharging hot gases; an air preheater; and other auxiliary units. A steam turbine is a device used to convert the thermal energy of steam into mechanical energy, by turning the blades of a rotor. Turbines of this kind usually consist of various stages, with each stage consisting of a fixed blade (or nozzle), and a rotating blade. Steam coming out of the fixed blade or nozzle, expands (or has its direction altered to a high-speed jet) against the rotating blades, which spins the shaft. Generator converts the mechanical energy of a turbine into an electrical output. The emitted steam from the boiler will be collected in the turbine and then generated electricity.

The process flow of the rice husk power generation which is operated in Myaung Mya FM Biomass power plant is as follow. The stored rice husk is transferred through conveyer to the boiler and burned at the 450 °C. The emitted gas is distilled with treated water and then the steam rotates the turbine and generated the electricity by the generator. The fly ash as the byproduct of this process will be collected by the electrostatic precipitator (ESP).

The power plant runs 24 hours for 300 days in a year. The total production amount of electricity per year is about 13,075,200 kWh and parasitic load for operation is 1,447,200 kWh. The net production amount is 11,352,960 kWh for distribution of electricity to neighboring mills and National Grid.

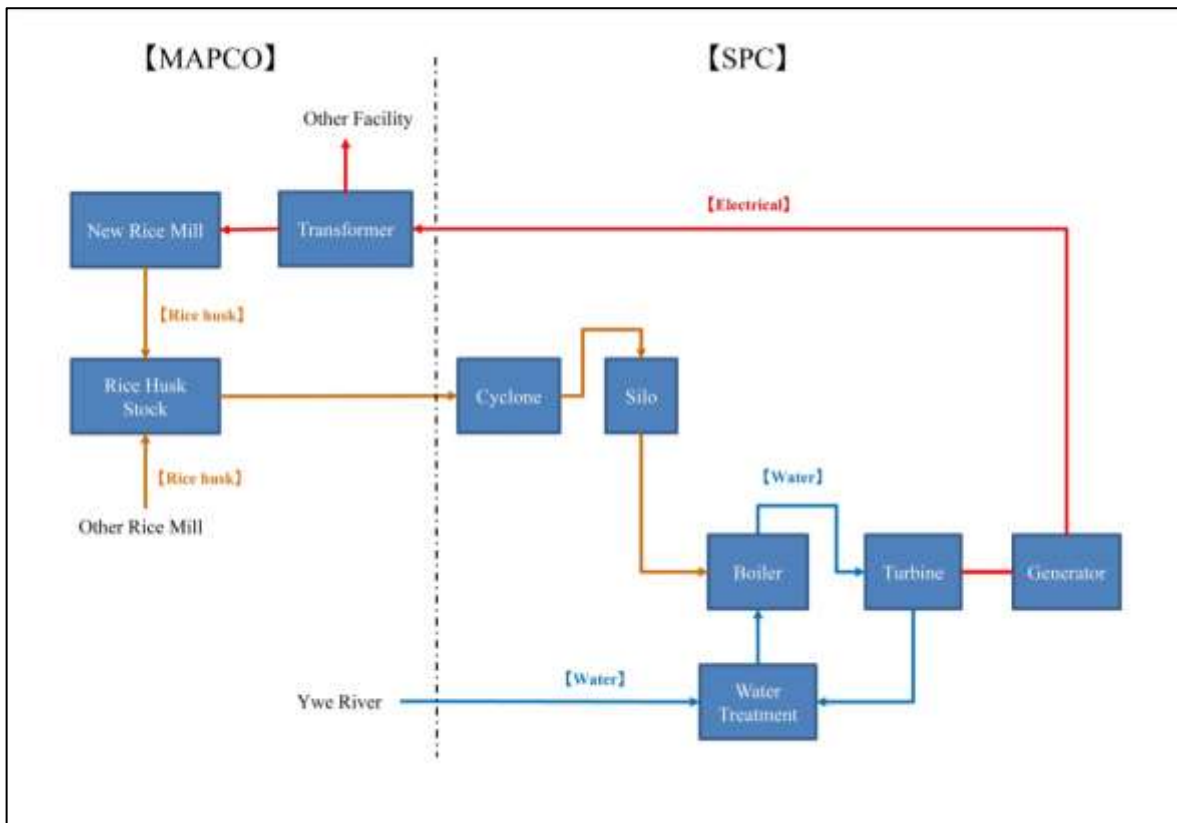


Figure 1. 6 Block Diagram for Rice Husk Generation

10.0 CONTROL AND INSTRUMENTATION

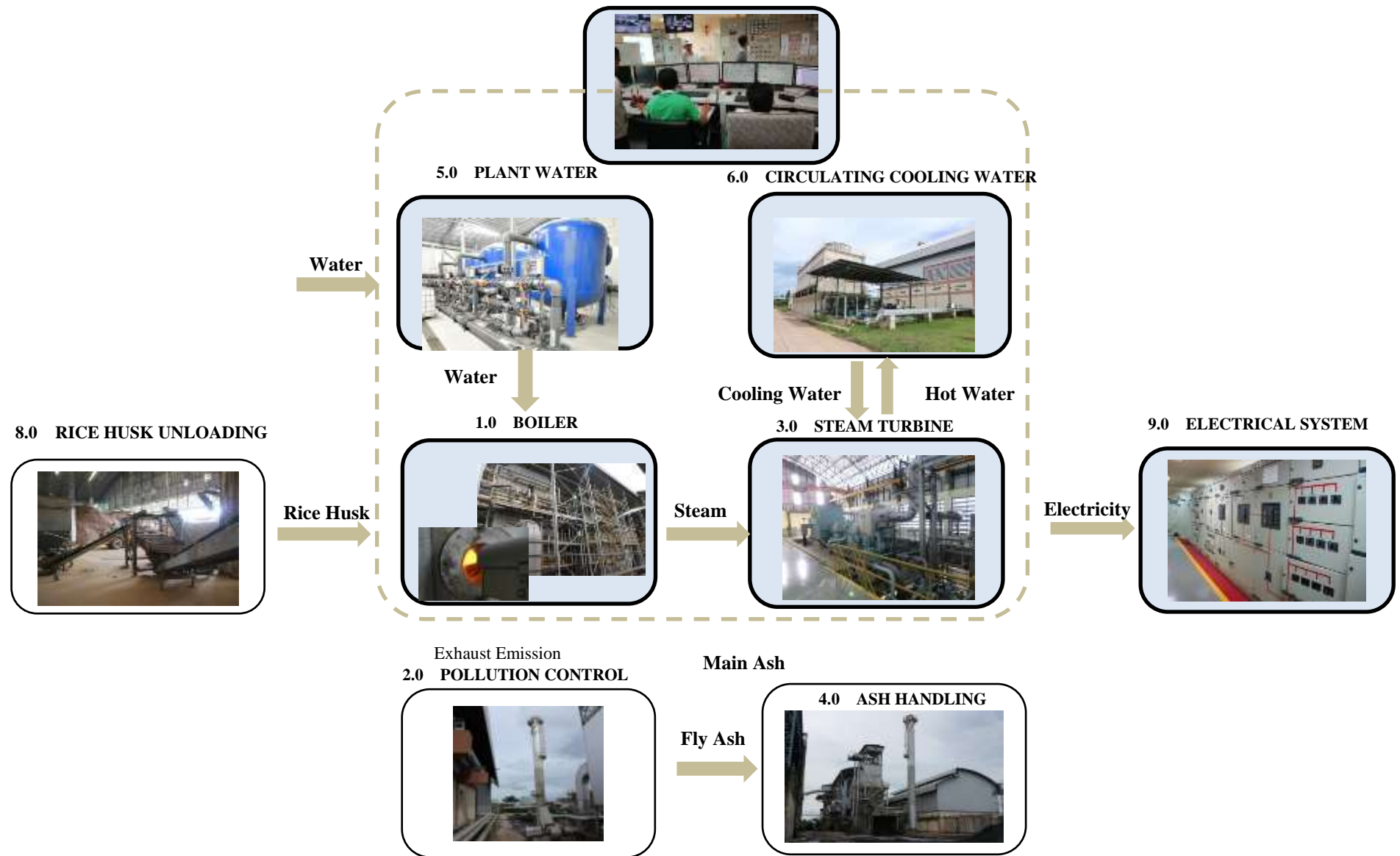


Figure 1. 7 Process of Rice Husk Power Generation

1.8 Resources Requirements

The proposed project required water, rice husk, turbine generator oil, human resources, machineries and utilities etc. The details of all major resources required for proposed project described in subsequent sections under respective headings.

1.8.1 Capital Investment

The proposed project of capital investment are over 3 million USD and 80% of foreign investment (Fujita Corporation) and 20% of local (MAPCO). The detail investment plan includes building construction, procurement of machineries and equipment etc. and shown in Error! Reference source not found..

Table 1. 3 Capital Investment of Myaung Mya FM Biomass Power Plant

Party	Amount	Number of Shares	Shareholding Ratio
Fujita	US\$ 2,947,912	2,947,912 Shares ("Fujita Shares")	80%
MAPCO	US\$ 736,978	736,978 Shares ("MAPCO Shares")	20%
Total	US\$ 3,684,890	3,684,890 Shares	100%

1.8.2 Electricity Consumption

Electricity supply would be obtained from the national grid at the initial stage of the operation phase and 201kW of parasitic load from the gross capacity for operation phase.

1.8.3 Water Requirements and Water Treatment System

The main water consumption of proposed project is for boiler and estimate water consumption for boiler of rice husk power plant is 429.5 m³ per day, and 10 m³ is for domestic use. The main water intake for operation and construction is from Ywe River and will be stored in storage tank through the inlet water treatment system. The drinking water will be bought. The flow diagram of water balance that used in a day was shown in **Figure 1. 8**.

Table 1. 4 Water usage of the plant per day

Item	Type of Water	Amount (m ³ /day)
Daily amount of water use	For Plant	429.5
	For Office, Toilet	10
	Total	439.5
Daily amount of wastewater discharge	Discharge from Plant	46
	Discharge form Office, Toilet	5
	Total	51

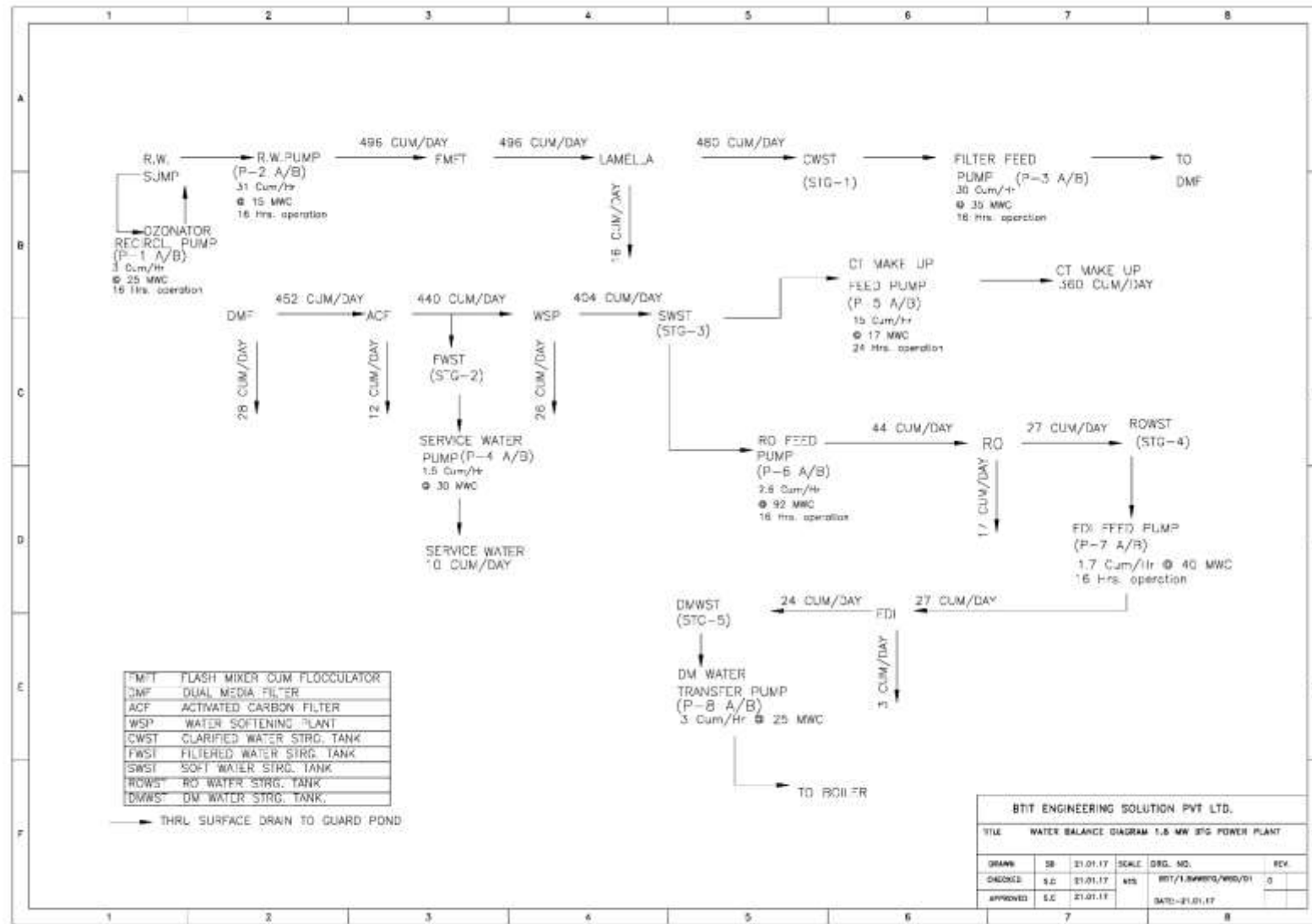


Figure 1. 8 Flow Diagram of Water Balance

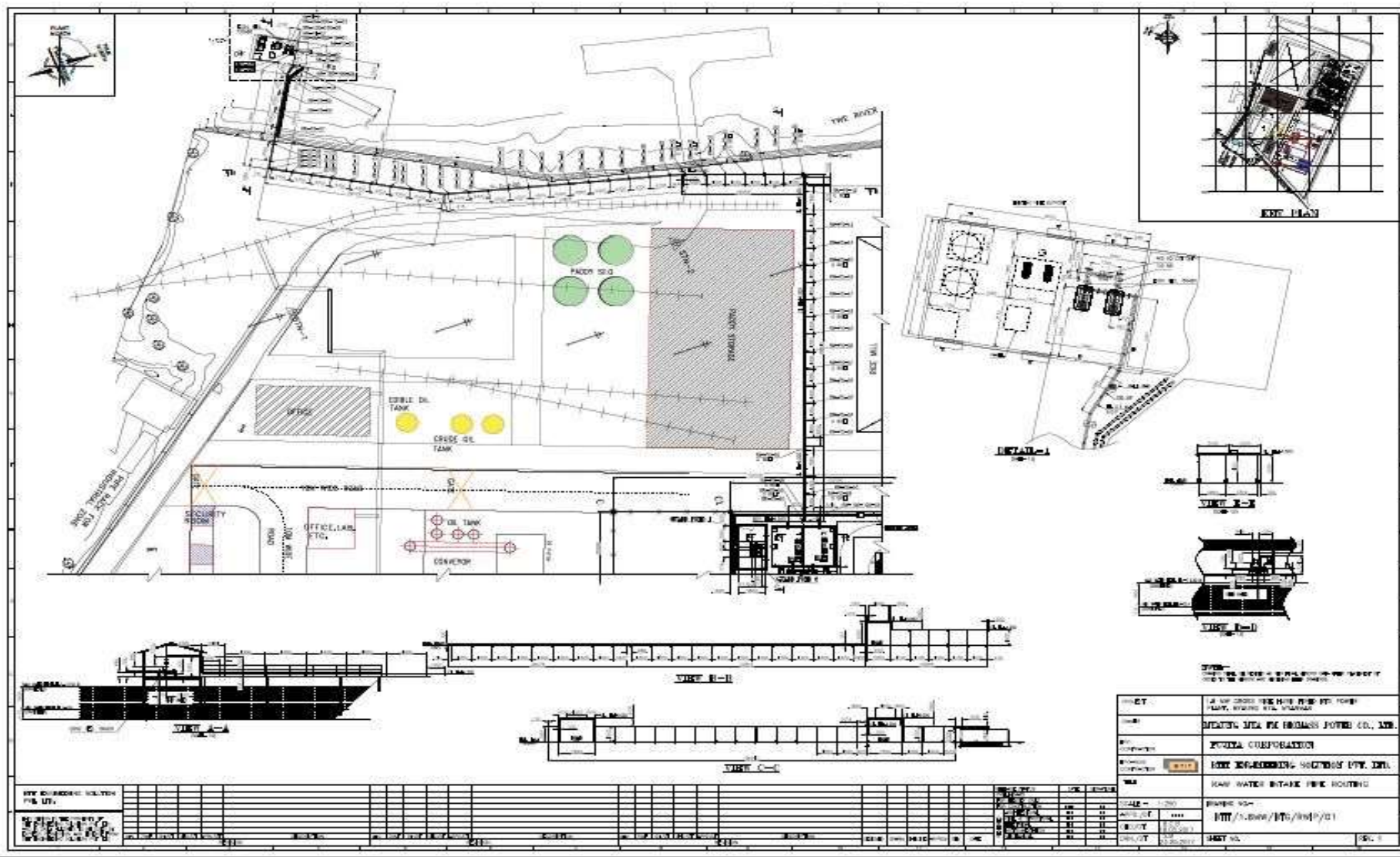


Figure 1. 9 Raw Water Intake Routing

1.8.3.1 Raw Water Clarification

First Raw Water Transfer Pump (P – 1A/B) will be started and it will feed raw water to the Cascade Aeration (CA) to reduce the iron level, before entering the aeration tank, Hypochlorite or Poly Aluminum Chloride dosing will take place into the raw water storage tank. (P – 1A/B) suction and discharge will be interlocked with its Pneumatic air operated Butterfly valve. As per the PLC program, valve will open along with the pump. The layout of water treatment plan was found out in **APPENDIX X: WTP General Layout**.

pH reducer, Alum and Lime will be dosed into the raw water. All dosing pump will be interlocked with the RWTP.

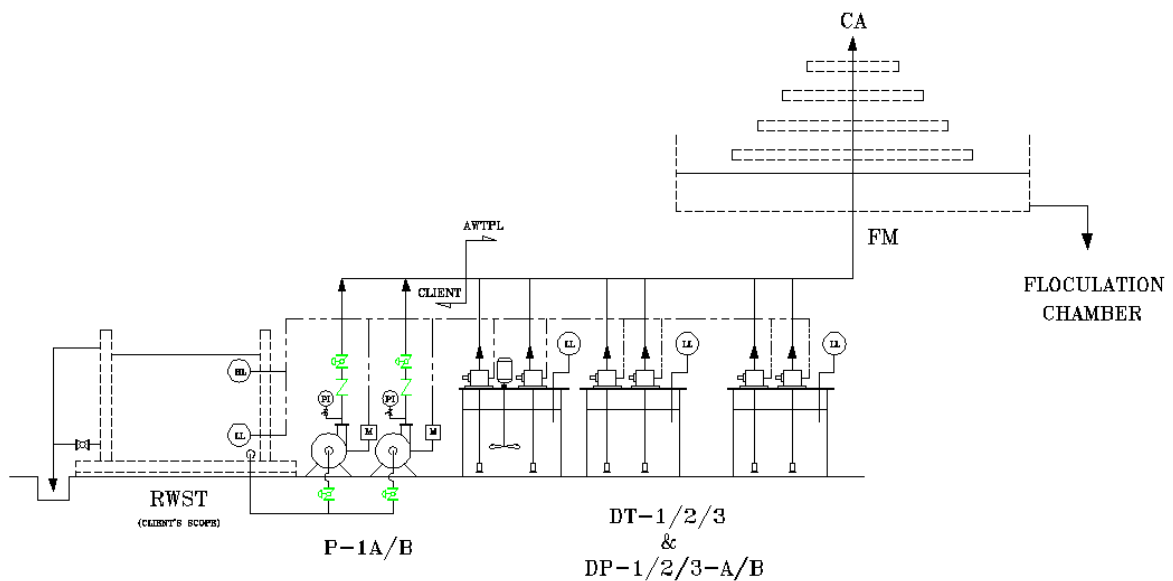


Figure 1.10 Diagram of pH reducer

From aeration tank, water will be stored into the flash mixer, and then it will enter to the Flocculation Chamber (FC) and Tube Settler. Agitator of Flocculation Chamber will be started along with the RWTP –1/2. After that, water will enter to the Tube Settler (TS) where the large particle will settle down. Two manual valves will be kept at the drain of FC and TS. From the TS, water will be stored into the Clarified Water Storage Tank (CWST).

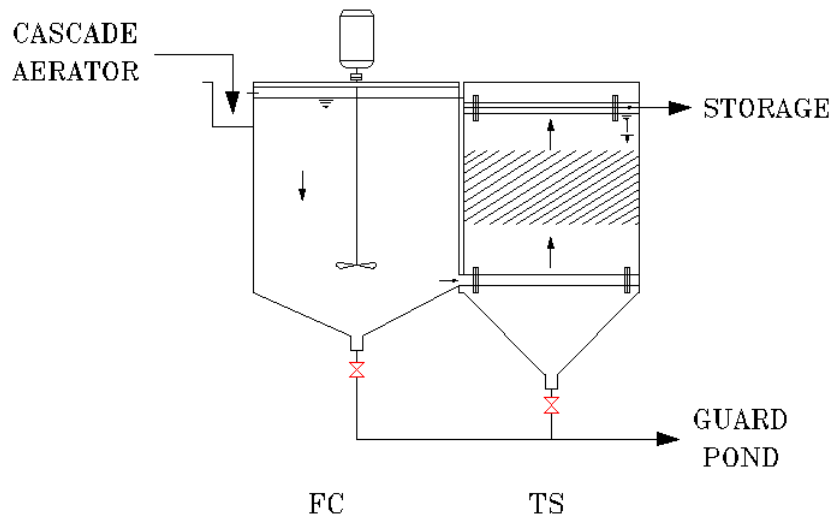


Figure 1. 11 Diagram of Flocculation Chamber

1.8.3.2 Pre-treatment

From the CWST, water will be pumped through the Clarified Water Transfer Pump (P – 2 A/B) to the Dual Media Filter to remove the turbidity and suspended solids of water. Then, it will pass through the Activated Carbon Filter to reduce the color, odor and smell. Green auto valves should be opened for the service mode. Red valves will remain close. P – 1 A/B will have auto timer and it will be programmed by the PLC through which it will automatically interchange its time of operation.

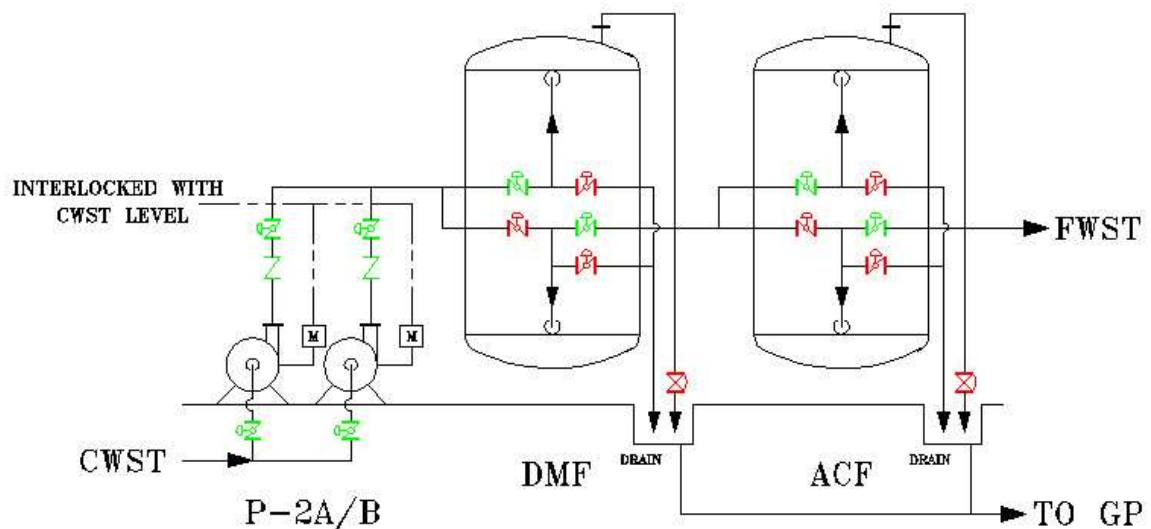


Figure 1. 12 Diagram of Filter Systems

For the backwash purpose of Filter Feed Pump (P – 2 A/B) will collect the water from Clarified Water Storage Tank (CWST). At the time of the Back Washing green colored valve will be opened and red marked valves will remain close as per the PLC. Both vessels will be

backwashed individually and backwash water will be discharged at the drain. Before backwashing air release valve will open to release the air and overflow water.

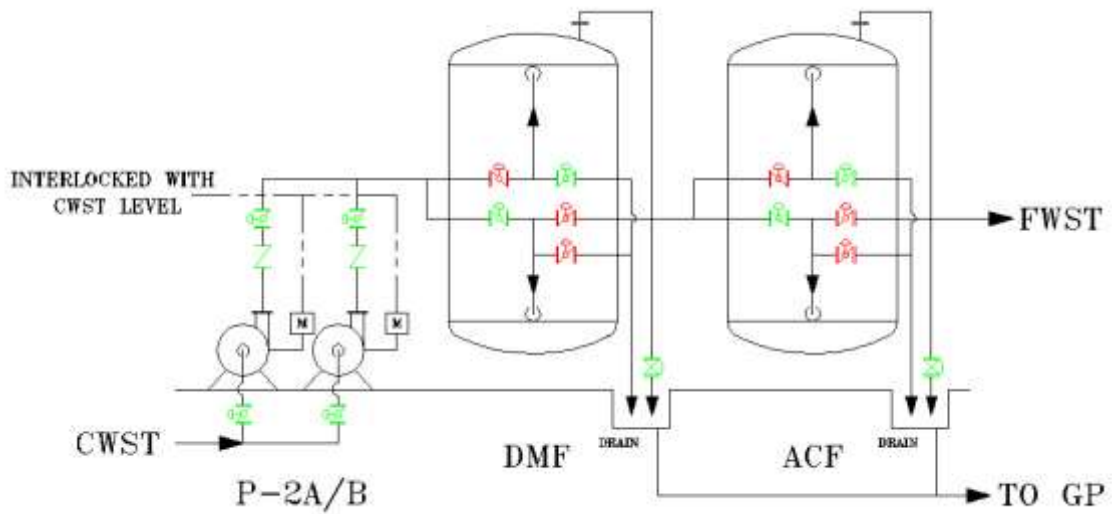


Figure 1.13 Diagram of Filter Feed Pump

For the rinse purpose, also P – 2 A/B will be on operating condition. Filter (DMF and ACF) will be rinsed by the clarified water. Green colored valve will be opened and red marked valves will remain close by the PLC. There will be a common rinse for both vessels. Rinsed water will be discharged at the drain.

1.8.3.3 Water Softening Plant

After getting the signal from PLC, Softener Feed Pump (P – 4 A/B) will collect the filtered water from the FWST to the Softener (SOF). For the service purpose, green marked auto valve will open and red marked auto valve will remain close. After the SOF, softened water will be stored into the Softened Water Storage Tank (SWST).

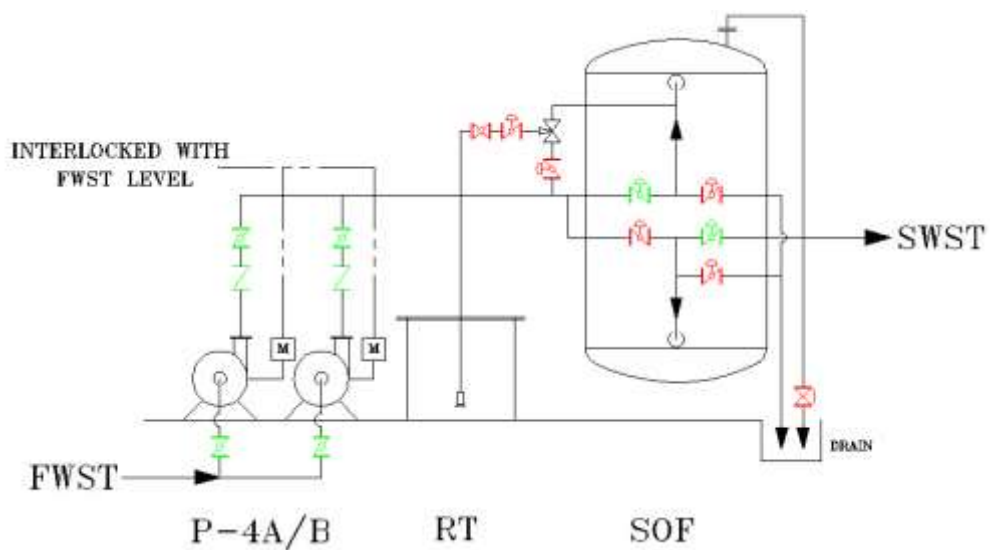


Figure 1.14 Softened Water Storage Tank

After 16 hrs of softener operation softener regeneration will be required. Before the regeneration backwash is needed to drain the unwanted particle which can be caused of improper regeneration of softener resin. For the backwash purpose, green marked auto valve will open and red marked auto valve will remain close at the same time air release valve will also open. P – 4 A/B will supply the water for backwash.

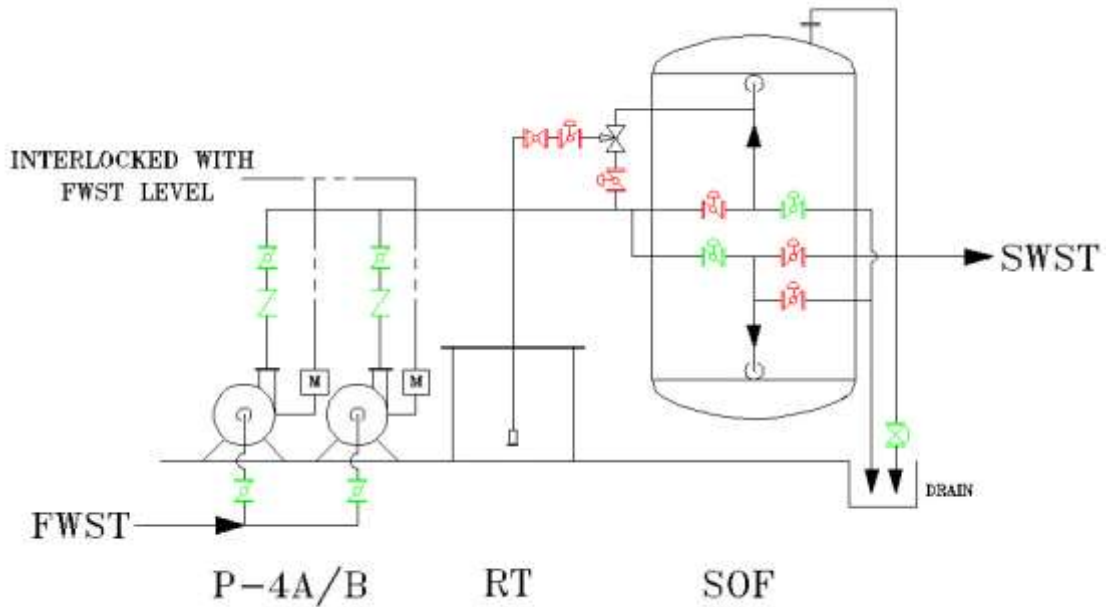


Figure 1. 15 Diagram of Softener regeneration

After completion of backwash regeneration should be started. For backwash purpose green marked auto valve will open and red marked auto valve will remain close. P – 4 A/B will supply the power water and NaCl solution will be prepared in regeneration tank (RT).

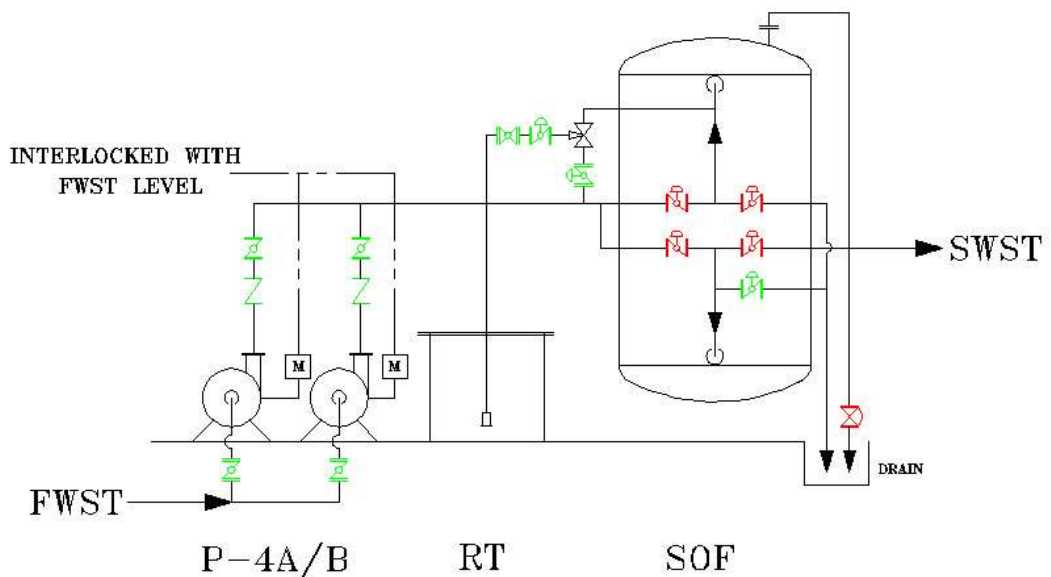


Figure 1. 16 Diagram of Regeneration Tank with NaCl solution

1.8.3.4 Cooling Tower Make Up Line

Softened water will be suctioned by the Softened Water Transfer Pump or Cooling Tower Make Up Pump (P-5 A/B) from the SWST and it will be fed primarily to the Cooling Tower Basin (CT Basin).

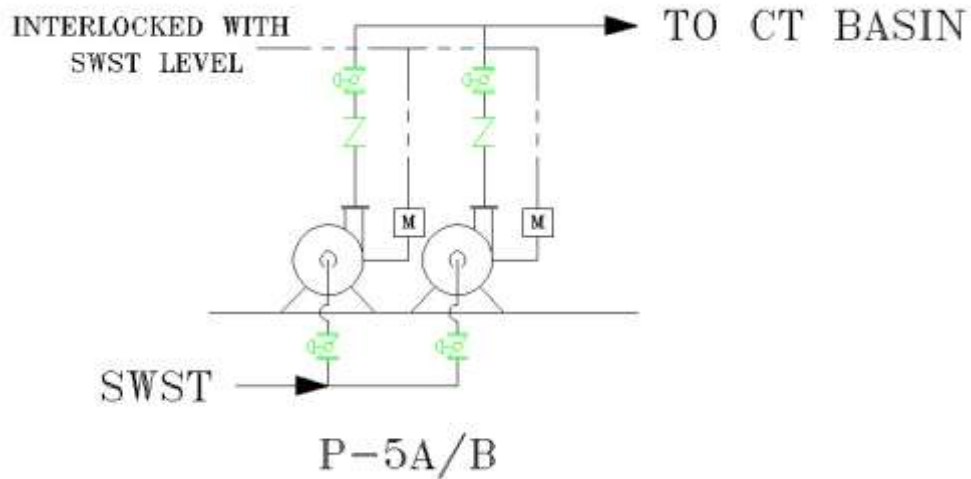


Figure 1. 17 Cooling Tower Make Up Line

1.8.3.5 Reverse Osmosis System

After pumped by the Cooling Tower Make Up Pump water will pass through the 5µ and 1µ filters, then water will be stored into the Buffer Tank. Before entering the Buffer Tank anti-scalant and acid will be dosed.

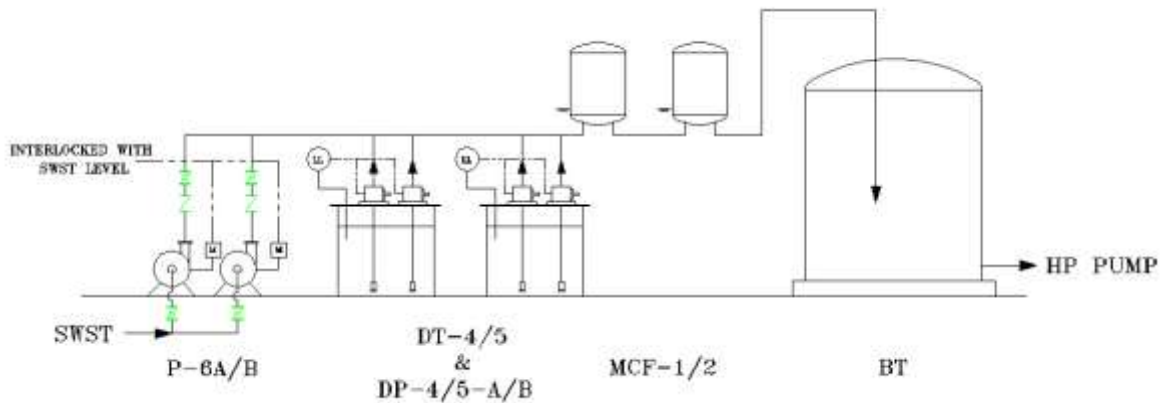


Figure 1. 18 Diagram of Reverse Osmosis System

Thereafter, water will be pumped through the RO high pressure pump to the Reverse Osmosis module. RO Module will have two numbers of RO membranes to get low TDS water. Reverse Osmosis Module has continuous permeate outlet and reject outlet. Permeate water from the permeate outlet will be stored into the Permeate Water Storage Tank and certain quality of reject from the reject outlet will be re-circulated into the Buffer Tank and remaining quantity will be drained out.

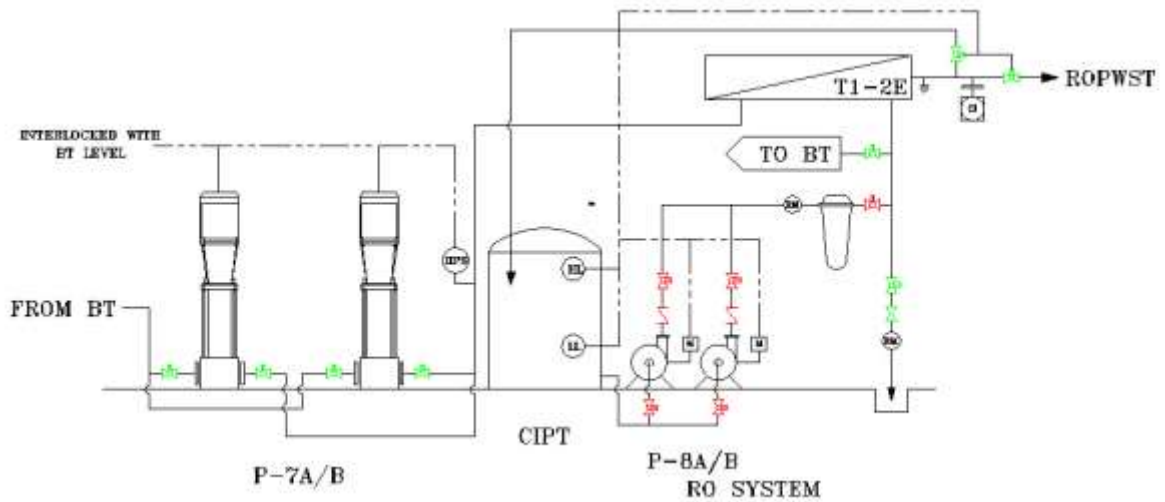


Figure 1. 19 Diagram of RO Module

1.8.3.6 Cleaning of RO System

For the RO cleaning purpose, cleaning solution will be prepared into the cleaning tank and solution will be fed by the RO high pressure pump to the RO module through the RO reject line. Water will come out through the RO permeate line again it will enter to the cleaning tank.

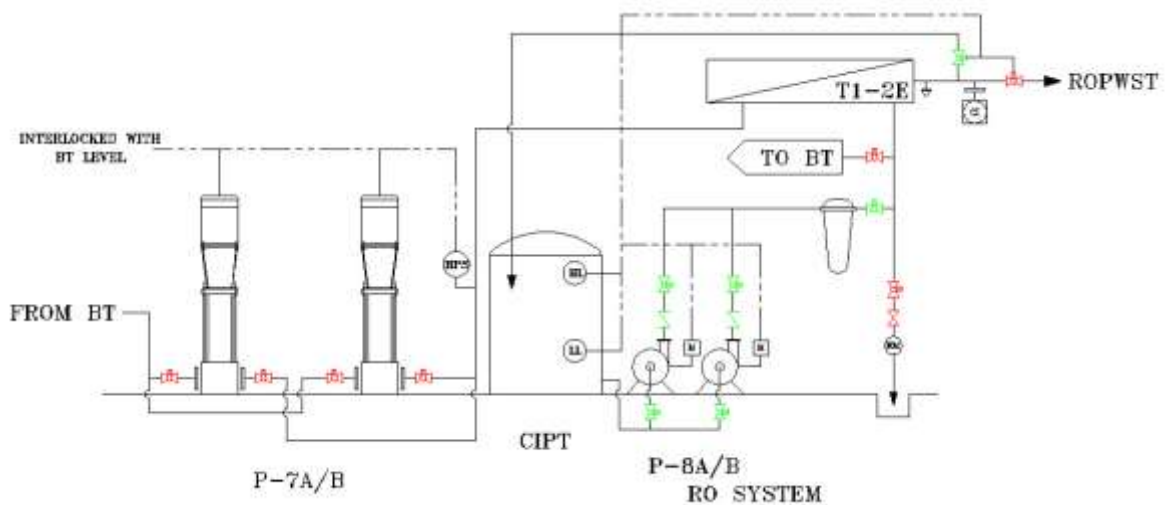


Figure 1. 20 Diagram of Cleaning of RO System

1.8.3.7 Electro De-ionized Unit

After storing into the RO permeate water (low TDS water), it will be pumped to the Electro De-ionized unit. EDI unit will remove the residual salts and aqueous species from water. EDI unit will also have two numbers of outlet permeate outlet and reject outlet. EDI permeate water will be stored into the Demineralized Water Storage Tank (DMWST).

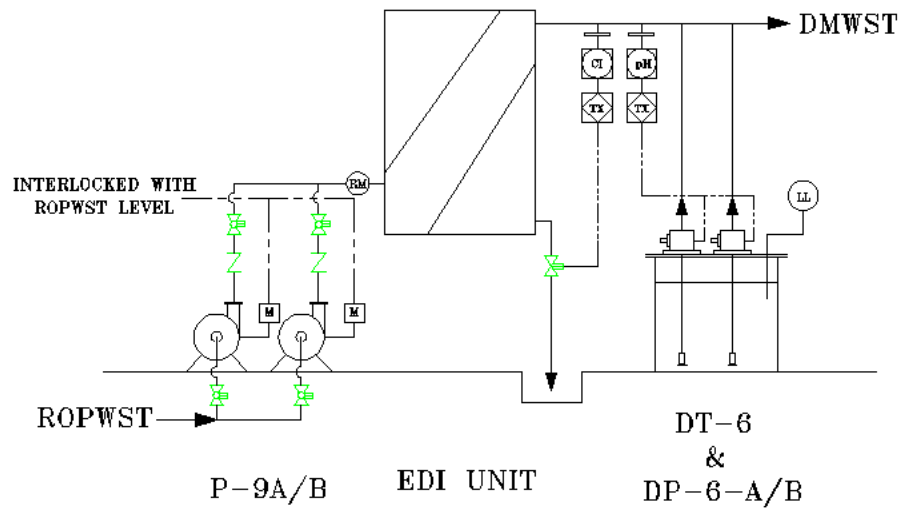


Figure 1. 21 Diagram of Electro De-ionized Unit

1.8.3.8 DM Water Transfer

EDI permeate water or DM water will be stored into the two numbers of DM water storage tank (DMWST). DM water will be transferred by the DM Water Transfer Pump (P – 10 A/B).

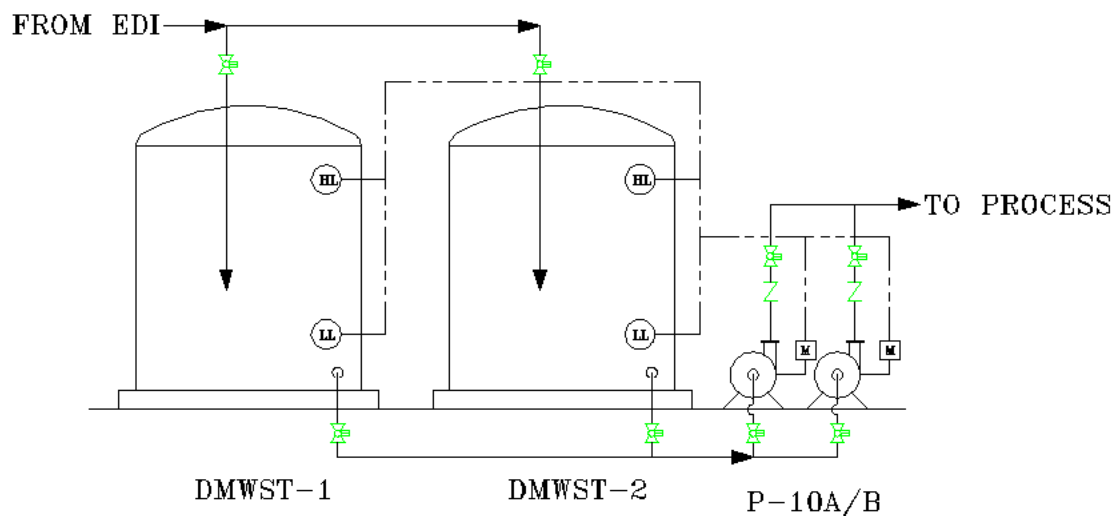


Figure 1. 22 Diagram of DM Water Transfer

Table 1. 5 Machineries and equipment lists of Rice Husk Power Plant

NO.	LIST OF ITEMS	QUANTITY	UNIT PRICE (USD)	TOTAL VALUE	SOURCE	
					LOCAL	IMPORT
1	Boiler, its Auxiliaries and Ancillaries Equipment	1	627,404.00	627,404.00		Brand New
2	Pollution Control Equipment with Accessory	1	91,020.00	91,020.00		Brand New
3	Boiler water System (Power Cycle)	1	7,000.00	7,000.00		Brand New
4	Fuel (Rice Husk) Handling System Form Storage Silo to Fuel Bunker at Boiler	1	25,000.00	25,000.00		Brand New
5	Ash Handling System with Accessory	1	57,400.00	57,400.00		Brand New
6	Plant Water System with Accessory	1	210,740.00	210,740.00		Brand New
7	Circulating and Auxiliary Cooling Water (CCW) System with Accessory	1	32,800.00	32,800.00		Brand New
8	Plant Piping System and valves	1	48,000.00	48,000.00		Brand New
9	Air Compressor with Accessory	1	15,500.00	15,500.00		Brand New
10	Hydrant System with Accessory	1	9,860.00	9,860.00		Brand New
11	Crane for Turbine Generator Building	1	34,500.00	34,500.00		Brand New
12	Rice Husk Unloading & Storing System with Accessory	1	142,280.00	142,280.00		Brand New
13	Electrical System with Accessory	1	221,400.00	221,400.00		Brand New
14	Control and Instrumentation with Accessory	1	73,800.00	73,800.00		Brand New

15	Steam Turbine and its Auxiliary Equipment	1	843,350.00	843,350.00		Brand New
	TOTAL	15		2,440,054.00		

The rice husk will be available from rice mills which is not only 240TPD rice mill but also other rice mills located at Myaung Mya Township. The detail design and capacity of the rice husk silo can be seen in **Figure 1. 23**.

Table 1. 6 Feedstock lists of Rice Husk Power Plant

NO.	LIST OF ITEM	UNIT	UNIT PRICE (USD)	ANNUAL NEEDS			
				LOCAL		IMPORT	
				QUANTITY	TOTAL VALUE (USD)	QUANTITY	TOTAL VALUE (USD)
1	Rice Husk	Ton	4.56	16,560	75,513.60		
2	Turbine Generator Oil	Kg	2,111.00			5	10,555.00
	TOTAL			16,560	75,513.60	5	10,555.00

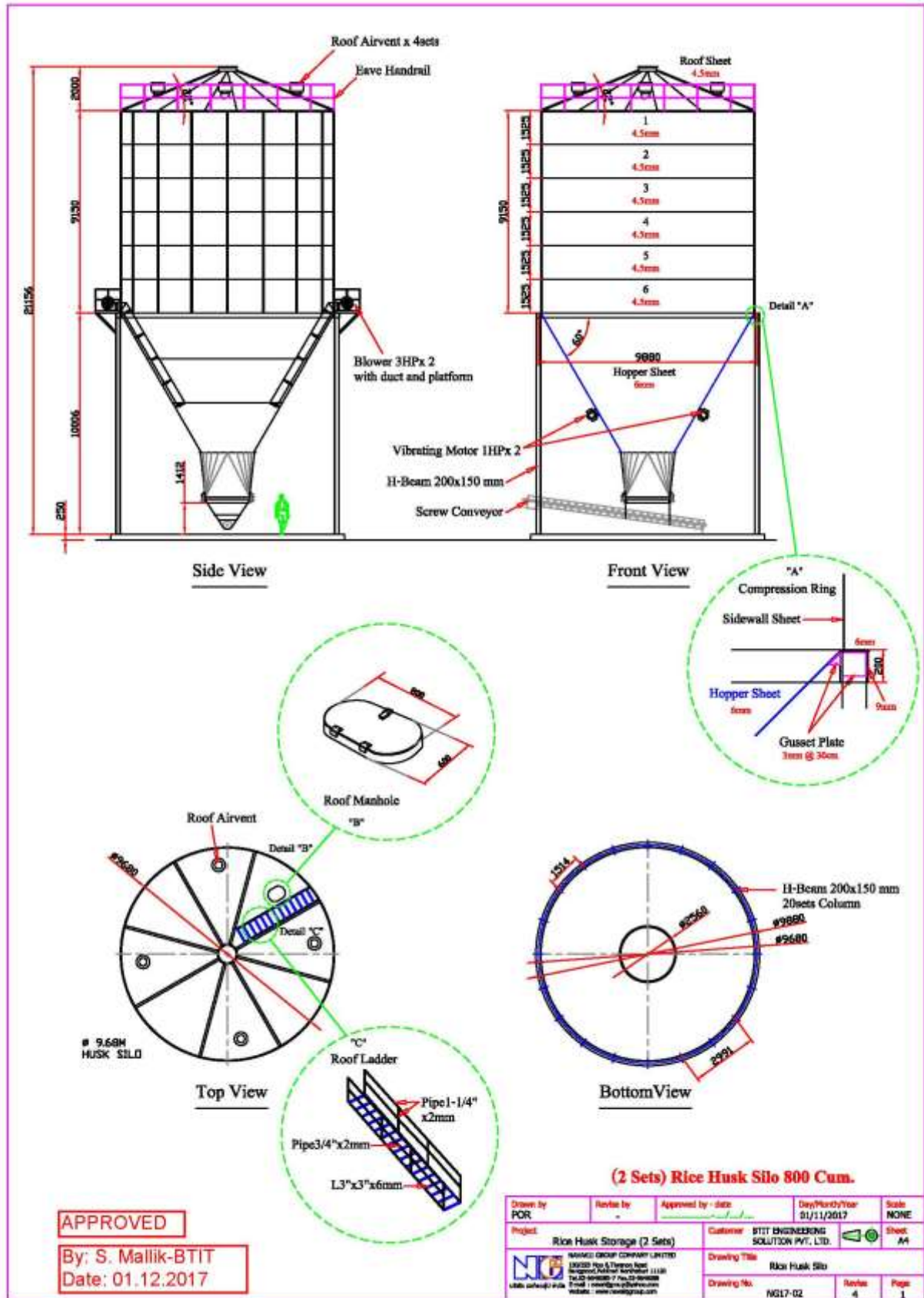


Figure 1. 23 Silo Design

1.8.4 Waste Management System

Electrostatic precipitator (EPS) was installed as a particle control device that uses electrical forces to move the particles out of the flowing gas steam and onto collector electrodes on the flue gas line before it escapes out through chimney. Generated Ash from EPS is around 460 kg/hr.11ton/day, 3,312 tons/year (Max). Ash of Rice husk fuel has its usage in a most productive and commercial purpose as stated below under.

- a. Silica Generation
- b. For silicate fertilizer in Paddy
- c. In cement factory and industrial product raw materials

1.8.4.1 Silica Generation

Among the various usage of RHA stated in clause no 3.0 above, the best usage of RHA will be the raw material for silica. RHA contains around 90-95% silica and this can be precipitated by using the patented and noble technology developed by one of the premier institutes of India.

This is a low temperature chemical process where RHA is digested by Sodium Hydroxide in digester vessel under Digestion Process to generate sodium silicate which again is reacted with Carbon di-oxide in precipitator vessel under precipitation Process to generate precipitated Silica. The sodium carbonate solution after precipitation vessel undergoes in the Regeneration Process in the regenerator vessel to recover costly sodium hydroxide by replacing with low cost calcium hydroxide and at the same time obtaining 98-99% pure Calcium Carbonate as a bi-product to be sold in the market.

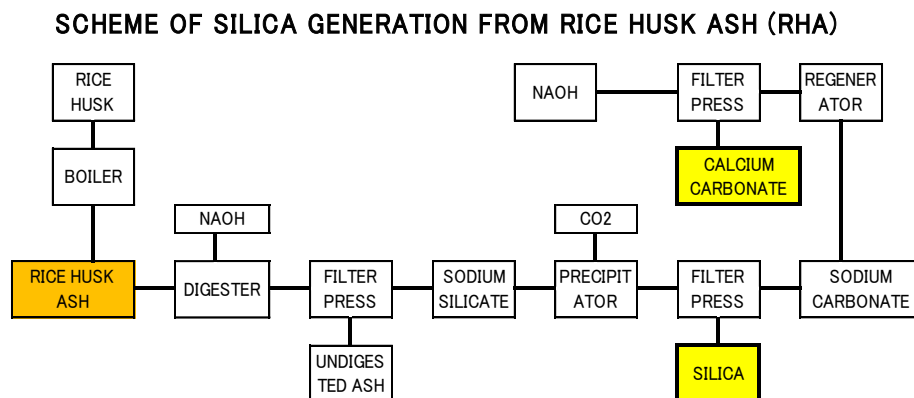


Figure 1. 24 Scheme of Silica Generation from Rice Husk Ash

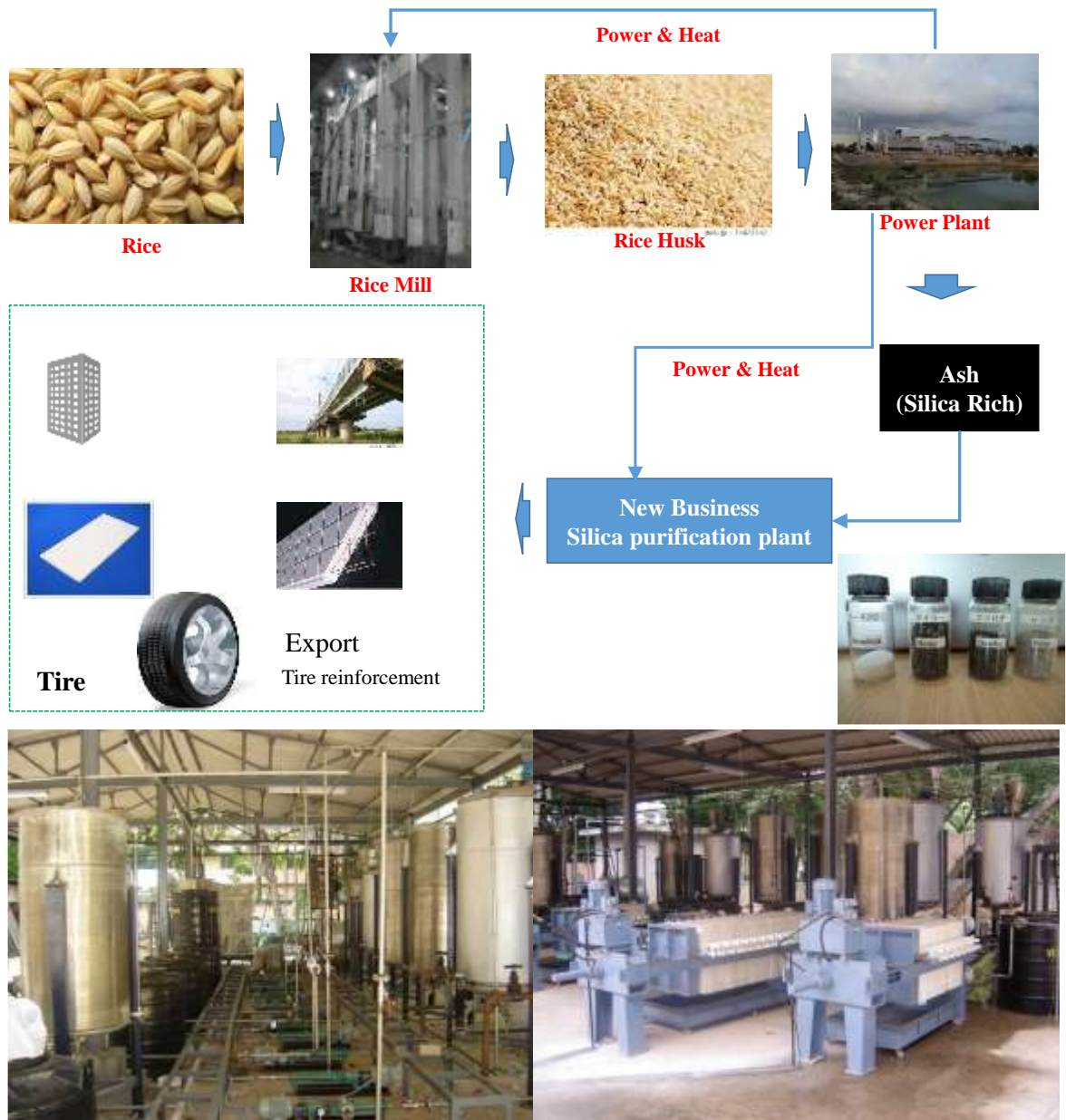


Figure 1. 25 New Business Silica Purification Plant

The silica plant has not been built yet. The construction process of the silica plant is shown in **Table 1. 7**.

Table 1. 7 Tentative Schedule for Construction of Silica Plant

Items	Month															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Design & Engineering	█	█	█	█												
MIC Endorsement			█	█	█	█	█	█								
Procurement & Supply				█	█	█	█	█	█	█	█	█	█	█	█	█
Construction									█	█	█	█	█	█	█	█
Commissioning															█	█

Until silica plant is completed, the generated ash will be put into the bags and kept it in the temporary area (see in **Figure 1. 26**) next to the power generation facility to prevent splashes and spills. There is enough land for storage, but it is also used for silica fertilizers and cement raw materials as needed.

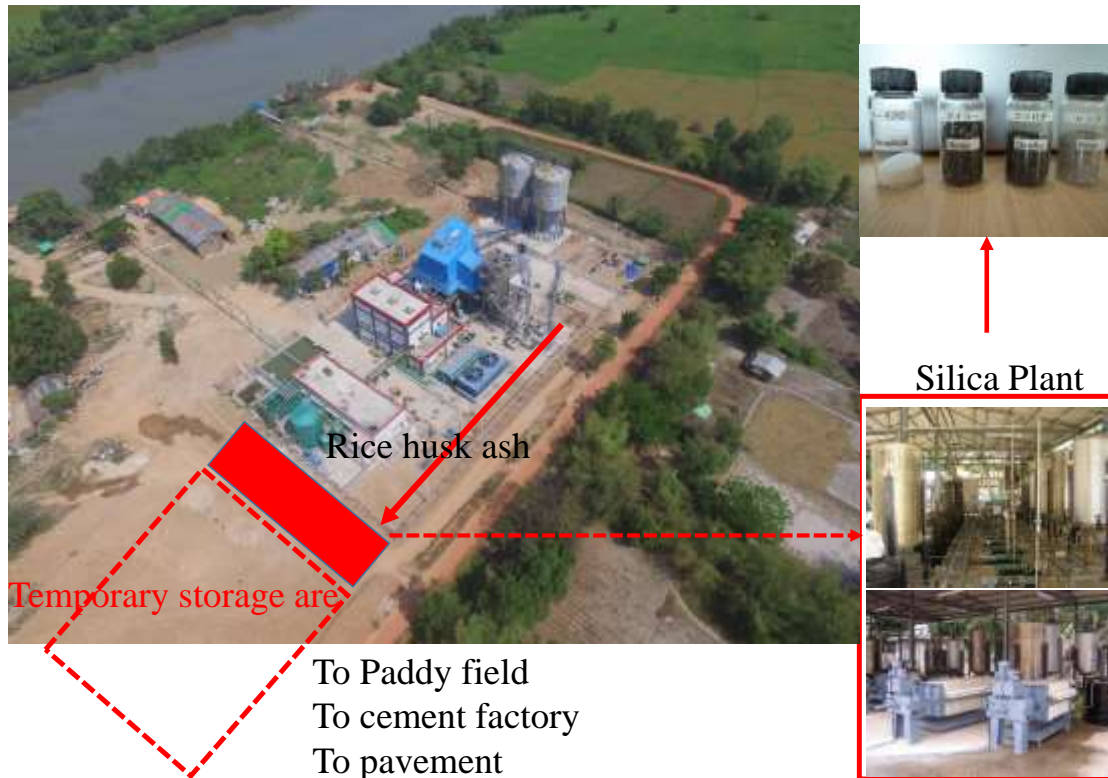


Figure 1. 26 Tentative Silica Plant Location and Temporary Storage Area

1.8.4.2 Silica fertilizer in Paddy

Silicic acid is important for paddy production: more than 50 kg of silicic acid is absorbed by 1,000m² of paddy rice whereas only 10 kg of nitrogen is absorbed by the same area, and hence paddy rice actively requires silicic acids unlike other plants. Enrichment of paddy soil results in strengthened roots stems and leaves, reduction of adverse impacts by rice blast, and an increased harvest and improved quality. There is a large paddy field for applying silica fertilizer around the power generation facility.

1.8.4.3 Raw materials for Industrial Products

The composition of RHA is particularly high in silicon dioxide (SiO₂) content than silica (Si) which can be an ingredient for a production of cement. The study on using RHA as a concrete ingredient has begun in 1970s, and its parameter, enforcement of concrete's strength for example, has been understood.

In Yangon, unblocked AAC (Autoclaved Aerated Concrete) has already been produced. However, because of the use of soil as a silicic acid raw material, it is a very heavy product. RHA is a promising raw material.

1.8.5 Human Resources Requirement

The following tables show the numbers of person who were employed at the construction phase and those who will be employed at the operation phase. In the operation phase, 57% of the total workers will be local people as workers and security.

Table 1. 8 No. of Employment at Construction Stage

No.	Type of Position	No. of Person	Local/ Foreign
1	General Labor	10	Local
2	Electrician	32	Foreign/ Local
3	Plant Erection Worker	26	Foreign/ Local

Table 1. 9 No. of Employment at Operation Stage

No.	Type of Position	Department	No. of Person	Local/ Foreign
1	Site Manager	Operation	1	Foreign
2	Engineer	Operation	3	Foreign/ Local
3	Administrator/ Accountant	Admin	1	Local
4	Operator	Operation	3	Foreign/ Local
5	Worker	Operation	9	Local
6	Security	Operation	2	Local
		Total	19	

CHAPTER 2: BACKGROUND OF THE STUDY

2.1 Background of the Study

The Environmental Management Plan (EMP) is formulated for 1.8MW Gross Rice Husk Fire BTG Power Plant to be established by Myaung Mya FM Biomass Power Co., Ltd. The proposed project is intended to achieve the following advantages in Myaung Mya, Ayeyarwaddy Division.

- i. Developing Waste to energy technology in Ayeyarwady Division where has rice husk waste.
- ii. Promoting and expansion of rice husk power plant technology
- iii. Improving socio-economic conditions and employment opportunities
- iv. Regional development and poverty reduction

The project aims to establish a distributed regional energy supply system in the Ayeyarwady region in Myanmar based on rice husk biomass generation in rice mills, supplying electricity to the surrounding community whose electrification rate is low.

The expected outcome is the formation of a low-carbon community centering on the rice mill, including new industries based on electricity and heat generation, and improved energy access of the local residents. The above mentioned project purposed to share the electricity to the rice mill which will be owned by MAPCO and rice bran mill which will be established by MAPCO Ayeyar Co., Ltd. and will also plan to distribute the surplus megawatt to the neighbored villages through off-gird. The proposed project period of the factory is aimed at 50 years by contract with government and extendable to two 10-year terms subject to approval by Myanmar Investment Commission (MIC). Nevertheless, development always affects more or less on the environment, natural resources and livelihood of the local community. So, the attention on the environmental and social security should be undertaken through emphasized the study of Environmental Management Plan (EMP) by the existing Environmental Conservation Laws 2012, Environmental Impact Assessment Procedures (2015), Rules and Regulations of the Republic of the Union of Myanmar to ensure sustainable development.

The investor has submitted a proposal for investment to the Myanmar Investment Commission (MIC) in June 21st, 2017. According to the requirement of Environmental Impact Assessment Procedure (notified on December 29, 2015) of the Republic of the Union of Myanmar, onsite inspection activities was conducted on September 26, 2017 at the proposed Myaung Mya FM Biomass Power Plant Co., Ltd under the supervision of Ayeyarwady Environmental Conservation Department by using private industry enterprise onsite inspection checklist to analysis current condition of project site. Therefore, 1.8 MW Gross Rice Husk Power Plant commissioned E Guard Environmental Services for EMP report preparation as per comments of Department of Ayeyarwady Environmental Conservation by the Letter No. (2/8/7 (01-05) / 35(711/2017) on proposed rice husk power plant project. In addition, onsite inspection report documents are mentioned in **APPENDIX XII**.

2.2 Methodology and Scope of Environmental Management Plan

2.2.1 Methodology

The study on existing environmental resources in the project area focused on two main resources – physical and socio-economic resources. The physical resources such as quality of air, noise and water inside the project are called the primary data, which is collected from existing information during the site visit. This data collection is done by direct observation, survey and sample analyses. And then, the socio-economic data or the secondary data are obtained from relevant ministries/bodies and research institutions as reference material for the preparation of the formulation of EMP report.

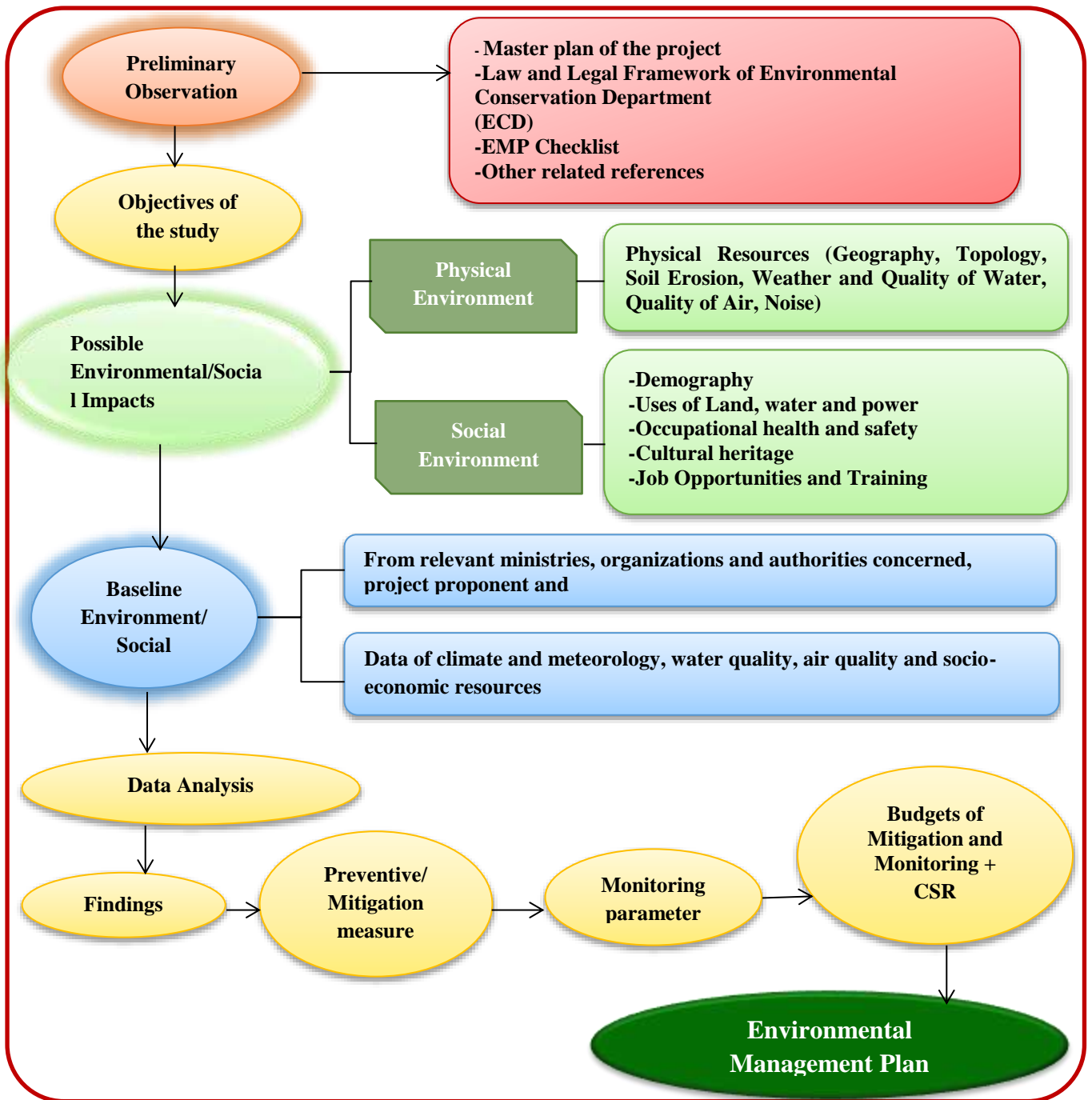


Figure 2. 1 Flowchart of the Methodology of Environmental Management Plan

2.2.2 Scope of Environmental Management Plan




The environmental management plan is taken into consideration for three phases of the project: during the construction, operation and decommissioning of the proposed project. The scope of this Environmental Management Plan covers:

Description of the proposed project;

- ❖ Provision of the relevant environmental laws;
- ❖ The baseline environmental conditions of the study area
- ❖ Identification and discussion of any adverse impacts to the environment anticipated from the proposed project;
- ❖ Appropriate mitigation measures; and
- ❖ Provision of an Environmental Management Plan outline.

The field studies of baseline environmental condition study were carried out by members of E Guard Environmental Services Co., Ltd having experiences in conducting environmental assessment for various types of projects in Myanmar. The E Guard team conducted field survey, assessment activities and prepared this report. **Table 2. 1** describes measuring devices use to collect baseline environmental data during sampling period for the proposed project.

Table 2. 1 Requirement of Environmental Equipment For Proposed Project

No	Name and Model of Instrument	Purpose Parameter	Measuring Instrument
1.	Haz-Scanner EPAS	PM ₁₀ , PM _{2.5} , NO ₂ , CO, CO ₂ , Temperature, and Relative Humidity	
2.	Digital Sound Level Meter	Noise	
3.	Vibration Level Meter VM 55	Vibration	

A reconnaissance study was performed on the proposed project site and baseline environmental data were also collected from possible sources, using appropriate measuring devices. Data interpretation and analysis were made based on the collected data for the present and potential future conditions. Suitable measures were proposed for the impacts to be mitigated to reduce to acceptable ones.

2.3 Study Team for EMP

Environmental Management Plan (EMP) for the proposed rice husk power plant project is prepared by E Guard Environmental Services Co., Ltd. The environmental study was carried out by the project listed below and following is a summary of team member's responsibilities during study period.

U Aye Thiha (Director)

Since E Guard was formed, U Aye Thiha is working as Managing Director. He managed and implemented numerous Projects (including local and foreign funded development as well as investment projects). At E Guard, he is responsible for cost estimation, contracting, staff recruitment, etc.

Daw Shwe Sin Ko Ko (Senior Consultant)

Ms. Shwe Sin Ko Ko is a Senior Consultant, who received Bachelor of Civil Engineering from Taunggyi Technological University in 2011. She received Master of Engineering in (International Graduate Program in Environmental and Water Resources Engineering) from Mahidol University, Thailand in 2016. She has the experience in environmental fields more than two year including her master degree research, "Study of Dissolved Oxygen Dynamics in the Cha-Am Municipality Wastewater Treatment Ponds System Using Mathematical Modelling and GIS". Her master thesis paper was presented in 49th Computational Hydraulics International (CHI) Conference, Toronto, Canada. She worked as a site engineer in IDEAL Construction Group, Taunggyi, Southern Shan State from October 2012 to April 2014.

Daw Yadanar Swam Htet Kyaw (Consultant)

Daw Yadanar Swam Htet Kyaw is a Consultant, who received Bachelor of Agricultural Science from Yezin Agricultural University in 2014. She also received Master of Science in Natural Resources Management from Asian Institute of Technology, Thailand in 2017. She has the experience in environmental and social fields more than two years including her Master Degree thesis, "Villagers' Assessment of the Impacts of Eucalyptus Plantations in the Mandalay Region of Myanmar". She also did research paper in her Bachelor Degree "Assessment on Resource Allocation of Rice Based Farmers in Zayyarthiri Township, Naypyitaw". In addition, she got Diploma in Remote Sensing and Geographic Information System from Dagon University and also experienced in carrying out the project paper of "Assessment of Traffic Noise Pollution on Pyay Road from Hledan Junction to 8 Mile Junction". She is familiar with not only conducting reconnaissance surveys, socio-economic surveys but also environmental impact assessment. Her responsibilities are concerning with the environmental and social impact assessment and mitigation measures for the project.

Daw Hnin Yee Mon Mon (Project Associate)

Daw Hnin Yee Mon Mon is a Project Associate who received Bachelor of Civil Engineering from Meiktila Technological University in Feb 2017. She has more than three months of experiences in conduction stakeholder engagement and public consultation, site visit. Her contributions on preparation of EMP for this project are secondary data and laws and regulations collection and writing environmental quality report.

Daw Nway Phyu Pyar Oo (Project Assistant)

Daw Nway Phyu Pyar Oo is a Project Assistant, who received her Bachelor Degree in Chemical Engineering from West Yangon Technological University in 2018. She did research paper in her Bachelor Degree thesis, “Preparation of Pectin from Pomelo Rinds”. She has experiences on environmental site survey and socio-economic surveys. Another experience is to cooperate with clients and to conduct stakeholder’s engagement and public consultations.

U Sai Thiha (Project Assistant)

U Sai Thiha is a Project Assistant, who received his Bachelor Degree in Myanmar from the University of Taunggyi in 2013. He has more than three-year experiences in land surveyor. He specializes in instrumentation and field data collection of environmental condition of the site and measuring of environment baseline data. He also participates in the activities of environmental quality measurement such as air, water and noise, and data analysis and interpretation of environmental baseline data and public hearing in this project.

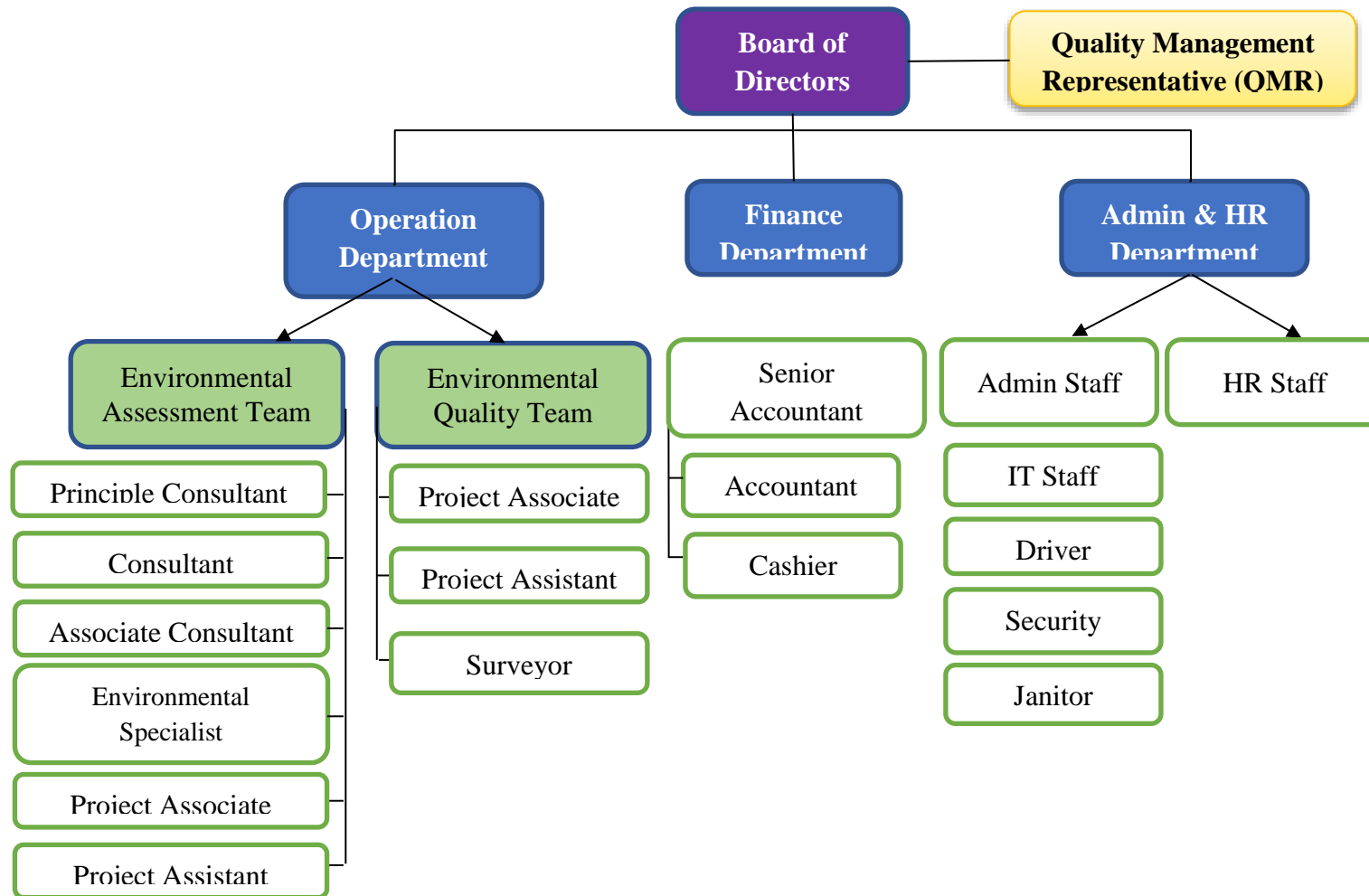


Figure 2. 2 Organization Chart of E Guard

Full address of the company conducting:

*E Guard Environmental Services Co., Ltd.
No. 11, Airport Avenue Road,
Yangon Airport Road, Saw Bwar Gyi Gone Quarter,
Insein Township, Yangon 1011, Myanmar.
Tel: +95 1 667953, Fax: +95 1 667953
URL: www.eguardservices.com*

CHAPTER 3: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 Institutional Framework for Environmental Conservation

The Ministry of Environmental Conservation and Forestry (MOECAAF) was re-organized as the Ministry of Natural Resources and Environmental Conservation (MONREC) on 30 March 2016 in order to undertake both environmental and natural resources conservation and management more effectively. Under Section 3 of the Environmental Impact Assessment Procedure (2015), pursuant to section 21 of the law and Articles 52, 53 and 55 of the Environmental Conservation Rules, all projects and project expansions undertaken by any organization, which may cause impact on environmental quality, are required to obtain Prior Permission. This is to be in accordance with section 21 of the Environmental Conservation Law, and Article 62 of the Environmental Conservation Rules, having the potential to cause Adverse Impacts, are required to undertake IEE or EIA or to develop an EMP, and to obtain an Environmental Compliance Certificate (ECC) in accordance with this Procedure.

3.2 National Laws and Regulations

National laws and regulations for environmental protection applicable to the proposed project are compiled and presented in **Table 3. 1**. The Constitution of the Republic of the Union of Myanmar is the governing law and is the governing body for the law enforcement. The others include the constitution (2008), National Environmental Policy (1994), Environmental Conservation Law (2014) to be abided by for the formulation of Environmental Management Plan.

Table 3. 1 Relevant National Laws and Regulations of Myanmar

Laws and Regulations	Description
Constitution of the Republic of the Union of Myanmar (2008)	
Section 45	The Union shall protect and conserve natural environment.
Section 390 (b)	Every citizen has the duty to assist the Union carrying out the environmental conservation.
National Environmental Policy (1994)	
To achieve harmony and balance between socio-economic, natural resources and environment through the integration of environmental considerations into the development process enhancing the quality of the life of all its citizens.	
The Environmental Conservation Law(2012)	
<i>Responsibilities of project proponent/ business owner for reducing environmental impact</i>	

Laws and Regulations	Description
Section 14	A person causing a point source of pollution shall treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.
Section 15	The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it shall be arranged to dispose the wastes in accord with environmentally sound methods.
Section 16	<p>A person or organization operating business in the industrial estate or business in the SEZ or category of business stipulated by the Ministry:</p> <ul style="list-style-type: none"> a) is responsible to carry out by contributing the stipulated cash or kind in the relevant combined scheme for the environmental conservation including the management and treatment of waste. b) shall contribute the stipulated users' charges or management fees for the environmental conservation according to the relevant industrial estate, SEZ and business organization. c) shall comply with the directives issued for environmental conservation according to the relevant industrial estate, SEZ or business.
<i>Provisions of Duties and Powers relating to the Environmental Conservation of the Ministry:</i>	
Section 7	<ul style="list-style-type: none"> a) To specify categories and classes of hazardous wastes generated from the production and use of chemicals or other hazardous substances in carrying out industry, agriculture, mineral production, sanitation and other activities; b) To prescribe categories of hazardous substances that may affect significantly at present or in the long run on the environment; c) To promote and carry out the establishment of necessary factories and stations for the treatment of solid wastes, effluents and emissions which contain toxic and hazardous substances; d) To prescribe the terms and conditions relating to effluent treatment in industrial estates and other necessary places and buildings and emissions of machines, vehicles and mechanisms; e) To lay down and carry out a system of EIA and SIA as to whether or not a project or activity to be undertaken by any Government department, organization or person may cause a significant impact on the environment; f) To manage to cause the polluter to compensate for environmental impact, cause to contribute fund by the organizations, which obtain benefit from the natural

Laws and Regulations	Description
	environmental service system, cause to contribute a part of the benefit from the businesses, which explore, trade and use the natural resources in environmental conservation works.
<i>This law concerns for the conservation, management, beneficial use, sustainable use of the environmental natural resources.</i>	
Objectives: Section 3	<ul style="list-style-type: none"> a) To enable to implement the Myanmar National Environmental Policy; b) To enable to lay down the basic principles and give guidance for systematic integration of the matters of environmental conservation in the sustainable development process; c) To enable to emerge a healthy and clean environment and to enable to conserve natural and cultural heritage for the benefit of present and future generations; d) To reclaim ecosystems as may be possible which are starting to degenerate and disappear; e) To enable to manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially; f) To enable to implement for promoting public awareness and cooperation in educational programmers for dissemination of environmental perception; g) To enable to promote international, regional and bilateral cooperation in the matters of environmental conservation; h) To enable to cooperate with the Government departments, Government organizations, international organizations, non-government organizations and individuals in matters of environmental conservation.
Environmental Quality Standards: Section 10	<p>The Ministry may, with the approval of the Union Government and the Committee, stipulate the following environmental quality standards:</p> <ul style="list-style-type: none"> a) Sustainable surface water quality standards in the usage in rivers, streams, canals, springs, marshes, swamps, lakes, reservoirs and other inland water sources of the public; b) Water quality standards for coastal and estuarine areas; c) Underground water quality standards; d) Atmospheric quality standards; e) Noise and vibration standards; f) Emissions standards; g) Effluent standards; h) Solid wastes standards; i) Other environmental quality standards stipulated by the Union Government.

Laws and Regulations	Description
Monitoring: Section 13	<p>The Ministry shall, under the guidance of the Committee, maintain a comprehensive monitoring system and implement by itself or in co-ordination with relevant Government departments and organizations in the following matters:</p> <ul style="list-style-type: none"> a) The use of agro-chemicals, which cause to impact on the environment significantly. b) Transport, storage, use, treatment and disposal of pollutants and hazardous substances in industries. c) Disposal of wastes, which come out from exploration, production and treatment of minerals, industrial mineral raw materials and gems. d) Carrying out waste disposal and sanitation works. e) Carrying out development and constructions. f) Carrying out other necessary matters relating to environmental pollution.
Environmental Conservation Rules (2014)	
Rule 51	The Ministry shall assign duty to the Department for enabling to adopt and carry out the environmental impact assessment system.
Rule 52	The Ministry shall determine the categories of plan, business or activity which shall carry out environmental impact assessment
Rule 53	The Ministry shall scrutinize whether or not it is necessary to conduct environmental impact assessment, determine the proposed plans, businesses or activities which do not include in stipulation under rule 52
Rule 56	The person who carries out any project, business or activity shall arrange and carry out for conducting the environmental impact assessment for any project, business or activity by a qualified third person or organization accepted by the Ministry.
Rule 58	The Ministry shall form the EIA Report Review Body with the experts from the relevant Government departments, organizations.
Rule 59	The Ministry may assign duty to the Department to scrutinize the report of EIA prepared and submitted by any organization or person relating to EIA and report through the EIA Report Review Body.
Rule 61	The Ministry may approve and reply on the EIA report on the EIA or IEE or EMP report with the guidance of the Committee.
National Land Use Policy(2016)	

Laws and Regulations	Description
Objectives	a) To promote sustainable land use management and protection of cultural heritage areas, environment, and natural resources for the interest of all people in the country. b) To strengthen land tenure security for the livelihoods improvement and food security of all people in both urban and rural areas of the country. c) To recognize and protect customary land tenure rights and procedures of the ethnic nationalities. d) To develop transparent, fair, affordable and independent dispute resolution mechanisms in accordance with rule of law. e) To promote people centered development in land resources and accountable land use administration in order to support the equitable economic development of the country; f) To develop a National Land Law in order to implement the above objectives of National Land Use Policy.
Land Acquisition Act (1894)	
<ul style="list-style-type: none"> • Stipulates that the government holds rights to take over land provides that compensation is made to the original land owner. • States that no private ownership of land is permitted and that all land must be leased from the Union State. 	
The Land Nationalization Act (1953)	
<ul style="list-style-type: none"> • With some exceptions stipulates that all types of agricultural land are owned by the President. • Mentions that in case of a breach of the regulations, even the land exempted from government confiscation will be forfeited to the country without compensation. • States that the President reserves rights to decide the crops to be grown on agricultural lands. 	
Building Regulations (2014)	
<p>The developer should follow the instructions made by concerned departments for the following activities: installation of electrical meters, installation of transformers, emergency exits, to develop systems for disposal of sewage and waste, fire safety system and matters relating to road and bridges.</p>	
Factories Act (1951)	
Has been enacted for affairs concerning with health, safety, working hours of employees.	
Hygiene in Working Environment: Section 3	Mentions responsibilities of employer and manager regarding waste disposal, ventilation, extreme temperature, dust and gas generation, minimum space for each worker, lighting, portable drinking water and toilets for employees.

Laws and Regulations	Description
Safety in Working Environment: Section 4	States responsibilities of employer and manager concerning with machine guarding, personal protective equipment, housekeeping, aisles and exits, chemical storage and fire protection system to avoid accidents.
Environmental Impact Assessment Procedure (2015)	
	<p>a) The project proponent shall submit the Project Proposal to the Ministry for Screening.</p> <p>b) The Ministry will send the Project Proposal to the Environmental Conservation Department to determine the need for environmental assessment.</p> <p>c) Following the preliminary Screening and verification that the Project Proposal contains all required documents and related materials, subject to Articles 8, 9, 10, 11, 26 and 27 the Department shall make a determination in accordance with Annex 1 ‘Categorization of Economic Activities for Assessment Purposes’, taking into account Article 25 and the additional factors listed in Article 28 in order to designate the Project as one of the following, and then submit it to the Ministry:</p> <p>-An EIA Type Project, or</p> <p>-An IEE Type Project, or</p> <p>-A Non IEE or EIA Type, and therefore not required to undertake any environmental assessment.</p>
Screening: Section 24	Ministry shall also make a determination whether an EMP shall be required in respect of any Project.
Screening: Section 29	Within fifteen (15) working days of receiving the complete Project Proposal, the Department shall determine the type of environmental assessment (EIA, IEE, or none) which the Project will require, and the Department shall inform the Project Proponent in writing as to such determination in accordance with the Ministry guidance.
National Environmental Quality (Emission) Guidelines (2015)	
Objectives	To provide the basis for regulation and control of noise and vibration, air emissions, and liquid discharges from various sources in order to prevent pollution for purposes of protection of human and ecosystem health.
Implementation procedures: Section 13	Air emissions, noise, odor, and liquid/effluent discharges will be sampled and measured at points of compliance as specified in the project EMP and ECC.
Foreign Investment Rules (2013)	
	<p>The applicable economic activities according to the Foreign Investment Rules are:</p> <p>a) Labor intensive industry with the view to create employment opportunities for the citizens;</p> <p>b) Business which enables to produce value added of products of the Union;</p> <p>c) Business which is capital intensive industry;</p>

Laws and Regulations	Description
	<p>d) Business applying high technology;</p> <p>e) Business producing goods and services which focuses on to causing the welfare of Consumption of citizens;</p> <p>f) Business which supports to promote the living standard of the citizens;</p> <p>g) Business which support the technology and increase the capital for the small and medium enterprises operated by citizens;</p> <p>In addition to that, for the application of the permit, draft land lease contract to be signed with citizen or government departments, organizations and draft contract related to business for the joint-venture or by mutual contract shall be submitted together with the investment proposal.</p> <p>For capital intensive investment projects designated by the Commission and designated businesses which need to assess the environmental impact by the then Ministry of Environmental Conservation and Forestry (MOECAAF), and now Ministry of Natural Resources and Environmental Conservation (MONREC) the Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) reports shall be attached together with the investment proposal.</p> <p>The form of investment shall be as follows:</p> <p>a) Carrying out with one hundred percent foreign capital by the foreigner in other business except for the businesses prescribed with the Notification issued by the Commission under Rule 5;</p> <p>b) Carrying out the capital contribution of foreigner and citizen by concluding the contraction accord with the mutual agreement if it is formed as a joint-venture between a foreigner and a citizen or the relevant government department and organization;</p> <p>carrying out in various forms of cooperation systems between the Government and private including BOT system, BTO system or other system according to any system of Contractual Agreement;</p>
Rule 54	<p>The promoter or investor shall:</p> <p>a) comply with Environmental Protection Law in dealing with environmental protection matters related to the business;</p> <p>b) shall carry out socially responsible investment in the interest of the Union and its people;</p> <p>c) shall co-operate with authorities for occasional or mandatory inspection;</p> <p>d) shall exercise due diligence to be in conformity and harmony with norms and standards prescribed by relevant Union Ministry in conducting construction of factories, workshops, buildings, and other activities;</p> <p>e) shall enforce Safety and Health</p>
Duties and Rights of the Investor:	<p>a) Abiding by the provisions of this Law, terms and conditions contained in the rules, procedures, notifications, orders, directives and permits issued under this Law;</p>

Laws and Regulations	Description
Section 15	<p>b) Informing immediately to the commission if natural mineral resources or antique objects and treasure trove which are not related to the permitted business and not included in the original contract, are found above and under the land on which he is entitled to lease or use, continuing to carry out business on such land if the commission allows, and transferring and doing at the substituted place if the permission of continuing to carry out is not obtained;</p> <p>c) Carrying out not to cause environmental pollution, damage in accord with existing Laws in respect of investment business;</p> <p>d) Entitle to apply to the commission to obtain more benefit for the invention of new technologies, the enhancement of product quality, the increase in the production of goods and the reduction of environmental pollution is investment business carried out under the permit;</p>
Myanmar Investment Law (2016)	
Objectives: Section 3	<p>a) To develop responsible investment businesses which do not cause harm to the natural environment and the society for the benefit of the Union and its citizens;</p> <p>b) To protect the investors and their investments in accordance with the law;</p> <p>c) To create job opportunities for the people;</p> <p>d) To develop human resources;</p> <p>e) To develop high functioning production, service, and trading sectors.</p> <p>f) To develop technology and the agriculture, livestock and industrial sectors;</p> <p>g) To develop various professional fields including infrastructure across the Union;</p> <p>h) To enable the citizens to be able to work alongside with the international community; and</p> <p>i) To develop businesses and investments that meet international standards.</p>
Submitting Proposal: Section 36	<p>The investor shall submit a proposal to the Commission and invest after receiving the Permit in the following businesses;</p> <p>a) Businesses /investment activities that are strategic for the Union and</p> <p>b) Large capital-intensive investment projects</p> <p>c) Projects which have large potential impact on the environment and the local community,</p> <p>d) Businesses/ investment activities which used state-owned land and building</p> <p>e) Businesses/ investment activities, which are designated by the government to require the submission of a proposal to the Commission.</p>

Laws and Regulations	Description
Employment of Staff and Workers: Section 51	<p>The investor:</p> <ul style="list-style-type: none"> a) may appoint a qualified person of any citizenship in the investor's investment within the Union as senior manager, technical and operational expert, and advisor in accordance with applicable laws; b) shall arrange to provide capacity building programs in order to be able to appoint citizens to positions of management, technical and operational experts, and advisors; c) shall appoint only citizens for the works which does not require skill; d) shall appoint skilled citizen and foreign workers, technicians, and staff by signing an employment contract between employer and employee in accordance with the existing labor laws and rules; e) shall ensure the entitlements and rights contained in applicable labor laws and rules including minimum wages and salary, leave, holiday, overtime fee, damages, workman's compensation, social welfare, and other insurance relating to workers by stipulating the rights and duties of employers and employees and other employment terms and conditions contained in the employment contract; and f) shall settle disputes arising amongst employers, amongst workers, between employers and workers, between workers and technicians or staff in accordance with applicable laws.
Responsibilities of Investors: Section 65	<p>The Investor -</p> <ul style="list-style-type: none"> a) shall respect and comply with the customs, traditions and culture of the national races in the Union; b) shall establish and register a company or sole proprietorship or legal entities or branches under the applicable laws in order to invest; c) shall abide by the rules and stipulations of special licenses, permits, and business operation certificates issued to them, including the rules, procedures, notifications, orders and directives issued under applicable laws and this law, terms and conditions of contract and tax obligations; d) shall carry out in accordance with the stipulations of department concerned if it is required by the nature of business or other need to obtain any license or permit from the relevant Union Ministries, governmental bodies and organizations, or to carry out registration;

Laws and Regulations	Description
	<p>e) shall immediately inform to the Commission if natural mineral resources or antique objects and treasure trove, which are not related to the permitted business and not included in original contracts, are found above and under the land on which the investor is entitled to lease or use. If the Commission allows shall continue to carry out business on such land, and carry out the business at the substituted place which is selected and submitted by the investor if not applicable;</p> <p>f) shall not make any significant alteration of topography or elevation of the land on which he is entitled to lease or has rights to use, without the approval of the Commission;</p> <p>g) shall in relation to the investment business, abide by applicable laws, rules, procedures and best standards practiced internationally so as not to cause damage, pollution, loss to the natural and social environment and not to cause damage to cultural heritage;</p> <p>h) shall prepare and keep proper records of books of account and annual financial statement, and necessary financial matters relating to the investments which are performed by permit or endorsement in accordance with internationally and locally recognized accounting standards;</p> <p>i) shall discontinue the business only after payment of compensation to employees in accordance with applicable laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of workforce;</p> <p>j) shall pay wages and salaries to employees in accordance with applicable laws, rules, procedures and directives during the period of suspension of business for a concrete reason;</p> <p>k) shall pay compensation and indemnification in accordance with applicable laws to the relevant employee or his/her successor for injury, disability, disease and death due to the work;</p> <p>l) shall supervise foreign experts, supervisors and their families, who employ in investment, to abide by applicable laws, rules, orders and directives, and the customs and traditions of Myanmar;</p> <p>m) shall respect and comply with existing labor laws;</p> <p>n) shall have the right to sue and be sued in accordance with laws;</p> <p>o) shall pay effective compensation for loss incurred to victim, if the investor causes damage to the natural environment and causes socioeconomic losses,</p>

Laws and Regulations	Description
	<p>such as that caused by logging or extraction of natural resources, which are not related to the scope of the permitted investment, except from carrying out the activities which are required to conduct investment which includes in a Permit or an Endorsement.</p> <p>p) If the investor received the prior notice for inspection from Commission, investor shall allow the Commission to inspect in any places related with the investment.</p> <p>q) The investments, which need to obtain prior approval under the environmental conservation law and the procedures, shall take permit or endorsement of Commission before undertaking the assessment. Such Investments which obtained permit or endorsement, shall report environmental and social impact assessment to the Commission along the period in which the activities of the investments</p>
Insurance: Section 73	The investor shall obtain all types of insurance prescribing in rules at any insurance enterprise, which is entitled to carry out insurance activities within the Union.
Myanmar Fire Brigade Law (2015)	
Section-8 Fire Safety Procedures; Rule 17	<p>The relevant Government Department or organization shall,</p> <p>a) Operating hotel, motel, guest house enterprise</p> <p>b) Constructing factory, workshop, storage facilities and warehouse</p> <p>c) Operating business expose to fire hazard by using in inflammable materials or explosive materials</p> <p>d) Producing and selling fire-extinguishing apparatuses</p> <p>e) Doing transport business, public utility vehicles train, airplane, helicopter, vessel, ship,</p>
Rule 18	The relevant government department or organization shall obtain the opinion of the Fire Services Department for the purpose of fire precaution and prevention, when laying down plans for construction for town, village and downtown or village development plans
Prevention of Hazard from Chemical and Related Substances Law (2013)	
Objectives	<p>a) To protect from being damaged the natural environmental resources and being hazardous any living beings by chemical and related substances;</p> <p>b) To supervise systematically in performing the chemical and related substances business with permission for being safety;</p>

Laws and Regulations	Description
	c) To perform the system of obtaining information and to perform widely educative and research for using the chemical and related substance systematically; d) To perform the sustainable development for the occupational safety, health and environmental conservation.
License Permitted for the chemical and related substances businesses: Section 13	A person who wants to operate the chemical and related substances business shall apply to obtain a license together with the management working plan relating to the environmental conservation to the Central Supervisory Board in accordance with the stipulations.
Section 16	A person who has obtained a license: a) Shall abide the license regulations; d) Shall make the course of training and study and instruction if necessary to the working persons for using the occupational safety equipment, the personal protection equipment and the dresses systematically in the chemical and related substances business; e) Shall be inspected by the respective Supervisory Board and Boards of Inspection in respect of whether or not the hazard may impact on the Human Being and Animals' health and the environment; h) Shall acquire in advance the guidance and agreement of the respective Department of Fire Brigade, if the business that is worried to fire hazard is operated by using the fire hazard substances or the explosive substances;
The Private Industrial Enterprise Law (1990)	
Basic Principles Section 3	The State Law and Order Restoration Council enacted this law by Law No.22/90 on 26 th November1990. According to this law, all private industrial enterprises shall avoid or reduce the use of polluting technology. Private Industrial Enterprises shall be conducted in accordance with the following basic principles: a) To enhance the higher proportion of the manufacturing value added in the gross national product and related to the industrial enterprises; b) To acquire modern technical know-how for raising the efficiency of industrial enterprises and to establish the sale of finished goods produced of the industrial enterprise not only in the local market, but also in the foreign market; c) To cause utilization by relying mainly as local natural resources;

Laws and Regulations	Description
	<p>d) To cause narrowing down of the gap between rural development and urban development by causing the development and improvement of industrial enterprises;</p> <p>e) To cause opening up of more employment opportunities;</p> <p>f) To cause avoidance of or reduction of the use of technical know-how which cause environmental pollution;</p> <p>g) To cause the use of energy in the most economical manner.</p>
Section 11	<p>The duties and powers of the Supervisory Body are as follows:</p> <p>a) Giving opinion in respect of the inspection, recommending or refusing to recommend for grant of registration, causing to be removed or to be terminated or to be closed down private industrial enterprises which are conducting on the day this law is enacted;</p> <p>b) Inspecting, recommending or refusing to recommend for grant of registration in respect of cases where applications are submitted for registration of new private industrial enterprises;</p> <p>c) In recommending for grant of registration of private industrial enterprises, the following factor shall be taken into consideration:</p> <ol style="list-style-type: none"> i. No cause of being injurious to the health of the public residing in the vicinity of the private industrial enterprise; ii. Being safe from the danger of fire; iii. No cause of being a nuisance to the environmental and no cause of there being any pollution; iv. No cause of being injurious to the health of the workers of the private industrial enterprise and no like hood also of there being any danger; v. Being also in compliance with the existing laws; <p>d) Supervising to ensure the compliance by the entrepreneurs in the conducting of the industrial enterprises in accordance with the basic principles;</p> <p>e) Informing the relevant Government department to take action against the entrepreneur if it is discovered that any private industrial enterprise is not in conformity with any existing law;</p> <p>f) Giving opinion for the determination of industrial, areas and for the granting of leases of land for the private industrial enterprise;</p> <p>g) In granting lease of land in an industrial area to entrepreneurs, causing to be done so in accordance with the stipulations;</p>

Laws and Regulations	Description
	h) Carrying out the duties and powers assigned by the Ministry or by the private industrial enterprise coordination body.
Labor Organization Law (2011)	
Rights and Responsibilities of the Labor Organization: Section 17	The labor organizations shall have the right to carry out freely in drawing up their constitution and rules, in electing their representatives, in organizing their administration and activities or in formulating their programs. The labor organizations have the right to negotiate and settle with the employer if the workers are unable to obtain and enjoy the rights of the workers contained in the labor laws and to submit demands to the employer and claim in accord with the relevant law if the agreement cannot be reached.
Section 18	The labor organization has the right to demand the relevant employer to re-appoint a worker if such worker is dismissed by the employer and if there is cause to believe that the reasons of such dismissal were based on labor organization membership or activities, or were not in conformity with the labor laws.
Section 19	The labor organizations have the right to send representatives to the Conciliation Body in settling a dispute between the employer and the worker. Similarly, they have the right to send representatives to the Conciliation Tribunals formed with the representatives from the various levels of labor organizations.
Section 20	In discussing with the Government, the employer and the complaining workers in respect of worker's rights or interests contained in the labor laws, the representatives of the labor organization also have the right to participate and discuss.
Section 21	The labor organizations have the right to participate in solving the collective bargains of the workers in accord with the labor laws.
Section 22	The labor organizations shall carry out peacefully in carrying out holding of meetings, going on strike and carrying out other collective activities in accord with their procedures, regulations, by-laws and any directives prescribed by the relevant Labor Federation.
Section 23	The labor organizations shall assist in making agreements relating to management of works, individual employment agreements, bonds and other individual agreements between the employer and the workers.
Duties of Employer:	The employer shall recognize the labor organizations of his trade as the organizations representing the workers.

Laws and Regulations	Description
Section 29	
Section 30	The employer shall allow the worker who is assigned any duty on the recommendation of the relevant executive committee to perform such duty not exceeding two days per month unless they have agreed otherwise. Such period shall be deemed as if he is performing the original duty of his work.
The Settlement of Labor Dispute Law (2012)	
The Pyidaungsu Hluttaw hereby had enacted this Law for safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly.	
Chapter II: Formation of the Workplace Coordinating Committee	<p>3. In any trade in which more than 30 workers are employed, the employer, with the view to negotiating and concluding collective agreement, shall:</p> <p>a) if there is any labor organization, form the Workplace Coordinating Committee with the view to make a collective bargaining as follows:</p> <p>(i) two representatives of workers nominated by each of the labour organizations;</p> <p>(ii) an equivalent number of representatives of employer;</p> <p>b) if there is no labor organization, form the Workplace Coordinating Committee as follows:</p> <p>(i) two representatives of workers elected by them;</p> <p>5. The Coordinating Committee shall promote the good relationship between the employer and worker or labor organization, negotiation and coordination on the conditions of employment, terms and conditions and occupational safety, health, welfare and productivity.</p> <p>6. (a) If the worker or labor organization or the employer, by themselves or by representative, request and complain their grievances to the Coordinating Committee, it shall be negotiated and settled by the Coordinating Committee within five days, not including the official holidays, from the day of the receipt of the request.</p> <p>(b) The Coordinating Committee shall keep the record of settlement and shall send report on the situation of performance in accord with the stipulation to the relevant Conciliation Body.</p>

Laws and Regulations	Description
Chapter III: Formation of the Conciliation Body	10. The Region or State Government shall form the Conciliation Body in the townships.
Chapter IV: Formation of the Dispute Settlement Arbitration Body	16. (a) The Ministry shall, with the approval of the Union Government, form the Dispute Settlement Arbitration Body in the Regions or States.
Chapter V: Formation of Dispute Settlement Arbitration Council	19. The Ministry shall, with the approval of the Union Government, form the Dispute Settlement Arbitration Council with 15 qualified persons of good standing from legal experts and experts in labour affairs.
Chapter VI: Settlement of Dispute	23. A party, employer or worker, may complain individual dispute relating to his grievance to the Conciliation Body and if he is not satisfied with the conciliation of such body in accord with stipulated manners, may apply to the competent court in person or by the legal representative.
The Water Power Act (1927)	
Article 2	In this Act, unless there is something repugnant in the context, the term “public water” shall mean a collection of water, whether running or still, which is not the subject of private property exclusively, situate on, or flowing over or to, any land to which the State has any title in possession or in future, or in respect of which the Government has a right to use water for obtaining energy or for mining purposes.
Article 3	When rules made under this Act prescribe licences for the use of any public water for obtaining energy or for mining operations, no person shall use, or attempt to use, any such water for any such purpose, or pollute or obstruct the flow of any such water, or discharge therein any mining refuse, except under and in accordance with the terms of such licence or any grant, lease, or licence from the President of the Union of, or in respect of, any land.
Article 4	The President of the Union may, by notification, make rules a) Prescribing licences for the use of any public waters in any local area for obtaining energy or for mining operations; b) Authorizing officers to make exemptions from the operation of such rules;

Laws and Regulations	Description
	<p>c) Prescribing the officers by whom, the circumstances in which, and the conditions subject to which, licences under this Act shall or may be granted, including provision for the payment of royalty or rent;</p> <p>d) Prescribing the procedure for granting such licences, and the fees payable for the issue thereof;</p> <p>e) Providing for appeals from orders of officers authorized to grant such licences; and</p> <p>f) Generally, for carrying out the purposes of this Act;</p>
Article 5	The Deputy Commissioner may, by written notice to any person by whom or on whose authority anything has been constructed or is maintained in contravention of this Act, order the removal of such thing, and if such person fails to comply with such order, the Deputy Commissioner may cause the thing to be removed or demolished, and the expense of such removal or demolition to be recovered from such person as if it were an arrear of land revenue.
Article 6	Every Person who contravenes any of the provisions of section 3, or who fails to comply with an order under section 5, shall be punishable with imprisonment for a term which may extend to one month, or with fine which may extend to five hundred rupees, or both.
The Electricity Law (2013)	
Chapter 2 Objectives Section 3	<p>a) Systematically manage electricity-related work in the country in order to better satisfy the country's need for electric power;</p> <p>b) To develop the electric power sector of the country in order to contribute to the implementation of present policies of the government of the Republic of the Union of Myanmar relating to economic, social and environmental conservation and development;</p> <p>c) To further encourage mid-and small-scale generation and distribution of electric power in the regions and the states to supplement large-scale power generation and distribution which is to be management by the Union;</p> <p>d) To enable the wider use of electric power in a safe way in the urban and rural areas in the whole country;</p> <p>e) To ensure that electricity-related work in the country is performed in accordance with the stipulated standards and norms;</p> <p>f) To develop modern electrical technology and to increase the number of electrical technicians and professionals;</p> <p>g) To promote standards, norms and quality of electrical appliances;</p>

Laws and Regulations	Description
	<ul style="list-style-type: none"> h) To control and supervise electricity-related work in conformity with the policies of the state; i) To prevent in advance, the occurrence of electrical hazards and to implement effective penalties and specific rules in order to prevent losses to the public and the state when electricity-related work is performed; j) To increase foreign and local investments in electricity-related work; k) To write and promulgate equitable, transparent and reasonable rules and regulations for fixing electric power rates which are economically viable and sufficient to cover the investment costs; l) To respect, and comply with, the international conventions on environmental conservation which were approved and signed by the Union.
Chapter 4	Organizations authorized to perform electricity-related work
Section 8	<ul style="list-style-type: none"> a) The relevant Union ministry shall have the right to carry out large-scale projects of investigation, construction, generation, transmission, distribution and trade which are reserved to be managed by the Union with the consent of the Union government. b) The relevant ministry shall have the right to issue licenses to and revoke licenses of local and foreign investors to engage in electricity-related work and to supervise and inspect the work.
Section 9	<ul style="list-style-type: none"> a) The relevant Union minister shall have the right to form an electric power board or an electric power company in any region or state, sub-administered region or sub-administered division in order to implement large-scale projects of investigation, construction, generation, transmission and trade which are reserved to be managed by the Union with the consent of the Union government. b) The governments of regions and states shall have the right to issue and revoke licenses to engage in electricity-related work in order to implement mid-and small scale electric power projects which are allowed to be managed in the region after consultation with the relevant ministry, and to supervise and inspect such work.
Chapter 5	Right to engage in electricity-related work
Section 11	Any person wishing to engage in any electricity-related work may apply, in accordance with the stipulations, to the government department or organization which is authorized by this law to allow the respective electricity-related work.

Laws and Regulations	Description
Section 12	The relevant Union ministry may allow any person or organization to engage in large-scale projects which are reserved to be managed by the Union with the consent of the Union government.
Section 13	The region or state government may, after consultation with the relevant ministry, allow any person or organization to engage in mid-or small-scale electricity-related work which is not connected to the national grid, except for large-scale power generation and distribution which is not connected to the national grid, except for large-scale power generation and distribution which is reserved to be managed by the Union.
Section 14	The region or state government may, after consultation with the relevant ministry, allow any person or organization to engage in electricity-related work in the towns and villages of the region.
Section 15	The government department or organization which has the right to allow electricity-related work under section 12,13 and 14 shall, upon receiving the application under section 11, scrutinize it and approve or reject it. It shall issue a license to the applicant if it allows him to engage in electricity-related work.
Section 16	The ministry shall fix the term of the license in accordance with the type of electricity-related work.
Section 17	The license holder shall register with the relevant ministry for electric power generation and distribution.
Section 18	The license holder shall abide by the orders and directive issued by the relevant ministry from time to time and by the stipulated rules and regulations notified by the relevant ministry relating to the permitted electricity-related work.
Section 19	The term of the license and the extension period shall be in accordance with the stipulations contained in the existing laws.
Section 20	The license holder shall, upon expiry of the permitted term, transfer the project to the concerned party in accordance with the agreement or the regulations in place at the time of receiving the license.
Chapter 6	Quality and norm specifications
Section 21	Importers, producers and sellers of electrical appliances shall abide by the quality and norm specifications contained in the international conventions and regional conventions signed by the government of the Republic of the Union of Myanmar and in the rules, regulations, by laws and procedures issued under this law.
Chapter 9	Electrical norms and inspection methods

Laws and Regulations	Description
Section 30	Power plants, power lines and power sub-stations of other departments or organizations which are connected to the national grid shall conform to the norms specified by the relevant ministry.
Section 31	Person engaging in any electricity-related work shall do so in accordance with the rules, norms and procedures issued by the ministry and shall accept necessary inspections.
Chapter 12	Prohibitions
Section 35	No one shall be engage in electricity-related work without having obtained a license from the relevant government department or organization.
Section 36	No license holder shall engage in any work except the work contained in the license.
Section 38	No one shall engage in electrical power generation, transmission, connection or use without having an electrical safety certificate.
Section 39	No one shall engage in the import, domestic production, export, distribution or sale of electrical appliances which do not conform to the norms stipulated by the relevant ministry.
Section 40	No holder of a license to engage in electricity-related work shall perform the work jointly with, or transfer it to, someone else without the permission of the relevant department or organization.
Section 41	No holder of a license to engage in electricity-related work shall sell, mortgage, lease, exchange, or use any other method to transfer the license or the whole work for which the license was granted or any part thereof without the permission of the relevant government department or organization which issued the license.
Section 43	No one shall, without the permission of the holder of the license to engage in electricity-related work, obtain electric power through a connection to the line, or waste or use electric power.
The Conservation of Water Resources and Rivers Law (2006)	
The State Peace and Development Council Law enacted this law by Law No. 8/ 2006 on the date of 2nd October 2006. This law covers for all water sources above and underground within boundaries of rivers, creeks, banks and water fronts. Under this law, Ministry of Transport has power to direct for carrying out waterways conservation work, to notify the land boundary as waterfront boundary for bank protection, river-creek improvement and to navigate the vessels in the rivers and creeks.	
Chapter 2 Objectives: Section 3	The aims of this Law are as follows; a) To conserve and protect the water resources and rivers system for beneficial utilization by the public; b) To smooth and safety waterways navigation along rivers and creeks;

Laws and Regulations	Description
	c) To contribute to the development of State economy through improving water resources and river system; d) To protect environmental impact.
Chapter 5 Section 8	Prohibitions No person shall: a) Carry out any act or channel shifting with the aim to ruin the water resources and rivers and creeks. b) Cause the wastage of water resources willfully.
Boiler Law (2015)	
Aims: Section 3	1) To get boilers in accordance with Myanmar National Standards or International Standards; 2) To prevent loss of country itself and public from accidents associated with boilers; 3) To apply boilers in accordance with Myanmar or International Standard; 4) To develop boiler technology and technicians enable to produce, repair and maintain boilers; 5) To utilize boilers effectively through efficient using of fuel; To use boilers for long-term and to produce environmental and social impacts from using boilers.
Registration: Section 5	Everyone who wants to use boilers for any operations must register in accordance with this law.

3.3 International Guidelines

Besides National Laws and Regulations, international guidelines such as World Health Organization's Guidelines, World Bank Safeguard Policies and IFC Performance Standards are referred for Environmental Management Plan (EMP) of the proposed project.

3.3.1 IFC Guidelines on Waste Management Facilities (2007)

The EHS Guidelines for Waste Management cover facilities or projects dedicated to the management of municipal solid waste and industrial waste, including waste collection and transport; waste receipt, unloading, processing, and storage; landfill disposal; physio-chemical and biological treatment; and incineration projects. Industry-specific waste management activities applicable, for example, to medical waste, municipal sewage, cement kilns, and others are covered in the relevant industry-sector EHS Guidelines, as is the minimization and reuse of waste at the source.

3.3.2 WHO Protecting Groundwater for Health (2006)

Groundwater is the water contained beneath the surface in rocks and soil, and is the water that accumulates underground in aquifers. Groundwater constitutes 97 per cent of global freshwater and is an important source of drinking water in many regions of the world. In many parts of the world groundwater sources are the single most important supply for the production of drinking water, particularly in areas with limited or polluted surface water sources. For many communities it may be the only economically viable option. This is in part because groundwater is typically of more stable quality and better microbial quality than surface waters. Groundwater often requires little or no treatment to be suitable for drinking whereas surface waters generally need to be treated, often extensively. There are many examples of groundwater being distributed without treatment. It is vital therefore that the quality of groundwater is protected, if public health is not to be compromised.

3.4 Authorized Institutions and Recommendations

In the Republic of the Union of Myanmar, the Ministry of Natural Resources and Environmental Conservation (MONREC) was reformed from Ministry of Environmental Conservation and Forestry (MOECAF) in 30 March 2016. It was intended to be a focal point and coordinating agency for the effective environmental management in Myanmar. Environmental Conservation Department was developed in October 2012, under the MOECAF and it becomes the most responsible department for EIA process in Myanmar. The followings are the comments and recommendation of MOECAF for the proposed project;

- a) In order to avoid the impacts on environment, social and health, to present the detailed information of the project and to apply effective operation system with the least adverse impacts, implement all commitments including using 2% of net profit for CSR plan as described in the proposal,
- b) To prepare and submit an EMP report so as to encounter no social and environmental impacts and to be the least if there is any impact by this project implementation,

- c) To develop an EMP which include production techniques with the least environmental impacts based on the assessment results, implementation program, fund for mitigation measures for environmental impact and implement in accordance with this EMP; and
- d) To adopt and implement in compliance with the prescribed environmental conservation law, rules and procedures.

3.5 The Constitution of the MYAUNG MYA FM BIOMASS POWER COMPANY LIMITED (2019)

- MYAUNG MYA FM BIOMASS POWER COMPANY LIMITED is organized in compliance with the Myanmar Companies Law enacted in 2017.
- The Company is to be a Private Company and accordingly the following provisions shall have effect: -
 - The number of Shareholders of the Company, exclusive of persons who are in the employment of the Company, shall be limited to fifty.
 - Any invitation to the public to subscribe for any Share or debenture or debenture stock of the Company is hereby prohibited, under the Article 5 of said Constitution.
- Unless, otherwise determined by a General Meeting the number of Directors shall not be less than four (4) by which at least one Director must be ordinarily resident in Myanmar.
The First Directors shall be-
 1. Mr. Yoshio Saeki
 2. Mr. Ishii Tomohiro
 3. Mr. Inoue Shoichi
 4. U Ye Min Aung, under the Article 54 of said Constitution.
- Subject to any decision of Shareholders in accordance with the law, the Company will have the following classes of Shares:
 - Ordinary shares (which shall have the rights as set out in the law); and
 - The additional clauses of Shares set out in the Schedule (which shall have the rights set out in the Schedule;)and
 - Any other classes of shares issued in accordance with the law, under the Article 7 of said Constitution.
- Subject to the law, the Company may:
 - Allot and issue shares to any persons, on any terms and at those times as the shareholder determine;
 - Grant an option over the issue of any shares to any persons, on any terms and during any time as the shareholders determine; and
 - Without limiting Article 10(1) above, allot and issue shares with any preferential, deferred or special rights or with any restrictions (whether in regard to dividends or other distributions, voting or otherwise) as the shareholders determine, under the Article 10 of said Constitution.

- The provisions under Section 181 of the Myanmar Companies Law (2017), the Company must not, directly or indirectly, indemnify a person against any of the following liabilities incurred as a director, officer or auditor of the Company:
 - A liability owed to the Company; or
 - A liability that is owned to someone other than the Company or a related body corporate and did not arise out of conduct in good faith, under the Article 148 of said Constitution.

Commitment to Follow Legal Frameworks



Subject: Commitment to follow legal frameworks including Environmental Conservation Law, Rules and Standards Stated in the Environmental Management Plan (EMP)

With regard to the above matter, we, Myaung Mya FM Biomass Power Generation Co., Ltd. have applied for permission to establish a private company under Myanmar Foreign Investment Law, 2012 and Myanmar Companies Act, 1914. Our company strongly commits that all our operations will be performed in an environmentally friendly manner by following existing laws and regulations especially Environmental Conservation Law 2012, Environmental Conservation Rules 2014, and relevant environmental standards through successful implementation of mitigation measures stated in the Environmental Management Plan (EMP).

Your Sincerely,
SHOICHI INOUE

A handwritten signature in black ink, consisting of the Japanese characters '井口 祥一' (Inoue Shoichi).

General Manager

Myaung Mya FM Biomass Power Generation Co., Ltd.



MYAUNG MYA FM BIOMASS POWER
Ta Pyay Win Plaza 37, Alan Pya Pagoda Road, Room No. 312 (6th Floor),
Dagon Township, Yangon, Myanmar.
Tel: (+95-1) 373634

CHAPTER 4: DESCRIPTION OF THE SURROUNDING ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1 Overview of the Project Area

The project is located at the compound of Myaungmya old jute factory as shown in **Figure 4. 1** which shows that Kanthagon village is 0.7 km away from project site and Pattarkon village is 1.3 km away from it. The study area has been developed for industrial use and there has no sensitive areas such as national parks, wildlife sanctuaries, historical and cultural sites, etc. To get baseline surrounding environmental conditions, the environmental quality survey was done at the project site before construction phase.






Figure 4. 1 Distance to Nearest Villages

The followings are the methodologies used for monitoring and analysis in this EMP report preparations;

- i) Onsite Measurements and Analysis – Baseline environmental parameters such as air quality, noise and vibration of the existing project site before the construction phase are measured at the project site and analysis results are mentioned in this Chapter.
- ii) Secondary Data Collection and Analysis – Some data such as socioeconomic condition, physical/biological environment and weather data are collected from official township data, General Administrative Department and analyzed by the study team.

Table 4. 1 Equipment Used for Onsite Measurement

No.	Name and Model of Instrument	Purpose	Measuring Instrument
1.	Haz-Scanner EPAS	PM ₁₀ , PM _{2.5} , NO ₂ , CO, CO ₂ , Temperature, and Relative Humidity	
2.	Digital Sound Level Meter	Noise	
3.	Vibration Level Meter VM 55	Vibration	

4.2 Physical Environment

4.2.1 Climate

Temperature and Rainfall: The proposed project site is located in Danone Chaung Taung Village, No.22, Motesoe Field, Myaung Mya Township, Myaung Mya District, Ayeyarwaddy Region, Myanmar. Myaung Mya has a humid climate. Myanmar has mainly three seasons; (i) summer, (ii) rainy season, and (iii) winter. The rainy season runs mainly in June, July and August. According to the data from Myaung Mya General Administration Department, the highest temperature was 42.5 °C and the lowest temperature was 8.0 °C. The following table describes the maximum, minimum temperature during the summer and winter, total precipitation and raining days of Myaung Mya Township for the years (2010 – 2016).

Table 4. 2 Precipitation and Temperature of Myaung Mya Township (2010-2018)

No.	Year	Precipitation		Temperature	
		Raining Days	Total Precipitation (inches)	Summer (°C)	Winter (°C)
				Maximum	Minimum
1	2010	119	86.75	42.5	14.0
2	2011	144	107.49	37.6	13.5
3	2012	125	115.71	38.9	12.7
4	2013	115	105.39	32.7	16.2
5	2014	113	110.46	32.8	21.2
6	2015	124	118.67	33.1	21.3
7	2016	124	121.29	33.3	21.1
8	2017	117	96.67	33.3	21.1
9	2018	124	118.67	33.3	21.1

Source: General Administration Department (Myaung Mya Township)

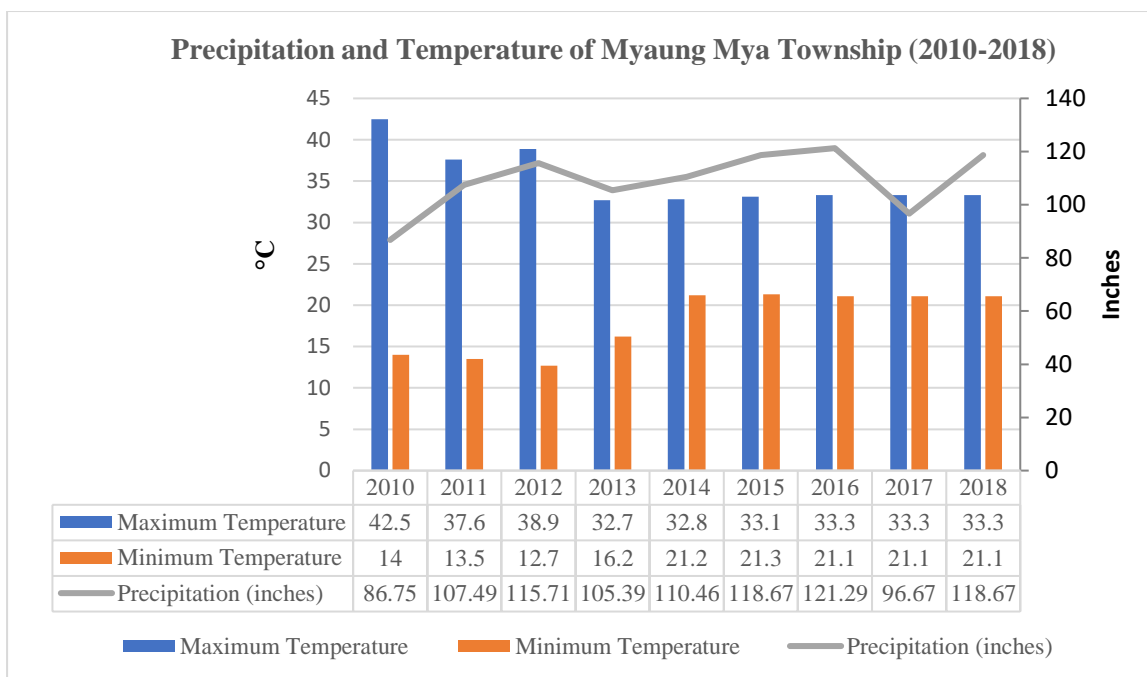


Figure 4. 2 Precipitation and Temperature of Myaung Mya Township (2010-2018)

The above graph shows the precipitation and temperature of Myaung Mya Township during 2010-2018. According to the data in the graph, 42.5 °C and 12.7 °C were found as the highest temperature and lowest temperature of Myaung Mya. The average precipitation of Myaung Mya for seven years was 109.39 inches.

4.2.2 Wind Speed and Wind Direction

The **Figure 4. 3** describes the weather condition of the existing project site on 27th October 2017. According to the data, wind is mostly blown from North-west direction of the existing project.

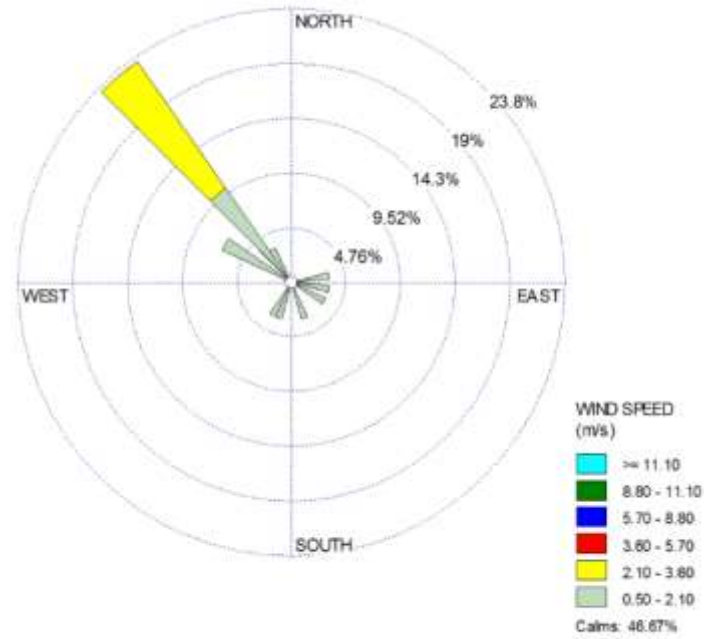


Figure 4. 3 Wind Speed and Wind Direction (blowing from) of the Proposed Project

4.2.3 Air Quality

In the project site, air quality was tested with EPAS (HAZ-SCANNER) Environmental Perimeter Air Station. This instrument can be used to measure ambient air quality and to measure and document critical U.S EPA criteria pollutants, including nitrogen dioxide, ozone, carbon dioxide, particulates mattes, etc. EPAS provides direct readings in real time with data-logging capabilities. At the initial stage of the project, baseline air quality should be measured in the vicinity of the

site to assess background levels of key pollutants and to differentiate between existing ambient conditions and project-related impacts in future. Air quality is composed of dust and gas emissions of the ambient air.

- (a) Dust Level: For EMP of this project, the observed air quality data for 1-hour interval are shown in **Table 4. 3** and 24-hour average are compared with National Environmental Quality (Emission) Guidelines as shown in the **Table 4. 4**.
- (b) . In this study, dust emission such as particulate matters PM₁₀ (particulate matters equal to or less than 10µm (0.01 mm)), and PM_{2.5} (particulate matters equal to or less than 2.5µm (0.0025 mm)) as the contents of the particulates were measured by EPAS (HAZ-SCANNER) Environmental Perimeter Air Station, was monitored for 24 hours continuous monitoring on October 27 and 28, 2017 at the project site. The location of the air quality monitoring point is Latitude 16° 35' 49.65" N and Longitude 94° 53' 9.98" E, 4.572 m elevation. The following figure portrays showed the air quality measuring and its location.



Figure 4. 4 Location of Air Quality Measurement



Figure 4. 5 Air Quality Measurement at the Project Site

Table 4. 3 Ambient Air Quality of the existing project site

No.	Date	Time	Average ($\mu\text{g}/\text{m}^3$)		Maximum ($\mu\text{g}/\text{m}^3$)		Minimum ($\mu\text{g}/\text{m}^3$)	
			PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
1.	10/27/2017	12:16:00 -13:16:00	37.42	22.10	47.35	24.09	27.48	21.00
2.		13:16:00 -14:16:00	32.43	23.40	39.28	25.43	25.59	16.00
3.		14:16:00 -15:16:00	23.35	13.18	33.13	19.00	13.57	9.00
4.		15:16:00 -16:16:00	14.00	8.20	14.00	9.00	14.00	8.00
5.		16:16:00 -17:16:00	14.00	9.52	14.00	11.00	14.00	8.00
6.		17:16:00 -18:16:00	23.87	6.45	37.43	10.43	10.30	1.00
7.		18:16:00 -19:16:00	25.73	8.37	39.28	12.32	40.99	1.00
8.		19:16:01 -20:16:00	20.10	1.00	33.24	3.75	6.96	1.00
9.		20:16:00 -21:16:00	18.50	1.18	24.23	2.29	12.77	1.00
10.		21:16:00 -22:16:00	19.33	1.03	39.38	1.75	11.29	1.00
11.		22:16:00 -23:16:00	20.48	1.30	39.33	2.43	1.62	1.00
12.		23:16:00 -00:16:00	20.68	1.73	31.00	3.33	10.37	1.00
13.	10/28/2017	00:16:00 -01:16:00	33.15	5.63	56.45	9.54	9.85	1.00
14.		01:16:00 -02:16:00	24.85	1.03	33.17	2.73	16.53	1.00
15.		02:16:00 -03:16:00	24.62	7.90	25.43	15.11	23.80	1.00
16.		03:16:00 -04:16:00	26.00	11.02	29.00	16.23	23.00	9.00
17.		04:16:00 -05:16:00	22.92	11.00	23.54	11.00	22.29	11.00
18.		05:16:00 -06:16:00	22.00	10.15	22.00	11.28	22.00	10.00

19.		06:16:00 -07:16:00	22.70	12.38	28.00	15.00	17.40	8.00
20.		07:16:00 -08:16:00	29.17	16.22	30.26	28.13	28.07	15.00
21.		08:16:00 -09:16:00	29.67	14.67	30.00	27.28	29.33	10.00
22.		09:16:00 -10:16:00	27.53	13.77	30.00	23.00	25.07	10.00
23.		10:16:00 -11:16:00	36.30	13.97	48.31	24.00	24.29	10.00
24.		11:16:00 -12:16:00	34.12	24.00	49.56	24.54	18.68	24.00
24-hour average			25.12	9.97	33.41	13.86	18.72	7.45

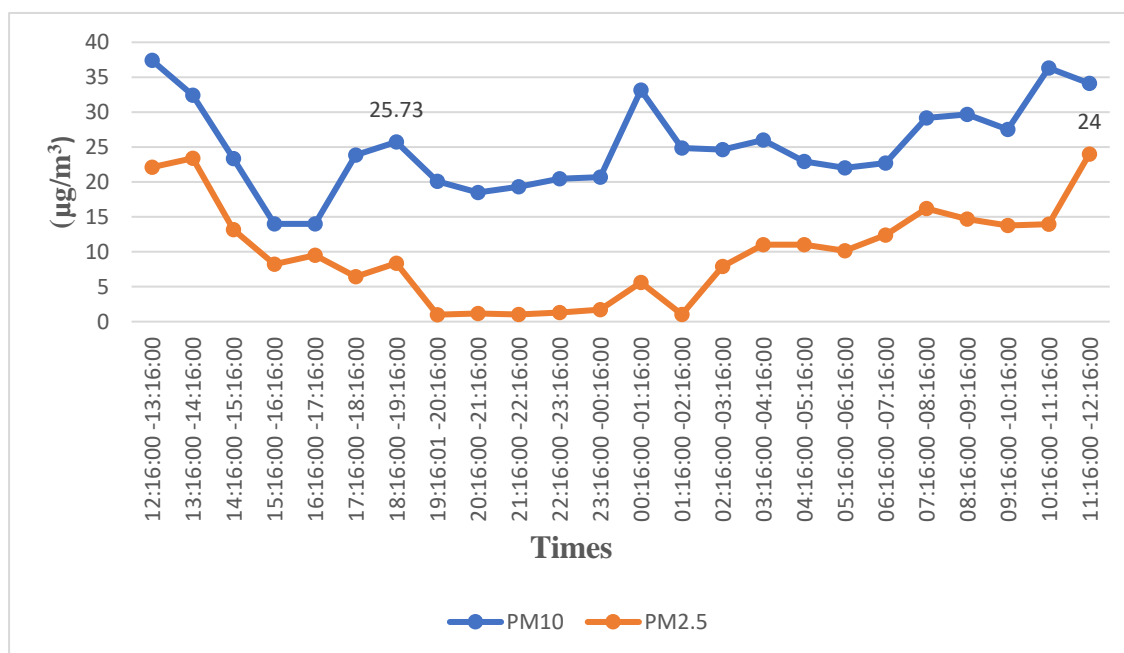


Figure 4. 6 Ambient air quality of the existing project

Table 4. 4 Comparison of the observed value and guideline values (NEQG)

No.	Parameter	Averaging Period	Observed Value (µg/m³)	Guideline Value (µg/m³)
1.	PM ₁₀	24 hours	25.12	50
2.	PM _{2.5}	24 hours	9.97	25

According to the observed data, the values of both PM₁₀ and PM_{2.5} were less than the National Environmental Quality (NEQ) Guidelines (for 24hrs continuously). PM concentrations in the air are related to weather conditions (such as wind speed, wind directions, humidity, rainfall, temperature and pressure). PM concentrations are usually higher in dry seasons than wet seasons. Both PM₁₀ and PM_{2.5} particles can cause health problems; specifically, respiratory health (that is the lungs and airway). It is because the PM_{2.5} travels deeper into the lungs and the PM_{2.5} is made up things that are more toxic (like heavy metals and cancer causing organic compounds), PM_{2.5} can have worse health effects than the bigger PM₁₀. The pollution can be controlled by the use of dust control methods such as efficient ventilation system at the working close buildings. However the value of both PM₁₀ and PM_{2.5} are less than NEQ guideline. Therefore, the PM concentrations in this propose site location cannot affect the labor’s health.

- (c) Gaseous Emission: Concentration of Carbon monoxide (CO), Carbon dioxide (CO₂), Sulphur dioxide (SO₂), and Nitrogen dioxide (NO₂) were investigated within in the site on 27th October, 2017 which was recorded as the baseline data. The observed values were compared with National Environmental Quality (Emissions) Guideline values and ACGIH Guideline values are as shown in the following table.

Table 4. 5 Comparison of the observed value and guideline values (Gaseous Emission)

No.	Parameter	Averaging Period	Observed Value	Standards/ Guidelines	Organization
1	CO	8 hrs	0.163(mg/m ³)	10 (mg/m ³)	WHO
2	CO ₂	24 hrs	585.903(ppm)	5000 (ppm)	ACGIH
3	SO ₂	24 hrs	10.44 (µg/m ³)	20 (µg/m ³)	ECD (Myanmar)
4	NO ₂	1 hrs	60.00(µg/m ³)	200 (µg/m ³)	ECD (Myanmar)

All of the observed values of the gaseous emission of the existing project are within the range of guideline values of related organization.

Nitrogen Oxides (NO_x) in the ambient air consist of nitric oxide (NO), nitrogen dioxide (NO₂) and nitrous oxide (N₂O). NO₂ is formed by chemical reaction of NO and ozone. These are generated from explosive manufacturing industry, automobile workshop, acid manufacturing plant, etc. In the proposing project site for Rice Husk BTG fire power plant, the sources of NO_x may be emission from the boiler, human sewage, smoke cigarette.

Carbon Monoxide (CO) and Carbon dioxide (CO₂) have the same emission sources and mitigation measures for SO₂ and NO₂. CO and CO₂ are generated form automobile exhaust, blast furnace, fuel gases, etc. They are poisonous gas and cause damage to the respiratory organ. In the proposing project site for Rice Husk BTG fire power plant, the sources of CO and CO₂ may be emission from combustion of Biomass.

SO₂ was generated from thermal power plants, petroleum industries, oil refineries, acid manufacturing plants etc. It causes respiratory diseases, irritation of throat and eyes, etc. The sources of SO₂ in the proposing project site for Rice Husk BTG fire power plant are refining, solvent extraction and storing of rice husk.

4.2.4 Water Quality

The existing water quality was measured by sampling some water from Ywe River near the project site. The survey team from E Guard made on site collection of water samples and sent to respective labs for measuring the parameters. With regard to the water quality standards of the Ministry of Agriculture and Irrigation and Yangon City Development Committee (YCDC), the World Health Organization (WHO), National Environmental Quality Guideline (NEQ) and

International Finance Corporation (IFC) standards can be compared for data interpretation. Most of Myanmar current standards are found to be close to WHO and IFC standards. **Table 4. 6** shows the baseline data of water quality measured on October 26, 2017 with respect to WHO drinking water quality standards. Water quality results from the laboratories are attached in **APPENDIX I**. The location of water sampling from Ywe River is Latitude 16°35'51.14"N and Longitude 94°53'4.86"E.

Table 4. 6 Water Quality Results of the Existing Project

No.	Parameters	Unit	Water Quality Result	Ambient Water Quality Standards for the Protection of Aquatic Life	National Environmental Quality (Emission) Guideline for Effluent level
<i>Ywe River Near the project site</i>					
<i>Ecological Laboratories</i>					
1	pH	pH	7.4	6.5 ~ 9	6-9
2	Color (True)	TCU	50	Not significantly higher than seasonally adjusted background value	-
3	Suspended Solids	mg/l	92	-	50
4	Chromium	mg/l	0.001	0.01	-
5	Ammonia (NH ₃)	mg/l	Nil	0.02	-
6	Chemical Oxygen Demand (COD)	mg/l	64	-	250
7	Biochemical Oxygen Demand (5 days at 20 C)	mg/l	26	-	50
8	Zinc (Zn)	mg/l	Nil	0.005	2
9	Copper (Cu)	mg/l	Nil	0.002	0.5
10	Total Coliform Count	CFU/100ml	20	5000	-
11	Thermo-tolerant (fecal) Coliform Count	CFU/100ml	8	1000	-
12	Turbidity	NTU	88	5	-
13	Free Chlorine	mg/l	Nil	-	-
14	Total Chlorine	mg/l	Nil	-	-
15	Cadmium	mg/l	Nil	0.0002	0.1
16	Nickel	mg/l	0.005	0.015	0.5
17	Mercury	mg/l	0.006	0.0001	0.01
18	Fluoride(F)	mg/l	0.6	0.2	20
19	Lead (as Pb)	mg/l	Nil	0.001	0.1
20	Arsenic (As)	mg/l	Nil	0.05	0.1 mg/l
21	Chlorine(Residual)	mg/l	Nil	-	0.2 mg/l

No.	Parameters	Unit	Water Quality Result	Ambient Water Quality Standards for the Protection of Aquatic Life	National Environmental Quality (Emission) Guideline for Effluent level
22	Cyanide (CN)	mg/l	Nil	0.005	0.1 mg/l
23	Sulfide	mg/l	<2	0.002	
24	Total Phosphorus	mg/l	<0.01	0.15	2 mg/l
25	Oil and Grease	mg/l	<5	Substantially absent, no iridescent sheen	10 mg/l

According to the observed values, all the parameters except Turbidity and Total suspended solids are within the limit of Ambient Water Quality Standards for the Protection of Aquatic Life and NEQ Guideline. Higher total suspended solid can cause higher turbidity and cause of higher turbidity, the dissolved oxygen will decrease. Higher Turbidity can indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, and diarrhea and associated headaches.

4.2.5 Noise and Vibration Level

- (a) Noise Level: Noise level for the existing project was measured by Digital Sound Level Meter at the project site. The Noise level measurement was conducted at 1 point: main source (in the existing project site location) on 27th October 2017 and 28th October 2017. Measuring period was 24 hours continuously. The observed values are described in the following table and the following figures showed noise level measurement at the existing project.



Figure 4. 7 Noise Level Measurement at existing project site

Table 4. 7 Observed Values of Noise Level Measurement at the Existing Project

No	Date	Time	Mean Value	Weight	Day/Night
			Source(db)		
1	27/10/17	13:30:03-14:29:39	52.02	A	Day
2		14:30:03-15:29:39	50.16	A	Day
3		15:30:03-16:29:39	48.88	A	Day
4		16:30:03-17:29:39	55.48	A	Day
5		17:30:03-18:29:39	51.48	A	Day
6		18:30:03-19:29:39	51.98	A	Day
7		19:30:03-20:29:39	51.91	A	Day
8		20:30:03-21:29:39	53.56	A	Day
9		21:30:03-22:29:39	52.14	A	Night
10		22:30:03-23:29:39	52.23	A	Night
11		23:30:03-0:29:39	52.62	A	Night
12	28/10/17	0:30:03-1:29:39	53.22	A	Night
13		1:30:03-2:29:39	53.69	A	Night
14		2:30:03-3:29:39	50.87	A	Night
15		3:30:03-4:29:39	49.23	A	Night
16		4:30:03-5:29:39	51.24	A	Night
17		5:30:03-6:29:39	53.12	A	Night
18		6:30:03-7:29:39	52.46	A	Night
19		7:30:03-8:29:39	52.38	A	Day
20		8:30:03-9:29:39	48.52	A	Day
21		9:30:03-10:29:39	45.52	A	Day
22		10:30:03-11:29:39	45.78	A	Day
23		11:30:03-12:29:39	45.88	A	Day
24		12:30:03-13:29:39	45.54	A	Day
Average for Day Time			49.94	A	Day
Average for Night Time			52.08	A	Night

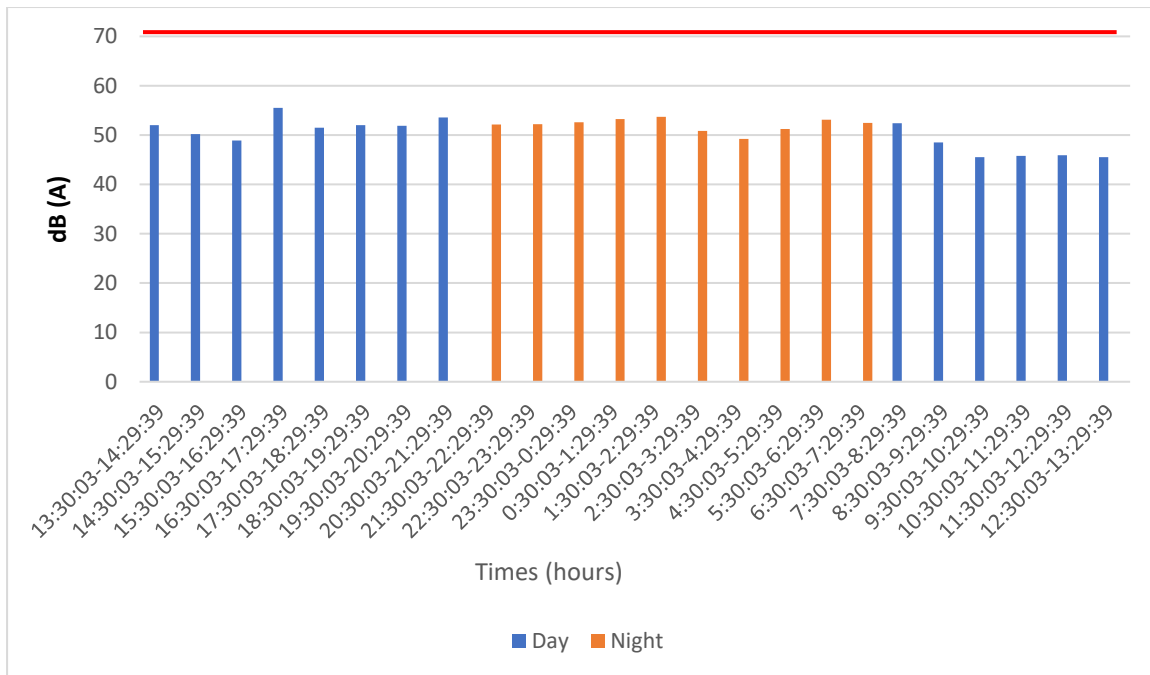


Figure 4. 8 Noise Level of the Existing Project

The observed values are compared with the National Environmental Quality (Emission) Guidelines as shown in the following table which indicates the separate level for residential and industrial points.

Table 4. 8 National Environmental Quality (Emission) Guidelines Values for Noise Level

Receptor	One Hour LAeq (dBA)	
	Daytime 07:00 - 22:00 (10:00 - 22:00 for Public Holidays)	Nighttime 22:00 - 07:00 (22:00 - 10:00 for Public Holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

The existing project is proposed to construct rice husk fire power plant and so can be considered as industrial and commercial receptor. The observed value of the existing project for daytime at point source was 49.94 dB (A). Therefore, the observed value at point source was within the limit. The observed value for nighttime at point source was 52.08 dB (A). Therefore, both of the values were within the limit of guideline value.

Above the observed value, the night time value was higher than the day time. Because the speaker from preparing for Public Hearing near the project site is produced sound around 7 pm to 9 pm and around 1 am on 28, October, it was raining very heavily and the sound from rain falling on the roof of old building that was used for locomotive at the previous time near the digital sound level meter caused higher effect on noise. But its effect can be acceptable and the observed value is within the guideline.

Noise (dB)	Effects observed
0	➤ Threshold of audibility
110	➤ Stimulation of reception in skin
120	➤ Pain threshold
130-135	➤ Nausea, Vomiting, Dizziness, Nervous disorder
140	➤ Pain in ear, prolonged exposure causing insanity
140	➤ Extreme limit of human noise tolerance
150	➤ Significant change in pulse rate and prolonged exposure
160	➤ Minor permanent damage if prolonged
190	➤ Major permanent damage in a short time

(b) Vibration Level: Vibration level for the proposed project was measured with RION VM55 Vibration Meter at the project site. The vibration level measurement is conducted on 27th October 2017 and 28th October 2017. Measuring period is 24 hours continuously. The observed values are described in the **Table 4. 9**.

Table 4. 9 Observed Values of Vibration Level Measurement at the Proposed Project

No	Date	Time	Mean Value (dB)		
			XL _{veq}	YL _{veq}	ZL _{veeq}
1.	27/10/2017	13:14:00	31.8	32.4	31.8
2.		14:14:00	32	29.8	25.4
3.		15:14:00	32.7	31.8	30.1
4.		16:14:00	32.5	32	33
5.		17:14:00	34.7	33.7	26.4
6.		18:14:00	33	32	29
7.		19:14:00	32.6	31.9	24.8
8.		20:14:00	33	31.6	30
9.		21:14:00	32.9	31.2	23.2
10.		22:14:00	32.8	31.2	23.1
11.		23:14:00	32.8	31.3	22.8
12.	28/10/2017	00:14:00	32.9	31.3	22.9
13.		01:14:00	32.8	31.3	22.7
14.		02:14:00	32.8	31.3	22.4
15.		03:14:00	32.8	31.4	22.6
16.		04:14:00	32.9	31.4	22.8
17.		05:14:00	33.7	32.2	30.7
18.		06:14:00	69.2	67.6	64.9
19.		07:14:00	35.1	34.1	24
20.		08:14:00	39.5	43.2	35.3

21.		09:14:00	65.1	65.3	61.9
22.		10:14:00	33.9	32.9	21.2
23.		11:14:00	80.2	78.6	79.6
24.		12:14:00	35.9	35.3	32.4
24 hours Average			38.23	37.28	31.79

Myanmar has no standards for the limits of vibration level. According to the Toronto Building Council (2007), based on the results of technical research for monitoring vibration levels, it is suggested that the PPV limits of the nearest neighboring building be 25mm/sec or 98.95 dB regardless of the frequency. Hence, the PPV near certain historic buildings may need to be less than the values mentioned in the table below.

Table 4. 10 Frequency Baseline Limit for Vibration

Frequency (Hz)	Vibration Peak Particle Velocity (mm/sec)	Vibration Peak Particle Velocity (dB)
< 4	8	89.06
4 to 10	15	94.52
>10	25	98.95

This is well supported by UK Transport and Road Research Laboratory (TRRL) studies for the effects of vibration on People and Buildings with PPV and dB equivalents in vertical direction.

Table 4. 11 Limit of Vibration Level for Human and Buildings

PPV (mm/s)	dB	Human Reaction	Effect on Buildings
0 – 0.15	0-54	Imperceptible	Unlikely to cause damage of any type
0.15 – 0.3	54-60	Threshold of perception	Unlikely to cause damage of any type
2.0	77	Vibrations perceptible	Recommended upper level to which ruins and ancient monuments should be subjected
2.5	78	Continuous exposure to vibrations begins to annoy	Virtually no risk of “architectural” damage to normal buildings
5	84	Vibrations annoying to people in buildings	Threshold for risk of “architectural” damage in houses with plastered walls and ceilings
10 - 15	91-94	Continuous vibrations unpleasant and unacceptable	Would cause “architectural” and possibly minor structural damage.

According to the observed value, vibration level of the proposed project is within the limit for both human and buildings. Therefore, baseline vibration level of the proposed project is imperceptible for human and unlikely to cause damage of any type for surrounding buildings.



Figure 4. 9 Vibration level Measurement at the project site

4.2.6 Soil Conditions

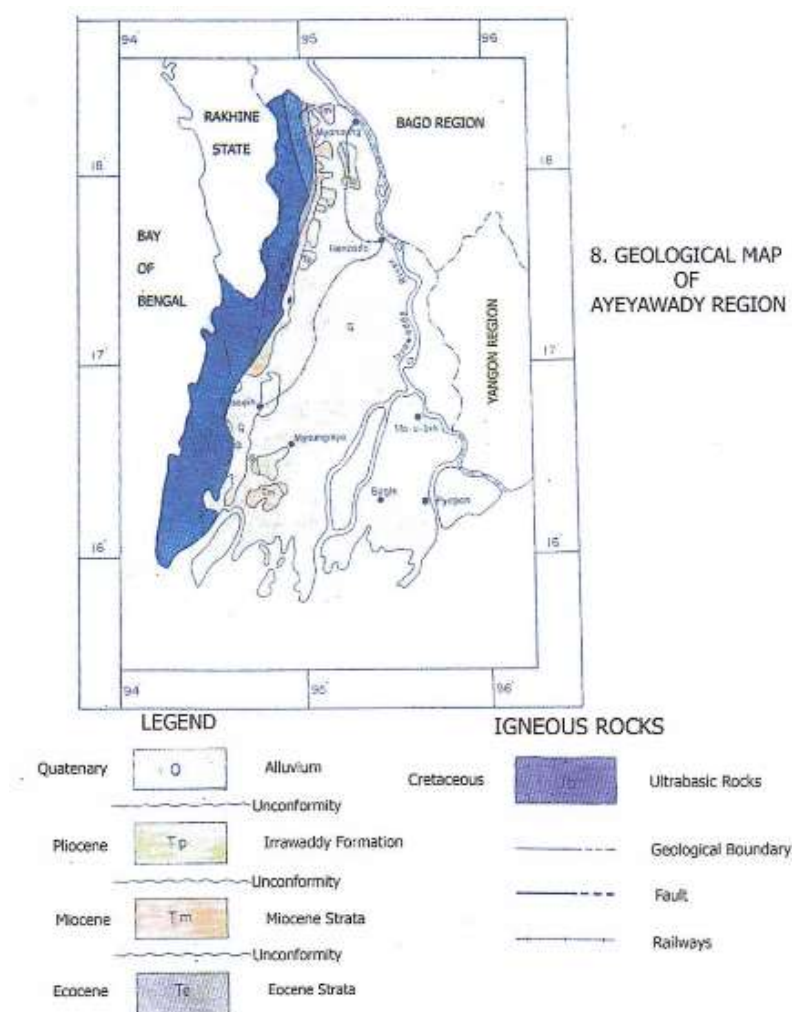






Figure 4. 10 Soil Geology of Ayeyawady Region

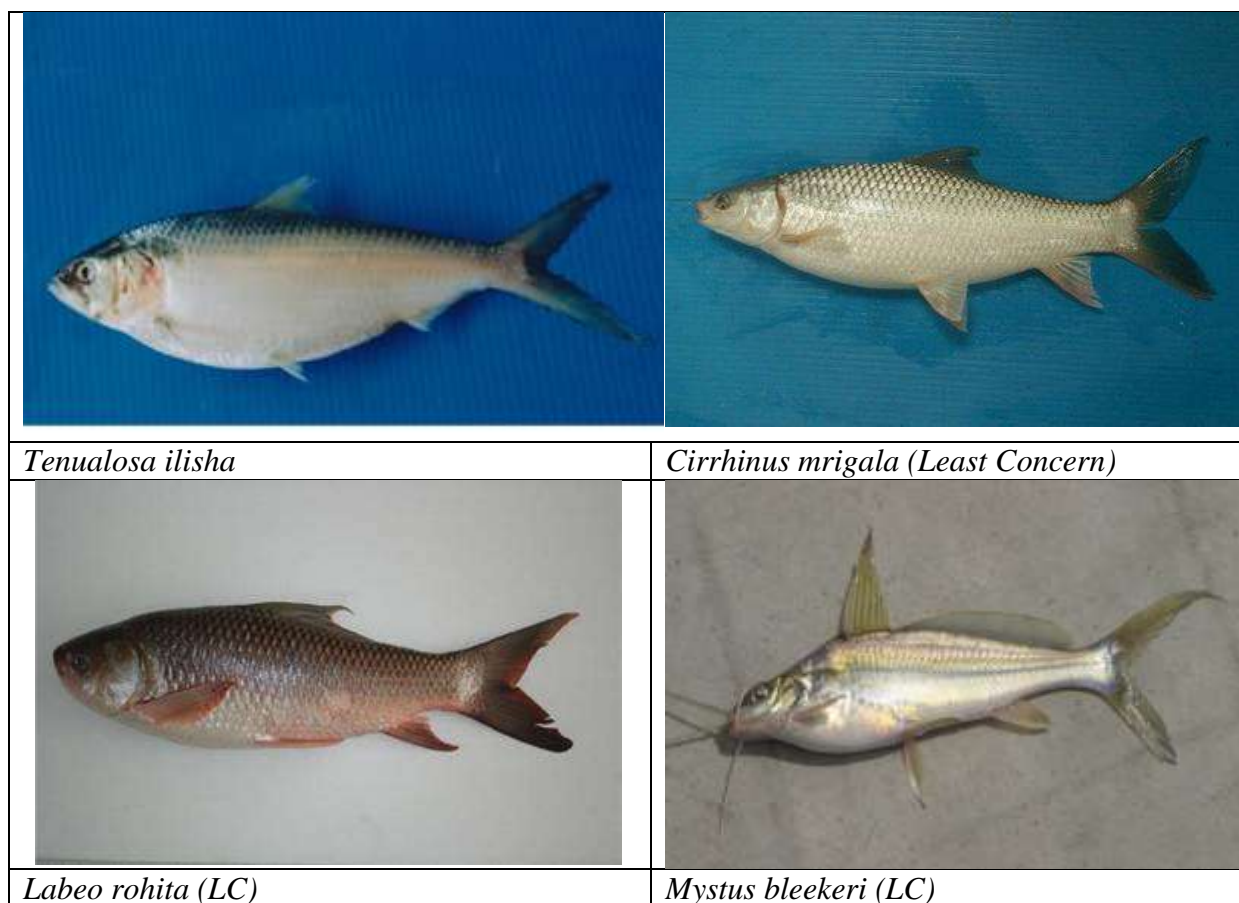
About 80% of Ayeyawady Region is covered by the Quaternary alluvium and the remaining hilly belt on the west is largely underlain by highly deformed Indobuman Flysch.

4.3 Biological Environment

As the proposed project area is located in area of the old Jute factory of MAPCO (Myanmar Agribusiness Public Corporation), there are no protected areas and coastal resources near the project area.

According to the secondary data of Myaung Mya Township, common species that can be found in Ywe River are tilapia, river catfish, snakehead, carp, hilsa shad, mrigal carp, rohu, day's mystus and orange croaker. In accordance with IUCN red lists, all these fish species are not included in this list.

	
<p><i>Oreochromis spp</i></p>	<p><i>Pangasius spp</i></p>
	
<p><i>Channa spp</i></p>	<p><i>Cyprinus spp</i></p>



Source: Formulation and operationalization on of National Action Plan for poverty alleviation and rural development through agricultural (NAPA)

Figure 4. 11 Common fish species that can be found at Ywe River

Table 4. 12 Biological Environment near the project site

Ecological Resources	Existing condition
Fisheries, aquatic biology	Presented Ywe river with freshwater fish species near the proposed project site.
Wildlife	Non-existence
Forests	Non-existence
Rare or endangered species	Non-existence
Protected areas	Non-existence
Coastal resources	Non-existence

4.4 Socio-economic Environment

The socioeconomic data was referred from the secondary data of Myaung Mya Township.

4.4.1 Demographic Profile

The total population of Myaung Mya township was 298,035 according to the data until September, 2017. The percentage of the ethnic group that live in Myaung Mya Township were Kachin(0.02%), Kaya (0.005%), Kayin (37.96%), Chin (0.01%), Mon (0.008%), Burma (60.2%), Rakhine (0.2%) and Shan (0.02%) of the total population. The following table shows the data of the inhabitants for foreign people in Myaung Mya Township.

Table 4. 13 Socio-economic Environment around the Proposed Project

Socio-economic Environment		
Population	55,664 (Urban), 242,637 (Rural)	
No. of Households	11,932 (Urban), 50,589 (Rural)	
Ratio of Male and Female	1: 1.08	
Workable Population	189,080	
People with employment	173,692	
People without employment	15,388 (10.9%)	
Economy	Government Staff - 3,281	
	Services - 9,502	
	Agriculture - 1,850	
	Livestock - 1,302	
	Trade - 5,960	
	Industries - 424	
	Fishery - 1,373	
	Causal Labor - 86,800	
	Others - 63,200	
Industries	173	
Types of Industries	Agricultural Industry – 17 (9.8%)	
	Rice Industry – 47 (27.2%)	
	Domestic Industry – 68 (39.3%)	
	Workshop – 2 (1.2%)	
	Furniture – 2 (1.2%)	
	Ice machine – 8 (4.6%)	
	Sticky candy – 4 (2.3%)	
	Lathe – 3 (1.73%)	
	Purified Drinking Water – 4 (2.3%)	
	Vermicelli machine – 1(0.6%)	
	Wrought Ironwork – 2 (1.2%)	
	Saw-mill – 8 (4.6%)	
	Salt machine – 5 (2.9%)	
Traditional medicine – 1(0.6%)		
Average Income per year	2016-2017	1,277,719
	2015-2016	1,189,157
	2014-2015	1,084,812
Education	Literacy Rate – 98%	
No. of Schools	4 Monastery Education	
	4 Primary schools	
	1 Basic school	
	4 Middle school	
	16 High school	
	2 Collage	
Public Health Facilities	General Hospital - 1	
	Urban Healthcare Centers - 3	
	Sub- Urban Healthcare Centers - 64	
	Public Healthcare Centers - 2	

Source: General Administration Department (Myaung Mya Township)

4.4.2 Land use and Water Resources

The **Table 4. 14** describes land use extend of Myaung Mya township according to the type of land.

Table 4. 14 Land use of Myaung Mya Township

No.	Type of Land	Area (ac)
1.	Net Agricultural Land	220,785
	i. Agricultural Land	174,285
	ii. Farm Land	10,609
	iii. Garden Land	33,794
	iv. Dani	2,146
2.	Pasture	7,608
3.	Industrial Land	833
4.	Urban Area	883
5.	Rural Area	3,699
6.	Other Land	13,942
7.	Reserved Forest/Protected Public Forest	1,245
8.	Fallow Land	-
9.	Uncultivated Land	35,607
Total		284,720

Source: General Administration Department (Myaung Mya Township)

On the report of General Administration Department (Myaung Mya Township), the main water resources for irrigation scheme are from Pamawady River, Kyonethut Creek, Kangyi Creek and Myaung Mya River.

Table 4. 15 Irrigation Scheme

No.	Name	Location	Contribute Arce
1	Bamaw Thone Khwa	Bamaw Thone Khwa	500
Total	Bamaw Thone Khwa	Bamaw Thone Khwa	500

Table 4. 16 Embankment, Reservoir/Sluice

No.	Embankment, Reservoir /Sluice			Protected River/Creek	Contribute Arce
	Name	Type	Length (Feet)		
1	Mway Taw	Sluice Gate	Around 6 fts, (5) Gate	Pamawady River	3000
2	Pyin Ma Chaung	Sluice Gate	Around 6 fts, (2) Gate	Kyonethut Creek	2000
3	Htan Pin Chaung	Sluice Gate	Around 6 fts, (6) Gate	Kankyi Creek	3000
4	Tha Min Chan	Sluice Gate	Around 6 fts, (3) Gate	Myaung Mya River	2500
Total		4			10500

4.5 Cultural Features

The following table describes religion of Myaung Mya Township.

Table 4. 17 Religion of Myaung Mya township

No	Township	Buddhist	Christian	Hindu	Islam	Sprit	Others	Total
1	Myaung Mya	257,077	37160	417	3381	-	-	298035

Source: General Administration Department (Myaung Mya Township)

The following table describes cultural features of Myaung Mya Township.

Table 4. 18 Cultural features of Myaung Mya Township

Religious status		Amount
Buddhist	Pagoda	13
	Temple	75
	Monastery	374
	Convent school	3
	Chapels	214
Christian	Urban	7
	Rural	61
Islam	Urban	3
	Rural	2
Hindu	Urban	4
	Rural	-
China temple	Urban	7
	Rural	1

Source: General Administration Department (Myaung Mya Township)

CHAPTER 5: IMPACT IDENTIFICATION AND ASSESSMENT

5.1 Potential Impact Identification and Assessment

The proposed project site undertaking may have direct or indirect impacts on local environment in terms of physical, biological and socio-economic impacts. Potential impacts, identified in terms of each environmental issue, are likely to occur during construction phase, operation phase and decommissioning phases. Potential impacts of the proposed project have been listed using a checklist based on the analysis of environmental baseline information and proposed activities of the project. Potential impacts are identified in terms of current status of the environmental issues and foreseeing significant impacts during construction, operation and decommissioning phases. Impacts on the environment from various activities of the project can be categorized as follows:

Impact on Environmental Resource

- Impact on Air Quality
- Impact on Noise Level
- Impact on Surface Water Quality
- Impact on Soils

Impact on Ecological Resources

- Aquatic Ecology

Impact on Human Environment

- Health and Safety
- Socio-economics

Waste Disposal

- Solid waste disposal
- Liquid waste disposal
- Sanitary waste disposal

5.1.1 Impact on Environmental Resources

5.1.1.1 Indoor Air Quality Impact Identification and Assessment

Construction Phase: The construction activities usually involve civil works, mechanical works, and electrical installation section in the proposed factory site. All three types of works will be the largest in scope and magnitude in the construction of onsite facilities. In addition to these core construction works, there will also be landscaping works and minor civil works. During construction phase, dust emission was addressed as potential environmental impact and is expected to be non-significant because the construction phase is a short-term affect. Potential air pollution sources include:

- Site preparation work such as excavation, leveling, compaction and trenching
- Movements of construction vehicles and machinery within the site and during transportation operations
- Materials and handling of construction phase (delivery, unloading and use of construction aggregates and structural fill)

- Operation of the batching plant, cement mixer etc. Exhaust emissions emitted from generator, vehicles emissions will contain NO_x, SO_x, CO, CO₂.

Operation Phase: During operation phase, the particulate materials will be emitted from raw materials (rice husk), fly ash and bottom ash. The suspended particulate matter will be emitted from the chimney by combustion of rice husk as well. Nevertheless, this is the low chance of impact on air quality because there will be set up the EPS (Electrostatic precipitator) for ash handling and use the technology of low carbon emission for electricity production as well as fly ash and bottom ash will be collected with silo and stored at the temporary storage area. The rice husk which is used for raw material will be stored at the silo and transported to the boiler by enclosed conveyor to get desirable moisture and to prevent dispersion of suspended particles. Furthermore, silica plant will be established as a future plan for purifying the silica from the ash.

Decommissioning Phase: Dust emission, gaseous pollutants from various decommissioning activities can effect on soil quality and its composition.

5.1.1.2 Noise Level Impact Identification and Assessment

Construction Phase: During the construction phase, significant noises are likely to be occurred due to the excavation activities and the transportation of equipment and building materials by heavy trucks. In addition, the other sources such as noise from metal grinders and concrete mixers could generate noisy condition to the surrounding area. However, the impact to the surrounding area is expected to be low as the proposed project is located at industrial zone and construction activities is the temporary and short-term affect.

Operation Phase: The boiler, turbine and generator will be generated noise pollution throughout the operation hour. Although, the noise impact can affect only at the operation building areas, the office staff can prevent by wearing the ear muff when they checked the machines at the operation area. Nevertheless, the noise pollution impact will be expected to be insignificant if the operation staffs should wear personal protective equipment (PPE) at the period of checking the machines and the sound absorbing materials such as acoustic steel sound enclosure (mufflers or exhaust silencers), duct or pipe lagging which is the simplest and effective ways to reduce the noise impacts.

On the other hand, the distances from receptors (nearest villages) are 0.7 km and 1.3 km and it can be realized that sound level attenuates with distance. Such attenuation is called “distance loss” and is influenced by the noise configuration (point source or line source). In this case noise level at Receptor is generally lower than the noise level due to traffic which is a line source. Hence, it can be concluded that the noise levels due to the operation activities at plant could not affect the hearing for the nearby communities.



Figure 5. 1 Distance to receptors

Decommissioning Phase: There may be some noise generated from heavy machineries running for dismantling activities. Activities likely to generate noise during this phase include cutting and demolition of structures, transportation of demolished material could affect the noise level of the area. Through decommissioning phases could lead to significant nuisance to the surrounding area, but it is a short-term activity. Hence, it can be assumed that the impact of this phase is likely to be low.

5.1.1.3 Soil Quality Impact Identification and Assessment

Construction Phase: The leveling of soil can create changing the physical feature by filling sand to the pond. The machinery and vehicles can cause loss of surface soil nutrients, soil structure deformity and degradation of soil quality and loss of fauna and flora living in the proposed site. The soil is compacted by the vehicles and the solid waste disposal by the workers can affect the soil quality.

Operation Phase: In this phase, there is no significant impact in soil quality and structure, however, there may be residue and toxic to the soil if there will manage the fly and bottom ash improperly. The oil and grease which used in the turbine generator will be polluted under improper management of waste disposal.

Decommissioning Phase: Similar to construction phase, the soil may be affected on their oil penetration and leaching the surface soil which can lead to soil erosion by the vehicles. The decommissioning activities can cause nutrient loss, contamination and degradation of soil.

5.1.1.4 Water Quality Impact Identification and Assessment

Construction Phase: During the construction period, water is required for cementing the structures in the foundation and concrete columns of which the steel structure will be erected from and during construction of the rice husk power plant. Since the construction period is a short term (12

months), water consumption of the proposed project could not affect the groundwater level and the impact is likely to be very low.

Operation Phase: Although the rice husk power generation will require the large amount of water for boiler, the intake water is reused and recycled before discharge to the Ywe River through the water treatment system. The water from Ywe River will be pumped up to the water tank and treated by the deaerator before utilizing it to the boiler and then discharged waste water will be treated also before releasing to the river. As mentioned in **Table 4. 15** and **Table 4. 16** (Reservoir and Irrigation Scheme), Ywe River is not included in the list that distribute the water for agriculture and other usages. Therefore, there is insignificant impact to the water quality and marine ecology because the wastewater treatment system is installed and the treated water from operation process will be discharged through the treatment system.

Decommissioning Phase: During the decommissioning phase, the oil spill from the demolished vehicles and machinery can penetrate into the ground water and run into the near river during rainy season. This may cause both surface water and ground water pollutions.

5.1.2 Impact on Ecological Resources

The proposed project power plant is located at the old field of Jute Factory Area near Ywe River, Myaung Mya Township, Ayeyarwady Division and there is no National protected area in the nearest proposed project site. So, it can be assumed that the factory site could not expect to have significant impact on this ecological resource. There may be potential impact during the land filling because some aquatic species reached at the land filling area together with sand. However, this could not affect the aquatic species and the impact is likely to be very low. The utilized waste water will be discharged through the deaerator into the river. The discharged water quality was tested whether it is within standard limit or not before discharging into the river so there will be slightly impact to the aquatic species.

5.1.3 Impact on Human Environment

5.1.3.1 Occupational Health and Safety

Construction phase: During the construction phase, significant physical hazards can be occurred due to the engineering and construction activities including erection and fastening of roofing materials, metal grinding and cutting, concrete work, steel erection and welding among others. Construction workers will be exposed to risk of accidents and injuries. Such injuries can result from accidental falls from heights, injuries from hand tools and construction equipment cuts from sharp edges of metal sheets and collapse of building section, etc. Moreover, accidents and injuries to workers and local communities can be caused from heavy vehicles movement for the transport of construction materials and equipment. The above mentioned of impacts may occur in decommission phase of project.

Operation phase: In the operation phase, physical hazards such as hand injuries, noise and accident case of explosion of boiler and turbine, noise from operation of boiler and turbine. In addition, occupational health risk of respiratory hazards may cause by fly ash and bottom ash.

However, the proponent will provide appropriate PPE for employees working at the operation of the machines for electricity production and first aid kits will also be provided in all of the buildings in the project area. Moreover, the control room will be built and each step of the operation part will be detected with CCTV. Fire and explosive hazards may be mainly caused by accidental explosive of boiler and turbine for generation of electricity. As the proposed project is the power plant generation, fire can be a very serious risk. According to the Fire Department's guidelines, fire protective materials and fire protection system will be installed at the operation areas. The risk of fire is to be reduced as sufficient numbers of fire extinguisher will be also installed in the boiler building, turbine building, etc. and office staff training for fire protection procedure. Furthermore, no smoking area will be set out within the site and laws and regulations for electricity utilization will be announced to protect the fire hazard.

5.1.3.2 Socio-economic Benefits

The proposed project is not only the long-term investment in the energy sector but also positive in socio-economic condition of Myaung Mya Township. Implementation of proposed project may create temporary employment during construction and decommissioning phase and permanent jobs in the operation phase. Subsequently, socio-economic standards of local people will be increased and eventually it may lead to the economic growth at the local and regional level by fulfilling the electricity demand.

5.1.4 Waste Disposal

5.1.4.1 Solid waste disposal

Construction phase: The construction wastes including undesired concrete and masonry materials, mixed debris with gypsum, plaster, metal scrap, glass and wood scrap produce from the construction of project building activities. However, the construction phase is the short term and proper waste management facilities may less impact to the environment.

Operation phase: Fly ash and bottom ash are the main solid waste producing from the rice husk power generation which can be extracted silica for the cement production and brick production and solid sludge from water treatment is kind of solid waste which can be used for land filling and gardening. In addition to that, solid waste will be produced office waste such as food residue, domestic waste form the lunch room. Improper management of solid waste facilities for such wastes can be harmful to the environment through blockage of drainage systems and the health of workers. Estimation of generated main solid waste, fly ash and bottom ash, is about 331.2 tons per month and then the collected waste will be stored at the container before processing the silica production, which is collected from the electrostatic precipitator (ESP). Likewise, the estimate solid sludge from water treatment will be 4.8 tons per month.

Table 5. 1 Solid Waste Disposal

Type of Solid Waste	Quantity/Month of 30 days in ton	Method of Disposal
Ash	331.2	Ash will be collected dry from the furnace and ESP of the plant and be stored in silo from there, it will be further transported with closed truck to the following areas. (a) Ash brick factory (b) Land filling (c) Silica generation plant in Future
Solid Sludge from water treatment	4.8	To be used for land filling/ gardening

Decommissioning phase: The solid waste can be produced like as the construction phase and the period of this phase is short term so that the solid waste disposal will be low significant impact to the community and environment.

5.1.4.2 Liquid waste disposal

Construction phase: Construction activities include concrete batching plant operation, use of blinding cement on roadways, wash-out during construction, and poor integrity of shuttering. Discharge to water body should be avoided. The generation of sanitary wastewater discharge in varying quantities depending on the number of workers involved. It can be harmful to the environment through blockage of drainage systems of nearest water source, choking of water bodies and negative impacts on human and animal health.

Operation phase: In the operation stage, since the main raw materials of power plant generation are water and rice husk, the waste water must be come out at the end of the process. So, the estimate amount of waste water discharge will be 46 m³ per day and 5 m³ per day from power plant process and from toilet and lunch room respectively. Nonetheless, the waste water discharge from the plant will be treated before discharging into the river and hygienic toilet and lunch room will be provided in the proposed power plant. Therefore, the impact of liquid waste to the environment will be low. The following tables show the minimum number of toilets and washbasin that should be provided according to the number of workers.

Table 5. 2 Number of toilets and wash basin

Number of people at work	Number of toilets	Number of washbasins
1-5	1	1
6-25	2	2
26-50	3	3
51-75	4	4
76-100	5	5
>150	**	**

Source: Health and Safety Executive

5.2 Methodology & Approach for Impact Assessment

The impacts of the proposed project were analyzed by the method, which is modified by Institute of Environmental Management and Assessment (IEMA) from United Kingdom. Accordingly, the impacts were classified into two classes: environmental impact and business impact. Then, three criteria such as Severity, Occurrence and Level of Control are defined for environmental impact and two criteria such as Legal Compliance and Stakeholder Complaint for business impact. Each criterion has three levels of weighting ranging from 1 to 3. Impacts, criteria and weightings are mentioned in **Table 5. 3** and individual project activity causing impacts was considered as per the above procedure. Overall score for impact of individual project activity was resulted by multiplication of weighting of each respective criterion. The value of overall score ranges from 1 to 243 and the largest range 183-243 shows that the whole process of the project activity must be redesigned and considered to plan again.

Table 5. 3 Impact and Criteria for Assessment of Significant

No.	Description	Criteria	Indicators	Weighting		
				1	2	3
1	Environmental Impact	Severity	Toxicity	Low	Medium	High
			Quantity	Small	Average	Large
			Impact on human and environment	Low	Medium	High
		Occurrence	Period	Annual or never occurrence	Monthly or weekly frequency	Daily frequency or chronicle
		Level of Control	Detection	Easy	Average	No
Precaution	Important		Medium	No		
2	Business Impact	Legal compliance	Regulatory control	For existing legislation	For near future (impending or amending legislation)	No
		Stakeholder complaint	Objection	No	Potential	Serious
Overall score = Weighting of (Severity * Occurrence * Level of Control * Legal Compliance * Stakeholder Complaint)						

Severity (S)

This criterion is used to evaluate the effects on man and environment, depending on the toxicity, quantity and impact of the activities.

Weighting	Description
1	Low severity: low toxicity, low quantity, low impact on man and environment
2	Medium severity: medium toxicity, averaged quantity, low effect on environment
3	High severity: high toxicity, very important quantity, high impact on environment

Occurrence (O)

This criterion is corresponding to the frequency of the impact occurrence.

Weighting	Description
1	Low: Annual frequency or never occurred
2	Medium: Monthly or Weekly Frequency
3	High: Daily frequency or chronicle

Level of Control (C)

This criterion is used to evaluate the level of control of the aspect, depending on the detection, available means, the operating procedures and the precautions taken.

Weighting	Description
1	High, easy detection and control with operating procedures regularly checked and/or important precautions taken to lower impact
2	Medium detection and control with operation procedures not regularly checked and/or average precautions taken to lower impact
3	No control, no detection and/or no precaution taken to lower impact

Legal Compliance

Weighting	Description
1	Subject to be existing regulatory controls (local, international and company regulations)
2	Subject to regulatory control in the near future (Impending or amending legislation within the next 5 years)
3	No regulatory control

Complaint from Stakeholders

Weighting	Description
1	No complaint
2	Potential to a cause of serious complaint
3	Complaint raised by partners, neighbors, customers, employees and communities

Score	Significance of Impact	Significance Description
1 – 60	Low	No significant impact
61 – 121	Moderate	Low impact, try to improve
122 – 182	High	Significant impact, real necessity to improve
183 – 243	Very High	Unsustainable situations

Table 5. 4 Potential Environmental Impacts and its Significance

Activities	Aspects of the risks	Impacts	Severity	Occurrence	Level of Control	Legal Compliance	Stakeholder Complaint	Result score	Significance
Construction Phase									
Land clearance	Loss of terrestrial habitat and biodiversity	Natural resource depletion	2	2	3	2	3	72	Moderate
Excavation	Loss of organic matter and nutrients by removal of top soil	Soil erosion land/water pollution	2	2	3	3	1	36	Low
Transportation	Dust generation, Oil spillage	Impact on air and soil	1	3	3	3	3	81	Moderate
Operation of construction material	Noise from the operation of batching plant, cement mixer	Impact on air and noise pollution	3	3	2	1	3	54	Low
Construction waste disposal	Waste generation by construction activities	Impact on drainage system and soil Land/water pollution	2	2	2	2	2	32	Low
Sewage and litter management	Liquid/solid waste generation	Land/water pollution	2	3	2	2	2	48	Low

Activities	Aspects of the risks	Impacts	Severity	Occurrence	Level of Control	Legal Compliance	Stakeholder Complaint	Result score	Significance
Employment and income generation	Opportunities to get employment for local people	Socio-economic standards of communities improved	-	-	-	-	-	-	Positive impact
Operation Phase									
Employment	Opportunities to get employment for local people	Socio-economic standards of communities improved	-	-	-	-	-	-	Positive Impact
Government revenue	Government acquired revenue	Government GDP increased	-	-	-	-	-	-	Positive Impact
Electricity Generation	Economic development	Development of local socio-economic standards and living standard	-	-	-	-	-	-	Positive Impact
Emitting Particulate matter	Emission fly ash and bottom ash from the combustion of rice husk	Impact on air and other living organisms	3	3	2	2	3	108	Moderate
Water Supply	Water resource depletion	Natural resource depletion	2	3	2	2	2	48	Low

Activities	Aspects of the risks	Impacts	Severity	Occurrence	Level of Control	Legal Compliance	Stakeholder Complaint	Result score	Significance
Solid waste disposal	Residual from the combustion of rice husk Fly ash and bottom ash emission	Land/water pollution	3	3	2	2	3	108	Moderate
Liquid waste disposal	Waste water discharge from the power plant	Water pollution	2	3	2	2	2	48	Low
Sewage treatment and disposal	Effluent discharge to environment	Land/water pollution	3	3	2	2	2	72	Moderate
Physical Hazard	Hand injuries, accident case of explosion of boiler and turbine	Injury/mortality	1	2	2	2	3	24	Low
Occupational health risk	Caused by fly ash and bottom ash	Respiratory hazards	2	3	2	2	3	72	Moderate
Fire hazard	Case of explosion of boiler, turbine	Injury/mortality	2	1	2	2	3	24	Low

Activities	Aspects of the risks	Impacts	Severity	Occurrence	Level of Control	Legal Compliance	Stakeholder Complaint	Result score	Significance
Operating machines	Noise from the generating of boiler, turbine and generator	Noise pollution	2	3	2	2	3	72	Moderate
Transportation of raw material and ash	Emitting particles to the environment	Air pollution and respiratory hazards	2	2	2	2	3	48	Low
Decommission Phase									
Decommission activities	Dust emission, gaseous pollutants	Impact on air and soil	2	3	2	2	1	24	Low
Transportation of decommission material	Emitting particles to the environment	Air pollution and respiratory hazards	2	3	2	3	3	108	Moderate
Oil spillage	Spill from the demolished vehicles and machinery	Impact on soil	2	2	3	3	2	72	Moderate
Solid waste disposal	Waste from the demolition	Soil pollution	3	1	2	3	3	54	Low
Socio-economic impact	Loss of income and job opportunities	Potential socio-economic impact	2	1	3	3	3	54	Low

5.3 Environmental Impacts and Its Significance

In the proposed rice husk power generation, according to the assessment method, the rice husk power generation project could not be expected to have significant impact during three phases (construction, operation and decommissioning). The plant could not be expected to have significant impacts on air pollution, noise pollution, and water pollution during construction phase because the project site is situated at the old jute factory and far from resident area and impact of construction activities are within the manageable limit. However, the operation activities of the power plant can affect moderate impacts to the air pollution, waste disposal, noise pollution and occupational health and all of these impacts are small scales site level and appropriate mitigation measure plan should be provided for provision of operation phase and PPE also provide for employees working with operation machinery equipment for checking boiler.

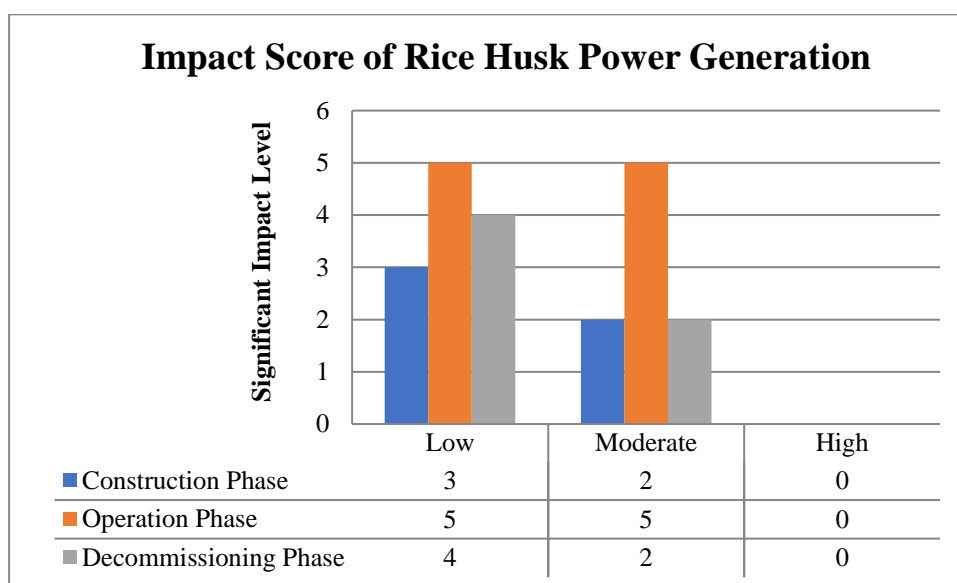


Figure 5. 2 Impact Score of Rice Husk Power Generation

5.4 Mitigation Measures for Impacts

Table 5. 5 Impact Mitigation Measure

Potential Impacts	Phases	Recommended Mitigation Measures
Ambient Air Quality	Construction Phase	<ul style="list-style-type: none"> • Carry out surface damping and wetting on general site area especially during dry ambient conditions to less fugitive dust, if necessary. • Twice per day (morning and evening) • 0.5 gallon once • Provide site enclosure and covering of any aggregate stockpiles • Limit traffic movement speed within the earmarked project site • Regular maintenance of construction vehicles/ equipment
	Operation Phase	<ul style="list-style-type: none"> • Provide good air ventilation systems such as pull-push ventilation systems, exhaust fans • Install enclosed conveyor to prevent dispersion of dust from rice husk • Regular monitoring of dust, CO₂, NO_x and SO_x emission • Re-vegetation as fence to reduce dust spreading to the local community and to control the carbon dioxide emission • Plantation around the compound area with natural vegetation as recreation area (e.g. suitable native species such as black plum (<i>Syzygium spp.</i>), mangrove palm (<i>Nypa fruticans</i>)) • Wetting of exposed top-soil for additional mitigation of dust emissions • Provide suitable ash handling system to manage ash emission and ash collecting storage should be closed type. • Employee from ash collecting area have to wear mask (PPE) to prevent dust inhaling (as mentioned in Waste Management System) • Implement the control measures that mentioned in Waste Management System

Potential Impacts	Phases	Recommended Mitigation Measures
	Decommissioning Phase	<ul style="list-style-type: none"> Dust suppression technique should be implemented, e.g. at least applying water on the top soil to reduce dust from vehicle movement especially dry season Provide and enforce the appropriate use of PPE against dust
Noise Pollution and Vibration	Construction Phase	<ul style="list-style-type: none"> Use noise control devices, such as temporary noise barriers and exhaust muffling devices for combustion engines Unused equipment will be turned off and the parallel use of noisy equipment/ machinery should be avoided Regular maintenance of all machinery and equipment for construction use Avoid working at night time Generators and compressors will be provided with enclosures
	Operation Phase	<ul style="list-style-type: none"> Maintain access way of operation area in good condition to reduce noise and vibrations from conveyor of raw material and ash Regular check and maintenance of boiler, turbine and generator Use noise barriers, sound insulating materials and buffer double layer sound-proof walling to mitigate the noise to the surrounding environment Provide and follow to wear personal protective equipment for employees who working at the power plant Boundary plantation could reduce noise pollution to the community and working environment
	Decommissioning Phase	<ul style="list-style-type: none"> Use noise control materials, such as temporary noise barriers Unused equipment will be turned off and the parallel use of noisy equipment/ machinery should be avoided Regular maintenance of all machinery and equipment
Water Quality	Construction Phase	<ul style="list-style-type: none"> Appropriate sanitary facilities maintained for construction workers throughout the construction stage Monitor, maintain, clean the temporary use of septic systems or toilets on daily

Potential Impacts	Phases	Recommended Mitigation Measures
		<ul style="list-style-type: none"> Prohibit strictly kitchen waste and domestic waste disposing to the nearby river Any accidental spill of fuel, oil or other hazardous chemicals should be cleaned up immediately
	Operation Phase	<ul style="list-style-type: none"> Water saving devices should be installed for kitchen and toilets facilities Minimization of spillage and leaks of oil and grease (e.g.; turbine and generator oil) Use of standard pollution control technique before discharging the waste water into the river Reuse the treated discharging water in the generation of turbine to save the consumption of water resources Regular check of cooling water system and water treatment system to control the water quality of plant water and discharged water (As mentioned in Water Requirements and Water Treatment System)
	Decommissioning Phase	<ul style="list-style-type: none"> Prohibit strictly kitchen waste, domestic waste and oil and grease disposing to the near river Any accidental spill of fuel, oil or other hazardous chemicals should be cleaned up immediately
Soil Quality	Construction Phase	<ul style="list-style-type: none"> Plan proper site clearing or disturbance of vegetation and compressing of soil to build the power plant Design channels and ditches for post-construction flows Reuse excavated materials in backfilling the trenches or landscaping activities Provide the temporary and/or permanent drainage systems to minimize blocking water in the site preparation works Any accidental spills of fuel, oil or other hazardous waste must be cleaned up immediately
	Operation Phase	<ul style="list-style-type: none"> Store the fly ash and bottom ash in the containers which are collected by ESP and silo Collect sludge from the water treatment system regularly and prohibit strictly disposed to the soil

Potential Impacts	Phases	Recommended Mitigation Measures
		<ul style="list-style-type: none"> Any accidental spills of fuel, oil or other hazardous waste must be cleaned up immediately Dispose the generator oil from the generator by contacting with Waste Management Company (e.g. Golden DOWA Ecosystem Co., Ltd)
	Decommissioning Phase	<ul style="list-style-type: none"> Plan proper land clearing and demolishing of buildings Avoid improper disposal of demolished materials and machinery
Occupational Health and Safety	Construction Phase	<ul style="list-style-type: none"> Train workers for first aid Establish, maintain and improve the workers-management relationship Use slip retardant foot wear Wear appropriate PPE, such as safety glasses with side shields, face shields, hard hats and safety shoes Provide temporary fall arrestors Maintain clear traffic ways to avoid driving of heavy equipment over loose scrap Promote safe and healthy working conditions and workforce health and well-being, and prohibit any use of forced labor All excavations should be filled up after the plant closure
	Operation Phase	<ul style="list-style-type: none"> All employee and visitors in the plant should be provided and worn personal protective equipment (uniform, helmet, or hat, ear and eye protection, safety gloves and shoes, etc.) should be provided Workers should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. Hearing protective devices provide should be capable of reducing sound levels at the ear to least 85 dB (A) Periodic medical hearing checks should be performed on workers exposed to high noise levels Making all energized electrical devices and lines with warning signs

Potential Impacts	Phases	Recommended Mitigation Measures
		<ul style="list-style-type: none"> • Checking all electrical cords, cables and do not use overload voltage • Appropriate labeling of services rooms housing high voltage equipment • Report and record such as all injuries, near misses, and environmental or property damage, accurately, completely and in a timely manner should be kept • Passageways for pedestrians and vehicles within and outside buildings should be segregated and provide for easy, safe and appropriate assess. • Provision of air conditioned sound heavens/control rooms • Training, instruction and assessment activities should be provided • Warning systems such as signs, labels and work instruction
	Decommissioning Phase	<ul style="list-style-type: none"> • Training of workers in lifting and materials handling techniques in decommissioning phase • Planning work site layout to minimize the need for manual transfer of heavy loads • Using inspected and well maintained lifting devices that are appropriate for load, such as cranes and securing loads when lifting them to higher job site elevations. • Promote safe and healthy working conditions and work force health and well-being, and prohibit any use of forced labor • All excavations should be filled up after the plant closure
Solid waste Disposal	Construction Phase	<ul style="list-style-type: none"> • Encourage waste segregation at the source • Good housekeeping practices are essential within the site • Use durable, long-lasting materials • Store in containerized compartments to reduce fugitive emission and pollutants from contaminating the environment especially the water bodies
	Operation Phase	<ul style="list-style-type: none"> • Provide adequate garbage containers with top cover for all departments

Potential Impacts	Phases	Recommended Mitigation Measures
		<ul style="list-style-type: none"> Collect and dispose sludge from the water treatment system at the specific containers Provide ash storing containers to reduce pollution to the soil and air Regular maintenance and checking of ash handling system
	Decommissioning Phase	<ul style="list-style-type: none"> Use recycled or refurbished demolition materials where possible Encourage waste segregation at the source Dispose of solid waste in compliance with regulations
Liquid Waste Disposal	Construction Phase	<ul style="list-style-type: none"> Minimize washing off the construction materials and tools Prohibit discharging the washing water of construction materials and tools into the river
	Operation Phase	<ul style="list-style-type: none"> Control the quality of treated water before discharging into river
	Decommissioning Phase	<ul style="list-style-type: none"> Recycle the treated water from the treatment plant to reduce prudently the water consumption and energy consumption Ensure sewage systems is functional during demolition, to prevent pollution of nearby underground and surface water resources Demolish the sewage systems properly to prevent pollution by contents into the environment and ground water.
Fire Hazard	Construction Phase	<ul style="list-style-type: none"> Provide necessary PPE for workers Set out fire hose for pump the water from river Describe emergency phone numbers of the Regional Fire Stations on notice board Store the construction waste material at the specific area to prevent accident or intended firing at the project site
	Operation Phase	<ul style="list-style-type: none"> Set out the fire protection scheme at the power plant by the Myaung Mya FM Biomass power Co., Ltd. (see in APPENDIX IV) Provide necessary PPE for all operation staffs

Potential Impacts	Phases	Recommended Mitigation Measures
		<ul style="list-style-type: none"> • Regular check the fire protection scheme and fire extinguisher have to be checked twice a year at least. • Provide fire door, fire hose, fire alarm and fire escape at the operation areas for safety of people • Describe emergency phone numbers of the Regional Fire Stations on notice board • Keep signage and signboards of fire in the noticeable place • Store systematically and regular examine the generator oil, raw materials • Regular check and maintenance of the electric wires and machines • Give the trainings to the staffs for planning the group of fireguards, rescues, transporters and security in order to kill the fire and save the workers if happen accidentally
	Decommissioning Phase	<ul style="list-style-type: none"> • Provide necessary PPE for workers • Set out fire hose for pump the water from river • Describe emergency phone numbers of the Regional Fire Stations on notice board • Store the decommissioning waste materials at the specific area to prevent accident or intended firing at the project site

CHAPTER 6: PUBLIC CONSULTATION

6.1 Public Consultation for 1.8MW Gross Rice Husk Fire BTG Power Plant

To introduce the project description and explain the Environmental Management Plan of the proposed power plant, the Public hearing concerning with EMP proposed by Myaung Mya FM Biomass Power Co., Ltd. was held on 28th October, 2017 at the proposed project site.

No	Category	Number of Participants
1	Government Department	3
2	NGO/ Company member	36
3	Local People	13
4	Media	1
Total		53

The Public Hearing was held according to the following agenda:

- 1) Opening Ceremony
- 2) Presentation of Project Introduction by Mr. Uchiyama Naoki, Project Director, Myaung Mya FM Biomass Power Generation Co., Ltd.
- 3) Presentation of Environmental Management Plan by Daw Shwe Sin Ko Ko, E Guard Environmental Services Co., Ltd
- 4) Comments and suggestions by attendees
- 5) Closing and Thank you Remark by Mr. Inoue Shoichi, Managing Director, Myaung Mya FM Biomass Power Generation Co., Ltd
- 6) Closing Ceremony

6.2 Presentation of Project Introduction

Mr. Uchiyama Naoki, Project Director, Myaung Mya FM Biomass Power Generation Co., Ltd. said that he will explain about the brief project description of 1.8MW Gross Rice Husk Fire BTG Power Plant.

Daiwa House Group Ltd., Fujita Corporation, Construction Company, is headquartered in Tokyo, Japan. It was established in 1910 and has a operating history of over 100 years. Fujita has presence in 12 countries, including a branch office in Yangon, with experience as well as expertise in overseas real estate development, urban revitalization, transport infrastructure service and environmental engineering. Fujita would like to contribute to Myanmar's economic development and environmental protection with Myanmar company through utilizing the scheme of Joint Crediting Mechanism (JCM).

At recent, there are many rice mills, low electrification rate, environmental problems of small gasification power generation facilities and improper treatment of rice husk in

Ayeyarwaddy Region. The project is first one in Ayeyarwaddy Region which can produce 1.8MW (Gross) and 1.6MW (Net) of power generation scale by using boiler and turbine generator. The investment amount for project is approximately USD 4 million, Joint Venture Company naming Myaung Mya FM Biomass Power Co., Ltd which generate electricity from rice husk and contributes 80% from Fujita Corporation and 20% from Myanmar Agribusiness Public Corporation (MAPCO) Limited. The project location is situated at the old jute factory. The draft process of rice husk power plant was that:

- (1) collecting rice husk from new MAPCO rice mill near the power plant and storing rice husk in silo*
- (2) combustion rice husk through boiler and producing electricity with turbine and generator*
- (3) produced megawatt from the power plant will be used for other factories (i.e. rice mill, rice bran mill) and surplus amount of megawatt will be distributed through off-grid line to the near villages.*

The gross megawatt for producing will be 1816kW and net megawatt will be 1615kW. The operation schedule will be 24 hours and 300days per year. The environmental management plan and fire protection plan have already set up for the project. The construction period will be held on December, 2017 and the operation would be started on December, 2018. The advantages of the project are; providing electricity for Ayeyarwaddy region, establishing new more rice mills due to the assess of electricity, producing electricity by using waste (rice husk) that can protect from environmental pollution. This project got the subsidies from the Japanese Government to provide project for electricity in Ayeyarwaddy Region.

6.3 Presentation of Environmental Management Plan

Daw Shwe Sin Ko Ko, Consultant, E Guard Environmental Services Co., ltd said that E Guard Environmental Services Co., Ltd presented the environmental management plan to mitigate and analyze the impacts on environmental and social at the project area.

We will do the Environmental Management Plan in accordance with analysis of potential impacts of the project and consulting the mitigation measures for environmental impacts. We will do this project according to the related laws and regulations. As a development project, it can either be beneficial to the local citizens or cause negative impacts. Therefore, it needs to find out the potential impacts of the project, discuss the mitigation measures for potential impacts and prepare the monitoring plan. The objectives of the public hearing and consultation are presentation about the potential positive and negative impacts, consideration for the opinions and suggestions of the local people and mitigation measures and monitoring plans for impacts, sharing the knowledge of project and improving the transparency and responsibility of the rice husk power plant.

We provided there portions of environmental management plans according to the project phase; construction, operation and decommission to protect and mitigation the potential impacts. The impacts causing by the project can be divided into environmental impacts (e.g. air pollution, noise, water pollution, soil degradation, biodiversity), social impacts

(e.g. occupational health and safety, socio-economic conditions) and waste management (e.g. solid, liquid, hazardous). Distribution of surplus megawatt to neighbored villages, implementation waste to energy technology by using the rice husk, improving the socio-economic conditions and job opportunities of the Ayeyarwaddy Region, poverty reduction and developing the technology of rice husk power plant are the advantages of the project. In each period, the mitigation measure will be provided for each operation steps to reduce the impacts on the above mentioned resources. Due to the decommission phase of the project will be long for 70 years, the suitable mitigation measures and monitoring plans will be set up according to the effective updated technology and management plans. Moreover, in grievance mechanism, the compliant can report via phone, email or social network to the responsible person from the factory, if there has no satisfaction in this step, the compliant can report to the committee which is organized by the representative from General Administrative Department, one form Myaung Mya Industrial Zone and related local people. Otherwise, report to the related organizations for example, Environmental Conservation Department or to the court.

6.4 Comments and suggestions by Attendees

(1) U Kyaw Myint (local person from Motesoekwin)

Question (1): After establishing the project, what kind of condition of air quality, waste material and odor of the local area?

Answer: This project was established by the use of subsidies from Japanese Government so that they will follow the rules and regulations for the environmental conservation. The mitigation measures and monitoring plan will be set up according to the National Emission Guideline which was promulgated in 29th December, 2015 to reduce the impacts of the project. The company must monitor the environmental impacts and reported to the Environmental Conservation Department. Moreover, the related government organizations will inspect to the project site. Therefore, if the local people have grievance with the project, the compliant should do according to the grievance mechanism.

Question (2): How will the electricity from the project be distributed to the villages?

Answer: Only surplus megawatt will be provided to the other factories and neighbored villages after distributing to the rice mill and rice bran oil mill.

(2) Dr. Kyaw Swar Lwin (Medical superintend / Township Doctor)

Question (1): How long does the project take in the project site and what are the plans for waste disposal and waste management? (e.g. place of landfill and ash brick factory, plan for silica generation plant)

Answer: In recent, only landfill with local municipal due to the lack of facilities. But the company has the plan to build the silica generation plant and used to research the silica content. For silica production, the high technique will be needed and the sufficient

amount of ash will be produced. In addition, the air quality will be monitored from source and receptor by the company and followed the national emission guidelines to be as ideal project in Myaung Mya.

Question (2): What are the technical supporting plan and technically combination training? What are the health care education plans for the local to promote community participation as the future ideal project?

Answer: *We have planned to contribute (1%) upon our net profit after tax by doing the following activities:*

- (a) *Trainings for upgrading of employees' skills (25%)
e.g. OHS and First Aid trainings, Equipment handling training*
- (b) *Health care to our employees (25%)
e.g. Medical fee and regular medical check with doctor for the employees*
- (c) *Contribution for industrial zone development (25%)
e.g. Donation to road work in the industrial zone*
- (d) *Charity activities (25%)
e.g. Donation to community development activities*

At the present, the first priority of the above mentioned activities is for employee from the factory.

Question (3): Does the waste management plan for rice husk power plant include hospital waste management system in Myaung Mya?

Answer: *Now, E Guard Environmental Services and Norway Environmental Waste Management are analyzing together at the private hospital and factory for strategy of hazardous waste management and hospital waste management. Even in Yangon City Development, the only accelerator is used for firing waste. In Mawlamyei, the rubber wood factory which is cooperated with Japan managed the saw dust waste by bringing to the Golden Blower where is situated at the Thilawa Special Economic Zone. So, we can recommend to do like this as initial.*

Question (4): Does the electricity distribute through off grid or national grid?

Answer: *The Fujita has the plan to distribute the electricity through off grid. If the electricity is distributed through off grid, the company needs to get IPP (Independent Power Producer) so the Fujita company submit to the government to get the permission for Electricity Distribution Certificate.*

6.5 Closing and Thank you Remark

Closing and Thank you Remark by Mr. Inoue Shoichi, Managing Director, Myaung Mya FM Biomass Power Generation Co., Ltd

Thank you for all attendees even though the weather is hot. I am so glad to appreciate doing first rice husk power plant cooperation with MAPCO in Myaung Mya. As above

mentioned, this project will focus upon environmental benefits and social welfare. To get clean environmental management, I would like to encourage the local people and other authorized people cooperate with us and support us.

CHAPTER 7: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The below mentioned environmental management plan is intended to develop a management framework for proposed rice husk power plant, Myaung Mya FM Biomass Power Co. Ltd. at old jute factory in Myaung Mya Township, Ayeyarwaddy Region. The environmental management practices, procedures and responsibilities are defined to get full compliance with the existing environmental policy, laws, rules and regulations of the Republic of the Union of Myanmar. There are five main sections in this Environmental Management Plan (EMP):

- 1) Mitigation Plan
- 2) Monitoring Plan
- 3) Occupational Health and Safety Plan
- 4) Emergency Response Plan
- 5) Cooperate Social Responsibility (CSR) Plan

7.1 Objectives of Environmental Management Plan

The specific objectives of the EMP are to:

- 1) Serve as a commitment and reference for the proponent to implement the EMP including conditions of approval from the Ayeyarwaddy Region Environmental Conservation Department (ECD), Ministry of Natural Resources and Environmental Conservation (MONREC).
- 2) Serve as a guiding document for the environmental and social monitoring activities.
- 3) Provide detailed specifications for the management, mitigation and monitoring plan of the project that have to reduce the potential negative impacts on the environment.
- 4) Implement as ideal project for wastes to energy development and environmental impact minimizing in Ayeyarwaddy Region.

7.1.1 Responsibilities of the Environmental Management Plan

In order to ensure the sound development and effective implementation of the EMP, it will be necessary to identify and define the responsibilities. The environmental management practices, procedures and responsibilities are defined herein to get full compliance with the existing environmental policy, laws, rules and regulations of the Republic of the Union of Myanmar. The following entities should be involved in the implementation of this EMP:

- Myaung Mya FM Biomass Power Co., Ltd.
- Regional and local levels stakeholders (e.g. ECD at Ayeyarwaddy Region)
- Third-Party Environmental Consultant

Myaung Mya FM Biomass Power Co. Ltd.: The proponent will be charged with the responsibility for ensuring that the proposed development has been accomplished in an environmentally sound manner. This can be achieved by inclusion of environmental specifications in the tender specifications, selection of environmentally conscious contractors and supervision to ensure that the objectives of this EMP are met. The implementation of

Environmental Management Plan (EMP) process will prepare and follow up by appointed persons for health, safety and environmental management under the instruction of management team of Myaung Mya FM Biomass Power Co., Ltd. and Human Resource Manager (HR) will be assigned as EHS coordinator for EMP implementation facilities.

Regional and local level stakeholders (Ayeyarwaddy Region): The stakeholders include related government and departments which are responsible for general supervision and coordinating over all matters relating to the environment and to be instrumental in providing guidance for recognized regulatory frameworks.(e.g. Environmental Conservation Department (ECD), Health and Sport Department, etc.)

Third-Party Environmental Consultant: The environmental consultant will have to ensure that the proposed EMP is up to date and is being followed properly by the proponent. Periodic audits of the EMP will have to be done to ensure that its performance is as expected, by comparing with operating standards so that any corrective actions can be taken.

The Environmental, Health and Safety (EHS) supervisor will be responsible for the selection and application of technology, management systems, and environmental risk assessment tools that will help ensure that the facility has no adverse environmental impact to the air, water, land or community. This position will also be responsible for maintaining the facility in full compliance with applicable environmental regulatory and company requirements. The appointed Quality person will be therefore be directly responsible for the development and implementation of the EMP and will be the contact point with the EHS in terms of issues related to the EMP. For certain issues such as the emergency response plan or sustainability issues, the Safety & Environmental Supervisor will coordinate with other managers and supervise their performance on issues relating to the EMP. The appointed person will also coordinate with the operating leaders/ supervisors in order to ensure that the EMP is correctly implemented in each of the units.

The main responsible of stakeholder for inspection is Environmental Conservation Department (ECD) and other authorized Government Department such as Regional municipality, Health and Sport Department.

7.2 Impact Mitigation and Monitoring Plan

The power plant shall conduct regular monitoring of water, wastewater, air and noise (major sources of environmental impacts) to compare with the baseline data measured on October, 2017. Environmental monitoring shall be carried out regularly by examining the parameters as described in **Table 7. 1** throughout the project's lifecycle. It is necessary to appoint a EHS Coordinator or Environmental Manager to perform the monitoring plan and inspect the EHS activities according to the existing laws and regulations.

Monitoring parameters were selected considering the impacts identified and predictions. The parameters shall expose the effectiveness of the mitigation measures and general environmental performances of the project. Monitoring of the parameters will be done in various stages of the project as follows:

- Construction Phase: To monitor the pollution levels that arise from the construction activities
- Operation Phase: To examine the impacts that might arise as the result of normal use of the infrastructures and resources
- Decommissioning Phase: Decommissioning is not anticipated in the foreseeable future. However, if this will happen, may entail parameters similar to those at construction phase.

7.2.1 Environmental Mitigation Plan for the Construction Phase

According to the impact assessments that have done in **CHAPTER 5**, it is categorized that the following impacts are inevitably to be occurred:

- 1) Dust emission
- 2) Noise and vibration
- 3) Solid waste generation and disposal
- 4) Risks of accidents and injuries to workers

Detail mitigation plan for each phase is mentioned in **Mitigation Measures for Impacts** which includes measures to minimize or offset the potential emission and pollutants of the biomass power plant generation. These activities shall be carried out to show that the power plant operations are in compliance with the maximum allowable environmental norms and standards.

7.2.2 Environmental Mitigation Plan for the Operation phase

Based on information on the project operation and knowledge of the project area, impacts of project operation have been identified in **CHAPTER 5: IMPACT IDENTIFICATION AND ASSESSMENT**. The overview of the plant has some environmental issues; however, the proponent has submitted in the technical proposal that environmentally friendly approaches will be applied and thereby preventing the dispersion of pollutants into the natural environment to some extent that the receiving environment is still healthy. Environmental issues associated with the operational phase primarily include the following issues:

- 1) Noise pollution (generation of boiler, turbine and generators)
- 2) Solid waste generation
- 3) Liquid waste generation
- 4) Occupational Health and Safety (accidental case of hand injuries, slip, trip and falls)
- 5) In case of Fire Hazards (steams turbine explosion for power generation)

The unavoidable impacts would evolve from occupational Health and safety of workers in the aspect of physical hazards by long term and short term working in rice husk power plant generation. Mitigation plan of operation phase is mentioned in **Table 7. 1**, which includes mitigation measures to minimize or offset the potential emission, solid and liquid generation due to ash handling system, waste water treatment system, use of occupational health and safety facilities such as appropriate PPE facilities and first aid training. These activities shall be

carried out to show that the power plant operations are in compliance with the maximum allowable environmental norms and standards.

7.2.3 Environmental Mitigation Plan for Decommissioning Phase

In this phase, it is necessary to outline some basic mitigation measure that will be required to be undertaken once all operational activities of the project have ceased. As a result of proposed plant closure, various environmental and social aspects may be affected. These are grouped as either socioeconomic impacts or environmental impacts.

- Interference with surface water quality
- Huge amount of demolishing wasted, electrical cables, electronic device waste generation
- Significant noise generation form demolishing activities
- Abandoned power plant may give visual impacts
- Loss of life or injury while persons or animals may fall into excavated pit/ drainage channels.

Table 7. 1 Impact Mitigation Plan for Rice Husk Power Generation

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
Ambient Air Quality	Construction Phase	<ul style="list-style-type: none"> Carry out regular surface damping and wetting on general site area especially during dry ambient conditions to less fugitive dust Provide site enclosure and covering of any aggregate stockpiles Limit traffic movement speed within the earmarked project site Regular maintenance of construction vehicles/ equipment 	Very low	Throughout the construction phase	Construction Contractor/ Myaung Mya FM Biomass Power Generation Company
	Operation Phase	<ul style="list-style-type: none"> Provide good air ventilation systems such as pull-push ventilation systems, exhaust fans Install enclosed conveyor to prevent dispersion of dust from rice husk Regular monitoring of dust, CO₂, NO_x and SO_x emission Re-vegetation as fence to reduce dust spreading to the local community and to control the carbon dioxide emission Plantation around the compound area with natural vegetation as recreation area (e.g. suitable native species such as black plum (<i>Syzygium spp.</i>), mangrove palm (<i>Nypa fruticans</i>)) 	Very low	Throughout the operation phase	EHS Coordinator and HR Manager of Myaung Mya FM Biomass Power Company

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
		<ul style="list-style-type: none"> Wetting of exposed top-soil for additional mitigation of dust emissions Provide suitable ash handling system to manage ash emission and ash collecting storage should be closed type. Employee from ash collecting area have to wear mask (PPE) to prevent dust inhaling (as mentioned in Waste Management System) Implement the control measures that mentioned in Waste Management System 			
	Decommissioning Phase	<ul style="list-style-type: none"> Dust suppression technique should be implemented, e.g. at least applying water on the top soil to reduce dust from vehicle movement especially dry season Provide and enforce the appropriate use of PPE against dust 	Low	Throughout the decommissioning phase	Contractor/ EHS Coordinator of Myaung Mya FM Biomass Power Company
Noise Pollution and Vibration	Construction Phase	<ul style="list-style-type: none"> Use noise control devices, such as temporary noise barriers and exhaust muffling devices for combustion engines Unused equipment will be turned off and the parallel use of noisy equipment/ machinery should be avoided Regular maintenance of all machinery and equipment for construction use Avoid working at night time 	Low	Throughout the construction phase	Contractor/ Myaung Mya FM Biomass Power Generation Company

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
Water Quality		<ul style="list-style-type: none"> Generators and compressors will be provided with enclosures 			
	Operation Phase	<ul style="list-style-type: none"> Maintain access way of operation area in good condition to reduce noise and vibrations from conveyor of raw material and ash Regular check and maintenance of boiler, turbine and generator Use noise barriers, sound insulating materials and buffer double layer sound-proof walling to mitigate the noise to the surrounding environment Provide and follow to wear personal protective equipment for employees who working at the power plant Boundary plantation could reduce noise pollution to the community and working environment 	Low	Throughout the operation phase	EHS Coordinator and HR Manager of Myaung Mya FM Biomass Power Company
	Decommissioning Phase	<ul style="list-style-type: none"> Use noise control materials, such as temporary noise barriers Unused equipment will be turned off and the parallel use of noisy equipment/ machinery should be avoided Regular maintenance of all machinery and equipment 	Low	Throughout the decommissioning phase	Contractor/ EHS Coordinator of Myaung Mya FM Biomass Power Company
Water Quality	Construction Phase	<ul style="list-style-type: none"> Appropriate sanitary facilities maintained for construction workers throughout the construction stage 	Very low	Throughout the construction phase	Contractor/ Myaung Mya FM Biomass

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
		<ul style="list-style-type: none"> Monitor, maintain, clean the temporary use of septic systems or toilets on daily Prohibit strictly kitchen waste and domestic waste disposing to the nearby river Any accidental spill of fuel, oil or other hazardous chemicals should be cleaned up immediately 			Power Generation Company
	Operation Phase	<ul style="list-style-type: none"> Water saving devices should be installed for kitchen and toilets facilities Minimization of spillage and leaks of oil and grease (e.g.; turbine and generator oil) Use of standard pollution control technique before discharging the waste water into the river Reuse the treated discharging water in the generation of turbine to save the consumption of water resources Regular check of cooling water system and water treatment system to control the water quality of plant water and discharged water 	Very low	Throughout the operation phase	EHS Coordinator and HR Manager of Myaung Mya FM Biomass Power Company
	Decommissioning Phase	<ul style="list-style-type: none"> Prohibit strictly kitchen waste, domestic waste and oil and grease disposing to the near river Any accidental spill of fuel, oil or other hazardous chemicals should be cleaned up immediately 	Very low	Throughout the decommissioning phase	Contractor/ EHS Coordinator of Myaung Mya FM

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
					Biomass Power Company
Soil Quality	Construction Phase	<ul style="list-style-type: none"> Plan proper site clearing or disturbance of vegetation and compressing of soil to build the power plant Design channels and ditches for post-construction flows Reuse excavated materials in backfilling the trenches or landscaping activities Provide the temporary and/or permanent drainage systems to minimize blocking water in the site preparation works Any accidental spills of fuel, oil or other hazardous waste must be cleaned up immediately 	Low	Throughout the construction phase	Contractor/ Myaung Mya FM Biomass Power Generation Company
	Operation Phase	<ul style="list-style-type: none"> Store the fly ash and bottom ash in the containers which are collected by ESP and silo Collect sludge from the water treatment system regularly and prohibit strictly disposed to the soil Any accidental spills of fuel, oil or other hazardous waste must be cleaned up immediately Dispose the generator oil from the generator by contacting with Waste Management Company (e.g. Golden DOWA Ecosystem Co., Ltd) 	Very low	Throughout the operation phase	EHS Coordinator and HR Manager of Myaung Mya FM Biomass Power Company

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
	Decommissioning Phase	<ul style="list-style-type: none"> Plan proper land clearing and demolishing of buildings Avoid improper disposal of demolished materials and machinery 	Very low	Throughout the decommissioning phase	Contractor/ EHS Coordinator of Myaung Mya FM Biomass Power Company
Health and Safety	Construction Phase	<ul style="list-style-type: none"> Train workers for first aid Establish, maintain and improve the workers-management relationship Use slip retardant foot wear Wear appropriate PPE, such as safety glasses with side shields, face shields, hard hats and safety shoes Provide temporary fall arrestors Maintain clear traffic ways to avoid driving of heavy equipment over loose scrap Promote safe and healthy working conditions and workforce health and well-being, and prohibit any use of forced labor All excavations should be filled up after the plant closure 	Low	Throughout the construction phase	Contractor/ Myaung Mya FM Biomass Power Generation Company
	Operation Phase	<ul style="list-style-type: none"> All employee and visitors in the plant should be provided and worn personal protective equipment (uniform, helmet, or hat, 	Low	Throughout the operation phase	EHS Coordinator and HR Manager of Myaung Mya FM

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
		<p>ear and eye protection, safety gloves and shoes, etc.) should be provided</p> <ul style="list-style-type: none"> • Workers should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. • Hearing protective devices provide should be capable of reducing sound levels at the ear to least 85 dB (A) • Periodic medical hearing checks should be performed on workers exposed to high noise levels • Making all energized electrical devices and lines with warning signs • Checking all electrical cords, cables and do not use overload voltage • Appropriate labeling of services rooms housing high voltage equipment • Report and record such as all injuries, near misses, and environmental or property damage, accurately, completely and in a timely manner should be kept • Passageways for pedestrians and vehicles within and outside buildings should be segregated and provide for easy, safe and appropriate assess. 			<p>Biomass Power Company</p>

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
		<ul style="list-style-type: none"> • Provision of air conditioned sound heavens/control rooms • Training, instruction and assessment activities should be provided • Warning systems such as signs, labels and work instruction 			
	Decommissioning Phase	<ul style="list-style-type: none"> • Training of workers in lifting and materials handling techniques in decommissioning phase • Planning work site layout to minimize the need for manual transfer of heavy loads • Using inspected and well maintained lifting devices that are appropriate for load, such as cranes and securing loads when lifting them to higher job site elevations. • Promote safe and healthy working conditions and work force health and well-being, and prohibit any use of forced labor • All excavations should be filled up after the plant closure 	Very low	Throughout the decommissioning phase	Contractor/ EHS Coordinator of Myaung Mya FM Biomass Power Company
Solid waste Disposal	Construction Phase	<ul style="list-style-type: none"> • Encourage waste segregation at the source • Good housekeeping practices are essential within the site • Use durable, long-lasting materials • Store in containerized compartments to reduce fugitive emission and pollutants from contaminating the environment especially the water bodies 	Low	Throughout the construction phase	Contractor/ Myaung Mya FM Biomass Power Generation Company

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
	Operation Phase	<ul style="list-style-type: none"> • Provide adequate garbage containers with top cover for all departments • Collect and dispose sludge from the water treatment system at the specific containers • Provide ash storing containers to reduce pollution to the soil and air • Regular maintenance and checking of ash handling system • Consider the alternative plan for ash storage and utilization (e.g., selling or providing the ash to the glass factory as the silica substance or use as adhesive substances for preparing of concrete roads in Myaung Mya Township) 	Low	Throughout the operation phase	EHS Coordinator and HR Manager of Myaung Mya FM Biomass Power Company
	Decommissioning Phase	<ul style="list-style-type: none"> • Use recycled or refurbished demolition materials where possible • Encourage waste segregation at the source • Dispose of solid waste in compliance with regulations 	Very low	Throughout the decommissioning phase	Contractor/ EHS Coordinator of Myaung Mya FM Biomass Power Company
Liquid Waste Disposal	Construction Phase	<ul style="list-style-type: none"> • Minimize washing off the construction materials and tools • Prohibit discharging the washing water of construction materials and tools into the river 	Very low	Throughout the construction phase	Contractor/ Myaung Mya FM Biomass Power Generation Company

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
	Operation Phase	<ul style="list-style-type: none"> Control the quality of treated water before discharging into river Regular check and maintenance the waste water treatment system twice per year at least Recycle the treated water from the treatment plant to reduce prudently the water consumption and energy consumption 	Low	Throughout the operation phase	EHS Coordinator and HR Manager of Myaung Mya FM Biomass Power Company
	Decommissioning Phase	<ul style="list-style-type: none"> Ensure sewage systems is functional during demolition, to prevent pollution of nearby underground and surface water resources Demolish the sewage systems properly to prevent pollution by contents into the environment and ground water. 	Very low	Throughout the decommissioning phase	Contractor/ EHS Coordinator of Myaung Mya FM Biomass Power Company
Fire Hazard	Construction Phase	<ul style="list-style-type: none"> Provide necessary PPE for workers Set out fire hose for pump the water from river Describe emergency phone numbers of the Regional Fire Stations on notice board Store the construction waste material at the specific area to prevent accident or intended firing at the project site 	Very Low	Throughout the construction phase	Contractor/ Myaung Mya FM Biomass Power Generation Company
	Operation Phase	<ul style="list-style-type: none"> Set out the fire protection scheme at the power plant by the Myaung Mya FM Biomass power Co., Ltd. (See in APPENDIX V) Provide necessary PPE for all operation staffs 	Very low	Throughout the operation phase	EHS Coordinator and HR Manager of Myaung Mya FM

Potential Impacts	Phases	Recommended Mitigation Measures	Residual Impact	Time frame	Responsible Person
		<ul style="list-style-type: none"> Regular check the fire protection scheme and fire extinguisher have to be checked twice a year at least. Provide fire door, fire hose, fire alarm and fire escape at the operation areas for safety of people Describe emergency phone numbers of the Regional Fire Stations on notice board Keep signage and signboards of fire in the noticeable place Store systematically and regular examine the generator oil, raw materials Regular check and maintenance of the electric wires and machines Give the trainings to the staffs for planning the group of fireguards, rescues, transporters and security in order to kill the fire and save the workers if happen accidentally 			Biomass Power Company
	Decommissioning Phase	<ul style="list-style-type: none"> Provide necessary PPE for workers Set out fire hose for pump the water from river Describe emergency phone numbers of the Regional Fire Stations on notice board Store the decommissioning waste materials at the specific area to prevent accident or intended firing at the project site 	Very low	Throughout the decommissioning phase	Contractor/ EHS Coordinator of Myaung Mya FM Biomass Power Company

7.3 Monitoring Plan

Monitoring of the anticipated environmental impact, social impacts and waste disposal in the receiving environments is important in evaluating the effectiveness of the mitigation plan and compliance with the regulatory measures in place. During the construction and operation phases, monitoring will be undertaken to ensure that proposed mitigation measures for negative impacts and enhancement measures for positive impacts are implemented. Through this program, the following objectives can be easily achieved which are also useful in subsequent environmental audits.

- 1) Accessing the level of accomplishment of mitigation measures for foreseen impacts;
- 2) Predicting the unforeseen impacts;
- 3) Assisting to assesses the designs and technologies for satisfactory;
- 4) Facilitating better management of the resources

Table 7.2 Monitoring Plan for Environmental, Social Impacts and Waste Disposal of Biomass Power Generation

Phase	Component	Parameter	Target Level	Measurement Method	Area to be monitored	Monitoring Frequency	Responsible Person
Construction Phase	Environmental Impacts						
	Water Quality (Construction wastewater)	National Environmental Quality (Emission) Guideline, NEQE Guideline	Within standard limit level	As per WHO Guideline	Construction wastewater source at project site	Twice per year*	Related Regional Stakeholders/ Contractor/ Myaung Mya FM Biomass Power Co., Ltd.
	Noise	Noise level	Within standard limit level	By using Relative Noise Meter	Sensitive area	Quarterly	Related Regional Stakeholders/ Contractor/ Myaung Mya FM Biomass Power Co., Ltd.
	Solid Waste	Sludge, plastic, paper, domestic refuse, kitchen waste, slag	Within standard limit level	Kg	Disposal site	Once after construction activities	Related Regional Stakeholders/ Contractor/ Myaung Mya FM Biomass Power Co., Ltd.
	Socio-economic Impacts						
	Occupational Health and Safety	<ul style="list-style-type: none"> - Number and type of safety equipment such as mask, helmet, gloves and ear plugs - Health and sanitation facilities in camps - Sign posts 	Actual injuries and illness statistics	Number of safety measures provided	Project site	Weekly	Related Regional Stakeholders/ Contractor/ Myaung Mya FM Biomass Power Co., Ltd.
Operational	Environmental Impacts						

Phase	Component	Parameter	Target Level	Measurement Method	Area to be monitored	Monitoring Frequency	Responsible Person
	Air Quality	PM ₁₀ , PM _{2.5} , CO, CO ₂ , NO ₂ , SO ₂	Within standard limit level ppm, µg/m ³	Relevant Air Quality Measuring Equipment	Populated areas in project site and chimney area	Twice per year	Related Regional Stakeholders/ EHS Coordinator/ HR manager of Myaung Mya FM Biomass Power Co., Ltd.
	Water Quality	National Environmental Quality (Emission) Guideline, WHO Guideline	Within standard limit levels/ NEQE Guideline	As per WHO Guideline & NEQE Guideline	Outlet of water treatment system before discharging	Twice per year*	Related Regional Stakeholders/ EHS Coordinator/ HR manager of Myaung Mya FM Biomass Power Co., Ltd.
	Noise	Noise level on dB(A) scale	Within standard limit levels/ NEQE Guideline	Relevant Noise Meter Equipment (dB)	Sensitive spots at project site	Twice per year	Related Regional Stakeholders/ EHS Coordinator/ HR manager of Myaung Mya FM Biomass Power Co., Ltd.
	Wastewater Effluent	Wastewater Effluent Parameter (National Environmental Quality (Emission) Guideline, WHO Guideline)	Within standard limit levels/ NEQE Guideline	NEQE Guideline/ WHO Guideline	Proposed project site drainage of domestic waste	Twice per year*	Related Regional Stakeholders/ EHS Coordinator/ HR manager of Myaung Mya FM Biomass Power Co., Ltd.

Phase	Component	Parameter	Target Level	Measurement Method	Area to be monitored	Monitoring Frequency	Responsible Person
	Solid waste	Fly ash and bottom ash, domestic refuse, clinical waste	Volume of solid waste	Kg	Disposal site	Monthly	Related Regional Stakeholders/ EHS Coordinator/ HR manager of Myaung Mya FM Biomass Power Co., Ltd.
	Fire hazard	Visual inspection and regular check of factory, coal storage, transformer, diesel generator and raw material storage			Operation buildings of boiler, turbine and generator	Monthly	Related Regional Stakeholders/ EHS Coordinator/ HR manager of Myaung Mya FM Biomass Power Co., Ltd.
	Socio-economic Impacts						
	Occupational Health and Safety	<ul style="list-style-type: none"> - Number and type of safety equipment such as mask, helmet, gloves and ear plugs - Health and sanitation facilities in camps - Sign posts 	Actual injuries and illness statistics	Number of safety measures provided	Project operation site	Monthly	Related Regional Stakeholders/ EHS Coordinator/ HR manager of Myaung Mya FM Biomass Power Co., Ltd.
Decommissioning Phase	Environmental Impacts						
	Air Quality	PM ₁₀ , PM _{2.5} , CO, CO ₂ , NO ₂ , SO ₂	Within standard limit level ppm, µg/m ³	Relevant Air Quality Measuring Equipment	Receptor's areas near project site	Once after the decommissioning activities	Related Regional Stakeholders/ Contractor/ Myaung Mya FM

Phase	Component	Parameter	Target Level	Measurement Method	Area to be monitored	Monitoring Frequency	Responsible Person
							Biomass Power Co., Ltd.
	Water Quality	National Environmental Quality (Emission) Guideline, WHO Guideline	As per WHO Guideline & NEQE Guideline	As per WHO Guideline & NEQE Guideline	Ywe River near project site	Once after the decommissioning activities	Related Regional Stakeholders/ Contractor/ Myaung Mya FM Biomass Power Co., Ltd.
	Noise	Noise level	Within standard limit levels/ NEQE Guideline	Relevant Noise Meter Equipment (dB)	Sensitive spots	Quarterly	Related Regional Stakeholders/ Contractor/ Myaung Mya FM Biomass Power Co., Ltd.
	Solid waste	Demolition debris including concrete, metal, wood, glass, adhesives, sealants and fasteners	Volume of solid waste	Kg	Disposal sites	Weekly	Related Regional Stakeholders/ Contractor/ Myaung Mya FM Biomass Power Co., Ltd.
Socio-economic Impacts							
	Socio-economic aspects	Employments' compensation, Pensions, local economy, gender issues	Within standard limit levels, Grievance Redress Mechanism (ECD)	Samples	Entire site	Once after the decommissioning activities	Related Regional Stakeholders/ Contractor/ Myaung Mya FM Biomass Power Co., Ltd.

* The frequency of environmental quality measurement depends on the first time monitoring result. If the first time results are within the NEQ guideline values, second time measurement will not require.

7.4 Grievance Redress Mechanism

People who live in the project effective area or stakeholder can complain about the impacts that they suffer through Grievance Committee, which includes the responsible persons of Myaung Mya FM Biomass Power Co., Ltd., quarter administrator and representative of Township Fire Department. If there have no satisfaction in solving problem through the Grievance Committee level, it can be submitted to higher responsible authorities and finally decided by the court in legal terms. **Figure 7. 1** shows the steps of Grievance Redress Mechanism of Myaung Mya FM Biomass Power Co., Ltd.

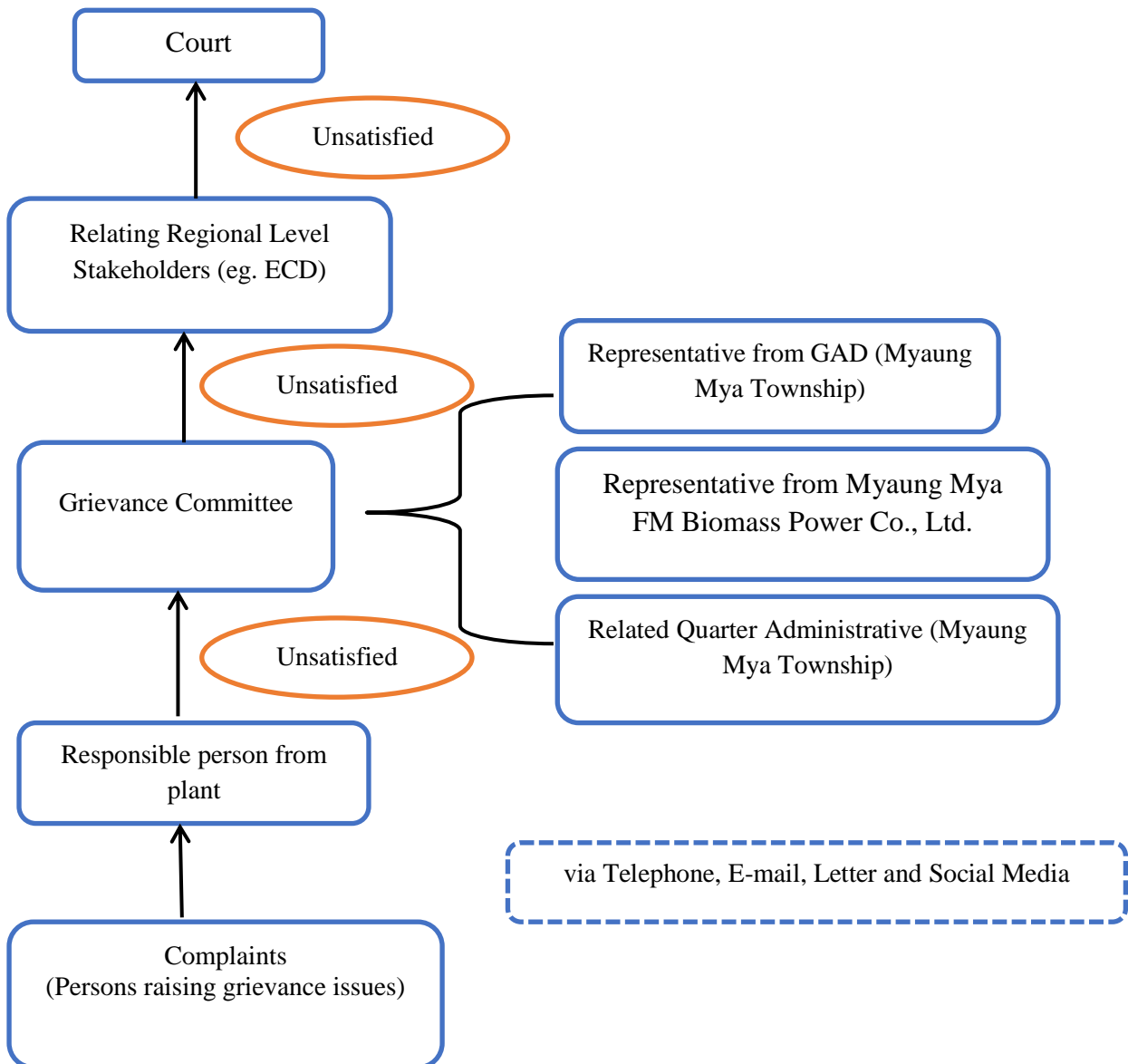


Figure 7. 1 Grievance Redress Mechanism

7.5 Budget Allocation for Environmental Management Plan

The implementation of Environmental Management Plan will be prepared and monitored by the management team of Myaung Mya FM Biomass Power Company including the appointment of EHS officer or environmental coordinator who is the trained person of Myaung Mya FM Biomass Power Company and the below table mentions the allocation of budget for monitoring and management plan throughout the life cycle of project. The notable project components that can be effectively charged for this project area:

- ❖ Provision of toilet facilities at project site; the number, type, location and of the sanitary facilities to be provided for the project will depend on size of work force, location of sludge discharge area, type of sanitary facilities available, location of project site
- ❖ Capacity building for project component management;
- ❖ Occupational health and safety gadgets such as firefighting equipment, fire alarm system, PPE, first aid training; and
- ❖ Solid waste monitoring

Table 7. 3 Budget Allocation for Mitigation Measures and Monitoring Plan

No.	Item	Unit	Quantity	Unit Cost (USD)	Cost (USD)
(A) Mitigation Measures					
1.	Electrostatic Precipitator	Day	365	5,000	5,000
2.	Fire Protection Scheme			20,000	20,000
3.	Water Treatment System			230,000	230,000
4.	Secondary Containment and Leakage Proof Container	Nos.	2		500
5.	Planting Trees Within Compound	Nos.	20-30		500
6.	Fire Extinguishers	Nos.	10	10	100
7.	PPE and First Aid Kits				500
	Subtotal				256,600
(B) Monitoring Plan					
1.	Air Quality	Year	2	600	1,200
2.	Noise Quality	Year	1	500	500
3.	Water Quality	Year	2	500	1,000
4.	Environmental Auditing	Year	1	800	800
	Subtotal				3,500
(C) Environmental Supervision and Advisors					
1.	HSE Coordinator	Month	12	500	6,000

No.	Item	Unit	Quantity	Unit Cost (USD)	Cost (USD)
2.	HSE Assistant	Month	12	250	3,000
	Subtotal				9,000
	Contingency				1,500
Total					270,600

The budget allocation of mitigation measures and monitoring plan will cover all phases but, for the decommissioning phase, this may change because this phase will be happened after 70 years.

7.6 Emergency Response Plan

The emergency preparedness is vital, as quick and correct response is necessary in case of emergency to reduce hazard risk such as injuries, harm and other damage. The proposed biomass power plant generation should check and maintenance regularly to prevent man-made errors (e.g., electricity shock, in case of fire hazards). Common emergency situation may involve an explosion of steam turbine, electric wires shock and personal injuries and illness. The emergency response plans should be established for handling all foreseeable emergency situations in the workplace and should provide the following;

- 1) Assignment of responsibilities
- 2) Emergency procedures (Fire hazard)

Assignment of responsibilities: All senior staff such as operation supervisor or safety officer should be assigned to lead the emergency response team and charged with the duties of (1) assessing the emergency situation and taking necessary actions, (2) overseeing the implementation of the emergency response plan, (3) ensuring all emergency equipment is well maintained.

Emergency procedures: Emergency procedures are operating instructions for employees to follow in emergency case. In regard to work safety in the concerned processing, the management team should

- i. Identify and list out all possible emergency situations in the workplace
- ii. Assess the effects and impacts of the emergency situations
- iii. Establish emergency response plans
- iv. Provide and maintain emergency equipment and other necessary resources
- v. Ensure that staffs are familiarized with the arrangement in case of emergencies by providing procedural instructions and employee training

7.6.1 Emergency Procedure for Fire Safety and Evacuation Plan

Fire Evacuation Plans should include the following information:

- ❖ Emergency egress or escape routes and whether evacuation of the building is to be complete or where approved, by selected floors or area only
- ❖ Procedures for employees who must remain to operate critical equipment before evacuating
- ❖ Identification and assignment of personal responsible for rescue or emergency medical aid

Fire Safety Plans should include the following information:

1. Procedure for reporting a fire or other emergency
2. Site plans indicating the following
 - Occupancy assembly point
 - Location of fire hose
 - Normal routes of fire department vehicles access
3. Floor Plans identifying the locations of the following
 - Exits
 - Primary evacuation routes
 - Secondary evacuation routes
 - Accessible egress routes
 - Areas of refuge
 - Exterior area for assisted rescue
 - Manual fire alarm boxes
 - Portable fire extinguishers
 - Occupant-use hose stations
 - Fire alarm enunciators and controls

Emergency evacuation Drill: An exercise performed to trained staff and occupants and to evaluate their efficiency and effectiveness in carrying out emergency excavation procedures

Employee Training and Response Procedures: Employee shall be trained in the fire emergency procedure described in their fire evacuation and fire safety plans and training should be based on these plans

Frequency: Employee shall receive training in the contents of fire safety and evacuation plans and their duties as part of new employee orientation and at least annually thereafter. Records shall be kept and made available to the fire code official upon request.

Employee Training Program: Employee shall be trained in fire prevention, evacuation, and fire safety in accordance with the following sections.

- Fire Prevention Training – Employee shall be apprised of the fire hazards of the materials and operation processes to which they are exposed. Each employee shall be instructed in the proper procedures for preventing fires in the conduct of their assigned duties

- Evacuation Training – Employees shall be familiarized with the fire alarm and evacuation signals, their assigned duties in the event of an alarm or emergency, evacuation routes, areas of refuge, exterior assembly areas and procedures for evacuation
- Fire Safety Training - Employee assigned fire-fighting duties shall be trained to know the locations and proper use of portable fire extinguishers or other manual firefighting equipment and the protective clothing or equipment required for its safe and proper use.

Site Fire Control

1. Alert other people through fire alarm
2. If small, control using an extinguisher
3. Contact fire brigade if not under immediate control
4. Attend to human life in immediate danger
5. For electrical fires turn off power before fighting
6. Once out of the building, stay out. Do not allow people to go back into the burning building to collect valuables. While evacuating the building, close doors (but do not lock) to slow down the spread of fire
7. Obey all instructions
8. Proceed to emergency evacuation area

Table 7. 4 Responsible persons for emergency

No.	Name	Position	Company
1	Mr. Inoue Shoichi	Managing Director	Myaung Mya FM Biomass Power Co., Ltd.
2	Mr. Ye Min Aung	Director	Myaung Mya FM Biomass Power Co., Ltd.

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EMERGENCY CONTACT ORGANIZATION

2018.2.1
FUJITA CORPORATION

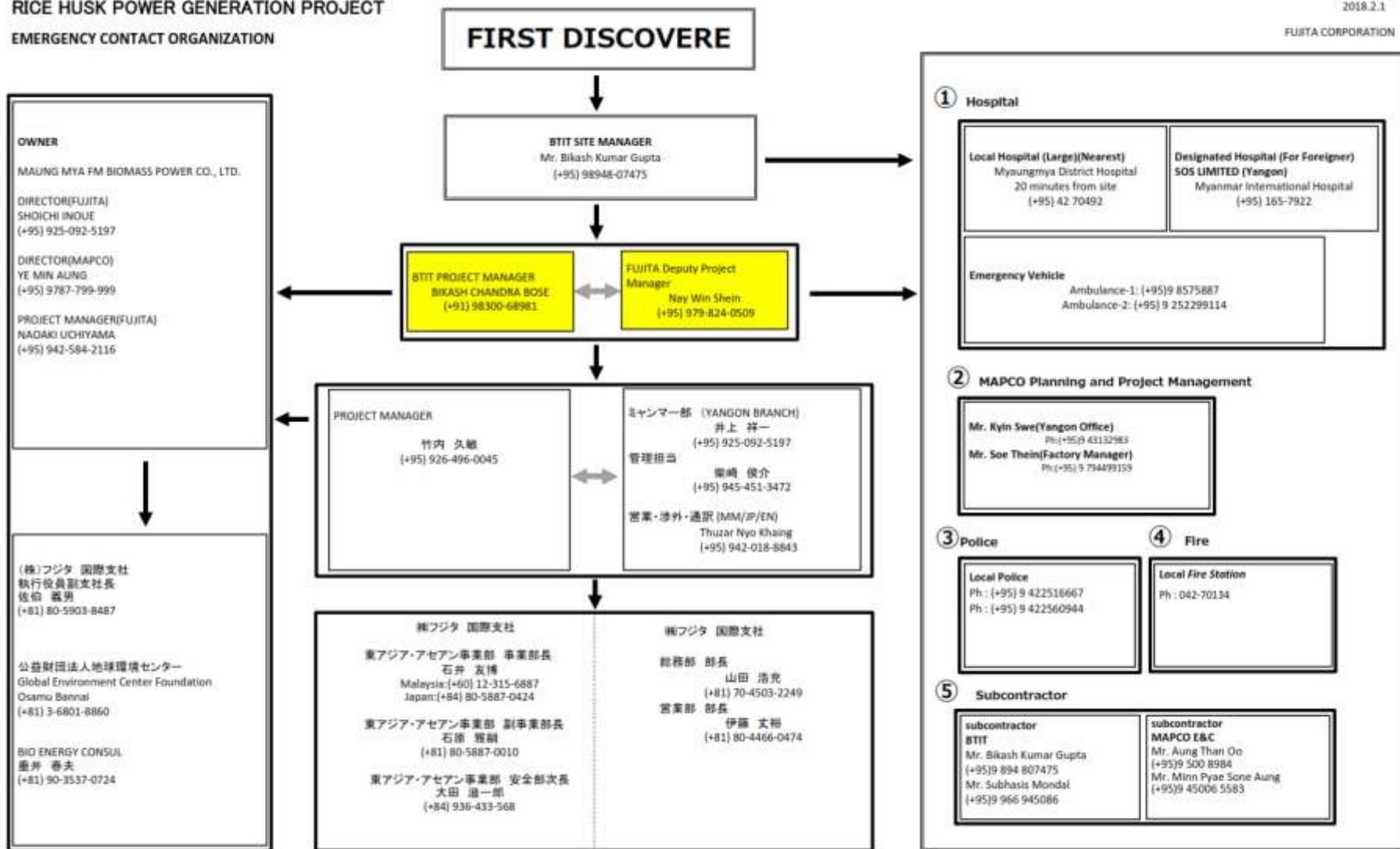


Figure 7. 2 Emergency Contact Organization

7.7 Corporate Social Responsibility (CSR) Plan

Myaung Mya FM Biomass Power Company Limited will implement Corporate Social Responsibility (CSR) Plan during the project lifespan of 70 years. The objective of this plan is to create social welfare of factory workers and local community and to prove that the establishment of the biomass power generation is beneficial not only for project owner but also for local community as well as introducing of low carbon emission waste to energy technology. The proponent will plan to hold the technical and technological transfer vocational training to transfer technology of waste to energy (biomass milling system, gasification) and post-harvest technology system (grain dry system, grain processing system) near the MMFM biomass power plant. This program is kind of capacity building program and the candidates who have finished the training can employ at the plant. This proposed project proponent will implement CSR plan by using 1% of net profit according to the MIC proposal of the project. CSR plan formulated for the proposed project can be seen in **Table 7. 5**.

Table 7. 5 Corporate Social Responsibility (CSR) Plan

No.	Activity	Responsibility	Time Frame	Estimated Amount of Net Profit (%)
1	Trainings for technical transfer to the local community	Myaung Mya FM Biomass Power Co., Ltd.	Annually	0.40
2.	Health care to the employees	Myaung Mya FM Biomass Power Co., Ltd.	Annually	0.20
2.	Contribution for industrial zone development	Myaung Mya FM Biomass Power Co., Ltd.	Annually	0.20
4	Charity activities	Myaung Mya FM Biomass Power Co., Ltd.	Annually	0.20
Total Annual CSR Plan				1

Commitment to Promote a Corporate Social Responsibility



Date:

Dear Sir,

We wish to confirm the commitment of the shareholders of Myaung Mya FM Biomass Company Limited to promote a corporate social responsibility program for the development of the economic and social environment in the Republic of the Union of Myanmar.

We have planned to contribute (1%) upon our net profit after tax by doing the following activities:

- (a) Trainings for upgrading of employees' skills (25%)
- (b) Health care to our employees (25%)
- (c) Contribution for industrial zone development (25%)
- (d) Charity activities (25%)

Yours Respectfully,

SHOICHI INOUE

A handwritten signature in black ink, appearing to read '井口 祥一' (Inoue Shoichi).

General Manager

Myaung Mya FM Biomass Power Generation Co.,Ltd.



MYAUNG MYA FM BIOMASS POWER

La Pyayt Win Plaza 37, Alan Pya Pagoda Road, Room No.612 (6th Floor),
Dagon Township, Yangon, Myanmar.
Tel: (+95-11) 373634

Commitment to follow Mitigation Measure stated in the Environmental Management Plan (EMP)



Subject: To follow Commitments and Mitigation Measure stated in the Environmental Management Plan (EMP)

With regard to the above matter, we, Myaung Mya FM Biomass Power Co., Ltd. strongly commits that EMP report for our project is strong and complete, we obeyed Rules and Regulations including EIA procedure in preparing EMP report and we will follow our commitments, mitigation measures and EMP which are mentioned in the EMP report for our proposed project.

Yours Respectfully,

SHOICHI INOUE

General Manager

Myaung Mya FM Biomass Power Generation Co., Ltd.



MYAUNG MYA FM BIOMASS POWER

La Pyayt Win Plaza 37, Alan Pya Pagoda Road, Room No.612 (6th Floor),
Dagon Township, Yangon, Myanmar.
Tel: (+95-1) 371634

CHAPTER 8: CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

This Environmental Management Plan (EMP) has been prepared for distribution of electricity from the biomass power generation of Myaung Mya FM Biomass Power Company situating at Danone Chaung Taung Village, No.22, Motesoe Field, Myaung Mya Township, Myaung District, Ayeyarwaddy Region, Myanmar. The main objective of the study is to identify the major environmental impacts due to the implementation of the project activities in all three phases (construction phase, operation phase and decommissioning phase). The EMP report has been prepared for the proposed project under the Myanmar Environmental Conservation Law as per comments of Ayeyarwaddy Environmental Conservation Department (ECD). The project proponent has to implement the proposed project in compliance with National Laws and Regulations for environmental protection.

Baseline environmental data collection and site visit activities were conducted on 26th to 27th, October, 2017. According to the data interpretation from the survey results of most analyzed parameters for background condition, air quality, noise pollution and vibration of the proposed project site are within the acceptable and allowable standard limits of the guideline values (WHO guidelines and NEQG emission standard). Nevertheless, among the parameters of water quality result, there have excess concentration of standard level of NEQG and WHO water quality guide in color, suspended solids, Turbidity and Mercury.

Existing air quality of surrounding area was also identified by categorizing two types, dust level (particulate matter) and gases concentrations (SO₂, CO, CO₂, NO) in the ambient air and indoor air quality. The observed average values for PM 10 and PM 2.5, SO₂, CO, CO₂, NO are mentioned in **CHAPTER 4: DESCRIPTION OF THE SURROUNDING ENVIRONMENTAL AND SOCIAL CONDITIONS**. When compared with National Environmental Quality (Emission) Guidelines values, and International Guideline Standards such as IFC, WHO, ACGIH, NAAQS, for ambient and indoor air quality of dust and gases values are within the acceptable limit. The emission can be controlled by implementation of manufacturer recommended engine maintenance programs, good driving practices, installing and maintaining emissions control devices, and implementing a regular vehicle maintenance and repair program. The average noise level is 49.94 dB A for day time operation and 52.08 dB A for night time for outside of factory near the security gate for 24 hours measurement. The allowable limit of the noise level at day is (70dB) and night time is (70 dB) for the industrial (commercial) business area according to the National Environmental Quality (Emission) Guideline's standard.

Primary and secondary data were used to assess the environmental impacts. The potential environmental impacts were assessed in a comprehensive and scientific manner. The report has provided a full picture of all potential environmental impacts associated with the proposed power plant and provide recommendations for suitable mitigation measures.

During the construction phase, there will be no major environmental impacts. All environmental issues could be readily addressed using conventional measures and good environmental practices. Possible negative impacts include noise, emission dust, solid waste and occupational health and safety among others during this phase. These impacts can be mitigated through strict adherence to the various guidelines.

During the operation phase, it is expected that no contamination from the fly ash and bottom ash to the soil since the process steps will be controlled by ash handling system (electrostatic precipitators) and stored in the specific container for ash. Moreover, to prevent respiratory problems, the working areas will be installed ventilation system and air conditioning. However, storage of ash may be burdened to the space gradually. Therefore, there may have the alternative plans for ash utilization method by providing or selling the ash to the glass factory and using as adhesive substance for preparing the concrete roads at the surrounding areas. Water usage would not affect to the surface water quality, as the water quality results, the original quality of river water exceeds with the standard limit of the guidelines as well as the proposed project will be installed water treatment system before and after utilization of river water during the operation activities. Regarding health and safety impacts, there are a number of risks such as fire, accidents, occupational health and electrical hazards during the construction, operation and decommissioning phases. There are a number of actions to be done to mitigate the risks such as providing safety awareness training, first aid, free medicine, transport to the nearest hospitals in case of emergency, and personal protective equipment. Therefore, the result of three phases (construction phase, operation phase, and decommissioning phase) after scoring evaluation of significant environmental impacts can be seen in **CHAPTER 5: IMPACT IDENTIFICATION AND ASSESSMENT** .

The effective implementation of the proposed mitigation measures will ensure towards good environmental management within the proposed project area. Furthermore, the environmental monitoring plan prepared as part of the EMP will provide adequate opportunities to address any residual impacts during the operation phase.

8.2 Recommendations

The following recommendations have been made for efficient and effective implementation of environmental conservation, health & safety, social responsibilities measures through the life cycle of the proposed factory.

- ✓ Follow the comments and suggestions made by ECD after reviewing this EMP report.
- ✓ Once EMP is approved by concerned authorities, strict implementation is essential.
- ✓ For full and proper implementation of EMP, well understanding and supports by proponent and authority is deem necessity.
- ✓ Well experienced and knowledgeable HSE Manager and HSE Assistants shall be appointed.
- ✓ Daily, monthly and annual action plan shall be formulated based on this EMP and practiced at operation level.
- ✓ Necessary care and environmentally sound practices should be taken for activities out of factory site particularly on raw material collection and transport.
- ✓ Keep full records of environmental management activities and present to independent third party environment audit in timely manner as mentioned in the EMP.
- ✓ Follow the audit report and comments.
- ✓ Abide environmental policy, laws, rules and instructions of the Republic of the Union of Myanmar.

8.3 Recommended Activities

- ✓ Provide a safe and healthy environment
- ✓ Provide safety rules and safe working procedures, and ensuring that the rules and procedures comply with legislation
- ✓ Ensure that experience and training of the persons employed are commensurate with the assigned task
- ✓ Ensure that responsibilities for managing safety and health are appropriately assigned and duties are effectively carried out by the staff concerned
- ✓ Ensure that all accidents and risks are investigated and recommendations made are properly followed up

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9. City of Los Angeles (2015): Environmental Impact Analysis (Noise and Vibration) 5750, Hollywood Boulevard Project

APPENDICES

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APPENDIX I PHYSIO-CHEMICAL RESULTS OF RIVER WATER NEAR THE PROPOSED PROJECT SITE



LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
 B.Sc Engg: (Civil), Dip S.E (Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001.
 Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)



WTL-RE-001

Issue Date - 01-12-2012

Effective Date - 01-12-2012

Issue No - 1.0/Page 1 of 2

W1017 552

WATER QUALITY TEST RESULTS FORM

Client E-Guard
 Nature of Water River Water
 Location Myaungmya Township
 Date and Time of collection 26.10.2017
 Date and Time of arrival at Laboratory 27.10.2017
 Date and Time of commencing examination 28.10.2017
 Date and Time of completing 2.11.2017

Results of Water Analysis

**WHO Drinking Water Guideline
(Geneva - 1993)**

pH	7.4	6.5 - 8.5
Colour (True)	TCU	15 TCU
Turbidity	NTU	5 NTU
Conductivity	micro S/cm	
Total Hardness	mg/l as CaCO ₃	500 mg/l as CaCO ₃
Calcium Hardness	mg/l as CaCO ₃	
Magnesium Hardness	mg/l as CaCO ₃	
Total Alkalinity	mg/l as CaCO ₃	
Phenolphthalein Alkalinity	mg/l as CaCO ₃	
Carbonate (CaCO ₃)	mg/l as CaCO ₃	
Bicarbonate (HCO ₃)	mg/l as CaCO ₃	
Iron	mg/l	0.3 mg/l
Chloride (as CL)	mg/l	250 mg/l
Sodium Chloride (as NaCL)	mg/l	
Sulphate (as SO ₄)	mg/l	200 mg/l
Total Solids	mg/l	1500 mg/l
Suspended Solids	92 mg/l	
Dissolved Solids	mg/l	1000 mg/l
Manganese	mg/l	0.05 mg/l
Phosphate	mg/l	
Phenolphthalein Acidity	mg/l	
Methyl Orange Acidity	mg/l	
Salinity	ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by

Signature: Zaw Hein Oo

Name: Zaw Hein Oo

B.Sc (Chemistry)

Sr. Chemist

ISO TECH Laboratory

Approved by

Signature: Soe Thit

Name: Soe Thit

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Issue Date - 01-12-2012

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Issue No - 1.0/Page 2 of 2

W1017 552

WATER QUALITY TEST RESULTS FORM

Client E-Guard
 Nature of Water River Water
 Location Myaungmya Township
 Date and Time of collection 26.10.2017
 Date and Time of arrival at Laboratory 27.10.2017
 Date and Time of commencing examination 28.10.2017
 Date and Time of completing 2.11.2017

Results of Water Analysis

**WHO Drinking Water Guideline
(Geneva - 1993)**

Temperature (°C)	°C	
Fluoride (F)	0.6 mg/l	1.5 mg/l
Lead (as Pb)	Nil mg/l	0.01 mg/l
Arsenic (As)	Nil mg/l	0.01 mg/l
Nitrate (N.NO ₃)	mg/l	50 mg/l
Chlorine (Residual)	Nil mg/l	
Ammonia (NH ₃)	Nil mg/l	
Ammonium (NH ₄)	mg/l	
Dissolved Oxygen (DO)	mg/l	
Chemical Oxygen Demand (COD)	64 mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	26 mg/l	
Cyanide (CN)	Nil mg/l	0.07 mg/l
Zinc (Zn)	Nil mg/l	3 mg/l
Copper (Cu)	Nil mg/l	2 mg/l
Silica (Si)	mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by

Signature: *Zaw Hein Oo*

Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr. Chemist
ISO TECH Laboratory

Approved by

Signature: *Soe Thit*

Name: Soe Thit
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 Issue Date - 01-1-2016
 Effective Date - 01-1-2016
 Issue No - 1.0/Page 1 of 1

M1017 022

WATER QUALITY TEST (MICROBIOLOGY) RESULTS FORM

Client _____ E-Guard
 Nature of Water _____ River Water
 Location _____ Myaungmya Township
 Date and Time of collection _____ 26.10.2017
 Date and Time of arrival at Laboratory _____ 27.10.2017
 Date and Time of commencing examination _____ 27.10.2017
 Date and Time of completing _____ 28.10.2017

Results of Water Analysis

**WHO Drinking Water Guideline
 (Geneva - 1993)**

Total Coliform Count	20	CFU/100ml	Not detected
Thermotolerant (fecal) Coliform Count	8	CFU/100ml	Not detected
pH	7.4		6.5 - 8.5
Turbidity	88	NTU	5 NTU
Colour (True)	50	TCU	15 TCU
Free Chlorine	Nil	mg/l	
Total Chlorine	Nil	mg/l	

Remark : Unsatisfactory for drinking purpose.

: This certificate is issued only for the receipt of the test sample.

: < - Less than

Tested by

Signature: _____
 Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr. Chemist
ISO TECH Laboratory

Approved by

Signature: _____
 Name: Soe Thit
B.E (Civil) 1980
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ANALYSIS REPORT

ORIGINAL

Job Ref: 2000034/17
Date: 1, November 2017
Page 1 of 1

Sample Described as : Environmental Water
Client Name : E guard Environmental Services
Sample Received Date : 27.October 2017
Sample Brought By : Client
Sample Marking : MM
Sample Location : Myaung Mya
Analyzed Date : 27.October 2017

Lab Code Nos. : 039/17

No	Test Parameter	Method	LOQ	Unit	Result
1	Sulfide	Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 4500-S ² -A&F.Iodometric Titration Method	2	mg/L	<2
2	Total Phosphorus	Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012;4500-P E.Ascorbic Acid Method	0.01	mg/L	<0.01
3	Oil and Grease	Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012;5520B	5	mg/L	<5

SGS (Myanmar) Limited

MM
(Nu Nu Yi)
Manager

WARNING : The sample(s) to which the findings recorded herein (the "Findings") relate was(were) drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted.

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Sample Name: Surface Water	Received Date: 27-10-2017
	Reported Date: 8-10-2017
	Reg no: 202/2017
Address: E-Guard	

No.	Analyzes	Ref: Value	Unit	Result	Method
1.	Chromium	0.05	mg/L	0.001	Inductively Coupled Plasma- Optical Emission Spectrometric Method
2.	Cadmium	0.003	mg/L	0.000	Inductively Coupled Plasma- Optical Emission Spectrometric Method
3.	Nickel	0.07	mg/L	0.005	Atomic Absorption Spectrophotometer (Graphite Furnace Method)
4.	Mercury	0.001	mg/L	0.006	Inductively Coupled Plasma- Optical Emission Spectrometric Method

Reference: National Drinking Water Quality Standard

Tested by

OH (Lab)

Checked by

Laboratory Officer

Signed by

Dr. Kay Khaing Aye
Deputy Director

Occupational and Environmental Health Division

APPENDIX II REPORT TO TOWNSHIP HEALTH DEPARTMENT

REPORT TO TOWNSHIP HEALTH DEPARTMENT

1 GENERAL INFORMATION

2070

Item	Description
a) Name of Company	Myaung Mya FM Biomass Power Co., Ltd.
b) Type of Business	1.8MW Gross Rice Husk Fire BTG Powre Plant
c) Item(s) of Production(s)	Electricity -13,543,200 Unit/Year
d) Address of Project Location	Danone Chaung Taung Village, No.22, Motesoe Field, Myaung Mya Township, Myaung Mya District, Ayeyarwaddy Region
f) Annual or Daily Amount of Raw Materail (Husk)	55.2 ton/day (16560 ton/year)
g) Site Area [m ²]	1.1 acre
h) Number of employees (each phase and maximum)	Construction phase- 50 max. for 1 month, Operation phase- 15 max.per shift of 8 hrs.
i) Production process or description of business	It is a 1.8 MW gross electric power generation plant for captive use of power in nearby rice mill and rice bran oil factory. Rice husk will be used as fuel in the Atmospheric Fluidised Bed Type Boiler to generate steam which in turn, will rotate the Turbine generator set producing power

2 AIR QUALITY

Description of Facility

Item	Description
a) Type of combustion facility	Atmospheric Fluidised Bed type combustion
b) Number of combustion facility [Unit]	one
c) Kind of material to be used and its hourly consumption [ton/hr]	Rice Husk as fuel and 2300 kg/hr
d) Generator capacity rating [MVA]	2.25
e) Other indicators of capacity of combustion facility	Nil

Amount of Exhaust Gas

Item	Volume of Exhaust Gas	
Amount of Exhaust Gas (Dry Base)	14824	[Nm ³ /h]
Amount of Exhaust Gas (Wet Base)	15605	[Nm ³ /h]

Please mention how to control Air Pollution in Plant

High efficiency Electrostatic precipitator will be used on the flue gas line before it escapes out thru chimney. At the outlet of ESP , SPM shall be 150 mg/ Nm³

Control of Air Pollutants

Air Pollutants	Averageing Period	Guideline Value(μ g/m ³)	Target Value(μ g/m ³)
Nitrogen dioxide	1 year		
	1 hour		
Ozone	8 hour daily maximum		
Particulate matter, PM10	1 year		
	24 hour		
Particulate matter, PM2.5	2 year		
	24 hour		
Sulfur dioxide	24 hour		
	10 minute		

(Continued)

Small Combustion Facilities Emission Guidelines(3-50MW Electric,Machine,Steam, Thermal Generation)

Combustion Technology	Particulate Matter PM10	Sulfur Dioxide	Nitrogen Oxides
Fuels other than Natural Gas(3<15 MW) - Guideline	-	0.5% Sulfur	200 mg/Nm3 (Electric Generation)
Fuels other than Natural Gas(3<15 MW) - Plant			
Gas			
Liquid			
Solid in cluding Biomass- Power Plant is further lower in size-1.8 MW<3 MW)	150mg/Nm3	Fuel is free of sulphur	650 mg/Nm3 at 6% O2

3 WASTEWATER

Item	Type of Water	Amount	
Daily amount of water use	For Plant	429.5	m ³ /day
	For Office, Toilet	10	m ³ /day
	Total	439.5	m ³ /day
Daily amount of wastewater discharge	reject from Plant	46	m ³ /day
	Reject from Office, Toilet	5	m ³ /day
	Total	51	m ³ /day

Please mention System of Water Treatment

Raw water will be passed thru lamellar clarifier to remove TSS and then it will be filtered thru ACF and DMF and a portion of filtered water will be used for office use after online chlorination. The balance filtered water will be softened in softener and softened water will be used primarily and mainly for Plant Cooling Water System. A small portion of softened water will be treated in RO plant followed by EDI to generate DM water for use in Boiler make up. Reject from the Plant will be from sludge from Lamellar, backwash of ACF and DMF, Regeneration waste from softener, reject from RO and regeneration from EDI. ACF= Activated carbon filter, DMF= Dual Media Filter,RO= reverse Osmosis and EDI- electrodeionisation

Item	Guide Level	Target Level	Unit
5-day BOD	50	<50	mg/l
Ammonia	10	nil	mg/l
Arsenic	0.1	nil	mg/l
Cadmium	0.1	nil	mg/l
COD	250	<250	mg/l
Chlorine(total residual)	0.2	<0.2	mg/l
Chromium(hexavalent)	0.1	Traces	mg/l
Chromium(total)	0.5	Traces	mg/l
Copper	0.5	Traces	mg/l
Cyanide(free)	0.1	nil	mg/l
Cyanide(total)	1	nil	mg/l
Fluoride	20	nil	mg/l
Heavy metal(total)	10	nil	mg/l
Iron	3.5	<3.5	mg/l
Lead	0.1	Traces	mg/l
Mercury	0.01	nil	mg/l
Nickel	0.5	nil	mg/l
Oil and grease	10	<10	mg/l
pH	6-9	6-8.5	
Phenols	0.5	nil	mg/l
Selenium	0.1	nil	mg/l
Silver	0.5	nil	mg/l
Sulphide	1	nil	mg/l

(Continued)

Total Suspended Solid	50	50	mg/l
Zinc	2	Traces	mg/l

4 SOLID WASTE

Type of Solid Waste	Quantity/month of 30 days in ton	Method of Disposal
Ash	331.2	Ash will be collected dry from the furnace and ESP of the plant and be stored in silo from there , it will be further transported I closed truck to the following areas. (a) ash brick Factory (b) land filling and © to Silica generation plant in Future
solid Sludge from watr treatment	4.8	To be used for land filling / gardening

5 NOISE AND VIBRATION

Receptor	One Hour Laeq(dBA)	
	Daytime 07:00-22:00	Nighttime 22:00-07:00
Residential, Institutional, Educational	55	45
Industrial, Commercial	70	70
Biomass Power plant falls under Industry	<70 at the factory fence	<70 at the factory fence

6 ODOR

Are there any odor sources? No

If marked "Yes", please describe odor control measures to be applied as follows: **Not Applicable**

7 HAZARDOUS AND CHEMICAL SUBSTANCE

Are there any hazardous substance to be dealt with? No

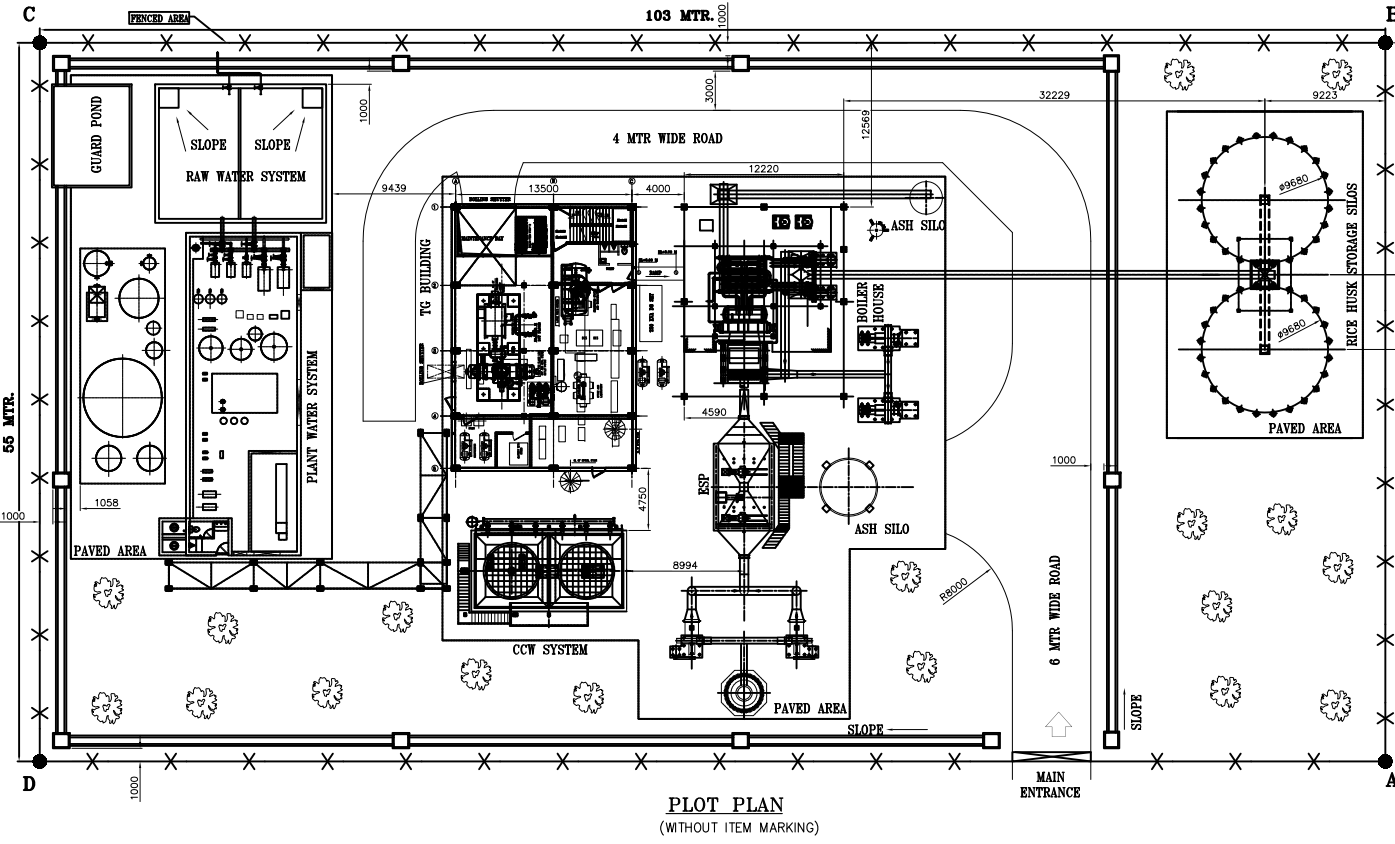
If marked "Yes", please describe odor control measures to be applied as follows:

8 OCCUPATIONAL HEALTH AND SAFETY

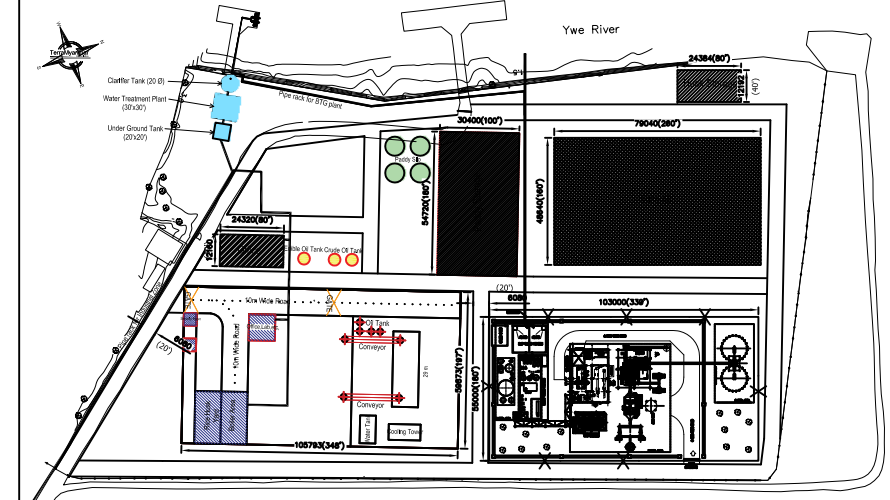
Occupation Health and Safety during Operation	Management Plan
Working Condition	well ventilated : AC enviornment for plant operators.
Accident	Nil
Sanitation	Nil
Infection	No
Management of Hazardous Substances	Nil
Training	trained operators

APPENDIX III PROPOSED ROUTE TO MYAUNG MYA SUBSTATION



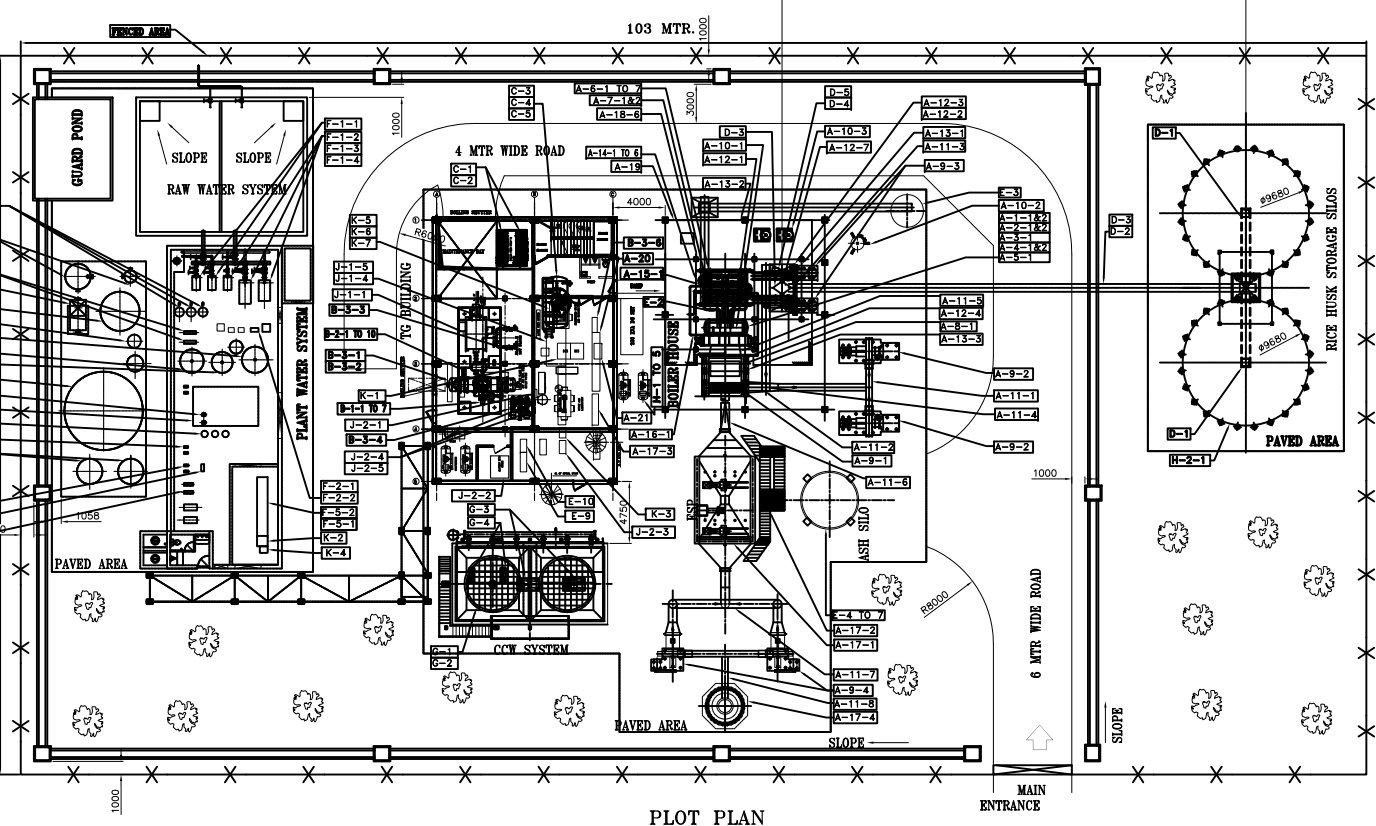


ITEM NO	ITEM DESCRIPTION
1.0 BOILER AND ITS AUXILIARY EQUIPMENT	
A-1-1	STEAM DRUM WITH INTERNALS
A-1-2	WATER DRUM
A-1-3	BOILER BANK TUBES
A-1-4	LUSS FOR BANK TUBES
A-1-5	INBED COILS
A-1-6	PRIMARY SUPERHEATER COILS WITH HEADER, STUB AND COIL SLEEVES
A-1-7	SECONDARY SUPERHEATER COILS WITH HEADER, STUB AND COIL SLEEVES
A-1-8	INTERSTAGE ATTEMPERATOR ASSEMBLY
A-1-9	ATOMOSPHERIC FLUIDISED BED COMBUSTION (AFBC) FURNACE
A-1-10	BOILER FURNACE WALL-FRONT PANEL WITH BOTTOM HEADER
A-1-11	BOILER FURNACE WALL-REAR PANEL WITH BOTTOM HEADER
A-1-12	BOILER FURNACE WALL-RHS PANEL WITH BOTTOM HEADER
A-1-13	BOILER FURNACE WALL-LHS PANEL WITH BOTTOM HEADER
A-1-14	ACCESS DOORS, DISTRIBUTOR PLATE, ALONG WITH WELDED AIR NOZZLES, PLENUM CHAMBER
A-1-15	PLENUM CHAMBER WITH ASH DRAIN PORTS
A-1-16	DOWNCOMER (WATER DRUM TO INBED HEADERS)
A-1-17	RISER (WATER WALL SIDE TOP HEADERS TO STEAM DRUM)
A-1-18	ECONOMISER CONSISTS OF COIL, 1/2 & O/L HEADER, CASING
A-1-19	AIR PRE HEATER (APH)
A-1-20	FORCE DRAUGHT (FD) FAN WITH DRIVE MOTOR
A-1-21	PRIMARY AIR (PA) FAN WITH DRIVE MOTOR
A-1-22	INDUCED DRAUGHT (ID) FAN WITH VFD
A-1-23	DUCTING FROM FD FAN TO APH
A-1-24	DUCTING FROM APH TO PLENUM HOPPER
A-1-25	PA FAN INLET AND OUTLET DUCT
A-1-26	APH BYPASS DUCTING
A-1-27	DUCTING FROM BOILER BANK TO APH
A-1-28	DUCTING FROM APH OUTLET TO ELECTROSTATIC PRECIPITATOR (ESP) INLET
A-1-29	DUCTING FROM ESP TO ID FANS
A-1-30	DUCT FROM ID FANS TO CHIMNEY
A-1-31	SOOT BLOWER
A-1-32	BLOWDOWN TANK WITH VALVES AND FITTINGS
A-1-33	HIGH PRESSURE (HP) & LOW PRESSURE (LP) CHEMICAL DOSING UNIT
A-1-34	SAMPLE COOLER
A-1-35	BOILER INTEGRAL PIPING WITH FITTINGS, VALVES AND INSTRUMENTS
A-1-36	BOILER BANK HOPPER
A-1-37	FUEL BUNKER AND BED MATERIAL BUNKER
A-1-38	FUEL FEEDERS WITH VFD
A-1-39	APH HOPPER
A-1-40	FUEL CONVEYING CHUTE FROM BUNKER TO FUEL FEEDERS AND UNDER BED CONVEYING PIPE
A-1-41	EXPANSION JOINTS
A-1-42	FUEL MIXING NOZZLES
A-1-43	DAMPERS
A-1-44	FURNACE STRUCTURE
A-1-45	BOILER SUPPORTING STRUCTURES WITH LADDERS, PLATFORMS
A-1-46	APH, ECONOMISER, FUEL BUNKER SUPPORTING STRUCTURES
A-1-47	REFRACTORY BRICKS FOR FURNACE
A-1-48	INSULATION MATERIAL FOR BOILER AND PIPING
A-1-49	INSTRUMENTS FOR BOILER SYSTEM
A-1-50	BOILER CANOPY WITH SIDE SHEETING
A-1-51	MOTOR CONTROL CENTRE (MCC) FOR BOILER AND ITS AUXILIARIES
A-1-52	PLC BASED CONTROL PANEL FOR BOILER AND ITS AUXILIARIES
2.0 POLLUTION CONTROL EQUIPMENT	
A-1-53	ESP WITH BOTTOM ASH HOPPER AND INSULATION MATERIAL
A-1-54	SUPPORT STRUCTURE FOR ESP
A-1-55	MCC (MOTOR CONTROL CENTER) CUM CONTROL PANEL FOR ESP
A-1-56	MS CHIMNEY
3.0 BOILER WATER SYSTEM (POWER CYCLE)	
C-1	BOILER FEED PUMP WITH VARIABLE FREQUENCY DRIVE (VFD) DRIVE MOTOR
C-2	FLOW CONTROL STATION
C-3	DEAERATOR
C-4	DEAERATOR WATER STORAGE TANK
C-5	DEAERATOR LEVEL & PRESSURE CONTROL STATION
C-6	DM WATER PIPING, VALVES AND INSTRUMENTS FOR THIS SYSTEM
4.0 FUEL (RICE HUSK) HANDLING SYSTEM: FROM STORAGE SILO TO RE BUNKER AT BOILER	
D-1	RICE HUSK (RH) SILO DISCHARGE CONVEYORS
D-2	CONVEYOR FROM RICE HUSK (RH) SILO DISCHARGE CONVEYORS TO BOILER RH BUNKER
D-3	CONVEYOR SUPPORT SYSTEM
D-4	BAG FILTER AT RICE HUSK BUNKER AT BOILER
D-5	VFD
D-6	VENT FAN
D-7	FIELD INSTRUMENTS FOR THIS SYSTEM
D-8	MCC CUM CONTROL PANEL (RELAY BASED) FOR CONVEYING SYSTEM
5.0 ASH HANDLING SYSTEM	
E-1	DUST COLLECTION SYSTEM
E-2	BOTTOM ASH CONVEYOR
E-3	BOTTOM ASH SILO FITTED WITH VENT AND DIAPHRAGM PLATE
E-4	ASH TRANSMITTER
E-5	FLY ASH CONVEYING PIPE WITH FITTINGS
E-6	FLY ASH SILO
E-7	VALVES AND INSTRUMENTS FOR ASH HANDLING SYSTEM
E-8	EQUIPMENT SUPPORT STRUCTURES
E-9	STARTER CUM PLC CONTROL PANEL FOR BOTTOM ASH HANDLING SYSTEM
E-10	STARTER CUM CONTROL PLC BASED PANEL FOR FLY ASH HANDLING SYSTEM
6.0 PLANT WATER SYSTEM	
F-1-1	RAW WATER SUPPLY PUMP
F-1-2	FIRE WATER PUMP (MOTOR DRIVEN)
F-1-3	FIRE WATER PUMP (ENGINE DRIVEN)
F-1-4	FIRE WATER JOCKEY PUMP
F-2-1	COZONATOR (OPTIONAL)
F-2-2	OZONATOR RECIRCULATION PUMP (OPTIONAL)
F-2-3	LIME DOSING TANK-PVC
F-2-4	LIME DOSING PUMP
F-2-5	FeO3 DOSING TANK
F-2-6	FeO3 DOSING PUMP
F-2-7	POLYELECTROLYTE DOSING TANK
F-2-8	POLYELECTROLYTE DOSING PUMP
F-2-9	FLASH MIXER CUM FLOCCULATOR
F-2-10	AGITATOR FOR FLASH MIXER WITH GEAR MOTOR
F-2-11	AGITATOR FOR FLOCCULATOR WITH GEAR MOTOR
F-2-12	LAMELLA CLASSIFIER
F-2-13	CLARIFIED WATER STORAGE TANK
F-2-14	FILTER FEED PUMP
F-2-15	MULTIMEDIA OR DUAL MEDIA FILTER
F-2-16	ACTIVATED CARBON FILTER
F-2-17	FILTERED WATER STORAGE TANK
F-2-18	RIVER WATER INTAKE PUMP
F-3-1	FILTERED WATER SUPPLY PUMPS TO SOFTENER PLANT AND DISTRIBUTION TO OTHER FACILITY
F-3-2	SOFTENER PLANT
F-3-3	SOFTENED WATER STORAGE TANK
F-3-4	SOFTENED WATER DISTRIBUTION PUMPS
F-4-1	RO FEED PUMP
F-4-2	ANTISCALANT DOSING TANK
F-4-3	ANTISCALANT DOSING PUMP
F-4-4	NSOH DOSING TANK
F-4-5	NSOH DOSING PUMPS
F-4-6	SMBS (SODIUM META BI-SULPHITE) DOSING TANK
F-4-7	SMBS DOSING PUMPS
F-4-8	MICRON CARTRIDGE FILTER
F-4-9	HIGH PRESSURE PUMPS
F-4-10	RO PRESSURE TUBE
F-4-11	RO MEMBRANE
F-4-12	RO CIP TANK
F-4-13	RO CIP PUMP
F-4-14	MICRON CARTRIDGE FILTER FOR CIP
F-4-15	RO PERMEATE TANK
F-4-16	EDI FEED PUMP
F-4-17	EDI UNIT
F-4-18	DM WATER TANK
F-4-19	FILLING PUMP TO BOILER/DEAERATOR
F-4-20	PIPE & VALVES FOR ABOVE SYSTEM
F-5-1	MCC FOR WATER TREATMENT SYSTEM
F-5-2	PLC BASED CONTROL PANEL FOR WATER TREATMENT SYSTEM
F-5-3	INSTRUMENTS OF ENTIRE WATER TREATMENT SYSTEM
7.0 CIRCULATING COOLING WATER (CCW) SYSTEM	
G-1	COOLING TOWER
G-2	COOLING TOWER FAN WITH GEARBOX & MOTOR
G-3	MAIN COOLING WATER PUMP WITH DRIVE MOTORS
G-4	AUXILIARY COOLING WATER PUMP WITH DRIVE MOTORS
G-5	PIPING, VALVES AND INSTRUMENTS FOR CIRCULATING COOLING WATER SYSTEM



STN_No	Easting	Northing
A	701281.116	1835986.896
B	701229.761	1836006.585
C	701192.888	1835910.412
D	701244.243	1835890.722

ITEM NO	ITEM DESCRIPTION
8.0 PLANT PIPING SYSTEM & VALVES	
A-14-1	MAIN STEAM LINE FROM BOILER MAIN STEAM STOP VALVE (MSSV) TO TURBINE INLET
A-14-2	COMPRESSED AIR AND INSTRUMENT AIR LINE
A-14-3	ALL DRAIN AND VENT LINES
A-14-4	STEAM PIPING TO SOOT BLOWER
A-14-5	HARDWARE AND FITTINGS REQUIRED IN THE ABOVE STATED LINES
A-14-6	INSTRUMENT REQUIRED IN THE ABOVE STATED LINES
9.0 AUXILIARY EQUIPMENT & SYSTEM	
H-1-1	AIR COMPRESSOR
H-1-2	AIR FILTER
H-1-3	AIR RECEIVER WITH ACCESSORIES
H-1-4	AIR DRIER
H-1-5	AIR FILTER REGULATOR
H-1-6	AIR CONDITIONER
H-1-7	HYDRANT WATER SUPPLY SYSTEM
H-1-8	HOSE BOX WITH FLEXIBLE HOSE PIPE
H-1-9	PORTABLE FOAM EXTINGUISHER
H-1-10	INSULATION MATERIAL FOR BALANCE OF PLANT ITEMS
H-1-11	PAINTING
H-1-12	EOT (ELECTRIC OVERHEAD TYPE) CRANE FOR TO BUILDING
10.0 RICE HUSK UNLOADING & STORAGE SYSTEM	
H-2-1	RICE HUSK STORAGE SILO WITH SUPPORT STRUCTURES
11.0 ELECTRICAL SYSTEM	
J-1-1	GENERATOR PROPER - 400V
J-1-2	GENERATOR PT (POTENTIAL TRANSFORMER)/CT (CURRENT TRANSFORMER) & SA (SURGE ARRESTOR) CUBICLE
J-1-3	GENERATOR NEUTRAL GROUNDING CUBICLE
J-1-4	GENERATOR CONTROL & PROTECTION PANEL
J-1-5	GENERATOR BREAKER (400V-L1) & SYNCHRONIZING PANEL
J-2-1	PLANT MCB (MAIN SWITCH BOARD)
J-2-2	BATTERY WITH STAND
J-2-3	BATTERY CHARGER PANEL
J-2-4	DC DISTRIBUTION BOARD
J-2-5	DC MOTOR STARTER PANEL
J-2-6	LT (LOW TENSION) POWER CABLE
J-2-7	CONTROL CABLE
J-2-8	CABLE TRAY WITH ACCESSORIES SUCH AS CABLE TIE, FASTENERS ETC
J-2-9	UPS (UNINTERRUPTED POWER SYSTEM)
J-2-10	GROUNDING MATERIAL
J-2-11	LIGHTNING ARRESTOR
J-2-12	PLANT AREA LIGHTING WITH FIXTURES INCLUDING MAIN LIGHTING DISTRIBUTOR BOARD (MLDB)
J-2-13	ALTERNATIVE CURRENT (AC) SINGLE PHASE DISTRIBUTION BOARD (ACDB)
12.0 CONTROL AND INSTRUMENTATION	
K-1	DCS
K-2	STARTER CUM CONTROL PANEL (RELAY BASED) FOR RAW WATER AND FIRE WATER SYSTEM
K-3	PLC BASED LOCAL CONTROL PANEL FOR COMPRESSOR
K-4	RELAY BASED CONTROL PANEL FOR SLUMP PUMPS
K-5	ENGINEERING CUM WORKSTATION
K-6	WORK STATION
K-7	LARGE VIDEO SCREEN
K-8	MISCELLANEOUS FIELD INSTRUMENTS
K-9	CONTROL VALVES
K-10	ANALYSERS
K-11	INSTRUMENT CABLES
K-12	ERECTION HARDWARE FOR INSTRUMENT HOOK-UP
A-16-1	PRESSURE REDUCING AND DESUPERHEATING STATION (PROS)
13.0 STEAM TURBINE & ITS AUXILIARY EQUIPMENT	
B-1-1	STEAM TURBINE PROPER WITH COVER
B-1-2	STEAM TURBINE GOVERNOR
B-1-3	STEAM TURBINE SOLE PLATE
B-1-4	MAIN STOP VALVE
B-1-5	GOVERNOR VALVE
B-1-6	EXTRACTION CONTROL VALVE
B-1-7	TURNING DEVICE
B-2-1	MAIN LUBE OIL PUMP (DRIVEN BY TURBINE)
B-2-2	AUXILIARY OIL PUMP WITH AC DRIVE MOTOR
B-2-3	EMERGENCY OIL PUMP WITH DC MOTOR
B-2-4	OIL PURIFIER
B-2-5	OIL COOLERS
B-2-6	OIL FILTER
B-2-7	OIL RESERVOIR
B-2-8	VAPOUR BREAKER
B-2-9	PIPING FOR LUB OIL SYSTEM
B-2-10	VALVES FOR LUB OIL SYSTEM
B-3-1	MAIN CONDENSER WITH EXPANSION JOINT AND HOTWELL
B-3-2	FLASH BOX FOR MAIN CONDENSER
B-3-3	CONDENSATE EXTRACTION PUMP WITH DRIVE MOTOR
B-3-4	VACUUM PUMPS ASSEMBLY WITH COOLER
B-3-5	INSTRUMENTS
B-3-6	TURBINE CONTROL PANEL & STARTER PANEL

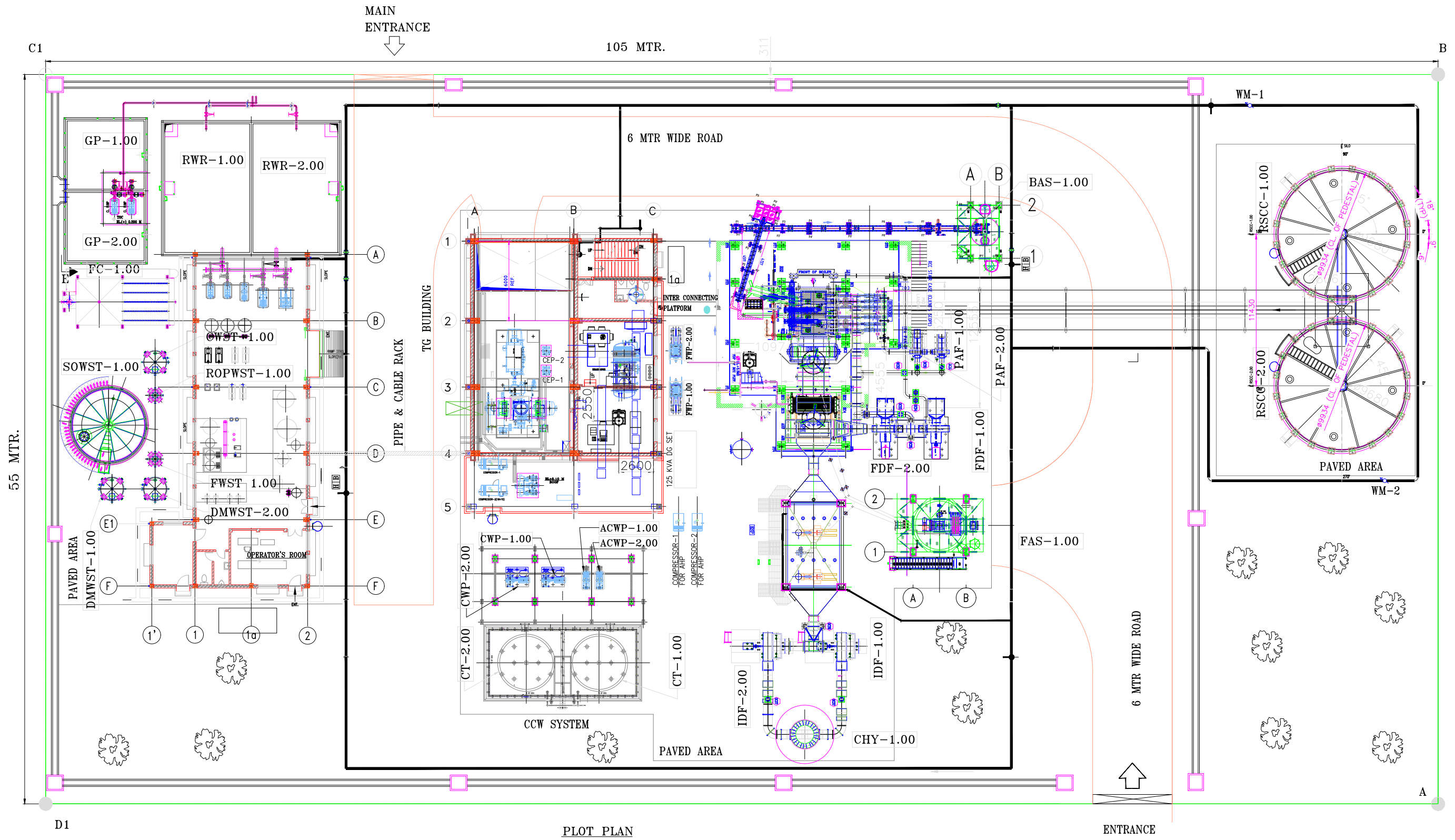


PROJECT	1.8 MW GROSS RICE HUSK FIRED BTG POWER PLANT, MYAUNG MYA, MYANMAR
OWNER	MAPCO
EPC CONTRACTOR	FUJITA CORPORATION
EPC-SUB CONTRACTOR	BTIT ENGINEERING SOLUTION PVT. LTD.
TITLE	PLOT PLAN WITH STORAGE SILO FOR RICE HUSK
SCALE: -	1:200 CAD REF.:-
APPD./DT.	****
CHD/DT.	B.C.B 14.06.2017
DRN./DT.	S.M 14.06.2017
DRAWING NO.-	BTIT/1.8MW/BTG/PP/01
REV.	00

REV.	ZONE	BY/DT	CHD/DT	APPD/DT	REVISION	DESCRIPTION	REV.	ZONE	BY/DT	CHD/DT	APPD/DT	REVISION	DESCRIPTION	DESIGNED	DRAWN	CHECKED	APPROV.	REV.	DATE	

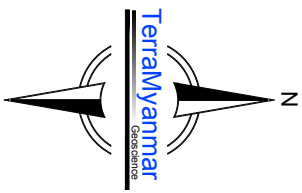
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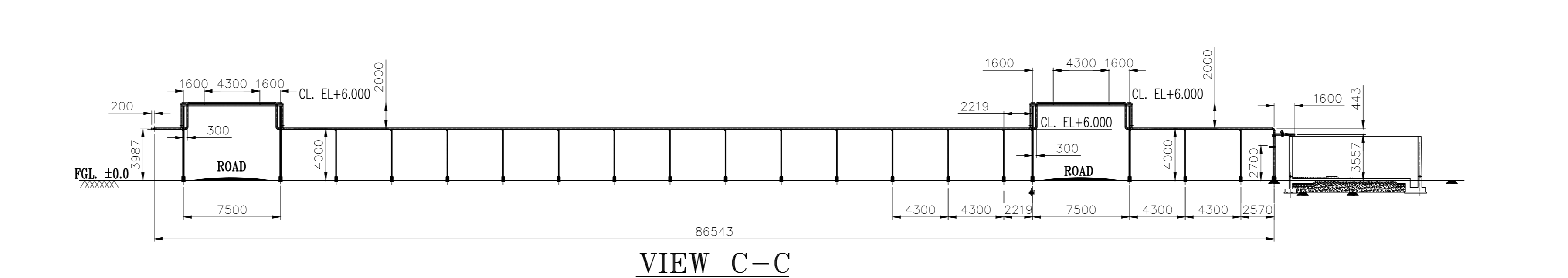
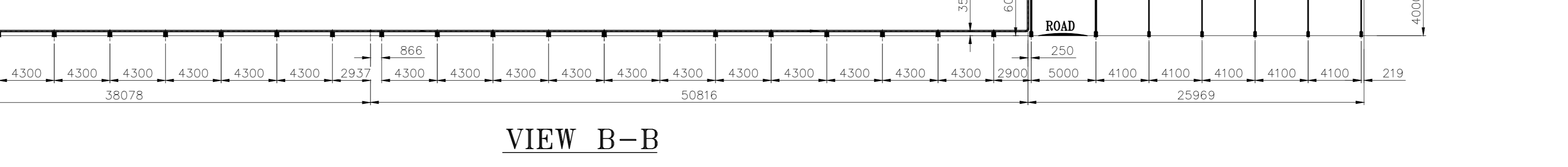
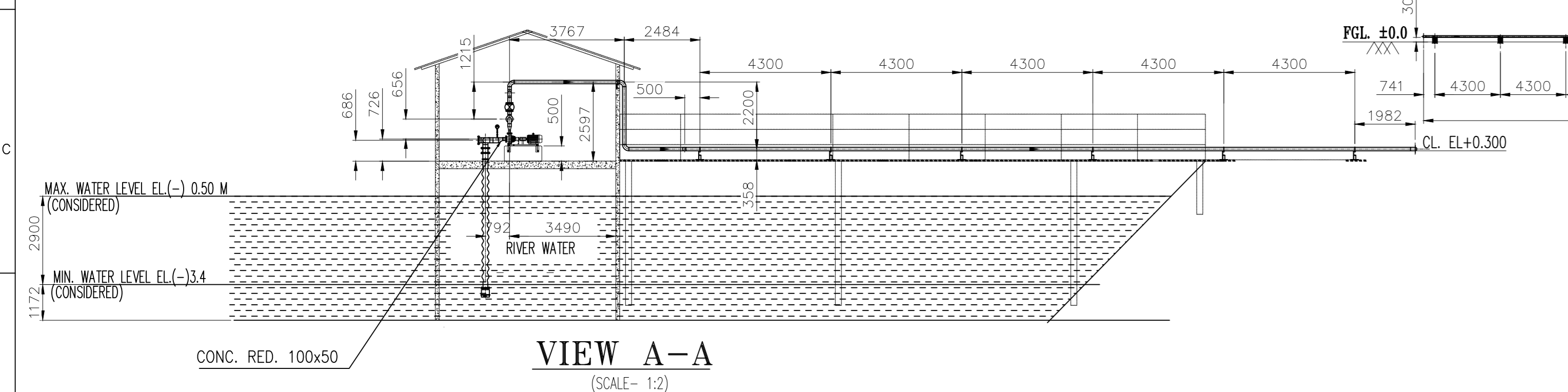
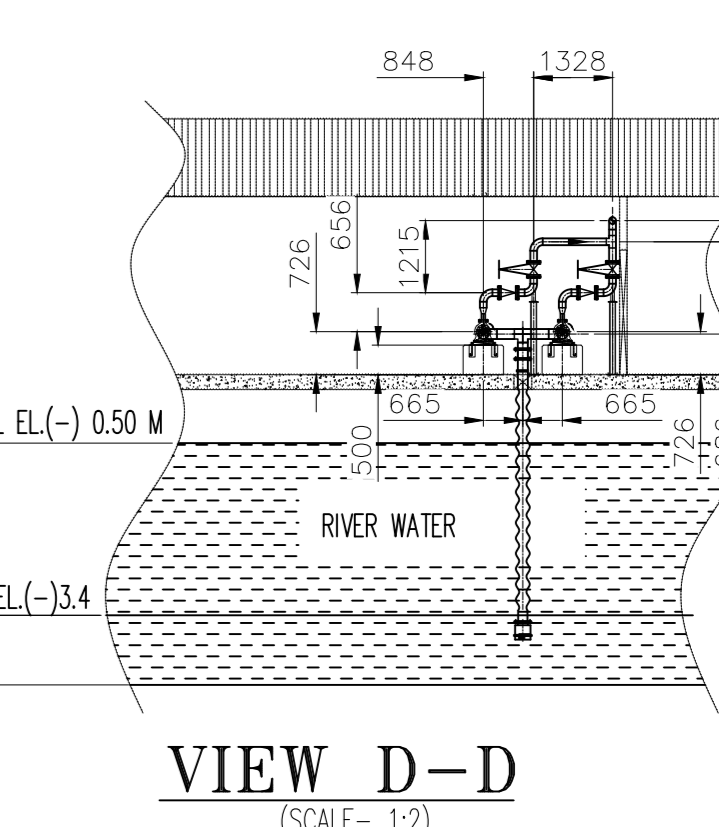
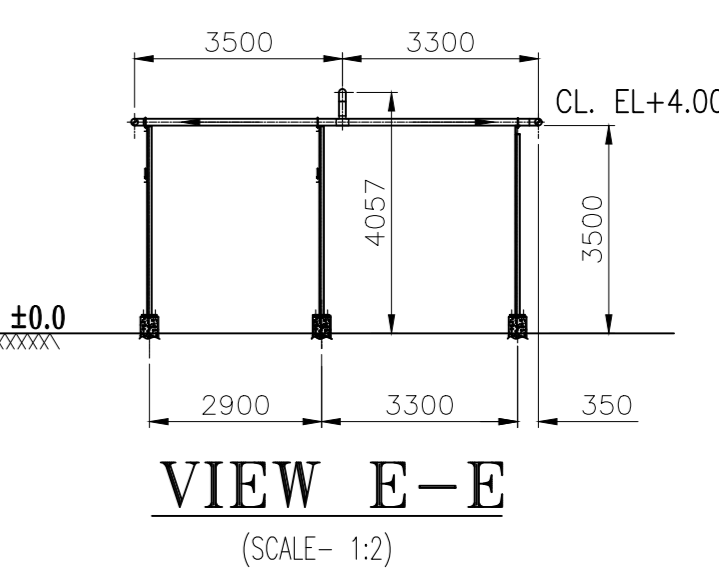
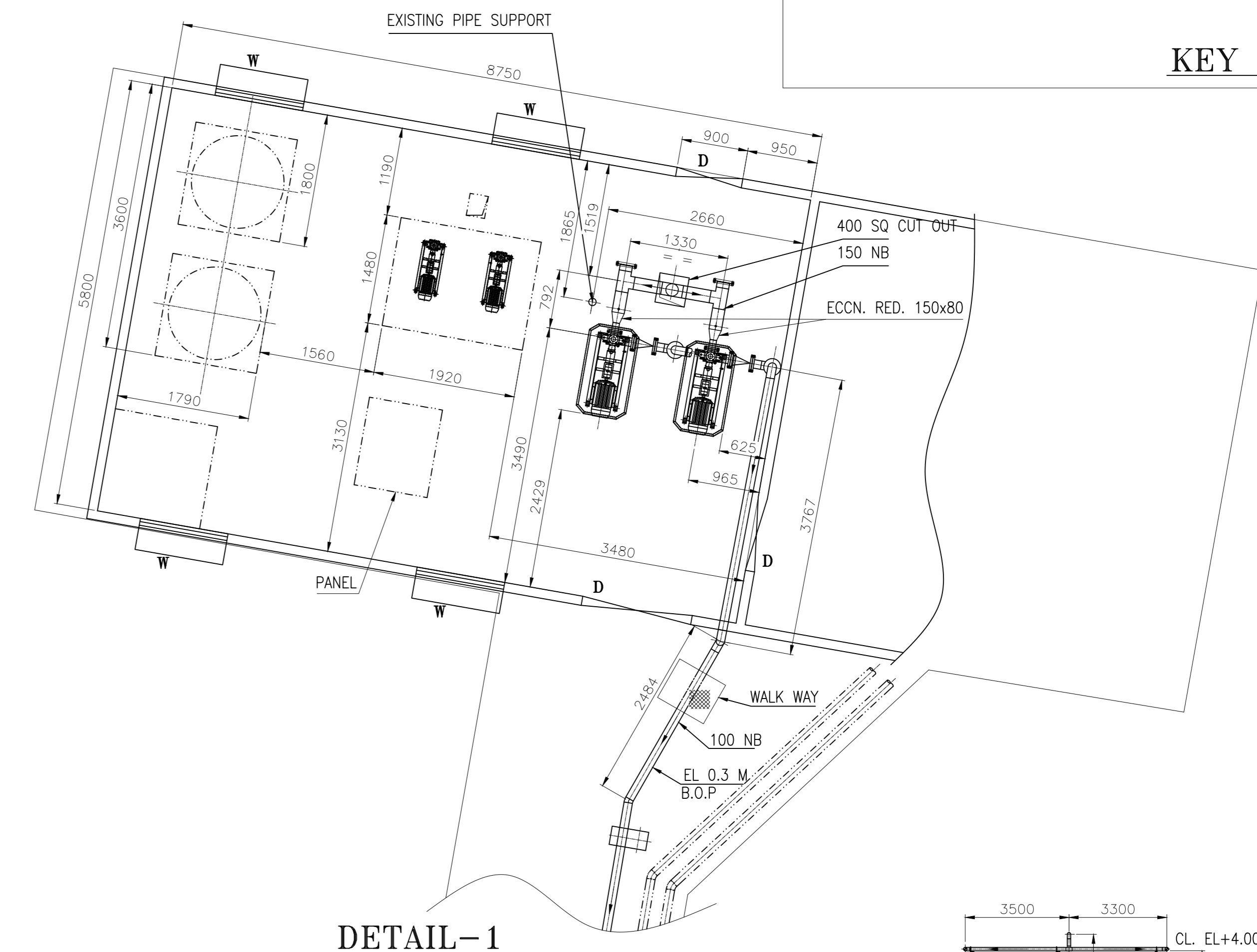
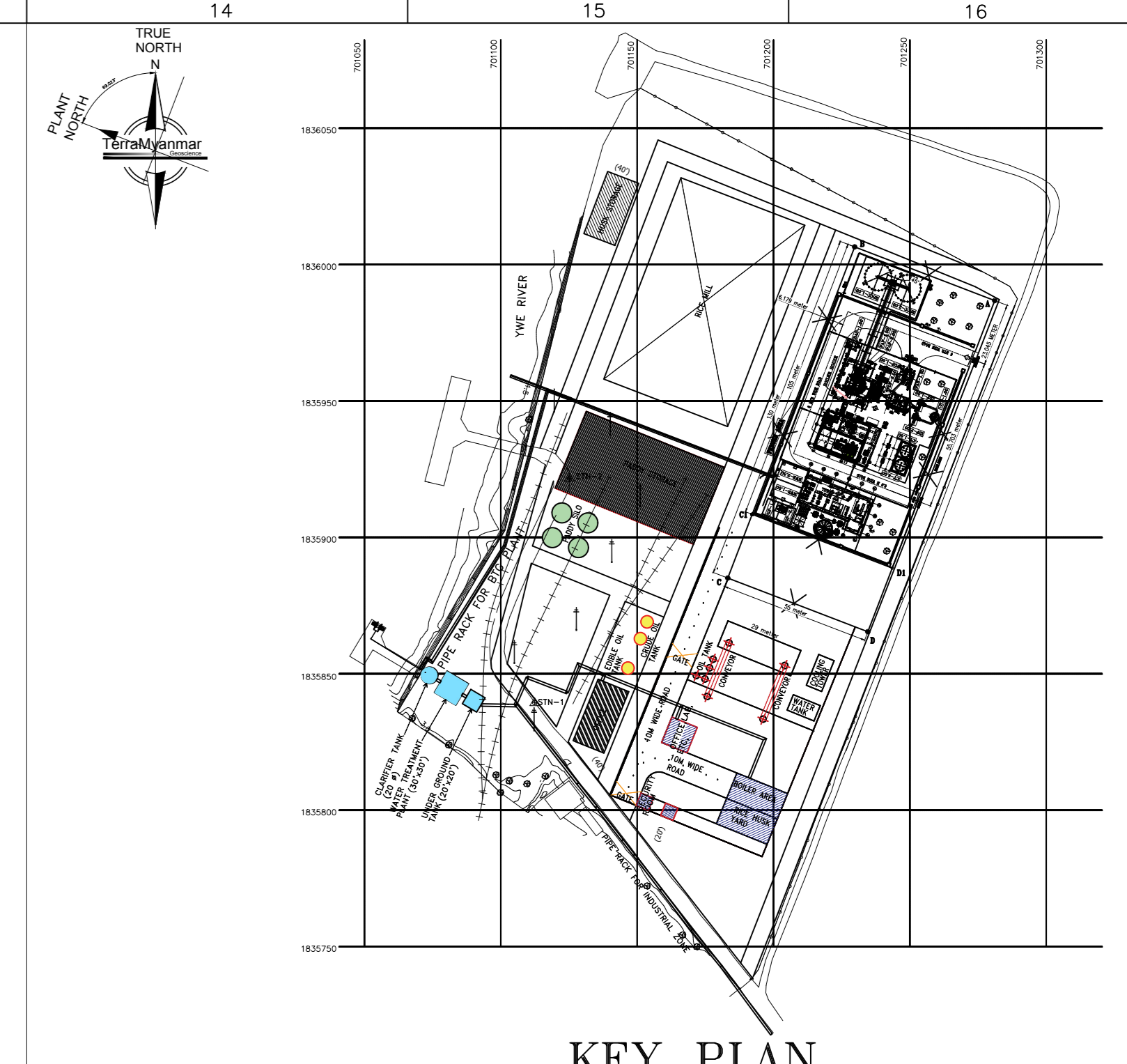
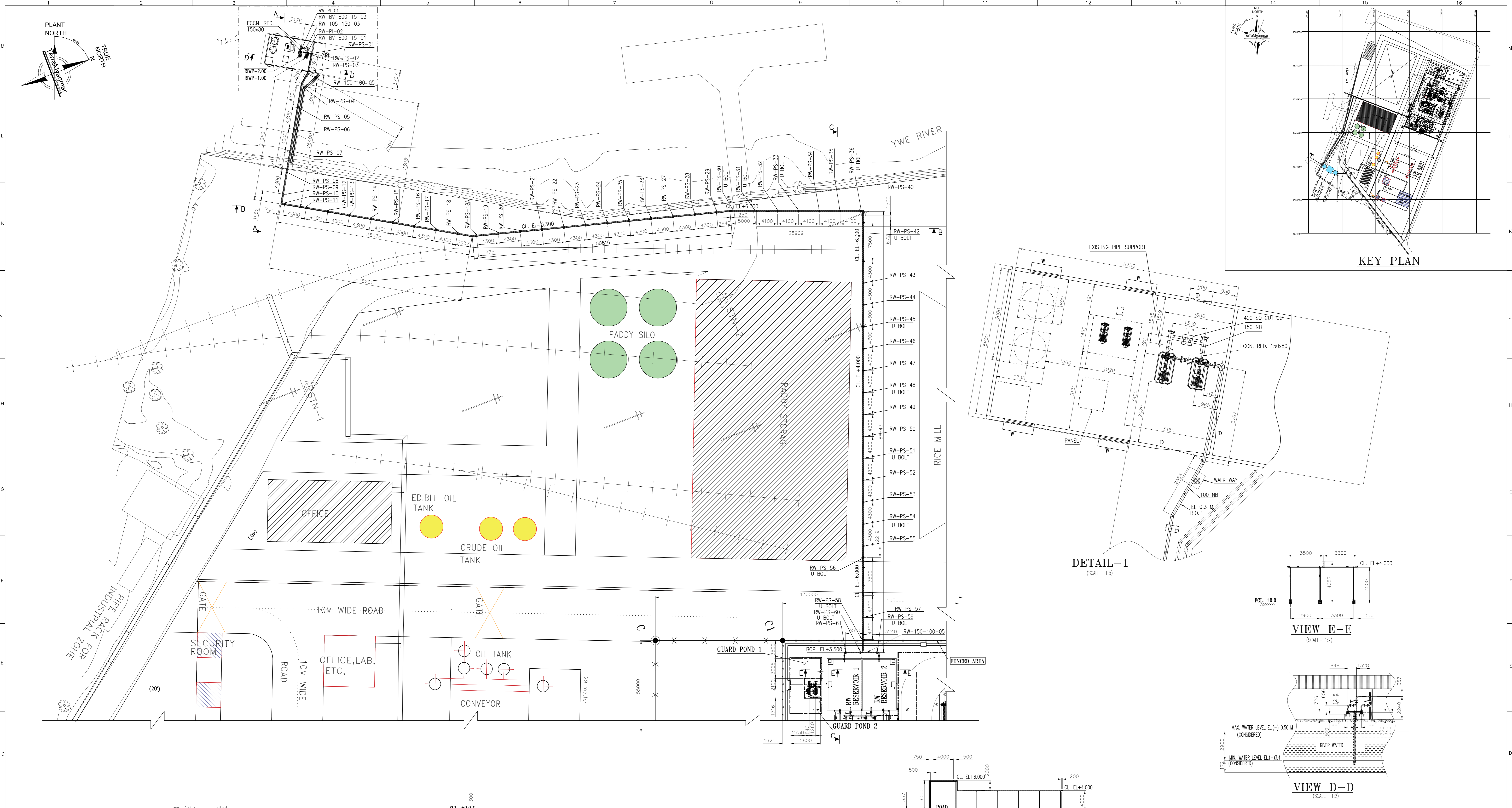
RELEASE STATUS	DATE	SIGNATURE
PRELIMINARY FOR TENDER ONLY FOR CONSTRUCTION	****	**
ARCHITECTURAL	***	**
CIVIL & STRUCTURAL	***	**
ELECTRICAL	***	**
INSTRUMENTATION	***	**
MECHANICAL	***	**



PLOT PLAN

Revision 1:	18-09-2018	Scale 1:300 21-08-2018
Revision 2:	18-10-2018	
Revision 3:	20-12-2018	



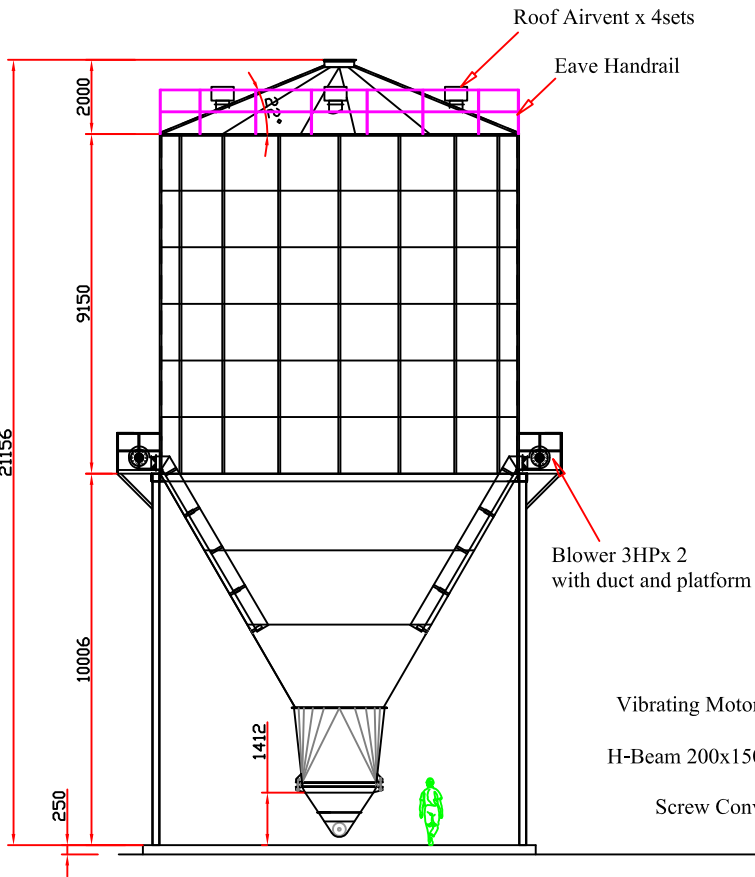


NOTE:-
DRAWING SHALL BE REVISED AS PER FINAL VENDOR DATA AFTER PLACEMENT OF ORDER TO THE VENDOR AND RECEIVING THEIR DRAWINGS.

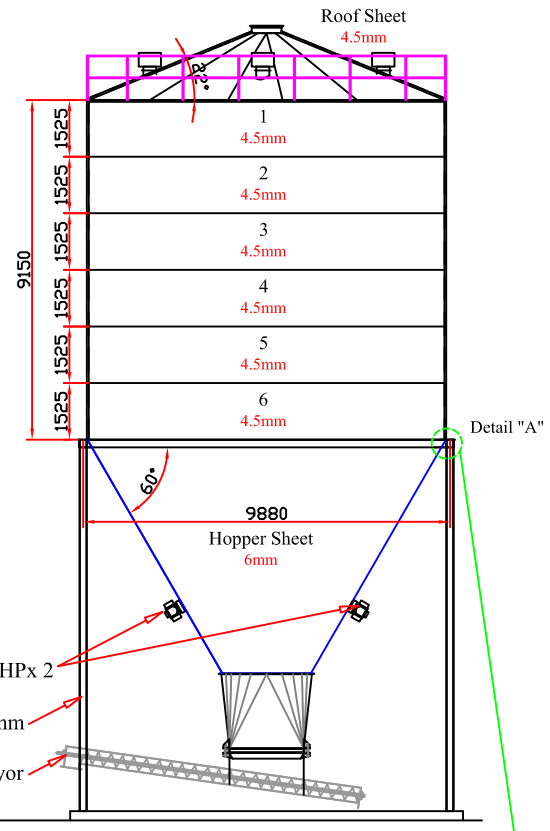
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REV.	ZONE	BY/DT	CHD/DT	APPD/DT	REVISION	DESCRIPTION	REV.	ZONE	BY/DT	CHD/DT	APPD/DT	REVISION	DESCRIPTION	DESIGNED	DRAWN	CHECKED	APPROV.	REV.	DATE	

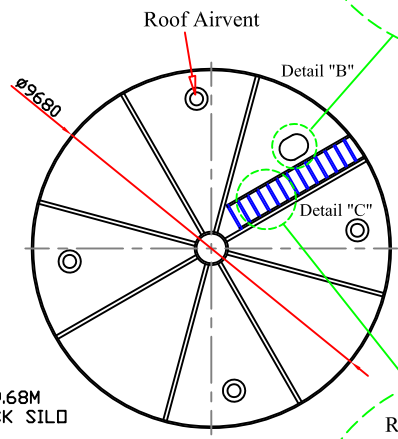
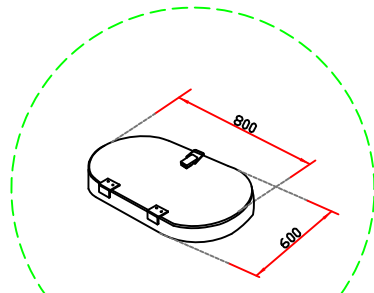
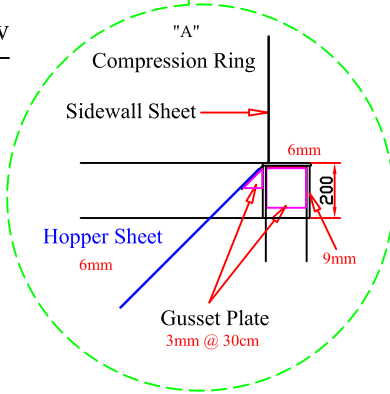
PROJECT	1.8 MW GROSS RICE HUSK FIRED BTG POWER PLANT, MYAUNG MYA, MYANMAR
OWNER	MYAUNG MYA FM BIOMASS POWER CO., LTD.
EPC CONTRACTOR	FUJITA CORPORATION
EPC-SUB CONTRACTOR	BTIT ENGINEERING SOLUTION PVT. LTD.
TITLE	RAW WATER INTAKE PIPE ROUTING
SCALE:-	1:250
APPD./DT.	****
CHD./DT.	B.C.B 18.05.2017
DRN./DT.	S.M 23.05.2017
DRAWING NO.-	BTIT/1.8MW/BTG/RWIP/01
SHEET NO.	REV. 1



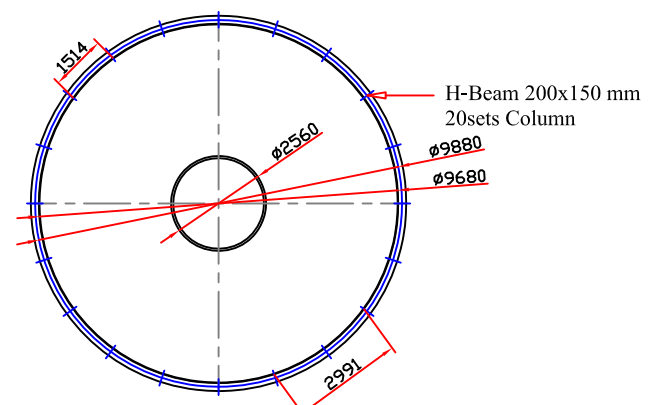
Side View



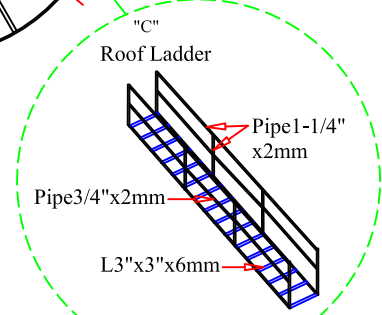
Front View



Top View

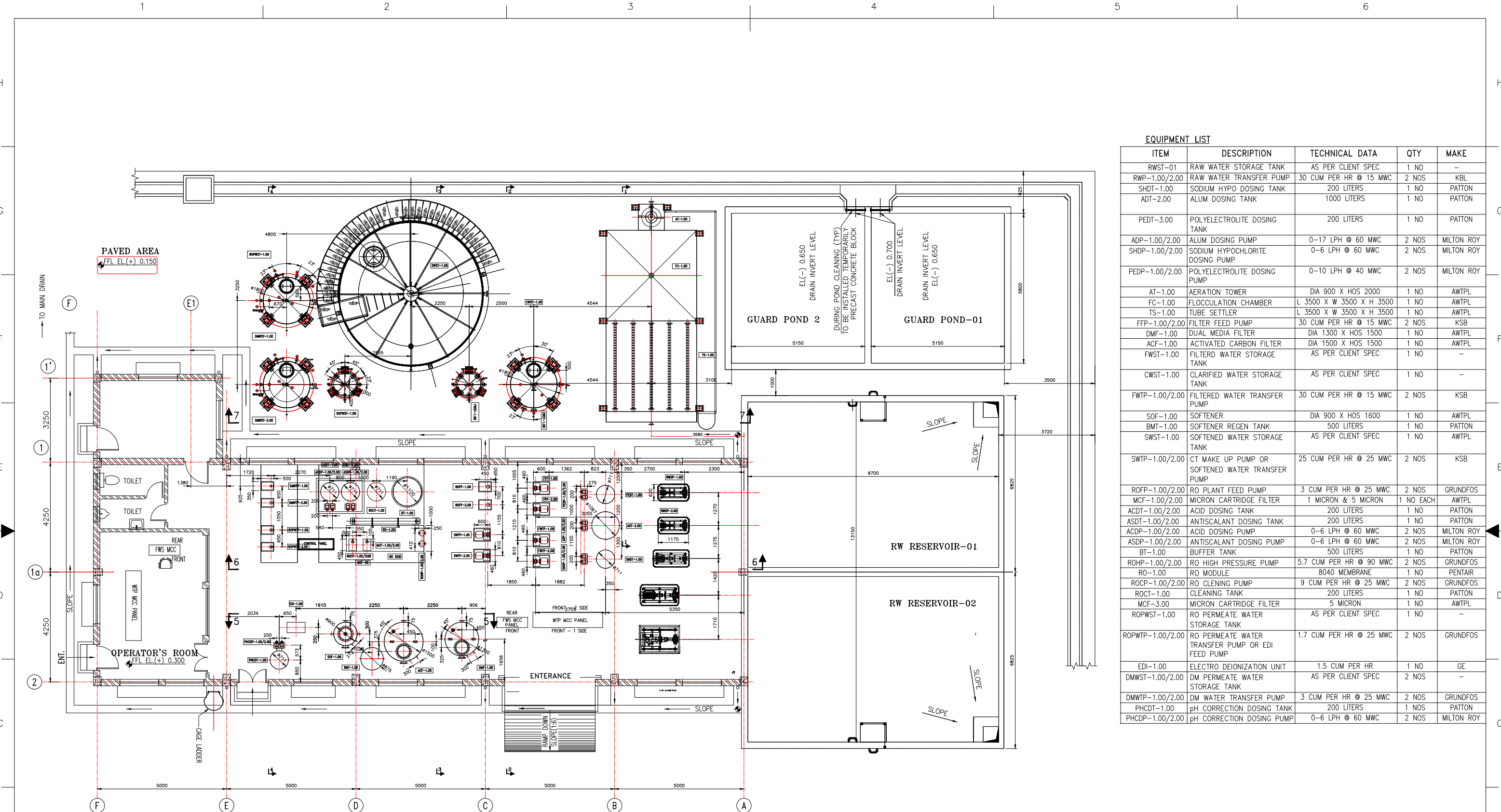


Bottom View



(2 Sets) Rice Husk Silo 800 Cum.

Drawn by POR	Revise by -	Approved by - date/...../.....	Day/Month/Year 01/11/2017	Scale NONE
Project Rice Husk Storage (2 Sets)		Customer BTIT ENGINEERING SOLUTION PVT. LTD.	Sheet A4	
NAVAKI GROUP COMPANY LIMITED 100/293 Moo 8, Tiwanon Road Bangpoo, Pakkred Nonthaburi 11120 Tel.02-9646085-7 Fax.02-9646088 E-mail : navaki@group@yahoo.com Website : www.navaki@group.com		Drawing Title Rice Husk Silo		
Drawing No. NG17-02		Revise 4	Page 1	



AREA G.A FOR POWER PLANT WATER SYSTEM
(SCALE 1:75)

EQUIPMENT LIST

ITEM	DESCRIPTION	TECHNICAL DATA	QTY	MAKE
RWST-01	RAW WATER STORAGE TANK	AS PER CLIENT SPEC	1 NO	-
RWP-1.00/2.00	RAW WATER TRANSFER PUMP	30 CUM PER HR @ 15 MWC	2 NOS	KBL
SHDT-1.00	SODIUM HYPO DOSING TANK	200 LITERS	1 NO	PATTON
ADT-2.00	ALUM DOSING TANK	1000 LITERS	1 NO	PATTON
PEDT-3.00	POLYELECTROLITE DOSING TANK	200 LITERS	1 NO	PATTON
ADP-1.00/2.00	ALUM DOSING PUMP	0-17 LPH @ 60 MWC	2 NOS	MILTON ROY
SHDP-1.00/2.00	SODIUM HYPOCHLORITE DOSING PUMP	0-6 LPH @ 60 MWC	2 NOS	MILTON ROY
PEDP-1.00/2.00	POLYELECTROLITE DOSING PUMP	0-10 LPH @ 40 MWC	2 NOS	MILTON ROY
AT-1.00	AERATION TOWER	DIA 900 X HOS 2000	1 NO	AWTPL
FC-1.00	FLOCCULATION CHAMBER	L 3500 X W 3500 X H 3500	1 NO	AWTPL
TS-1.00	TUBE SETTLER	L 3500 X W 3500 X H 3500	1 NO	AWTPL
FFP-1.00/2.00	FILTER FEED PUMP	30 CUM PER HR @ 15 MWC	2 NOS	KSB
DMF-1.00	DUAL MEDIA FILTER	DIA 1300 X HOS 1500	1 NO	AWTPL
ACF-1.00	ACTIVATED CARBON FILTER	DIA 1500 X HOS 1500	1 NO	AWTPL
FWST-1.00	FILTERED WATER STORAGE TANK	AS PER CLIENT SPEC	1 NO	-
CWST-1.00	CLARIFIED WATER STORAGE TANK	AS PER CLIENT SPEC	1 NO	-
FWTP-1.00/2.00	FILTERED WATER TRANSFER PUMP	30 CUM PER HR @ 15 MWC	2 NOS	KSB
SOF-1.00	SOFTENER	DIA 900 X HOS 1600	1 NO	AWTPL
BMT-1.00	SOFTENER REGEN TANK	500 LITERS	1 NO	PATTON
SWST-1.00	SOFTENED WATER STORAGE TANK	AS PER CLIENT SPEC	1 NO	AWTPL
SWTP-1.00/2.00	CT MAKE UP PUMP OR SOFTENED WATER TRANSFER PUMP	25 CUM PER HR @ 25 MWC	2 NOS	KSB
ROFP-1.00/2.00	RO PLANT FEED PUMP	3 CUM PER HR @ 25 MWC	2 NOS	GRUNDFOS
MCF-1.00/2.00	MICRON CARTRIDGE FILTER	1 MICRON & 5 MICRON	1 NO EACH	AWTPL
ACDT-1.00/2.00	ACID DOSING TANK	200 LITERS	1 NO	PATTON
ASDT-1.00/2.00	ANTISCALANT DOSING TANK	200 LITERS	1 NO	PATTON
ACDP-1.00/2.00	ACID DOSING PUMP	0-6 LPH @ 60 MWC	2 NOS	MILTON ROY
ASDP-1.00/2.00	ANTISCALANT DOSING PUMP	0-6 LPH @ 60 MWC	2 NOS	MILTON ROY
BT-1.00	BUFFER TANK	500 LITERS	1 NO	PATTON
ROHP-1.00/2.00	RO HIGH PRESSURE PUMP	5.7 CUM PER HR @ 90 MWC	2 NOS	GRUNDFOS
RO-1.00	RO MODULE	8040 MEMBRANE	1 NO	PENTAIR
ROCP-1.00/2.00	RO CLENIING PUMP	9 CUM PER HR @ 25 MWC	2 NOS	GRUNDFOS
ROCT-1.00	CLEANING TANK	200 LITERS	1 NO	PATTON
MCF-3.00	MICRON CARTRIDGE FILTER	5 MICRON	1 NO	AWTPL
ROPWST-1.00	RO PERMEATE WATER STORAGE TANK	AS PER CLIENT SPEC	1 NO	-
ROPWTP-1.00/2.00	RO PERMEATE WATER TRANSFER PUMP OR EDI FEED PUMP	1.7 CUM PER HR @ 25 MWC	2 NOS	GRUNDFOS
EDI-1.00	ELECTRO DEIONIZATION UNIT	1.5 CUM PER HR	1 NO	GE
DMWST-1.00/2.00	DM PERMEATE WATER STORAGE TANK	AS PER CLIENT SPEC	2 NOS	-
DMWTP-1.00/2.00	DM WATER TRANSFER PUMP	3 CUM PER HR @ 25 MWC	2 NOS	GRUNDFOS
PHCDT-1.00	pH CORRECTION DOSING TANK	200 LITERS	1 NOS	PATTON
PHCDP-1.00/2.00	pH CORRECTION DOSING PUMP	0-6 LPH @ 60 MWC	2 NOS	MILTON ROY

PROJECT	1.8 MW GROSS RICE HUSK FIRED BTG POWER PLANT, MYAUNG MYA, MYANMAR
OWNER	MYAUNG MYA FM BIOMASS POWER CO., LTD.
EPC CONTRACTOR	FUJITA CORPORATION
EPC-SUB CONTRACTOR	BTIT ENGINEERING SOLUTION PVT. LTD.
WTP CONTRACTOR	AQUATHERM Water Treatment Pvt. Ltd.
TITLE	AREA GA
SCALE:- AS MKD.	DRAWING NO.-
APPD./DT.	SK 6/1
CHKD./DT.	SK 6/1
DRN./DT.	SM 1/1
SHEET NO.-	SH 01 OF 08
REV. 6	

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REVISIONS	DESCRIPTION	DESIGNED	DRAWN	CHECKED	APPROV.	REV.	DATE
		SK	SK	AC	-	6	02.04.18

RICE HUSK POWER GENERATION PROJECT
EMERGENCY CONTACT ORGANIZATION

OWNER
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BIO ENERGY CONSUL
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BTIT SITE MANAGER
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BTIT PROJECT MANAGER BIKASH CHANDRA BOSE (+91) 98300-68981	FUJITA Deputy Project Manager Nay Win Shein (+95) 979-824-0509
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PROJECT MANAGER 竹内 久敏 (+95) 926-496-0045	ミャンマー部 (YANGON BRANCH) 井上 祥一 (+95) 925-092-5197 管理担当 柴崎 俊介 (+95) 945-451-3472 営業・渉外・通訳 (MM/JP/EN) Thuzar Nyo Khaing (+95) 942-018-8843
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(株)フジタ 国際支社 東アジア・アセアン事業部 事業部長 石井 友博 Malaysia:(+60) 12-315-6887 Japan:(+84) 80-5887-0424	(株)フジタ 国際支社 総務部 部長 山田 浩充 (+81) 70-4503-2249 営業部 部長 伊藤 文裕 (+81) 80-4466-0474
東アジア・アセアン事業部 副事業部長 石原 雅嗣 (+81) 80-5887-0010	
東アジア・アセアン事業部 安全部次長 大田 滋一郎 (+84) 936-433-568	

① Hospital

Local Hospital (Large)(Nearest) Myaungmya District Hospital 20 minutes from site (+95) 42 70492	Designated Hospital (For Foreigner) SOS LIMITED (Yangon) Myanmar International Hospital (+95) 165-7922
Emergency Vehicle Ambulance-1: (+95)9 8575887 Ambulance-2: (+95) 9 252299114	

② MAPCO Planning and Project Management

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③ Police

Local Police Ph : (+95) 9 422516667 Ph : (+95) 9 422560944

④ Fire

Local Fire Station Ph : 042-70134

⑤ Subcontractor

subcontractor BTIT Mr. Bikash Kumar Gupta (+95)9 894 807475 Mr. Subhasis Mondal (+95)9 966 945086	subcontractor MAPCO E&C Mr. Aung Than Oo (+95)9 500 8984 Mr. Minn Pyae Sone Aung (+95)9 45006 5583
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APPENDIX XII SITE DAILY REPORT SAMPLE



**Safety, Quality and Environment
Site Daily Report**

PM	SM	SE

Date 28 Month 2 Year 2019. Weather: Sunny

① Working Record		Number of workers		
		Trade	Today	Accum.
1	Boiler Work Finialing	Scaffolding		
		General Labor	10	9348
2	Electrical Work - Panel Side Termination	Excavator		508
		Surveyor		670
3	Electrical Work - DCS Termination Both Side	Piling		788
		Form		
4	Electrical Work - LPBS & JB Termination	R-bar		2649
		Concreteer		
5	Electrical Work - Secondary Grounding System	Steel structure		174
		Roof/Wall sheet		
6	Electrical Work - General and Cable Laying & Arrange Cables	Water Proofing		245
		Bricklayer		26
7	Electrical Work - Ferrule Printing	Tiler		79
		Mason		3001
		AW/AD/SD/SS		
		Wooden door		15
		Glazier		21
		Carpenter/Jointer		3760
		Plasterer		917
		Metal worker		
② Unconformity Records				
		FJT Check		
		Dry wall(LGS)		
		Ceiling Hanging		
		Gypsum board		
		Painter		580
		Welder		553
		Plumber		
		MVAC		
		Electrician	32	1907
		Lift		
		External worker		
③ Lecture, Training and Complaints Record				
		Demolisher		
		Plant operator		117
1	Always use Safety Vest, Helmet, Safety Shoes.	Other worker		194
		Security		2712
2	Never Smoking during working time	Roller Compactor		4
		Plant Erection Worker	26	6605
3	Becareful when working at height	Other 3		
		Other 4		
④ Project Manager/Site Manager Comments				
		Other 5		
		Other 6		
		Other 7		
[Safety]		Sub-con staff	5	3457
		FJT Staff	1	368
		Other Staff(BTIT)	3	761
		Total of workers	73	38330
		Total of staff	4	1129
[Quality]		Grand total	77	39459
		Accumulative working time (hr)		
		Worker	584	306,640
[Environment]		Staff	32	9032
		Total	616	315,672

**1.8MW GROSS RICE HUSK FIRED BTG POWER PLANT (MYAUNG MYA) PROJECT
MASTER SCHEDULE**

▬ Civil Work
▬ Erection Work

Item	Particular	February		March				April				May				June				July				August				September				October				November				December			
		3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th								
1	Guard Pond																																										
1.1	Civil Work	▬	▬																																								
2	Water Treatment Plant																																										
2.1	Civil Work																																										
2.2	Erection of Water Treatment Plant Equipment																																										
3	Boiler																																										
3.1	Civil Work																																										
E-2	Erection of Boiler																																										
4	Cooling Tower Basin																																										
4.1	Civil Work																																										
E-3	Erection of Cooling Tower																																										
5	Raw Water Reservoir																																										
5.1	Civil Work																																										
6	Power House (including TG foundation)																																										
6.1	Civil Work																																										
E-4.1	Erection of EOT Crane																																										
E-4.2	Erection of TG set and other items of power house																																										
7	Rice Husk Silo																																										
7.1	Civil Work																																										
E-5	Erection of Rice Husk Silo with Belt Conveyor																																										
8	Chimney																																										
8.1	Civil Work																																										
E-6	Erection of MS Chimney																																										
9	ESP Foundation																																										
9.1	Earth Work																																										
E-7	Erection of ESP																																										
10	Fly Ash Silo																																										
10.1	Civil Work																																										
E-8	Erection of Fly Ash Silo with Fly Ash Handling System																																										
11	Bed Ash Silo																																										
11.1	Civil Work																																										
E-9	Erection of Bed Ash Silo Bed Ash Handling System																																										
12	Others Foundation Work (Outdoor equipment like fan, storage tank etc?)																																										
E-10	Erection of outdoor equipment like fan, pumps, storage tanks etc																																										
E-11	Erection of All piping with pipe supports, PRDS and instruments																																										
E-12	Erection of Electrical Panels including DCS																																										
E-13	Erection of Cable, Cable Trays, Busduct, grounding material																																										
E-14	Erection of Fire Protection sensors and alarms																																										
13	Temporary road inside plant area																																										
14	Road & Drain Work																																										
15	Fence Work																																										

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APPENDIX XIV SITE COMPLETION REPORT

1.8 MW Gross Rice Husk Fired
BTG Power Plant Project
Myaung Mya



SITE COMPLETION REPORT

31st, March 2019

1

Project Completion Overall View



3

Project Progress %
Over All Project

No.	Name of Facility	Progress Percent
1	Power House Building	100%
2	Water Treatment Plant Building	100%
3	Boiler House Building	100%
4	Raw Water Reservoir	100%
5	Guard Pond	100%
6	Fence & Gate	100%
7	Ash Silos	100%
8	Rice Husk Silo	100%
9	Road	100%
	Overall	100%

2

Project Completion Overall View



4

Project Completion Overall View



5

Project Completion Photo
Power House Building



6

Project Completion Photo
Water Treatment Plant Building



7

Project Completion Photo
Boiler House Building



8

Project Completion Photo
Raw Water Reservoir



9

Project Completion Photo
Fence & Gate



11

Project Completion Photo
Guard Pond



10

Project Completion Photo
Fly Ash Silo



Bottom Ash Silo



12

Project Completion Photo
Rice Husk Silo



13

Project Completion Photo
Road Completion



14

APPENDIX XV PRESENTATION FROM MYAUNG MYA BIOMASS POWER GENERATION

**ဇီဝလောင်စာသုံးစနစ်
(စပါးခွံမှလျှပ်စစ်ဓါတ်အားထုတ်လုပ်ရေးစီမံကိန်း)
မြောင်းမြ၊ဧရာဝတီတိုင်းဒေသကြီး**

28 October, 2017
Myaung Mya FM Biomass Power Generation Co., Ltd.





Fujita Corporation အကြောင်း

Daiwa House Group Ltd. Fujita Corporation ("Fujita") သည် အထွေထွေဆောက်လုပ်ရေးကုမ္ပဏီဖြစ်ပြီး ဂျပန်နိုင်ငံတိုကျိုမြို့တွင်ရုံးချုပ်တည်ရှိပါသည်။

Fujita သည် 1910 ခုနှစ်တွင်စတင်တည်ထောင်ခဲ့ပြီး ဆောက်လုပ်ရေးလုပ်ငန်းများဆောင်ရွက်လာသည့်မှာနှစ်ပေါင်း 100 ကျော်တိုင်ခွဲပါပြီ။

Fujita သည်ရန်ကုန်ရုံးခွဲအပါအဝင်နိုင်ငံပေါင်း 12 နိုင်ငံတွင်ရုံးခွဲများစွာရှိပြီး အိမ်ခြံမြေဖွံ့ဖြိုးရေး၊ မြို့ပြတည်ဆောက်ရေးနှင့်ပြန်လည်ထောင်ရေး၊ သယ်ယူပို့ဆောင်ရေးဆိုင်ရာဝန်ဆောင်မှုများ၊ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာအင်ဂျင်နီယာနည်းပညာများတွင်အတွေ့အကြုံရှိပြီးအထူးကျွမ်းကျင်သည့်ကုမ္ပဏီဖြစ်ပါသည်။

Fujita အနေဖြင့် **Joint Crediting Mechanism (JCM)** စနစ်ကိုအသုံးပြုပြီး မြန်မာနိုင်ငံ၏စီးပွားရေးတိုးတက်မှု၊ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာလုပ်ငန်းများကိုမြန်မာကုမ္ပဏီနှင့်အတူဆောင်ရွက်ပြီးမြန်မာနိုင်ငံအတွက်အထောက်အပံ့ပေးလိုပါသည်။

စီမံကိန်း၏နောက်ခံသမိုင်းကြောင်း

ဧရာဝတီတိုင်းဒေသကြီး၏လက်ရှိအခြေအနေ

ဆန်စက်လုပ်ငန်းများအများစုလုပ်ကိုင်ကြသည်။ 

လျှပ်စစ်စီးရရှိမှုနည်းပါးသည်။ 

အသေးစားဓါတ်ငွေ့ ဖြိုခွဲ၍လျှပ်စစ်ဓါတ်အားထုတ်လုပ်ခြင်းကြောင့်သဘာဝပတ်ဝန်းကျင်ပြဿနာများ။ 


စပါးခွံစွန့်ပစ်ရေးပြဿနာများ။ 

ဧရာဝတီတိုင်းဒေသကြီးအတွင်းပထမဦးဆုံးစီမံကိန်း

**စပါးခွံသုံးလျှပ်စစ်ဓါတ်အားထုတ်လုပ်ရေးစီမံကိန်း
မြောင်းမြမြို့နယ်၊ဧရာဝတီတိုင်းဒေသကြီး။**

လျှပ်စစ်ဓါတ်အားထုတ်လုပ်နှုန်း: **1.8 MW (စုစုပေါင်း) 1.6 MW (အသားတင်)**
 ထုတ်လုပ်သည့်နည်းလမ်း : **ဘိုင်လာ နှင့်တာဘိုင်ဂျင်နရေတာ**
 ရင်းနှီးမြုပ်နှံမှုပမာဏ : **ခန့်မှန်းခြေ အမေရိကန်ဒေါ်လာ ၄ သန်း**


စပါးခွံ



ဘိုင်လာ



တာဘိုင်ဂျင်နရေတာ



ကုမ္ပဏီမှတ်တမ်းအကျဉ်း

ကုမ္ပဏီအမည် **Myaung Mya FM Biomass Power Co., Ltd.**

တည်နေရာ **ခန်းချောင်းကျေးရွာ၊အမှတ်(၂၂) မုဆိုးကွင်း၊ မြောင်းမြ မြို့နယ်၊မြောင်းမြရေိုင်း၊ ဧရာဝတီတိုင်းဒေသကြီး။**


အမျိုးအစား **ဖက်စပ်ကုမ္ပဏီ
စပါးခွံလှုပ်စစ်ခါတ်အားထုတ်လုပ်ရေး**

(1) Fujita Corporation - (80%) ရင်းနှီးမြုပ်နှံမှု

(2) Myanmar Agribusiness Public Corporation - (20%) ရင်းနှီးမြုပ်နှံမှု (MAPCO) Limited.

စီမံကိန်းမြေ(၂)

စီမံကိန်းမြေ : MAPCO မြောင်းမြရေိုင်းလျှော်စက်ရုံ




တည်နေရာ : ခန်းချောင်းကျေးရွာ၊ အမှတ်(၂၂) မုဆိုးကွင်း၊မြောင်းမြမြို့နယ်၊ မြောင်းမြရေိုင်း။

စုစုပေါင်းဧရိယာ : 334.72 ဧက (1,354,565m²)
မြေယာငှားရမ်းစာချုပ်: နှစ် 70

မြေပိုင်ရှင် : MAPCO (Myanmar Agribusiness Public Corporation)
ဆိုင်ခံဧရိယာအတွင်းခရေပေးပေးပူရှိပါသည်။

စီမံကိန်းမြေ(၃)


ဆိုင်ခံဧရိယာ: 13.77 acres (55,725m²)
MAPCOမှ ဆိုင်ခံဧရိယာအတွင်းဆန်စက် တည်ဆောက်ရန်လျာထားပါသည်။
ဆန်စက်: ၁၀၀၀နဲ့/၀နာရီ(Satake)



ဆိုင်ခံ (130' x 25') 39m x 7.5m

စီမံကိန်းတည်ဆောက်မည့်မြေနေရာ

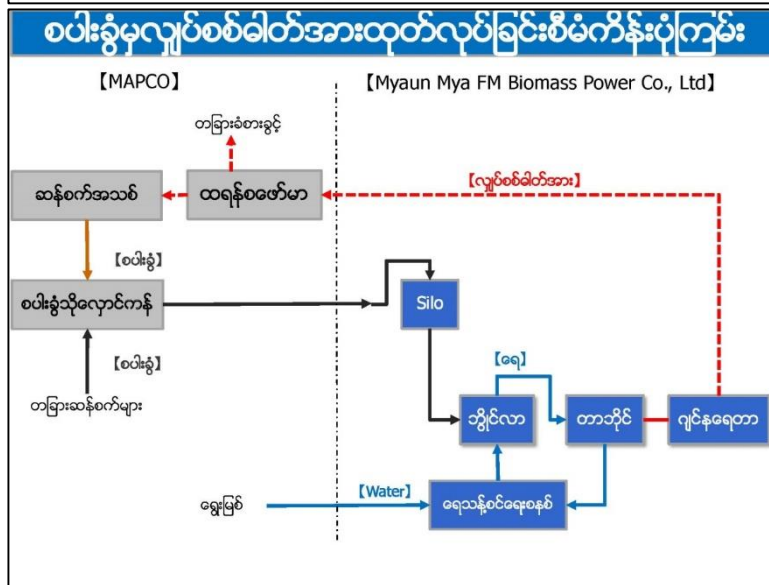
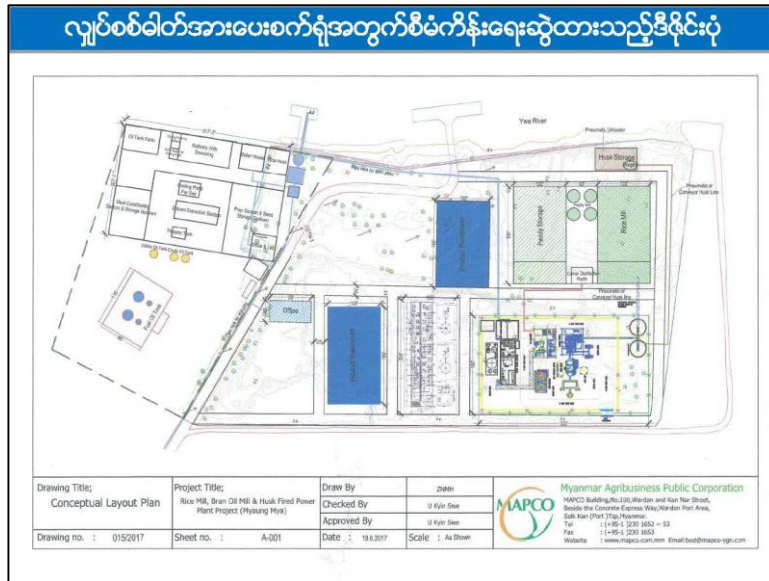
စိုက်ပျိုးရေးနှင့်မွေးမြူရေးစက်မှုဇုန် (မြောင်းမြ)



Administration & Service Units	7.61 acres	0 Pits
Integrated Rice Complex Project	28.54 acres	40 Pits
Beak Con. & Sarene Processing Factories	13.173 acres	11 Pits
Ferrous Cold Storage & Processing Factories	21.244 acres	45 Pits
Agro - Industries	14.187 acres	14 Pits
Food-Storage, Mill & Paper Mill	17.268 acres	16 Pits
CHP Generator Factory	21.08 acres	Existing Area
Logistic & Transportation Area and Oil Depot	30.337 acres	22 Pits
Total	204.38 acres	128 Pits

Drawing Title:	Project Title:	Draw By:	zheni
Conceptual Layout Plan	Myaung Mya Industrial Zone	Checked By:	U Win Hnat
		Approved By:	U Myo Swe
Drawing no. : 001/2017	Sheet no. : A-001	Date :	24.2.2017
		Scale :	As Shown

MAPCO Myanmar Agribusiness Public Corporation
MAPCO Building No. 100, Wundwin and Kan Nar Street, South Kan (Port 7) Yangon Myanmar.
Tel : (+95) 1 230 1602 ~ 53
Fax : (+95) 1 230 1653
Website : www.mapco.com.mm Email: bod@mapco-ypr.com



- ### လျှပ်စစ်ဓါတ်အားထုတ်လုပ်ခြင်းဖြစ်စဉ်
- ထုတ်လုပ်မည့်ပမာဏ : 1,816 kW
 - Parasitic Load : 201 kW
 - အသားတင်ပမာဏ : 1,615 kW (1816 kW - 201 kW)
 - လုပ်ငန်းလည်ပတ်မည့်အချိန် : 24 နာရီ
 - လုပ်ငန်းလည်ပတ်မည့်ရက် : ရက် 300
- တနှစ်တာထုတ်လုပ်မည့်ပမာဏ = 1,816 x 24 x 300 = 13,075,200 kWh
 - Parasitic Load = 201 x 24 x 300 = 1,447,200 kWh
 - တနှစ်တာအသားတင်ပမာဏ = 1,615 x 24 x 300 = 1,1628,000 kWh
- မှတ်ချက် : Parasitic Load = ထုတ်လုပ်မှုဖြစ်စဉ်တွင်ပြန်လည်သုံးစွဲရသည့် ဓါတ်အားပမာဏ

ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာအစီအစဉ်များ

- ပတ်ဝန်းကျင်ကိုသန့်ရှင်းသပ်ရပ်အောင်ဆောင်ရွက်ပါမည်။
- ရေစီးရေလာကောင်းမွန်အောင်ဆောင်ရွက်ပါမည်။
- စက်ရုံဝန်းအတွင်းနေရာတိုင်း၌အမှိုက်ပုံးထားရှိပါမည်။
- ထွက်ရှိလာသည့်စွန့်ပစ်ပစ္စည်းများနှင့်ပတ်သတ်၍မြို့နယ်စည်ပင်သာယာရေးကော်မတီ၏နည်းဥပဒေအတိုင်းလိုက်နာဆောင်ရွက်ပါမည်။
- လေထုနှင့်ရေထုညစ်ညမ်းမှု၊အသံဆူညံမှုများကိုလဲထိန်းချုပ်ဆောင်ရွက်ပါမည်။

အချိန်ဇယား

ဆောက်လုပ်ရေးကာလ (ခန့်မှန်း) : 2017ခုနှစ် ဒီဇင်ဘာလမှစ
လုပ်ငန်းစတင်လည်ပတ်ချိန်(ခန့်မှန်း) : 2018ခုနှစ် ဒီဇင်ဘာလ

မီးဘေးအန္တရာယ်ကာကွယ်ရေးအစီအစဉ်

- မီးသတ်ဦးစီးဌာနမှညွှန်ကြားချက်နှင့်အညီမီးဘေးအန္တရာယ်ကာကွယ်ရေးပစ္စည်းများနှင့်မီးဘေးကာကွယ်ရေးစနစ်ကိုတပ်ဆင်ထားရှိပါမည်။
- မီးဘေးလုံခြုံရေးအတွက်စည်းမျဉ်းစည်းကမ်းများထားရှိပါမည်။
- မီးဘေးအန္တရာယ်ကာကွယ်တားဆီးနိုင်ရန်ဝန်ထမ်းများအားအသိပညာပေးခြင်းများလုပ်ဆောင်ပါမည်။
- အရေးပေါ်မီးသတ်ဆေးဘူးများအားစက်ရုံဝန်းအတွင်းလုံလောက်စွာထားရှိပါမည်။
- မီးဘေးလုံခြုံရေးအတွက်ဝန်ထမ်းများမှချမှတ်ထားသည့်စည်းကမ်းများအတိုင်းလိုက်နာဆောင်ရွက်ရန်ကွက်ကံဆောင်ရွက်ပါမည်။
- မီးသတ်နှင့်ပတ်သတ်သည့်နည်းပညာရပ်များအားလဲလေ့ကျင့်သင်ကြားပေးပါမည်။
- စက်ရုံဝန်းအတွင်းဆေးလိပ်မသောက်ရန်သတ်မှတ်ထားရှိပါမည်။
- မီးဘေးအန္တရာယ်ကိုကာကွယ်တားဆီးနိုင်ရန်လျှပ်စစ်မီးအသုံးပြုမှုအပေါ်စည်းမျဉ်းစည်းကမ်းများထားရှိပါမည်။

လူထုအကျိုးပြုလုပ်ငန်းများဆောင်ရွက်ခြင်းအစီအစဉ်

အခွန်ဆောင်ပြီးအသားတင်အမြတ်၏၁%အားအောက်ပါလူမှုအကျိုးပြုလုပ်ငန်းများဆောင်ရွက်ရာတွင်အသုံးပြုရန်လျာထားပါသည်:

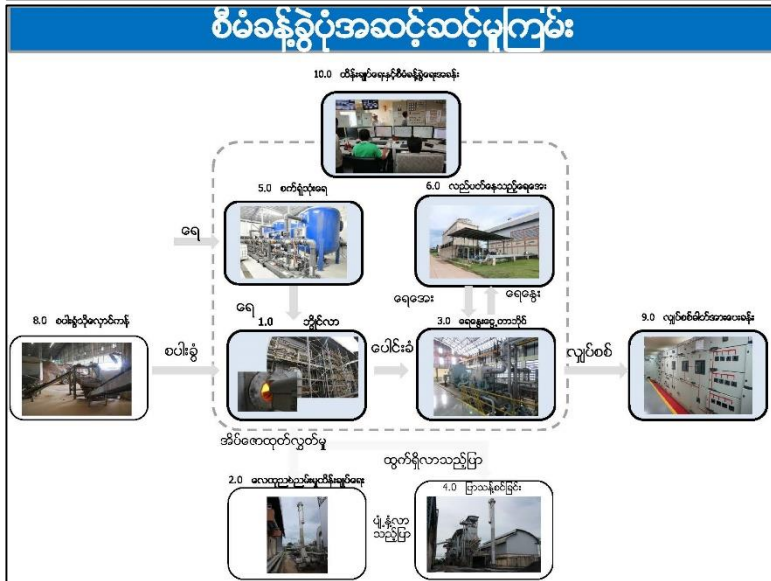
- (က) ဝန်ထမ်းများ၏စွမ်းဆောင်ရည်မြှင့်တင်စေရန်လေ့ကျင့်သင်ကြားပေးရာတွင် (၂၅%)
- (ခ) ဝန်ထမ်းများ၏ကျန်းမာရေးစောင့်ရှောက်မှုတွင် (၂၅%)
- (ဂ) စက်မှုရန်ပုံငွေဖြိုးတိုးတက်ရေးလုပ်ငန်းများတွင်အထောက်အပံ့ပေးရန် (၂၅%)
- (ဃ) ပရဟိတလှူဒါန်းမှုများဆောင်ရွက်ရန် (25%)

စီမံကိန်း၏အရေးပါမှု

ဤစီမံကိန်းမှတစ်ဆင့်

1. ဧရာဝတီတိုင်းဒေသကြီးအတွက်လျှပ်စစ်ဓာတ်အားထောက်ပံ့ပေးနိုင်ပါသည်။
2. လျှပ်စစ်ဓာတ်အားရရှိမှုကြောင့်ဆန်စက်အသစ်များတည်ထောင်နိုင်ရန်အထောက်အကူဖြစ်စေပါသည်။
3. စွန့်ပစ်ပစ္စည်းဖြစ်သည့်စပါးခွဲများအားအကျိုးရှိစွာအသုံးပြုမှုကြောင့်ပတ်ဝန်းကျင်ညစ်ညမ်းမှုကိုလဲကာကွယ်ရာရောက်ပါသည်။
4. ဆန်စပါးလုပ်ငန်းဆိုင်ရာစီမံခန့်ခွဲမှုပုံစံအသစ်ဖြစ်သည့်နှင့်အညီဧရာဝတီတိုင်းဒေသကြီး၏စီးပွားရေးဖွံ့ဖြိုးတိုးတက်မှုအတွက်လဲအထောက်အကူပြုပါသည်။
5. ဆန်စက်လုပ်ငန်းများစီးပွားရေးဖွံ့ဖြိုးတိုးတက်လာသည်နှင့်အမျှကျေးလက်ဒေသဆင်းရဲနွမ်းပါးမှုပြဿနာကိုလဲဖြေရှင်းရာရောက်ပါသည်။
6. ဆောက်လုပ်ရေးနှင့်လျှပ်စစ်ဓာတ်အားထုတ်လုပ်ရေးနည်းပညာသစ်များအားဖြန့်ဖြူးရာရောက်ပါသည်။

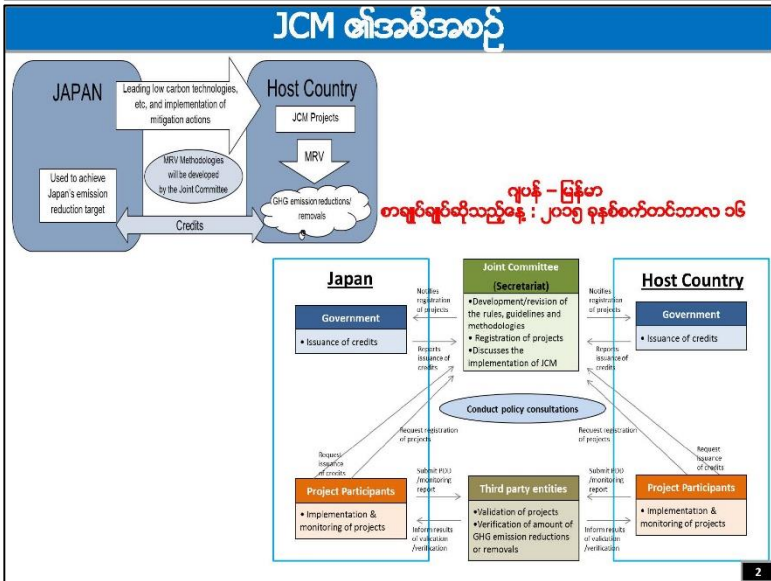
13



အဆောက်အဦးနှင့်မြေအမျိုးအစား

- မြေဧရိယာ : 7,150 sqm (1.766 ဧက)
- မြေရှင် : Myanmar Agribusiness Public Corporation (MAPCO) Limited
- မြေဌာန်းရမ်းသူ : Myaung Mya FM Biomass Power Co., Ltd.
- အဆောက်အဦး : တာဘိုင်ဂျင်နရေတာ အဆောက်အဦး (အကျယ် 12.5m x အရှည် 16m x အမြင့် 17.15m) ဥထည်အဆောက်အဦး
- မြေဌာန်းရမ်းကာလ : ကနဦး နှစ်(50)+ သက်တမ်းတိုး (10)နှစ် နှစ်ကြိမ်

ဆောက်လုပ်ရေးကာလ : (2) နှစ်



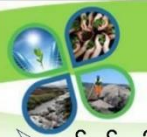
JCM ၏ အခြေခံအယူအဆ

- ဖွံ့ဖြိုးဆဲနိုင်ငံများ၏ ရေရှည်ဖွံ့ဖြိုးတိုးတက်မှုတွင် အထောက်အကူဖြစ်စေမည့် ကာဗွန်လျော့ချရေးနည်းပညာ၊ ထုတ်ကုန်၊ စနစ်များနှင့် ဝန်ဆောင်မှုလုပ်ငန်းများစသည့် အခြေခံလိုအပ်ချက်များကို လက်တွေ့ အကောင်အထည်ဖော်ဆောင်ရွက်ရန်။
- ဖန်လုံအိမ်ဓာတ်ငွေ့ ထုတ်လွှတ်မှုလျော့ကျစေရန် တိုင်းတာခြင်း၊ အစီရင်ခံခြင်း၊ စစ်ဆေးခြင်း (MRV နည်းစနစ်) အသုံးပြု၍ သင့်တော်သော ဓာတ်ငွေ့ ပမာဏအား သတ်မှတ်ထားရခြင်း စသည့် ဂျပန်နိုင်ငံ၏ လေထုအတွင်းဓာတ်ငွေ့ ပမာဏလျော့ချခြင်း ဆိုသည့် ရည်ရွယ်ချက်အား အောင်မြင်အောင် ဆောင်ရွက်ရန်။
- CDM ကို ဖြည့်ဆည်းပြီး ကမ္ဘာ့ဘဏ်ကမ်းအတိုင်းအတာအရ ဖန်လုံအိမ်ဓာတ်ငွေ့ ထုတ်လွှတ်မှုလျော့ချရေး၊ စုပ်ယူရေးလုပ်ငန်းစဉ်များအားစဉ်ဆက်မပြတ် ဆောင်ရွက်ခြင်းဖြင့် ရာသီဥတုပြောင်းလဲမှုအပေါ် ကုလသမဂ္ဂနှင့် ချုပ်ဆိုခဲ့သော ပဋိပညာဉ်စာချုပ်ပါ ရည်ရွယ်ချက်အတိုင်း လိုက်နာ ဆောင်ရွက်နိုင်ပါမည်။

The diagram illustrates the JCM (Japan-Myanmar) mechanism. On the left is a box for 'Japan ဂျပန်နိုင်ငံ' (Japan) containing 'ဂျပန်နိုင်ငံ၏ ကာဗွန်လျော့ချရေး ရည်ရွယ်ချက် ဖြစ် ပြောက်အောင်မြင်စေရန် ဆောင်ရွက်ရက်' (Japan's carbon reduction goal achievement). On the right is a box for 'အိမ်ရှင်နိုင်ငံ (Myanmar) JCM စီမံကိန်း' (Myanmar JCM Project) containing 'MRV' and 'ဖန်လုံအိမ်ဓာတ်ငွေ့ ထုတ်လွှတ်မှုလျော့ချခြင်းနှင့် သစ်စွန်းစိုက်ပျိုးခြင်းဖြင့် ကာဗွန်ပမာဏ လျော့ချခြင်း' (Carbon reduction through biomass cultivation). A double-headed arrow labeled 'Crediting' connects the two boxes. Text above the arrow reads 'ကာဗွန်လျော့ချရန် ထူးချွန်ပြောင်မြောက်သော နည်းပညာနှင့် ကျွမ်းကျင်မှု ဖွံ့ဖြိုးတိုးတက်ရန်' (Advanced technology and expertise for carbon reduction). Text below the arrow reads 'ပူးပေါင်းဆောင်ရွက်သည့်အဖွဲ့မှ MRV နည်းစနစ် ဖြင့် တိုင်းတာ၍ ဖွံ့ဖြိုးတိုးတက်ရန် ဆောင်ရွက်ခြင်း' (Measurement and achievement by the joint team using MRV technology).

တိုးတား → http://www.env.go.jp/earth/ondanka/mechanism/bilateral/attach/jcm-23bocm_trend1401_1.pdf


APPENDIX XVI PRESENTATION FROM E GUARD ENVIRONMENTAL SERVICES



စီမံကိန်းကြောင့် ဖြစ်ပေါ်လာနိုင်သော ကောင်းကျိုး သက်ရောက်မှုများ

- လျှပ်စစ်မဂ္ဂါဝပ်များကို အနီးပတ်ဝန်းကျင်ရှိကျေးရွာများအား ဖြန့်ဖြူးပေးနိုင်ခြင်း၊
- စွန့်ပစ်စပါးခွံများပြားသော ဒေသတွင် အမှိုက်မှ မီးလင်းရေး (Wastes to Energy) နည်းဗျူဟာ ကို ကျယ်ပြန့်စွာ အကောင်အထည်ဖော်နိုင်ခြင်း ၊
- ဧရာဝတီတိုင်း၏ လူမှုစီးပွားရေး အခြေအနေ နှင့် အလုပ်အကိုင်အခွင့်အလမ်း များ တိုးတက်စေခြင်း ၊
- ဆင်းရဲနွမ်းပါးမှု လျော့ချနိုင်ရေး၊
- စပါးခွံသုံး ဓာတ်အားပေးစက်ရုံ နည်းပညာများ တိုးတက်ပြန့်ပွားလာစေခြင်း ၊

9 **E-Guard Environmental Services**




ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှု အစီအစဉ်

ဆိုးကျိုးလျော့နည်းစေမည့် ဆောင်ရွက်မှုများနှင့် တောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်

စက်ရုံတည်ဆောက်ခြင်းကာလ

10 **E-Guard Environmental Services**



ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်

စဉ်	သက်ရောက်မှု	စီမံကိန်းဆောင်ရွက်ချက်	လျော့နည်းစေရန် ဆောင်ရွက်မှု
၁။	လေအရည်အသွေး	<ul style="list-style-type: none"> လုပ်ငန်းသုံးယာဉ်များနှင့် ယန္တရားများသွားလာခြင်းမှ ဖုန်တခြင်း၊ အခြား ဓါတ်ငွေ့ များ ထွက်ခြင်း ၊ 	<ul style="list-style-type: none"> စက်ရုံတွင်းလမ်းများအား ရေဖျန်းခြင်း၊ လုပ်ငန်းသုံးယာဉ်များ၏ အရိန်နှင့် လောင်စာအသုံးပြုမှုအား ထိန်းချုပ်ခြင်း ၊
၂။	မြေပေါ်မြေအောက် ရေအရည်အသွေး	<ul style="list-style-type: none"> ယာဉ်ယန္တရားများနှင့် စက်များမှ ဆီများယိုစိမ့်ခြင်း ၊ မိလ္လာရေဆိုးများကြောင့် ညစ်ညမ်းခြင်း ၊ 	<ul style="list-style-type: none"> လုပ်ငန်းသုံးယာဉ်များအား ပုံမှန်စစ်ဆေးခြင်းနှင့် ကောင်းမွန်သောယာဉ်ယန္တရားများ၊ စက်များ အသုံးပြုခြင်း၊ ကောင်းမွန်သော မိလ္လာရေဆိုးစနစ်ကို စနစ်တကျ ပြုလုပ်ခြင်း၊
၃။	ဆူညံသံ	<ul style="list-style-type: none"> အဆောက်အဦးများတည်ဆောက်ခြင်းနှင့် စက်ပစ္စည်းများ တပ်ဆင်ခြင်း၊ မီးစက်များ လည်ပတ်ခြင်း ၊ 	<ul style="list-style-type: none"> လုပ်ငန်းခွင်ပတ်ဝန်းကျင်တွင် ဆူညံသံကာပစ္စည်းများ တပ်ဆင်ခြင်း၊ အလုပ်သမားများအား အများပြည်သူ အိပ်စက် အနားယူသည့် ညအချိန်တွင် အလုပ်လုပ်ခြင်းကို တားမြစ်ခြင်း၊


11 **E-Guard Environmental Services**



ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်

စဉ်	သက်ရောက်မှု	စီမံကိန်းဆောင်ရွက်ချက်	လျော့နည်းစေရန် ဆောင်ရွက်မှု
၄။	လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် တေးအန္တရာယ် ကင်းရှင်းရေး	<ul style="list-style-type: none"> လုပ်ငန်းခွင်သုံးယာဉ်နှင့် ယန္တရားများသွားလာခြင်း ၊ အဆောက်အဦးများ ဖြိုဖျက်ခြင်း ၊ 	<ul style="list-style-type: none"> လုပ်ငန်းခွင် အန္တရာယ် ကာကွယ်ရေးပစ္စည်းများ (PPE) အသုံးပြုစေခြင်း၊ လိုအပ်သော သင်တန်းများ၊ မီးသတ်သင်တန်းများနှင့် အခြား စက်ပစ္စည်းများကိုင်တွယ်အသုံးပြုနည်း သင်တန်းများပို့ချခြင်း ၊ သတိပေးဆိုင်ဘုတ်များတပ်ဆင်ခြင်း ၊ မတော်တဆမှုများဖြစ်ပွားပါက နီးစပ်ရာဆေးရုံ၊ ဆေးခန်းများသို့ ပို့ဆောင်ရန် အစီအစဉ်များ ရေးဆွဲထားခြင်း ၊
၅။	စွန့်ပစ်ပစ္စည်း	<ul style="list-style-type: none"> အဆောက်အဦး တည်ဆောက်ရာမှ ထွက်ရှိလာသော အပိုင်းအစများ၊ အလုပ်သမားများမှ ထွက်ရှိသော မိလ္လာအညစ်အကြေးများ နှင့် ရေဆိုးများ ၊ 	<ul style="list-style-type: none"> ထွက်ပေါ်လာသော စွန့်ပစ်ပစ္စည်းများအား သက်ဆိုင်ရာ စည်ပင်သာယာရေး အဖွဲ့နှင့် ချိတ်ဆက်ခြင်း ၊ အန္တရာယ်ရှိသောစွန့်ပစ်ပစ္စည်းများ ယာယီသိုလှောင်သည့်နေရာတွင် စနစ်တကျသိုလှောင်ခြင်း ၊

12 **E-Guard Environmental Services**



ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်

ဆိုးကျိုးလျော့နည်းစေမည့် ဆောင်ရွက်မှုများနှင့် စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်

စက်ရုံလည်ပတ်သည့်ကာလ

13 E Guard Environmental Services



ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်

စဉ်	သက်ရောက်မှု	စီမံကိန်းဆောင်ရွက်ချက်	လျော့နည်းစေရန် ဆောင်ရွက်မှု
၁။	လေအရည်အသွေး	<ul style="list-style-type: none"> စပါးခွဲများသယ်ယူရာတွင် အမှုန်များထခြင်း၊ ဘေးထွက်ပစ္စည်းဖြစ်သော ပြာများမှ လေထုထဲသို့ ပြန့်နှံ့ခြင်း၊ လုပ်ငန်းသုံး ယန္တရားများလည်ပတ်ရာမှ စာတိဋ္ဌများထွက်ခြင်း၊ 	<ul style="list-style-type: none"> အမှုန်စုပ်သည့်စနစ်နှင့် အမှုန်ဖမ်းသည့်စနစ်များ တပ်ဆင်ခြင်း၊ စက်ရုံတွင်းလမ်းအား ရေဖျန်းခြင်း၊ လုပ်ငန်းသုံးယာဉ်ယန္တရားများနှင့် စက်များအား ပုံမှန်စစ်ဆေးခြင်း၊ ကောင်းမွန်သောယာဉ်ယန္တရားများနှင့် စက်များအသုံးပြုခြင်း၊ လုပ်ငန်းသုံးယာဉ်များ၏ အရှိန်နှင့် လောင်စာအသုံးပြုမှုအား ထိန်းချုပ်ခြင်း၊
၂။	မြေပေါ်မြေအောက် ရေအရည်အသွေး	<ul style="list-style-type: none"> ယာဉ်ယန္တရားများနှင့် စက်များမှ ဆီများယိုစိမ့်ခြင်း၊ မိလ္လာရေဆိုးများ၊ ဘေးထွက်ပစ္စည်းဖြစ်သော အနယ်အနှစ်များ ကြောင့် ညစ်ညမ်းခြင်း၊ အသုံးပြုထားသော ရေများအား မြစ်အတွင်းသို့ပြန်လည်စွန့်ထုတ်ခြင်း၊ 	<ul style="list-style-type: none"> လုပ်ငန်းသုံးယာဉ်များအား ပုံမှန်စစ်ဆေးခြင်း နှင့် ကောင်းမွန်သောယာဉ်ယန္တရားများ၊ စက်များ အသုံးပြုခြင်း၊ ရေစီးရေလာကောင်းအောင် ပြုလုပ်ခြင်း၊ စွန့်ထုတ်ရေများကို သေချာစွာသန့်စင် ပြီးမှစွန့် ထုတ်ခြင်း၊ ကောင်းမွန်သော မိလ္လာရေဆိုးစနစ်ကို စနစ်တကျ ပြုလုပ်ခြင်း။

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ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်

စဉ်	သက်ရောက်မှု	စီမံကိန်းဆောင်ရွက်ချက်	လျော့နည်းစေရန် ဆောင်ရွက်မှု
၃။	မြေအရည်အသွေး	<ul style="list-style-type: none"> ထွက်လာသောပြာမှုန်များကို စုပုံထားခြင်း၊ 	<ul style="list-style-type: none"> ပြာစုပုံ သည့် နေရာ တွင် မြေအောက်ရေသို့ စိမ့်ဝင်မှု မရှိစေရန် ဆောင်ရွက်ခြင်း၊ ပြာစုပုံ သည့် နေရာ ကို စနစ် တကျ အမိုးအကာ ဖြင့်ဆောင်ရွက်ခြင်း၊
၄။	ဆူညံသံ	<ul style="list-style-type: none"> လုပ်ငန်းသုံးယာဉ်များနှင့် ယန္တရားများ သွားလာခြင်း။ ဘိဉ်လာများနှင့် ဂျင်နရေတာများ လည်ပတ်ခြင်း၊ 	<ul style="list-style-type: none"> အလုပ်သမားများအား သင့်လျော်သည့် ဆူညံသံလျော့ချနိုင်သော လုပ်ငန်းခွင်သုံး ပစ္စည်းများ အသုံးပြုစေခြင်း၊ အလုပ်သမားများအား အလုပ်ချိန် အလှည့်ကျစနစ်ဖြင့်ဆောင်ရွက်စေခြင်း၊ စက်ရုံတွင်းသစ်ပန်းများစိုက်ပျိုးခြင်း၊ ကောင်းမွန်သောယာဉ်ယန္တရားများ အသုံးပြုခြင်းနှင့် ပုံမှန်စစ်ဆေးခြင်း၊ ဆူညံသံ နည်းသော ဂျင်နရေတာ များအား အသုံးပြုခြင်း၊

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ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်


စဉ်	သက်ရောက်မှု	စီမံကိန်းဆောင်ရွက်ချက်	လျော့နည်းစေရန် ဆောင်ရွက်မှု
၅။	မီးဘေးအန္တရာယ်	<ul style="list-style-type: none"> စပါးခွဲသို့လောင်သည့် နေရာနှင့် စွန့်ပစ်ပစ္စည်း (အစိုင်အခဲ)များ ယာယီစုပုံသည့်နေရာ 	<ul style="list-style-type: none"> စပါးခွဲများအားယာယီစုပုံရန် အမိုးအကာဖြင့် သီးသန့်နေရာထားရှိခြင်း၊ စက်ရုံ၏ဝင်ပေါက်များအား ရှင်းလင်းထားခြင်း၊ မီးသတ်ဆေးဘူးများ အလုံအလောက်ထားရှိခြင်း၊ အချက်ပေးစနစ်များတပ်ဆင်ခြင်း၊ စက်ရုံတွင်းဆေးလိပ်သောက်ခြင်းအား တားမြစ်ခြင်း၊
၆။	စွန့်ပစ်ပစ္စည်း	<ul style="list-style-type: none"> အသုံးပြုမည့်ရေနှင့် စွန့်ထုတ်မည့်ရေများ သန့်စင်မှုပြုလုပ်ခြင်း။ ပြာ များထွက်ရှိခြင်း။ ရုံ၊ မီးဖိုချောင်နှင့် ဝန်ထမ်းအဆောင်များမှ ထွက်သော စွန့်ပစ်ပစ္စည်းများ 	<ul style="list-style-type: none"> အသုံးပြုထားသည့်ရေများကို စနစ်တကျ သန့်စင်သည့်စနစ်များ တပ်ဆင်ခြင်း၊ အန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းများအား သီးသန့်နေရာတွင် ထားရှိခြင်း၊ စပါးခွဲမီးရှို့ရာတွင် သက်ပတ်ထားသော အပူချိန်အတွင်းသာ ပြုလုပ်ခြင်း။

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ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် 			
စဉ်	သက်ရောက်မှု	စီမံကိန်းဆောင်ရွက်ချက်	လျော့နည်းစေရန် ဆောင်ရွက်မှု
			<ul style="list-style-type: none"> ထွက်ရှိလာသော ဖြိုပြာမှုန့်များ (fly ash) ကို Ash Handling စနစ်ဖြင့် ထိန်းသိမ်းခြင်း။ စွန့်ပစ်ပစ္စည်းအမျိုးအစားပေါ် မူတည်၍ ခွဲခြားသို့လှောင်ပြီး သက်ဆိုင်ရာ စည်ပင်သာယာရေးအဖွဲ့နှင့် ချိတ်ဆက်ဆောင်ရွက်ခြင်း ၊
၇။	လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး	<ul style="list-style-type: none"> လုပ်ငန်းခွင်သုံးယာဉ်နှင့် ယန္တရားများသွားလာခြင်းနှင့် စက်များလည်ပတ်ခြင်းကြောင့် မတော်တဆထိခိုက်မှုများ ၊ စပါးခွံများစုပုံ သည့် နေရာတွင် အင်းဆက်ပိုးမွှားများ ခိုအောင်းနိုင်ခြင်း ၊ စွန့်ပစ်ပစ္စည်း အစိုင်အခဲများနှင့် အရည်များယာယီ စုပုံခြင်း ၊ 	<ul style="list-style-type: none"> လုပ်ငန်းခွင် အန္တရာယ် ကာကွယ်ရေးပစ္စည်းများ (PPE) အသုံးပြုခြင်း ၊ လိုအပ်သောသင်တန်းများ၊ မီးသတ်သင်တန်းများနှင့် အခြား စက်ပစ္စည်းများကိုင်တွယ်အသုံးပြုနည်း သင်တန်းများပို့ချခြင်း ၊ သတိပေးဆိုင်းဘုတ်များတပ်ဆင်ခြင်း မတော်တဆမှုများဖြစ်ပွားပါက နီးစပ်ရာဆေးရုံ၊ ဆေးခန်းများသို့ ပို့ဆောင်ရန် အစီအစဉ်များ ရေးဆွဲထားခြင်း ၊

ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် 

ဆိုးကျိုးလျော့နည်းစေမည့် ဆောင်ရွက်မှုများနှင့် စောင့်ကြပ်ကြည့်ရှုမည့် အစီအစဉ်



စီမံကိန်းဖျက်သိမ်းသည့်ကာလ

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ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ် 

သက်ရောက်မှုများ

- ၁ လေအရည်အသွေး
- ၂ မြေပေါ် မြေအောက် ရေအရည်အသွေး
- ၃ မြေအရည်အသွေး
- ၄ ဆူညံသံ
- ၅ မီးဘေးအန္တရာယ်
- ၆ စွန့်ပစ်ပစ္စည်း
- ၇ လုပ်ငန်းခွင် ကျန်းမာရေးနှင့် ဘေးအန္တရာယ် ကင်းရှင်းရေး

❖ ဖော်ပြပါ သက်ရောက်မှုများကို လျော့နည်းစေရန် စီမံကိန်းဖျက်သိမ်းသည့်ကာလတွင် လုပ်ဆောင်ရန် သင့်လျော်သော နည်းလမ်းသစ်များ၊ နည်းပညာသစ်များဖြင့် ထိခိုက်မှု အနည်းဆုံး ဖြစ်စေရန် အစီအစဉ်များအား အကြံဉာဏ်ပေးခြင်း

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မကျေလည်မှုများကိုဖြေရှင်းပေးမည့် အစီအစဉ် 



ပြောင်းမြဲ မြို့နယ် အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာနမှ ကိုယ်စားလှယ်တစ်ဦး

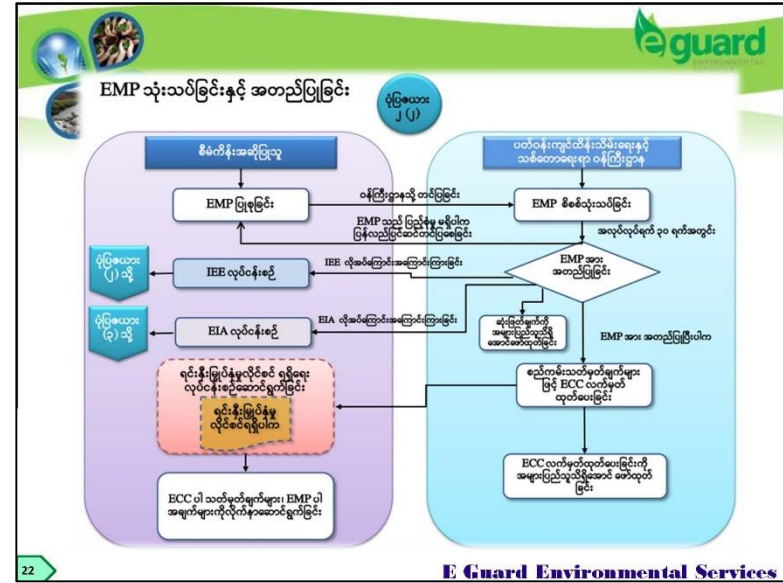
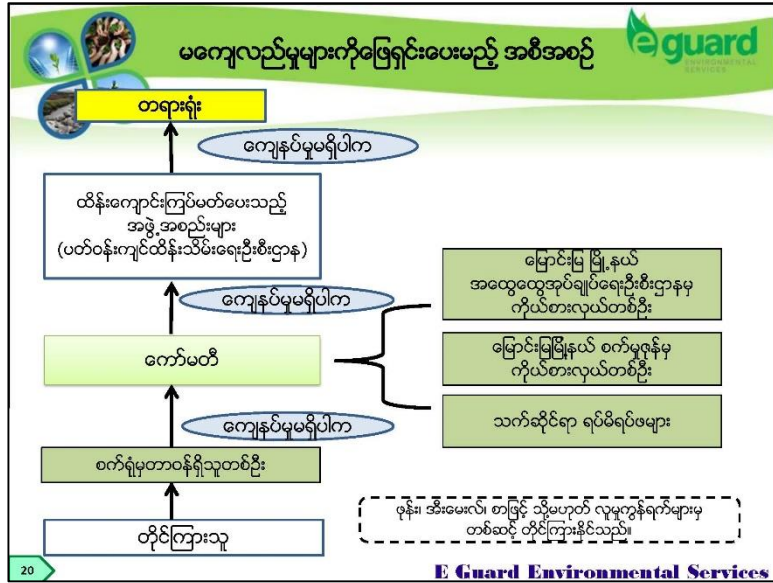
ပြောင်းမြဲမြို့နယ် စက်မှုဇုန်မှ ကိုယ်စားလှယ်တစ်ဦး

သက်ဆိုင်ရာ ရပ်မိရပ်ဖများ

စုန်း၊ အီးမေလ်၊ စာဖြင့် သို့မဟုတ် လူမှုကွန်ရက်များမှ တစ်ဆင့် တိုင်ကြားနိုင်သည်။

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APPENDIX XVII PHOTOS OF PUBLIC CONSULTATION

Registration by attendee



Presentation by Myaung Mya Biomass Power Generation Co., Ltd.



Presentation by E Guard Environmental Services



Asking questions concerning with potential impacts of project by Attendee



Asking questions concerning with potential impacts of project by Attendee



Answering the questions concerning with potential impacts of project by E Guard Environmental Services



APPENDIX XVIII DETAIL LISTS OF EQUIPMENT IN OPERATION SYSTEM

No.	Item No	Item Description	Quantity
	1.0	Boiler and its auxiliary equipment	
1	A-1-1	Steam drum with internals	1
2	A-1-2	Water drum	1
3	A-2-1	Boiler bank tubes	1
4	A-2-2	Lugs for bank tubes	1
5	A-3-1	INBED cols	1
6	A-4-1	Primary SUPERHEATER COLIS with Header, Stub and Coil sleeves	1
7	A-4-2	Secondary SUPERHEATER COLIS with Header, Stub and Coil sleeves	1
8	A-5-1	INTERSTAGE attemperator assembly	1
9	A-6-1	Atmospheric fluidized bed combustion (AFBC) Furnace	1
10	A-6-2	Boiler Furnace wall-front panel with bottom header	1
11	A-6-3	Boiler Furnace wall-rear panel with bottom header	1
12	A-6-4	Boiler Furnace wall-RHS panel with bottom header	1
13	A-6-5	Boiler Furnace wall-LHS panel with bottom header	1
14	A-6-6	Access doors, distributor plate along with welded air nozzles, plenum chamber	1
15	A-6-7	Plenum chamber with ash drain ports	1
16	A-7-1	DOWNCOMER (Water drum to INBED headers)	1
17	A-7-2	Riser (Water wall side top headers to steam drum)	1
18	A-8-1	Economiser consists of coil, I/L & O/L Header, casing	1
19	A-9-1	Air pre heater (APH)	1
20	A-9-2	Force draught (FD) Fan with drive motor	2
21	A-9-3	Primary air (PA) Fan with drive motor	1
22	A-9-4	Induced draught (ID) Fan with VFD	2
23	A-11-1	Ducting from FD fan to APH	1
24	A-11-2	Ducting from APH to Plenum hopper	1
25	A-11-3	PA Fan Inlet and outlet Duct	1
26	A-11-4	APH Bypass Ducting	1
27	A-11-5	Ducting from boiler bank to APH	1
28	A-11-6	Ducting from APH outlet to electrostatic precipitator (ESP) Inlet	1
29	A-11-7	Ducting from ESP to ID fans	1
30	A-11-8	Duct from ID fans to chimney	1
31	A-10-1	Soot Blower	1
32	A-10-2	Blowdown tank with valves and fittings	1
33	A-10-3	High pressure (HP) & Low pressure (LP) chemical dosing unit	1
34	A-10-4	Sample cooler	1
35	A-10-5	Boiler internal piping with fittings, valves and instruments	1
36	A-12-1	Boiler bank hopper	1
37	A-12-2	Fuel bunker and bed material bunker	1
38	A-12-3	Fuel feeders with VFD	1
39	A-12-4	APH Hopper	1

40	A-12-5	Fuel conveying chute from bunker to fuel feeders and under bed conveying pipe	1
41	A-12-6	Expansion joints	1
42	A-12-7	Fuel mixing nozzles	1
43	A-12-8	Dampers	1
44	A-13-1	Furnace structure	1
46	A-13-2	Boiler Supporting structures with ladders, Platforms	1
47	A-13-3	APH, Economizer, Fuel bunker supporting structures	1
48	A-15-1	Refractory bricks for furnace	1
49	A-15-2	Insulation material for boiler and piping	1
50	A-15-3	Instruments for boiler system	1
51	A-19	Boiler canopy with side sheeting	1
52	A-20	Motor control center (MCC) for boiler and its auxiliaries	1
53	A-21	PLC based control panel for boiler and its auxiliaries	1
	2.0	Pollution control equipment	
54	A-17-1	ESP with bottom ash hopper and insulation material	1
55	A-17-2	Support structure for ESP	1
56	A-17-3	MCC (Motor Control Center) CUM Control panel for ESP	1
57	A-17-4	MS Chimney	1
	3.0	Boiler water system (Power Cycle)	
58	C-1	Boiler Feed Pump with variable frequency drive (VFD) Drive Moor	1
59	C-2	Flow control Station	1
60	C-3	Deaerator	1
61	C-4	Deaerator water storage tank	1
62	C-5	Deaerator Level & Pressure control station	1
63	C-6	DM Water piping, valves and instruments for this system	1
	4.0	Fuel (Rice Husk) Handling System: From Storage Silo to RH Bunker at Boiler	
64	D-1	Rice Husk (RH) silo discharge conveyors	2
65	D-2	Conveyor from rice husk (RH) silo discharge conveyors to boiler RH bunker	1
66	D-3	Conveyor Support System	1
67	D-4	Bag filter at rice husk bunker at boiler	1
68	D-5	Void	1
69	D-6	Vent Fan	1
70	D-7	Field instruments for this system	1
71	D-8	MCC CUM control panel (relay based) for conveying system	1
	5.0	ASH Handling System	
72	E-1	Dust Collection System	1
73	E-2	Bottom Ash conveyor	1
74	E-3	Bottom ash silo fitted with vent and diaphragm plate	1
75	E-4	Ash transmitter	1
76	E-5	Fly ash conveying pipe with fittings	1
77	E-6	Fly ash silo	1
78	E-7	Valves and instrument for ash handling system	1






79	E-8	Equipment support structures	1
80	E-9	Starter cum PLC control panel for bottom ash handling system	1
81	E-10	Starter cum control PLC based panel for fly ash handling system	1
	6.0	Plant Water System	
82	F-1-1	Raw water supply pump	1
83	F-1-2	Fire water pump (Motor Driven)	1
84	F-1-3	Fire water pump (Engine Driven)	1
85	F-1-4	Fire water jockey pump	1
86	F-2-1	Ozonator (Optional)	1
87	F-2-2	Ozonator recirculation pump (Optional)	1
88	F-2-3	Lime dosing tank-PVC	1
89	F-2-4	Lime dosing pump	1
90	F-2-5	FeCl ₃ dosing tank	1
91	F-2-6	FeCl ₃ dosing pump	1
92	F-2-7	Polelectrolyte dosing tank	1
93	F-2-8	Ployelectrlyte dosing pump	1
94	F-2-9	Flash mixer cum flocculator	1
95	F-2-10	Agitator for Flash mixer with gear motor	1
96	F-2-11	Agitator for Flocculator with gear motor	1
97	F-2-12	Lamella clarifier	1
98	F-2-13	Clarified water storage tank	1
99	F-2-14	Filter feed pump	1
100	F-2-15	Multimedia or dual media Filter	1
101	F-2-16	Activated carbon Filter	1
102	F-2-17	Filtered water storage tank	1
103	F-2-18	River water intake pump	1
104	F-3-1	Filtered water supply pumps to softener plant and distribution to other facility	1
105	F-3-2	Softener plant	1
106	F-3-3	Softened water storage tank	1
107	F-3-4	Softened water distribution pumps	1
108	F-4-1	RO feed pump	1
109	F-4-2	Antiscalant dosing tank	1
110	F-4-3	Antiscalant dosing pump	1
111	F-4-4	NaOH dosing tank	1
112	F-4-5	NaOH dosing pumps	1
113	F-4-6	SMBS (Sodium Meta BI-Sulphite) dosing tank	1
114	F-4-7	SMBS dosing pumps	1
115	F-4-8	Micron cartridge filter	1
116	F-4-9	High pressure pumps	1
117	F-4-10	RO pressure tube	1
118	F-4-11	RO membrane	1
119	F-4-12	RO CIP tank	1
120	F-4-13	RO CIP pump	1
121	F-4-14	Micron cartridge filter for CIP	1
123	F-4-15	RO Permeate tank	1

124	F-4-16	EDI Feed pump	1
125	F-4-17	EDI unit	1
126	F-4-18	DM water tank	1
127	F-4-19	Filling pump to boiler/deaerator	1
128	F-4-20	Pipe & Valves for above system	1
129	F-5-1	MCC for water treatment system	1
130	F-5-2	PLC based control panel for water treatment system	1
131	F-5-3	Instruments of entire water treatment system	1
	7.0	Circulating Cooling water (CCW) system	
132	G-1	Cooling tower	2
133	G-2	Cooling tower fan with gearbox & motor	2
134	G-3	Main cooling water pump with drive motors	1
135	G-4	Auxiliary cooling water pump with drive motors	1
136	G-5	Piping, Valves and instruments for circulating cooling water system	1
	8.0	Plant Piping system & Valves	
137	A-14-1	Main steam line from boiler main steam stop valve (MSSV) to turbine inlet	1
138	A-14-2	Compressed air and instrument air line	1
139	A-14-3	All drain and vent lines	1
140	A-14-4	Steam piping to soot blower	1
141	A-14-5	Hardware and fittings required in the above stated lines	1
142	A-14-6	Instrument required in the above stated lines	1
	9.0	Auxiliary equipment & system	
143	H-1-1	Air compressor	1
144	H-1-2	Air Filter	1
145	H-1-3	Air receiver with accessories	1
146	H-1-4	Air drier	1
147	H-1-5	Air filter regulator	1
148	H-1-6	Air conditioner	1
149	H-1-7	Hydrant water supply system	1
150	H-1-8	Hose box with flexible hose pipe	1
151	H-1-9	Portable foam extinguisher	1
152	H-1-10	Insulation material for balance of Plant items	1
153	H-1-11	Painting	1
154	H-1-12	EOT (Electric overhead type) Crane for TG Building	1
	10.0	Rice Husk unloading & storing system	
155	H-2-1	Rice Husk storage silo with support structures	2
	11.0	Electrical system	
156	J-1-1	Generator proper- 400V	1
157	J-1-2	Generator PT (Potential Transformer)/CT (Current transformer) & SA (Surge Arrestor) cubicle	1
158	J-1-3	Generator neutral grounding cubicle	1
159	J-1-4	Generator control & Protection panel	1
160	J-1-5	Generator breaker (400V-LT) & Synchronizing Panel	1
161	J-2-1	Plant MSB (Main Switch Board)	1

162	J-2-2	Battery with stand	1
163	J-2-3	Battery charger panel	1
164	J-2-4	DC distribution board	1
165	J-2-5	DC motor starter panel	1
166	J-2-6	LT (Low Tension) power Cable	1
167	J-2-7	Control cable	1
168	J-2-8	Cable tray with accessories such as cable tie, fastener ETC	1
169	J-2-9	UPS (uninterrupted power system)	1
170	J-2-10	Grounding material	1
171	J-2-11	Lightning arrestor	1
172	J-2-12	Plant area lighting with fixtures including main lighting distribution board (MLDB)	1
173	J-2-13	Alternative current (AC) single phase distribution board (ACDB)	1
	12.0	Control and instrumentation	
174	K-1	DCS	1
175	K-2	Starter cum control panel (Relay based) for raw water and fire water stream	1
176	K-3	PLC based local control panel for compressor	1
177	K-4	Relay based control panel for sump pumps	1
178	K-5	Engineering Cum workstation	1
179	K-6	Work station	1
180	K-7	Large video screen	1
181	K-8	Miscellaneous field instruments	1
182	K-9	Control valves	1
183	K-10	Analyzers	1
184	K-11	Instrument cables	1
185	K-12	Erection hardware for instrument hook-up	1
186	A-16-1	Pressure reducing and desuperheating station (PRDS)	1
	13.0	Steam Turbine & Its Auxiliary Equipment	
187	B-1-1	Steam turbine proper with cover	1
188	B-1-2	Steam turbine governor	1
189	B-1-3	Steam turbine sole plate	1
190	B-1-4	Main stop valve	1
191	B-1-5	Governor valve	1
192	B-1-6	Extraction control valve	1
193	B-1-7	Turning device	1
194	B-2-1	Main lube oil pump (Driven by turbine)	1
195	B-2-2	Auxiliary oil pump with AC Drive Motor	1
196	B-2-3	Emergency oil pump with DC motor	1
197	B-2-4	Oil purifier	1
198	B-2-5	Oil coolers	1
199	B-2-6	Oil filter	1
200	B-2-7	Oil reservoir	1
201	B-2-8	Vapour breather	1
202	B-2-9	Piping for LUB oil system	1
203	B-2-10	Valves for LUB oil system	1

204	B-3-1	Main condenser with expansion joint and hotwell	1
205	B-3-2	Flash box for main condenser	1
206	B-3-3	Condensate extraction pump with drive motor	1
207	B-3-4	Vacuum pumps assembly with cooler	1
208	B-3-5	Instruments	1
209	B-3-6	Turbine control panel & Starter panel	1

APPENDIX XIX PERSONAL PROTECTIVE EQUIPMENT AND THEIR FUNCTIONS

Function of PPE	Feature and Characteristics
Protective Goggles (Suitable for protection from dust, particle, chips, chemical splattering)	
Goggles with direct vents are not suitable for protection from chemical splattering or smoke.	
Hearing Protection	
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.	
Respiratory Protection	
Dust mask: lightweight mask that is fitted over the nose and mouth and secured behind the head with elastic.	
Head Protection	
Use head gear which conforms to recognized safety standards	

Hand and Arm Protection	
<p>Gloves for common tasks (cotton/ leather)</p>	
Foot Protection	
<p>Select footwear that fits the purpose and conforms to recognized safety standards.</p>	
Body Protection	
<p>Reflective clothing: For working in busy traffic: brightly-colored reflective clothing can increase the visibility of employees and reduce their chances of being struck by vehicles or machinery</p>	

APPENDIX XX SAFETY SIGNAGE AT THE PROPOSED PROJECT SITE

The project proponent must tag the following safety sign near the project area.

SITE SAFETY			
	Construction work in progress. Parents are advised to warn children of the dangers of entering this site		Danger Demolition work in progress
	No admittance for unauthorised personnel		Use ear protectors
	This is a hard hat area		High visibility jackets must be worn
	Protective footwear must be worn		Danger Look out for overhead loads



Fire action

- 

Sound the alarm

- 

Leave building by nearest available exit

- 

Report to assembly point

 Fire assembly point
- 

Do not return to the building until authorised to do so
- 

Do not use the lifts



Danger
Highly flammable





No smoking or naked lights

APPENDIX XXI FIRE HAZARD PREPARATION AND PROTECTION



[FIRE]

A fire is both frightening and destructive. Fires are a danger to buildings and residents in equal measure. Keep your cool in the event of a fire by following these SAFE STEPS:

BE PREPARED...

 <p style="font-size: 8px; background-color: yellow; padding: 2px;">PREPARE YOUR GO-BAGS</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">KNOW AND PRACTICE YOUR ESCAPE ROUTE</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">FIRE ALARM GET IT INSTALL IT CHECK IT</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">DO NOT LEAVE BURNING CIGARETTES OR CANDLES UNATTENDED</p>
 <p style="font-size: 8px; background-color: yellow; padding: 2px;">PREPARE FIRE FIGHTING EQUIPMENT...</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">AND KNOW HOW TO EXTINGUISH A FIRE</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">PULL AIM SQUEEZE SWEEP</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">NEVER USE WATER OR FOAM EXTINGUISHER ON AN OIL OR ELECTRICAL FIRE</p>

IN CASE OF FIRE...

 <p style="font-size: 8px; background-color: yellow; padding: 2px;">IF YOUR CLOTHES CATCH FIRE... STOP</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">DROP</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">ROLL</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">IF THERE IS SMOKE...</p>
 <p style="font-size: 8px; background-color: yellow; padding: 2px;">STOP WHERE YOU ARE</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">DROP TO THE GROUND</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">ROLL ON THE FLOOR TO PUT OUT THE FLAMES</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">GET DOWN LOW - COVER YOUR MOUTH WITH A DAMP CLOTH AND GET OUT!</p>
 <p style="font-size: 8px; background-color: yellow; padding: 2px;">GET OUT THROUGH A SAFE EXIT</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">SOUND ALARM AND CALL FOR HELP</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">BEWARE OF GAS LEAKS AND EXPOSED WIRE</p>	 <p style="font-size: 8px; background-color: yellow; padding: 2px;">DO NOT GO HOME UNLESS LOCAL AUTHORITIES DEEM IT SAFE</p>








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SAFE STEPS TIPS APPROVED BY:  International Federation of Red Cross and Red Crescent Societies



KNOW YOUR FIRE EXTINGUISHERS COLOUR CODES

 <p>WATER</p> <ul style="list-style-type: none"> SAFE FOR USE ON WOOD, PAPER TEXTILES ETC. DO NOT USE ON LIVE ELECTRICAL EQUIPMENT DO NOT USE ON FLAMMABLE LIQUID FIRES DO NOT USE ON FLAMMABLE METAL FIRES 	 <p>DRY POWDER</p> <ul style="list-style-type: none"> SAFE FOR USE ON WOOD, PAPER TEXTILES ETC. SAFE FOR USE ON FLAMMABLE LIQUID FIRES SAFE FOR USE ON GASEOUS FIRES SAFE FOR USE ON ELECTRICAL FIRES 	 <p>CO₂ CARBON DIOXIDE</p> <ul style="list-style-type: none"> SAFE FOR USE ON FLAMMABLE LIQUID FIRES SAFE FOR USE ON ELECTRICAL FIRES DO NOT USE ON WOOD, PAPER, TEXTILES ETC DO NOT HOLD HORN WHEN OPERATING 	 <p>AFFF FOAM SPRAY</p> <ul style="list-style-type: none"> SAFE FOR USE ON WOOD, PAPER TEXTILES ETC. SAFE FOR USE ON FLAMMABLE LIQUID FIRES DO NOT USE ON LIVE ELECTRICAL EQUIPMENT DO NOT USE ON FLAMMABLE METAL FIRES 	<p>Fire Blanket</p> <p>FOR SMOTHERING FIRES</p> <ul style="list-style-type: none"> SAFE FOR USE ON CHIP PAN FIRES SAFE FOR USE ON DEEP FAT FIRES SAFE AND SUITABLE FOR WRAPPING AROUND SOMEONE WHOSE CLOTHES ARE BURNING 	 <p>WET CHEMICAL</p> <ul style="list-style-type: none"> SAFE FOR USE ON COOKING OILS & DEEP FAT FIRES SAFE FOR USE ON WOOD, PAPER TEXTILES ETC. DO NOT USE ON LIVE ELECTRICAL EQUIPMENT DO NOT USE ON FLAMMABLE LIQUID FIRES DO NOT USE ON FLAMMABLE GAS DO NOT PUT NOZZLE INTO FAT/OIL
---	---	--	---	---	---

HOW TO USE A FIRE EXTINGUISHER



-  **PULL THE PIN**
-  **AIM AT THE BASE OF FIRE**
-  **SQUEEZE THE LEVER**
-  **SWEEP SIDE TO SIDE**



APPENDIX XXII SPECIFICATION FOR WATER TREATMENT

BTIT ENGINEERING SOLUTION Pvt. Ltd.

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**ANNEXURE-I****Site Conditions:**

01. Ambient temperature	:	35 deg. C
02. Ambient Temperature (For electrical design)	:	45 deg. C
03. Barometric Pressure*	:	Corresponding to site elevation
04. Relative humidity	:	60 % (Design)
05. Site elevation*	:	250 m above MSL
06. Plant location	:	Myanmar
07. Seismic Zone	:	Zone II as per UBC
08. Maximum wind velocity	:	100 mph
09. Support structure design*	:	As per IS 800

<u>Electric power*</u>	:	Low Tension
Voltage	:	400 V \pm 10%
Frequency	:	50 Hz \pm 5 %
Combined variation	:	\pm 10%
Type	:	3 Phase, AC supply

Instrumentation

Voltage	:	220 V
Frequency	:	50 Hz \pm 5 %
Type	:	1 Phase, AC

Raw Water Quality:

The offered plants have been designed on the basis of following inlet water quality:

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
Turbidity	NTU	382
pH	-	7.3
Color Pt-Co		110
Appearance		Colorless
Electrical Conductivity	μ S/cm	158
Total Dissolved Solids	mg/ l	79

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Total Suspended Solids	mg/ l	363
Total Volatile Solids	mg/ l	45
Alkalinity	mg/ l	64
Calcium	mg/ l	34
Magnesium	mg/ l	18
Total Hardness	mg/ l	52
Bicarbonate	mg/ l	64
Iron	mg/ l	9.14
Chloride	mg/ l	10.00

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Guaranteed treated Water Quality and Quantity:

Treated Water Quality after Dual Media Filter and Activated Carbon Filter

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
pH		7.3
Total Suspended Solid	Ppm	< 10
Qty	M3/day	10

Treated Water Quality after Softener

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
pH		5.5 – 6
Total Hardness as CaCO ₃	ppm	≤ 5
Total dissolved solids	Ppm	79
Qty	M3/day	360

Treated Water Quality after RO

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
pH		5.5
Total Hardness as CaCO ₃	ppm	2
Total dissolved solids	ppm	< 4
Reactive Silica	ppm	0.5
Colloidal Silica	ppm	Nil

Treated Water (DM) Quality after EDI

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
pH		7.5 – 8.5
Total Hardness as CaCO ₃	ppm	0
Conductivity at 25 deg C	μS/cm	< 0.2
Oxygen max	ppm	0.007
Total dissolved solids	ppm	Nil
Reactive Silica	ppm	0.02

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Colloidal Silica	ppm	Nil
Total CO2	ppm	Nil
Permanganate No. (max)	ppm	Nil
Sodium as Na and Potassium as K	ppm	Nil
TDS	ppm	Nil before pH correction dosing
TSS	ppm	Nil
Residual Phosphate	Ppm	Nil
Qty	M3/day	10

1.4 Our approximate Reject Water Characteristics

At the outlet of Flocculator and Tube Settler

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
pH		8.5 – 9.2
Iron	ppm	30 – 50
TSS	ppm	1500 - 2000

At the outlet of Dual Media Filter and Activated Carbon Filter

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
Iron	ppm	3 – 4
TSS	ppm	260

At the outlet of Softener

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
pH		8.5 – 9.2
Salinity	ppm	1000
Brine Concentration		13%

At the outlet of Softener

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
pH		8.5 – 9.2

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Salinity	ppm	1000
Brine Concentration		13%

At the reject of RO System

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
pH		6 – 6.5
TDS	ppm	400
Bi-Carbonate	ppm	250

At the reject of Electro Di Ionization Unit

<u>Parameters</u>	<u>Unit</u>	<u>Value</u>
pH		6 – 6.5
TDS	ppm	60
Sodium	ppm	17
Chloride	ppm	15

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**Reject Water calculation**

- Our calculated waste water for Flocculator and Tube Settler 0.57 m³/ hr.
- Waste Water from Filters (Dual Media Filter and Activated Carbon Filter)

Steps	Flow rate (m ³ / hr)	Duration (mins) /day	Flow (m ³)
Backwash of ACF	15.9	10	2.65
Backwash of DMF	26.53	10	4.42
Common Rinse*	26.53	10	4.42
		Total time 30 mins	Total Flow 11.49 m ³

* Common rinse will discharge from ACF. So that we have mentioned ACF drain 7.07 m³ per day (4.42 m³ + 2.65 m³).

- Waste Water from Softener

Steps	Flow rate (m ³ / hr)	Duration (mins)	Flow (m ³)
Backwash Water	5.67	10	0.945
Injection	1.416	30	0.708
Slow rinse	1.416	46.6	1.1
Fast rinse	25.13	10.5	4.4
		Total time 96.6 mins	Total Flow 7.153 m ³

- Reject from RO 1.05 m³/ hr.
- Reject from EDI System is 80 LPH.

Operation Philosophy1. Raw Water Clarification

1.1 First Raw Water Transfer Pump (P – 1 A/B) will be started and it will feed raw water to the Cascade Aeration (CA) to reduce the iron level, before entering the aeration tank Hypochlorite or Poly Aluminium Chloride dosing will take place into the raw water storage tank. (P – 1 A/B) suction and discharge will be

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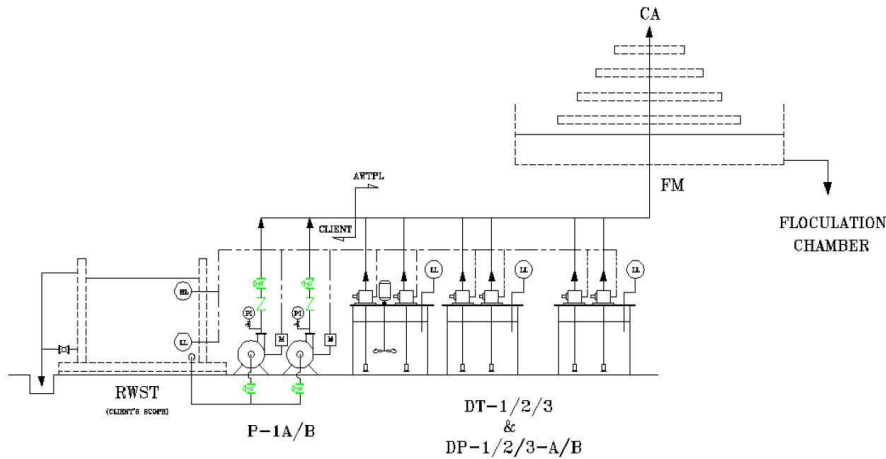
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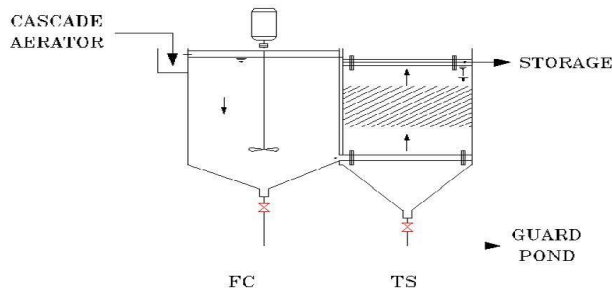
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interlocked with its Pneumatic Air operated Butterfly Valve. As per the PLC program valve will open along with the pump.

1.2 pH reducer, Alum and Lime will be dosed into the raw water. All dosing pump will be interlocked with the RWTP.



1.3 From aeration tank water will be stored into the flash mixer, then it will enter to the Flocculation Chamber (FC) and Tube Settler. Agitator of Flocculation Chamber will be starts along with the RWTP – 1 / 2.

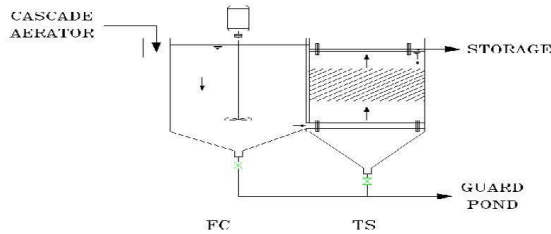


1.4 After that water will enter to the Tube Settler (TS) where the large particle will settle down. We have considered 2% loss for every hour. Two nos of manual valve will be kept at the drain of FC and TS. From the TS water will be stored into the Clarified Water Storage Tank (CWST).

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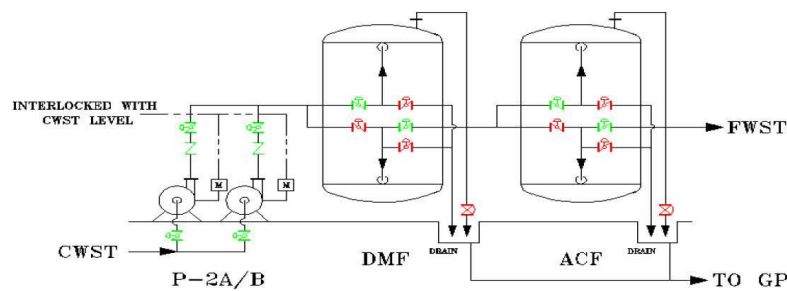
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2. Pre-Treatment

2.1 From the CWST water will be pumped through the Clarified Water Transfer Pump (P – 2 A/ B) to the Dual Media Filter to remove the turbidity and suspended solids of water. Then it will pass through the Activated Carbon Filter to reduce the color, odor and smell. We have shown the flow diagram for the service mode of the. Green auto valves (From the bellow flow diagram) should be opened for the service mode. Red valves will remain close. P – 1 A/ B will have auto timer and it will be programmed by the PLC through which it will automatically interchange its time of operation. Time can be set as per clients convenient.

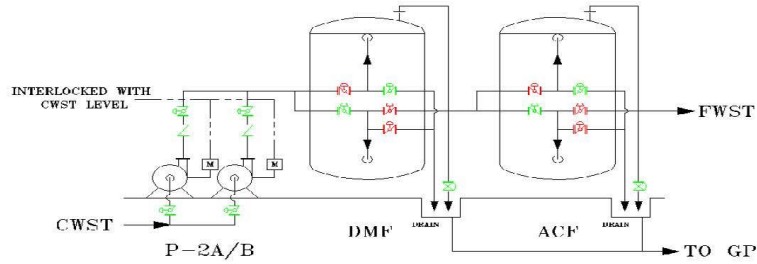


2.2 For the backwash purpose of Filter Feed Pump (P – 2 A/ B) will collect the water from Clarified Water Storage Tank (CWST). At the time of the Back Washing green colored valve will be opened and red marked valves will remain close as per the PLC. Both vessels will be backwashed individually and backwash water will be discharged at the drain. Before backwashing air release valve will open to release the air and overflow water.

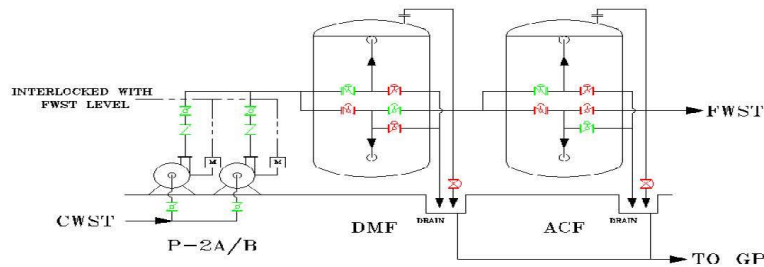
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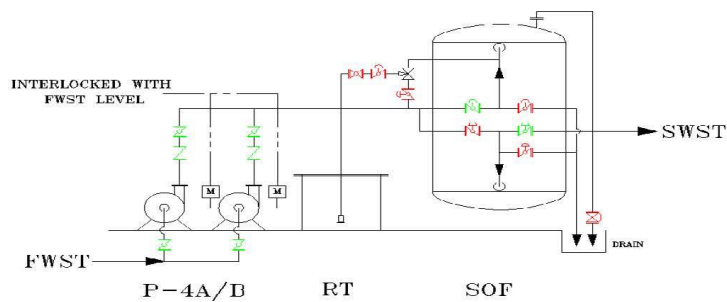


2.3 For the rinse purpose also P – 2 A/ B will be on operating condition. Filter (DMF and ACF) will be rinsed by the clarified water. Green colored valve will be opened and red marked valves will remain close by the PLC. There will be a common rinse for both vessels. Rinsed water will be discharged at the drain.



3. Water Softening Plant

3.1 After getting the signal from PLC Softener Feed Pump (P – 4 A/B) will collect the filtered water from the FWST to the Softener (SOF). For the service purpose green marked auto valve will open and red marked auto valve will remain close. After the SOF softened water will be stored into the Softened Water Storage Tank (SWST).

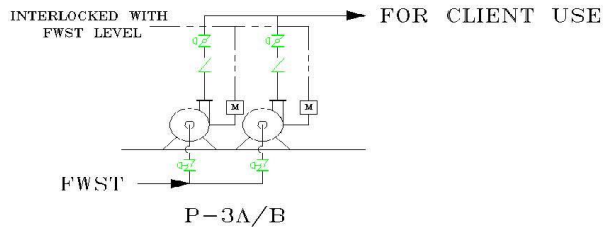


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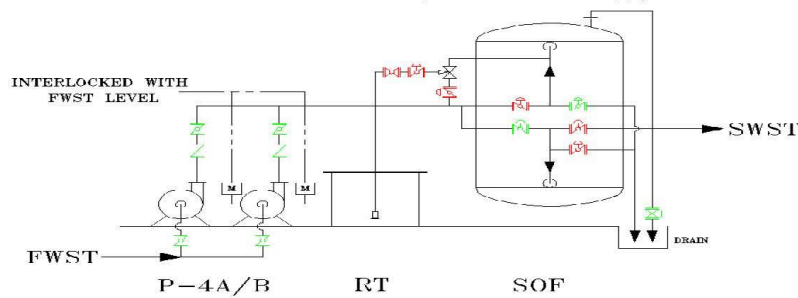
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Another two pumps P – 3 A/B will transfer the filtered water for client daily use.



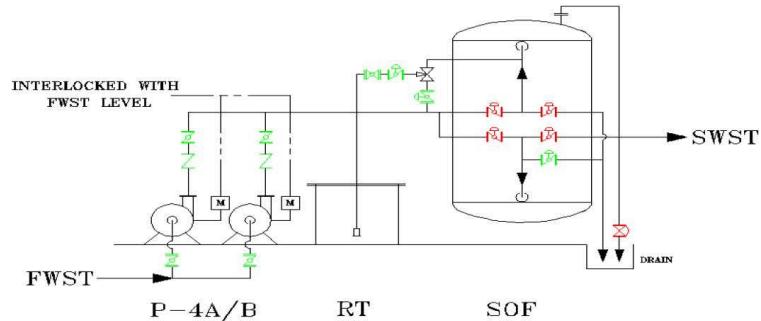
3.2 After 16 hrs of softener operation softener regeneration will be required. Before the regeneration backwash is needed to drain the unwanted particle which can be cause of improper regeneration of softener resin. For the backwash purpose green marked auto valve will open and red marked auto valve will remain close at the same time air release valve will also open. P – 4 A/ B will supply the water for backwash.



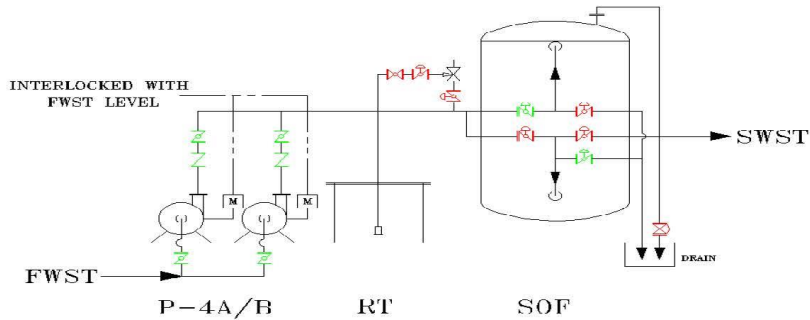
3.3 After completion of backwash regeneration should be started. For backwash purpose green marked auto valve will open and red marked auto valve will remain close. P – 4 A/ B will supply the power water and NaCl Solution will be prepared in Regeneration tank (RT).

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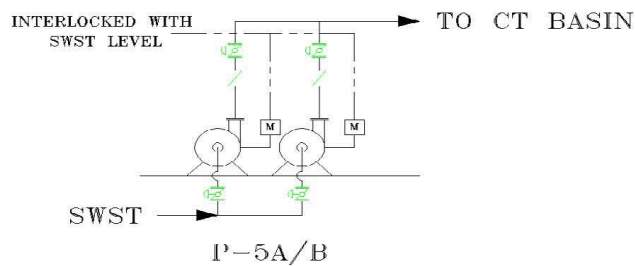


3.4 After 16 hrs of softener operation softener regeneration will be required. For the regeneration purpose green marked auto valve will open and red marked auto valve will remain close. P – 4 A/ B will supply the power water and NaCl Solution will be prepared in Regeneration tank (RT).



4. Cooling Tower make up line

4.1 Softened water will be suctioned by the Softened water Transfer Pump or Cooling Tower Make Up Pump (P – 5 A/ B) from the SWST and it will be fed primarily to the Cooling Tower Basin (CT Basin).



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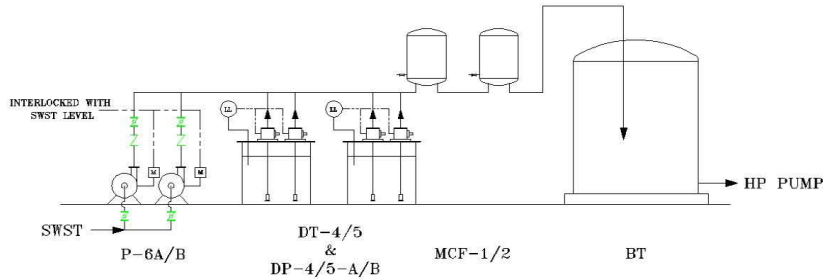
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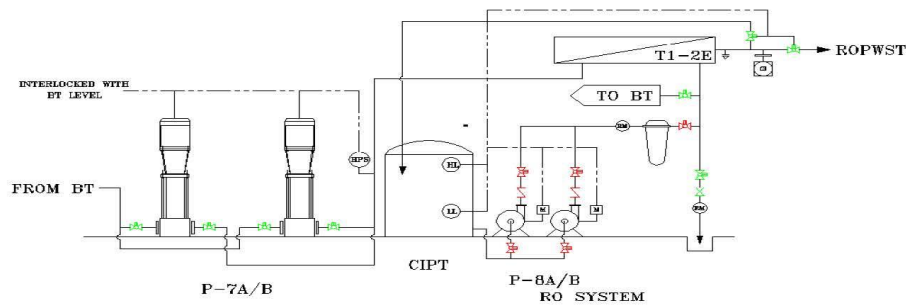
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5. Reverse Osmosis System

5.1 After pumped by the CT Make up Pump water will pass through the 5 μ and 1 μ Micron Cartridge Filter where particulates up to the 1 μ will be restricted, then water will be stored into the Buffer Tank. Before entering the Buffer Tank anti-scalant and acid will be dosed.



5.2 There after water will be pumped through the RO High pressure pump to the Reverse Osmosis module. RO Module will have two numbers of RO membrane by which we will get low TDS water. Reverse Osmosis Module has continuous permeate outlet and reject outlet. Permeate water from the permeate outlet will be stored into the Permeate water Storage Tank and certain quantity of reject from the reject outlet will be recirculated into the Buffer Tank and remaining quantity will be drained out.

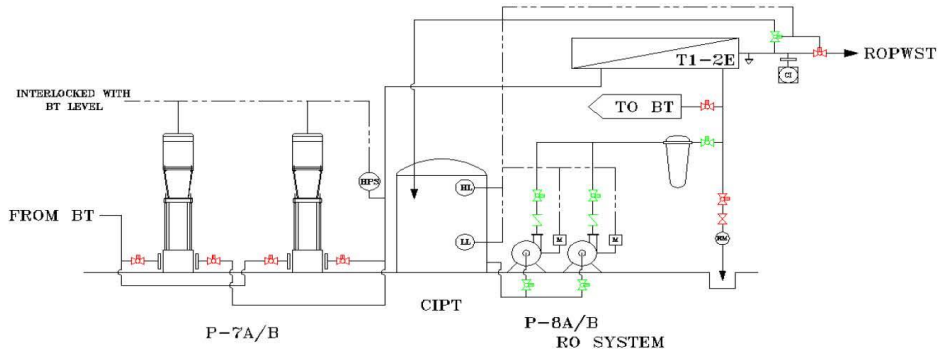


6. Cleaning of RO System

6.1 For the RO Cleaning purpose, cleaning solution will be prepared into the cleaning tank and solution will be fed by the RO High pressure Pump to the RO module through the RO reject line. Water will come out through the RO Permeate line again it will enter to the Cleaning Tank.

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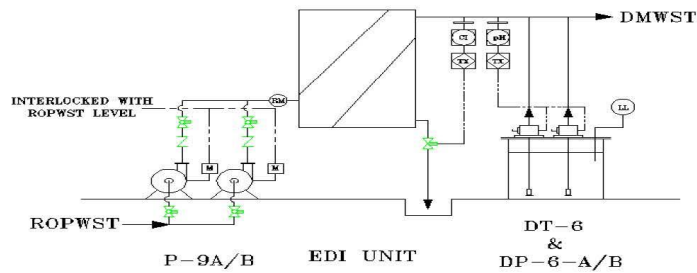
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Red marked valve will be closed and green marked valve will be open.

7. Electro De-Ionized Unit

7.1 After storing into the RO Permeate Water (Low TDS water), it will be pumped to the Electro De-Ionized Unit. EDI unit will remove the residual salts and aqueous species from water. EDI unit will also have two numbers of outlet permeate outlet and reject outlet. EDI Permeate Water will be stored into the Demineralized Water Storage Tank (DMWST).



8. DM Water Transfer

EDI Permeate Water or DM water will be stored into the two nos of DM Water Storage Tank (DMWST). DM water will be transferred by the DM Water Transfer Pump (P – 10 A/ B).

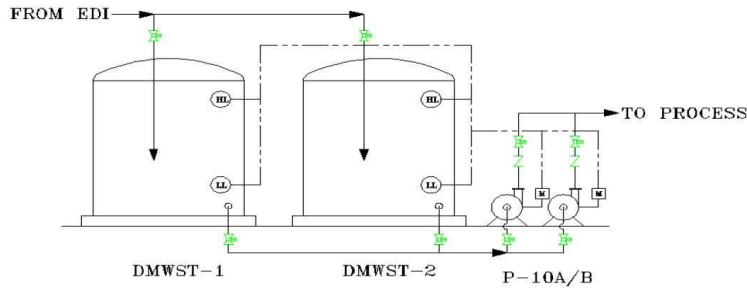
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**Instruments and Auto Valve List**

Location	Instruments and Valves	Qty (Nos.)
Raw Water Storage Tank	Level Switch (Low & High)	: 1
Raw Water Transfer Pump	Pressure Gauge	: 2
	Pneumatic Air Operated Butterfly Valve	: 4
	Non Return Valve	: 2
Cascade Aeration	By pass Rotameter	: 1
Flocculation Chamber	Agitator	: 1
Tube Settler	Motorized Get Valve (Size : 80 NB)	: 1
Clarified Water Storage Tank	Level Switch (Low & High)	: 1
Filter Feed Pump	Pressure Gauge	: 2
	Pneumatic Air Operated Butterfly Valve	: 4
	Non Return Valve	: 2
Dual Media Filter	Pressure Gauge (0 – 7 kg/ cm ²), 4" Dial	: 2
	Pneumatic Air Operated Butterfly Valve (Size : 80 NB)	: 5
	Pneumatic Air Operated Diaphragm Valve (Size : 40 NB)	: 1
Activated Carbon Filter	Pressure Gauge (0 – 7 kg/ cm ²), 4" Dial	: 2
	Pneumatic Air Operated Butterfly Valve (Size : 80 NB)	: 5
	Pneumatic Air Operated Diaphragm Valve (Size : 40 NB)	: 1

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Filtered Water Storage Tank	Level Switch (Low & High)	:	1
Softener Feed Pump	Pressure Gauge	:	2
	Pneumatic Air Operated Butterfly Valve	:	4
	Non Return Valve	:	2
	Pneumatic Ball Valve (direct Solenoid Valve)	:	1
Softener	Pneumatic Air Operated Butterfly Valve	:	7
	Pneumatic Air Operated Diaphragm Valve (Size : 40 NB)	:	1
	Pressure Gauge (0 – 7 kg/ cm ²), 4" Dial	:	2
Softened Water Storage Tank	Level Switch (Low & High)	:	1
CT Make UP Pump	Pressure Gauge	:	2
	Pneumatic Air Operated Butterfly Valve	:	4
	Non Return Valve	:	2
RO Plant Feed Pump	Pressure Gauge	:	2
	Pneumatic Ball Valve (Direct Solenoid Type)	:	4
	Non Return Valve	:	2
Micron Cartridge Filter (5 & 1 micron)	Pressure Gauge	:	2
Buffer Tank	Level Switch (Low & High)	:	1
RO High Pressure Pump	Pressure Gauge (0-20 kg/ cm ²) 2 1/2" Dial	:	2
	Pneumatic Ball Valve (Direct Solenoid Type)	:	4
	High Pressure Switch	:	2
RO System	Pneumatic Ball Valve (Direct Solenoid Type)	:	4
	Pressure Transmitter 4-20 mAmp	:	1
	Pneumatic Ball Valve 4-20 mAmp	:	1
	Glove Valve	:	1
	Online TDS Meter	:	1
RO Cleaning Pump	Pressure Gauge (0-7 kg/ cm ²) 2 1/2" Dial	:	2
	Pneumatic Ball Valve (Direct Solenoid Type)	:	4
	Non Return Valve	:	2

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RO Permeate Water Storage Tank	Level Switch (Low & High)	:	1
EDI Feed Pump	Pressure Gauge	:	2
	Pneumatic Ball Valve (Direct Solenoid Type)	:	4
	Non Return Valve	:	2
Outlet of EDI	Online Conductivity Meter	:	1
	Online pH meter	:	1
	Pneumatic Ball Valve (Direct Solenoid Type)	:	1
DM Water Storage Tank	Level Switch (Low & High)	:	1
	Pneumatic Ball Valve (Direct Solenoid Type)	:	4
DM Water Transfer Pump	Pressure Gauge	:	2
	Pneumatic Ball Valve (Direct Solenoid Type)	:	4
	Non Return Valve	:	2
	Online Rotameter	:	1

Technical details

For Water treatment plant

2.1 Flocculator

Quantity	:	1 no
Size	:	3500 mm X 3500 mm
Depth	:	3500 mm
Free Board	:	20%
MOC	:	MS 6 mm thick
Make	:	AWTPL
Motor Rating of agitator	:	0.75 kW

2.2 Tube Settler

Quantity	:	1 no
Size	:	3500 mm X 3500 mm

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Depth	:	3500 mm
Free Board	:	20%
MOC	:	MS 6 mm thick
Make	:	AWTPL

2.3 Hypochlorite Dosing System

Quantity	:	2 nos (1 working + 1 stand by)
Capacity	:	0 – 5 LPH
Pressure	:	40 mWC
MOC	:	PP
Make	:	Milton Roy
Pump Rating	:	100 Watt, Single Phase
Dosing Tank Capacity	:	100 Liters
Motor rating for Agitator	:	0.37 kW

Quantity	:	1 no
MOC of Tank	:	LLDPE
Make	:	Patton/ Sintex

2.4 Alum Dosing System

Quantity	:	2 nos (1 working + 1 stand by)
Capacity	:	0 – 5 LPH
Pressure	:	40 mWC
MOC	:	PP
Make	:	Milton Roy
Pump Rating	:	100 Watt, Single Phase
Dosing Tank Capacity	:	100 Liters
Motor rating for agitator	:	0.37 kW
Quantity	:	1 no

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MOC of Tank : LLDPE
Make : Patton/ Sintex

2.5 Polyelectrolite Dosing System

Quantity : 2 nos (1 working + 1 stand by)
Capacity : 0 – 10 LPH
Pressure : 40 mWC
MOC : PP
Make : Milton Roy
Pump Rating : 100 Watt, Single Phase
Dosing Tank Capacity : 100 Liters
Quantity : 1 no
MOC of Tank : LLDPE
Make : Patton/ Sintex

2.6 Filter Feed Pump

Quantity : 2 nos (1 working + 1 stand by)
Capacity : 30 m³/ h
Pressure : 20 mWC
MOC : Body – Cast Iron
Impeller – Cast Iron
Shaft – Steel
Make : KSB/ Wilo
Motor Rating : 4 kW

2.7 Dual Media Filter

Quantity : 1 no
Type : Down flow
Media : Sand, Anthracite & Supporting media

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Media Bed depth	:	1000 mm
Diameter	:	1300 mm
Height of Straight	:	1500 mm
Free Board	:	50 %
Material of construction	:	MS (IS: 2062 shell & dished end)
Thickness – Shell	:	6 mm
Thickness – Dished End	:	8 mm
Service Flow	:	26.20 m ³ / hr
Backwash Flow	:	Mentioned in reject water calculation.
Backwash Duration	:	(Page 14)
Work Pressure	:	3.5 kg/ cm ²
Type of Valves	:	Butterfly with pneumatic actuator type
MOC	:	AI – Body, SS 316 - Disc
Size of Valves	:	80 NB
Make of Valves	:	Kitz/ Aira
Make of Actuator	:	Rotex
Painting Specification	:	Outside – Sand Blasting, two coat epoxy based primer and two coat epoxy based finish paint Inside – Two coat Black Bitumin No 1
Frontal Pipe work	:	80 NB MS
Air release Pipe work	:	40 NB MS
Make	:	AWTPL

2.8 Activated Carbon Filter

Quantity	:	1 no
Type	:	Down flow
Media	:	Activated carbon & Supporting media
Media Bed depth	:	1000 mm
Diameter	:	1500 mm
Height of Straight	:	1500 mm

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Free Board	:	50 %
Material of construction	:	MS (IS: 2062 shell & dished end)
Thickness – Shell	:	6 mm
Thickness – Dished End	:	8 mm
Service Flow	:	26.20 m ³ / hr
Backwash Flow	:	Mentioned in reject water calculation.
Backwash Duration	:	(Page 14)
Work Pressure	:	3.5 kg/ cm ²
Type of Valves	:	Butterfly with pneumatic actuator type
MOC	:	AI – Body, SS 316 - Disc
Size of Valves	:	80 NB
Air release pipe work	:	40 NB
Make of Valves	:	Kitz/ Aira
Make of Actuator	:	Rotex
Painting Specification	:	Outside – Sand Blasting, two coat epoxy based primer and two coat epoxy based finish paint Inside – Two coat Black Bitumin No 1
Frontal Pipe work	:	80 NB MS
Air release Pipe work	:	40 NB MS
Make	:	AWTPL

2.9 Filtered Water Transfer Pump

Quantity	:	2 nos (1 working + 1 stand by)
Capacity	:	1 m ³ / h
Pressure	:	25 mWC
MOC	:	Body – Cast Iron Impeller – Cast Iron Shaft – Steel
Make	:	KBL/ Wilo
Motor Rating	:	4 kW

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2.10 Softener Feed Pump

Quantity	:	2 nos (1 working + 1 stand by)
Capacity	:	28 m ³ / h
Pressure	:	25 mWC
MOC	:	Body – Cast Iron Impeller – Cast Iron Shaft – Steel
Make	:	KSB/ Wilo
Motor Rating	:	4 kW

2.11 Softener

Quantity	:	1 no
Type	:	Down flow
Media Bed depth	:	850 mm
Diameter	:	900 mm
Height of Straight	:	1600 mm
Free Board	:	70 %
Material of construction	:	MS (IS: 2062 shell & dished end)
Thickness – Shell	:	6 mm
Thickness – Dished End	:	8 mm
Service Flow	:	25.13 m ³ / hr
Resin Volume	:	550 Liters
OBR	:	403 m ³
Work Pressure	:	3.5 kg/ cm ²
NaCl Required	:	88 kg
Regeneration Tank Volume	:	500 Liters
MOC of Tank	:	LLDPE
Make of Tank	:	Patton/ Sintex
Type of Valves	:	Butterfly with pneumatic actuator type

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MOC	:	AI – Body, SS 316 - Disc
Size of Valves	:	80 NB
Make of Valves	:	Kitz
Make of Actuator	:	Rotex
Frontal Pipe work	:	80 NB MS
Air release Pipe work	:	40 NB MS
Make	:	AWTPL

2.12 CT Make Up Pump

Quantity	:	2 nos (1 working + 1 stand by)
Capacity	:	25 m ³ / h
Pressure	:	25 mWC
MOC	:	Body – Cast Iron Impeller – Bronze Shaft – Steel
Make	:	KSB/ Wilo
Motor Rating	:	4 kW

2.13 RO Plant Feed Pump

Quantity	:	2 nos (1 working + 1 stand by)
Capacity	:	3 m ³ / h
Pressure	:	25 mWC
MOC	:	Body – Cast Iron Impeller – Bronze Shaft – Steel
Type	:	Monoblock
Make	:	KBL/ Wilo
Motor Rating	:	4 kW

2.14 Micron Cartridge Filter

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Quantity	:	2 set.
Flow	:	3 m ³ / hr
Specification of Cartridge filter	:	5 μ, 1 μ
Type of Cartridge	:	PP, Spun
No of Cartridge	:	2 Nos
MOC of Filter Housing	:	PP

2.15 Antiscalant Dosing Tank

Quantity	:	1 no
Capacity	:	100 Liters
Make	:	Patton/ Sintex

2.16 Antiscalant Dosing Pump

Quantity	:	2 nos (1 working + 1 stand by)
Flow	:	0 – 5.5 LPH
Pressure	:	0 – 6 kg/ cm ²
MOC	:	PP
Make	:	Milton Roy
Pump Rating	:	100 Watt, Single Phase

2.17 Acid Dosing Tank (optional)

Quantity	:	1 no
Capacity	:	100 Liters
Make	:	Patton/ Sintex

2.18 Acid Dosing Pump (optional)

Quantity	:	2 nos (1 working + 1 stand by)
Flow	:	0 – 5.5 LPH
Pressure	:	0 – 6 kg/ cm ²
MOC	:	PP

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Make : Milton Roy
Pump Rating : 100 Watt, Single Phase

2.19 Buffer Tank

Quantity : 1 no
Capacity : 1000 Liters
MOC : LLDPE
Make : Patton/ Sintex

2.20 High Pressure Pump

Quantity : 2 nos (1 working + 1 stand by)
Capacity : 5.7 m³/ hr
Pressure : 75 mWC
MOC : Casing – SS 304
Impeller – SS 316
Shaft – SS 316
Base – SS 304
Make : Grundfos
Motor Rating : 3.75 kW

2.21 RO Module/ RO Skid

Quantity : 1 no
Capacity : 1.7 m³/ hr
System Recovery : 50 %
MOC : MS
Make : AWTPL

2.22 RO Membranes

Quantity : 2 nos
Feed Flow : 3.5 m³/ hr

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Permeate Flow	:	1.7 m ³ / hr
Recovery	:	60 %
Size of Membrane	:	8040
MOC	:	Polyamide, Thin Film Composite
Make	:	Hydranautics/ GE Water

2.23 RO Pressure Tube

Quantity	:	1 nos
Array of RO Modules	:	2 : 1
MOC of Pressure Tubes	:	FRP
Make	:	Pentair
No of Membranes in each pressure tube	:	2 nos

2.24 Cleaning Pump

Quantity	:	2 nos (1 working + 1 stand by)
Capacity	:	8 m ³ / h
Pressure	:	25 mWC
MOC	:	Casing – SS 304 Impeller – SS 316 Shaft – SS 316 Base – SS 304
Type	:	Monoblock
Make	:	Grundfos
Motor Rating	:	2.2 kW

2.25 Cleaning Tank

Quantity	:	1 no
Capacity	:	100 Liters
MOC of Tank	:	LLDPE
Make	:	Patton/ Sintex

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2.26 EDI Feed Pump

Quantity	:	2 nos (1 working + 1 stand by)
Capacity	:	1.7 m ³ / hr
Pressure	:	25 mWC
MOC	:	Casing – SS 304 Impeller – SS 316 Shaft – SS 316 Base – SS 304
Type	:	Monoblock
Make	:	Grundfos
Motor Rating	:	1.5 kW

2.27 EDI Unit

Quantity	:	1 no
Feed Flow	:	1.58 m ³ / hr
Permeate Flow	:	1.5 m ³ / hr
Recovery	:	Up to 95%
Dimensions	:	30 cm X 61 cm X 48 cm
Voltage	:	0 – 300 VDC
Amperage	:	0 – 5.2 ADC
MOC	:	Body – SS 304, Base – CI
Make	:	GE Water

2.28 pH Correction Dosing Tank

Quantity	:	1 no
Capacity	:	100 Liters
Make	:	Patton/ Sintex

2.29 pH Correction Dosing Pump

Quantity	:	2 nos (1 working + 1 stand by)
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Telefax : +91-33-23379754



Flow	:	0 – 5.5 LPH
Pressure	:	0 – 6 kg/ cm ²
MOC	:	PP
Make	:	Milton Roy
Pump Rating	:	100 Watt, Single Phase

2.30 DM Water Transfer Pump

Quantity	:	2 nos (1 working + 1 stand by)
Capacity	:	3 m ³ / hr
Pressure	:	25 MWC
MOC	:	Casing – SS 304 Impeller – SS 316 Shaft – SS 316 Base – SS 304
Type	:	Monoblock
Make	:	Grundfos
Motor Rating	:	1.5 kW

4.1 List of Exclusions

- All civil works like leveling, foundation, building, drains, etc.
- Raw Water Storage Tank, Raw Water Transfer Pump (Head needed 15 mWC), Clarified Water Storage Tank, Filtered water Storage tank, Softened Water Storage Tank, RO Permeate Water Storage Tank Water Treatment Plant.
- Salt and chemical Storage area.
- Electrical lighting and earthing work.
- All piping etc. beyond the termination points.
- All consumables to commission and run the plant.

4.2 Termination Points

Mechanical and process Equipment and Pipe work	:	Scope mark in the P&ID attached shall be referred to. Wherever supply of water will be made for Client's use, the
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		terminal point shall be 1 meter from the common discharge header of supply pumps by Aquatherm.
Electrical	:	At the terminal box of all drive motors, at the integral starter of motorized valve and at the Terminal block of RO PLC based starter cum control Panel
C & I		At the local field Junction Box /Boxes
		For EDI and RO PLC panel at RS 485 port
		Instrument air from one corner of WTP house where Purchaser will provide Instrument air supply
Drain		Upto guard pond and / or nearest drain train as per final piping layout by Aquatherm
Civil		At the base plate on foundation by Purchaser
Structural		At the connection of secondary structures of pie support to the primary main structure to be provided by the Purchaser

APPENDIX XXIII STAKEHOLDERS MEETING ATTENDEES LISTS

Fujita + MAPCO

Myaung Mya FM Biomass Power CO., Ltd. မှ စရောင်းတိုင်း၊ အေးကြီး၊ မြောင်းမြခရိုင်၊ မြောင်းမြမြို့နယ်၊ ဝန်းချောင်းကျေးရွာ အမှတ် (၂၂) မှုဆိုးကွင်းတွင် အကောင်အထည်ဖော် စီမံကိန်း လျှင်စက်ရင်းနှီးမြှုပ်နှံရေးစီမံကိန်းနှင့် ပတ်သက်၍ ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ် (Environmental Management Plan -EMP) ဆိုင်ရာတိရစ္ဆာန်များနှင့် စစ်လျဉ်း၍အများပြည်သူသဘောထားရယူခြင်း အစမ်းအနား (Public Consultation) သို့ တက်ရောက်လာသူများစာရင်း

ဌာနဆိုင်ရာအဖွဲ့အစည်းများ Company ရက်စွဲ- ၂၀၁၇ ခုနှစ်၊ အောက်တိုဘာလ () ရက်

စဉ်	အမည်	ရာထူး	ဌာနအမည်	စုန်းနံပါတ်	လက်မှတ်
၁	SAT AKA HATSUSHI KA	Deputy General Manager	International	0208313-8846	和久 哲夫
၂	Akin Ogasu	Chief Manager	Yangoon Branch	0259524903	小川 晃夫
၃	Shoichi Inoue	General Manager	Yangoon Branch	08-745-072-099	井上 将一
၄	Atsaki Uchiyama	Town Manager	International		内山 亜博
၅	A Sre Thea	GM	MAPCO	0949742931	
၆	စောကျော်	ဥက္ကဋ္ဌ	MAPCO	09-857122334	
၇	အောင်ကျော်	Supervisor	MAPCO Field Office	09-85027838	
၈	Myint Tunng Tun	Sale (F.M)	MAPCO	09-850853412	
၉	Mr. Mr. Hlwe	Sale (F.M)	MAPCO	09-701661857	
၁၀	Teein Teein Win	Sale (F.M)	MAPCO	09-852396004	
၁၁	Kyi Kyi Aye	Sale (F.M)	MAPCO	09-46607726	
၁၂	အောင်ကျော်		MAPCO	09-250122274	
၁၃	အောင်ကျော်		MAPCO	09-252731606	

Myaung Mya FM Biomass Power CO., Ltd. မှ စရောင်းတိုင်း၊ အေးကြီး၊ မြောင်းမြခရိုင်၊ မြောင်းမြမြို့နယ်၊ ဝန်းချောင်းကျေးရွာ အမှတ် (၂၂) မှုဆိုးကွင်းတွင် အကောင်အထည်ဖော် စီမံကိန်း လျှင်စက်ရင်းနှီးမြှုပ်နှံရေးစီမံကိန်းနှင့် ပတ်သက်၍ ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ် (Environmental Management Plan -EMP) ဆိုင်ရာတိရစ္ဆာန်များနှင့် စစ်လျဉ်း၍အများပြည်သူသဘောထားရယူခြင်း အစမ်းအနား (Public Consultation) သို့ တက်ရောက်လာသူများစာရင်း

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စဉ်	အမည်	ရာထူး	ဌာနအမည်	စုန်းနံပါတ်	လက်မှတ်
၁၅	Mying ee		MAPCO	09-25796904	
၁၆	အောင်ကျော်		MAPCO	09-25796904	
၁၇	အောင်ကျော်		MAPCO	09-25079316	

Myaung Mya FM Biomass Power CO., Ltd. မှ စတင်တည်ထောင်မည့် အသံကြား၊ မြောင်းမြစ်ရေ၊ မြောင်းမြစ်မြို့နယ်၊ ဝန်းချောင်းကျေးရွာ အနီးတွင် (၂၂) မုဆိုးကွင်းတွင် အကောင်အထည်ဖော် စီမံကိန်း လျှင်စစ်စိတ်အားထုတ်လုပ်ရေးစီမံကိန်းနှင့် ပတ်သက်၍ ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ် (Environmental Management Plan -EMP) ဆိုင်ရာတိရစ္ဆာန်များနှင့် စစ်လျဉ်း၍အများပြည်သူသဘောထားရယူခြင်း အခမ်းအနား (Public Consultation) သို့ တက်ရောက်လာသူများစာရင်း

အစိုးရမဟုတ်သောအဖွဲ့အစည်းများ နှင့် ကုမ္ပဏီများ (NGOs) ရက်စွဲ- ၂၀၁၇ ခုနှစ်၊ အောက်တိုဘာလ () ရက်

စဉ်	အမည်	ရာထူး	အဖွဲ့အစည်းအမည်	ဖုန်းနံပါတ်	လက်မှတ်
၁	Thandar Myo	MAPCO Marketing	MAPCO	၀၉-၄၅၅၂၁၂၄၀၀	
၂	Tin Tin Htay	MAPCO Marketing	MAPCO	၀၉-၂၅၀၃၁၃၀၀၉	
၃	Khin Thun Thun	MAPCO	MAPCO	၀၉-၀၅၂၆၅၅၅၅၅	
၄	Kyi Htwe	"	"	၀၉-၂၆၄၈၄၈၅၈၅	
၅	Hsiao Hsiao	MAPCO	"	၀၉-၃၆၇၇၃၀၃၃၀	
၆	Zaw Lin Htut	MAPCO Officer	MAPCO	၀၉-၇၅၁၅၅၁၅၅၅	
၇	Moe Kyan	MAPCO Sale Man	"	၀၉-၃၁၃၇၇၇၇၅	
၈	Khin Mye San	MAPCO	"	၀၉-၇၅၇၆၅၅၅၅၅	
၉	Khin Hsiao Hsiao		NGO	၀၉-၄၇၀၁၆၀၇၆၀	
၁၀	Ei Ei Soe		"	၀၉-၇၇၆၀၇၈၂၁	

Myaung Mya FM Biomass Power CO., Ltd. မှ စတင်တည်ထောင်မည့် အသံကြား၊ မြောင်းမြစ်ရေ၊ မြောင်းမြစ်မြို့နယ်၊ ဝန်းချောင်းကျေးရွာ အနီးတွင် (၂၂) မုဆိုးကွင်းတွင် အကောင်အထည်ဖော် စီမံကိန်း လျှင်စစ်စိတ်အားထုတ်လုပ်ရေးစီမံကိန်းနှင့် ပတ်သက်၍ ပတ်ဝန်းကျင်ဆိုင်ရာစီမံခန့်ခွဲမှုအစီအစဉ် (Environmental Management Plan -EMP) ဆိုင်ရာတိရစ္ဆာန်များနှင့် စစ်လျဉ်း၍အများပြည်သူသဘောထားရယူခြင်း အခမ်းအနား (Public Consultation) သို့ တက်ရောက်လာသူများစာရင်း

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စဉ်	အမည်	ရာထူး	အဖွဲ့အစည်းအမည်	ဖုန်းနံပါတ်	လက်မှတ်
၁	Man Sian Hau	MAPCO	MAPCO	၀၉-၇၆၁၃၁၈၃၅၅	
၂	H KVIN SWE	MAPCO (PD)	MAPCO	၀၉-၄၃၁၃၂၅၅၅	
၃	U Ye Thun	MAPCO COGM	MAPCO	၀၉-၄၅၅၅၀၆၅၅၅	
၄	U Win Shwe	MAPCO AGM	"	၀၉-၄၅၅၅၀၆၅၅၅	
၅	U Zar A Mye Htay	MAPCO CEO	"	၀၉-၃၅၆၅၇၁၅၅	
၆	Uaw Latt Latt Kywe	"	"	၀၉-၂၅၀၂၅၀၂၅၀	
၇	Uaw Nu Nu Htwe	"	"	၀၉-၂၅၂၇၆၅၅၅	
၈	Uaw Shwe Zar Oo	"	"	၀၉-၄၅၅၅၃၅၀၇၅	
၉	Uaw Htay Hla	"	"	၀၉-၄၅၅၅၁၆၅၅၅	

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